

## **DETERMINANTS OF OFFER RETRIEVING PERFORMANCE ON A VIRTUAL STORE**

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### **ABSTRACT**

This paper investigates the determinants of offer retrieving performance on a virtual store. Drawing on research on online consumer behaviour and information retrieving on the Web, we conducted a 2x2x2 experiment with 180 participants. Our results show that the offer retrieving performance depends on individual characteristics (Internet experience, cognitive absorption) and on interactions between, the type of strategy used, the nature of the task, and site design.

### **1. INTRODUCTION**

When consumers visit Internet shops intending to make a purchase, many of them don't complete the transaction and abandon their intention prematurely (Cho, 2004). Ranganathan and Grandon (2005) cite that 43% of attempted online purchases fail because the consumer had trouble finding the product on the Web site. Indeed, problems connected to navigation and offer identification within a site seem to be an important obstacle for online purchasing (Markellou and al., 2005; Kalczynski et al., 2006).

In this perspective and aiming at a better understanding of problems related to online offer retrieving, the present study investigates factors affecting offer retrieving performance on a commercial Web site. Adopting the point of view of previous researches on information retrieving on the Web, we consider that offer retrieving performance depend on situational, individual and site characteristics, and interactions between some of these elements (Moles and Rohmer, 1977; Chebat et al. 2005; Ingwersen, 1996; Nielsen, 1993; Schaik and Ling 2006). In this study, the potential effects on offer retrieving performance are presented and experimentally tested. To achieve this, we begin by introducing the concepts of offer retrieving and offer retrieving performance. We then present and test our conceptual framework. We conclude with a discussion of the theoretical and managerial implications of our findings.

### **2. OFFER RETRIEVING PERFORMANCE**

The concept of product or offer retrieving was first introduced by Moles and Rohmer (1977) in the brick and mortar context. According to Moles and Rohmer (1977), offer retrieval involves the consumer identifying the space-time point where the product is available; by recognising (identifying) and selecting a commercial interface susceptible to distribute the product and decoding the specific product category organization proposed by the commercial interface. Failure in the identification of the category within the global assortment proposed by the store or orientation problems within the store can lead the consumer to abort the purchase process (Chebat et al. 2005).

Despite the fact that on the Web the consumer is freed from time and space constraints, he will not be able to find what he looks for if he does not understand the system of classification proposed by the site (Ingwersen, 1996). A less usable site is susceptible to inhibit the achievement of the most important information and thus making the offer retrieving more complex (Nielsen, 1993). With this perspective, usability researchers address their interest in studying information retrieving performance on the Internet. In this article by offer retrieving performance we mean the extent the individual retrieves, from the site, the information necessary for product purchase decisions, which includes, but not limited to, the product description, price, image, payment type, delivery methods, etc....

Building on usability research (Turetken and Sharda, 2001; Ondrusek, 2004; Topi and al., 2005; Schaik and Ling 2006) this specific paper uses three variables to measure offer retrieving performance on a commercial Web site: effectiveness, efficiency and time. In the following sections the determinants of offer retrieving performance are discussed and the development of our research model and hypotheses.

### **3. HYPOTHESES AND MODEL DEVELOPMENT**

Generally, Internet and hypertext literature presents three categories of variables that have the potential to affect offer retrieving performance: (1) situational characteristics, (2) user characteristics and (3) site design,, (Chen and Rada, 1996).

#### *3.1 Situational Characteristics*

Key results of studies that examined online shopping behaviour show that situational factors have significant influence on online purchasing success (e.g., Gehrt and Yan, 2004). Consumer situations are all those factors that are specific to a certain time and place of observation, and can change consumer decisions once they are inside the store (Rads and Anic, 2007). Some key situational factor shown to impact online shopping behaviour is the interaction between behavioural strategy and task nature (Nielsen, 1997; Hsieh-Yee, 2001). Nielsen's (1997) works distinguish between three strategies: search-dominant strategy, link-dominant strategy and mixed strategy. Consumer using a search-dominant strategy goes straight for the search button when he enters a website, and all his site behaviour is dominated by search engine use. In contrast, the link-dominant strategy adopters use quasi-exclusively the hyperlinks around the site.

Kim and Allen (2002) specify that search efficiency is affected by the type of strategy used. This impact is strongly dependent on how well the adopted strategy fits with the specific task. In fact, the nature of the task is one of the major factors affecting both search performance on a commercial Web site (Hsieh-Yee, 2001). Marchionini (1989) classifies tasks as closed or opened. Closed tasks possess specific purposes, whereas opened tasks have more general purposes. Consequently, we propose:

H1: The type of adopted strategy affects the offer retrieving performance

H2: The impact of adopted strategy on offer retrieving performance is moderated by task nature.

#### *3.2 Individual Characteristics*

Scholars in psychology and sociology, and recently, have demonstrated an individual's characteristics are regarded as a major source affecting the formation of this individual's shopping behaviour. Consumer traits that are of interest in understanding why consumers shop on the Internet include demographic factors and personality characteristics. Khan and Locatis (1998) examine the search performance of novices and experts and find that experts exhibited better ability in prioritizing search tasks. Hsieh-Yee (1993) concludes that in online search, search experience affects positively search performance. This suggests the following hypothesis:

H3. Internet experience affect positively offer retrieving performance on a commercial Web site

Other researches suggest that another type of knowledge is necessary to improve retrieving performance: domain knowledge and familiarity (Holscher and Strube, 2000). In an offer retrieving context, domain knowledge and familiarity can be assimilated to product category knowledge and familiarity. Considering previous research findings, our next hypothesis states that:

H.4 Product category familiarity has a positive impact on offer retrieving performance.

Recently researchers have realized the importance of affect in understanding customers' evaluation of e-commerce websites and subsequent behaviours. For example, Agarwal and Karahanna (2000) note that cognitive absorption is an important variable affecting both online consumer behaviour and information retrieving performance. Cognitive absorption can affects online consumer behaviour through its five dimensions of temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity (Agarwal and Karahanna, 2000). The intrinsically motivating state of cognitive absorption will lower the perceived cognitive burden associated with the task: the individual experiencing pleasure will expend more effort on it. (Shang and al. 2005). This can improve the offer retrieving effectiveness on a commercial Web site. In addition, cognitive absorption can affect positively the time duration of task execution through amplified curiosity and temporal dissociation dimensions. Thus we propose that:

H.5.a Cognitive absorption has a positive impact on offer retrieving effectiveness.

H.5.b Cognitive absorption has a positive impact on offer retrieving time duration.

### 3.3 Website Characteristics

Similar to situational and individual characteristics, some site design elements are found to have important impacts on information and offer retrieving (Topi et al., 2005). Building on site atmospherics works (Eroglu and al., 2003; Richard, 2005) and on site complexity researches findings (Gupta and al., 2005, Bruner and Kumar, 2000, Geissler and al., 2001), two design factors are considered in the present study: level of links abstraction and use of animation. We present, in what follows, their potential impact.

Bensadoun-Medioni and Gonzalez (1999) developed the “label abstraction” concept. They approached the notion of labels (hyperlinks) degree of abstraction according to two levels: “the abstract or generic labels” and “the concrete or content oriented labels”. The generic labels describe, in an abstract way, the contents of the pages to which they give access.

Likewise, Tung and al., (2003) results prove that navigation tolls impact user lostness, his capacity to retrieve information and search efficiency. Khan and Locatis (1998) results indicate that the correspondence between the terminology in search tasks and links increased the search efficiency. According to these results, we propose that:

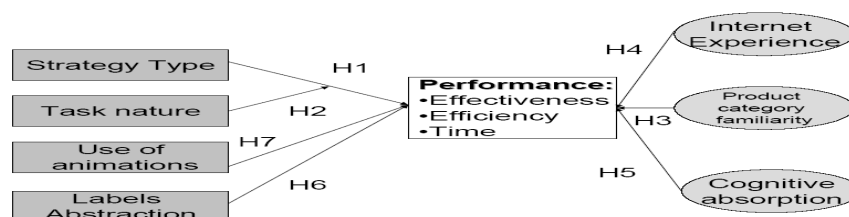
H.6.a Level of hyperlink abstraction has a negative impact on offer retrieving effectiveness.

H.6.b Level of hyperlink abstraction has a negative impact on offer retrieving efficiency.

Another Web design element that may affect offer retrieving is the use of animation. Zhang (1999) find that, when the task was difficult, animation had a negative effect on user performance. Lowe (2003) proves that the inclusion of animation distracts the user from important details or stable information which can negatively affect offer retrieving performance. Thus we propose that:

H7: Use of animation impacts negatively the offer retrieving performance.

Thus, based on the literature leading to the development of our study hypotheses and performance measure choice, our research model can be presented as follows (see figure 1):



**Figure 1: Determinants of offer retrieving performance on a commercial Web site research model**

## 4. EXPERIMENTAL DESIGN

A laboratory 2x2x2 experiment was conducted to test the proposed hypotheses. Three independent variables were experimentally manipulated: nature of the task (closed tasks versus opened tasks), use of animation (use of animation versus no use of animation) and level of labels abstraction (high abstraction level versus low abstraction level). Two different task presentations and four sites were developed to test the effect of controlled variables. 180 participants were randomly assigned to one of the task presentations and one of the four sites. (see figure 2). (the low label abstraction level was operationalized by presentation of links followed by indications about the category content)

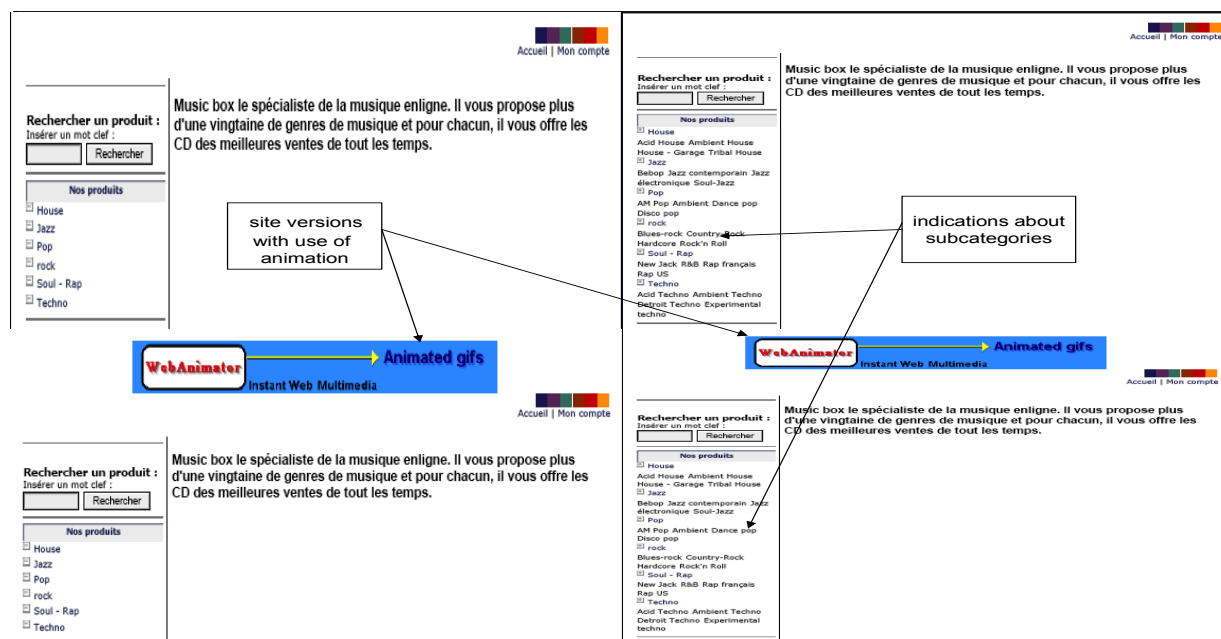


Figure 2: experimental Web site versions

## 5. MEASUREMENTS

The independent variables, Internet expertise, product category familiarity and cognitive absorption, were measured using a combination of existing scales from an I.S./Marketing literature. Log files were used to measure strategy type and all of our dependent variables (time, effectiveness, efficiency).

Concerning the strategy type used, three kinds of information were taken into account: the total number of clicks, the number of search engine uses and the number of clicks on category links. According to previous works, a distinction is made between two kinds of strategies: “search dominant strategy” and “link dominant strategy”. Using log files we compared two ratios:

$R1 = \text{Total number of uses of the search engine} / \text{Total number of clicks}$ ,  
and  $R2 = \text{Number of clicks on category links} / \text{Total number of clicks}$

In fact, when  $R2 = 0$  or  $R1 > R2$ ; we considered that the consumer uses a search dominant strategy, Whereas a link dominant strategy was used when  $R1 = 0$  or  $R2 > R1$ ;

Time was measured by the duration of time a participant spent to perform the simulation tasks of the experiment (the difference between the site access time and end of the session for each participant).

We measured effectiveness by the number of successful tasks carried out by each participant in our experiment. Efficiency was measured by the ratio “Level of achievement of the tasks / total effort”. Using log files, the level of achievement of the tasks is measured by the number of (exact) products retrieved (or chosen) while effort is measured by the total number of clicks.

## 6. RESULTS

Our hypotheses were tested by General Linear Model (GLM) MANCOVA analysis. Task nature, label abstraction, use of animation and strategy type are integrated in the equation as factors. Product category familiarity, Internet experience and absorption were integrated as covariables. Time, effectiveness and efficiency were our dependent variables. We also tested the interaction effect between factors. The MANCOVA results are summarized in table 1.

Variables	Wilk's Lambda	F	Sig.
Internet experience	.919	3.679	0.014**
Absorption	.942	2.572	0.057*
Product category familiarity	.985	0.621	0.603
Labels abstraction	.963	2.858	0.040**
Strategy	.926	3.375	0.021**
Use of animation	.919	3.708	0.013**
Tasks nature	.968	1.387	0.250
Strategy x Tasks	.702	17.853	0.000**

\*<0.1; \*\*<0.05

Table 1. MANCOVA results

Table 1 indicates that product familiarity effect is insignificant, thus we reject hypothesis H4. It also indicates significant effects of “level of label abstraction”, “strategy type” and “strategy x tasks” interaction. On the hand, hypotheses H1 and H2 are confirmed. MANCOVA results allow us to show the effects of variables on *overall retrieving performance*, thus we use ANCOVA’s results to see the impact of independent variables on each of the performance measure indicators (see table 2)

Variables	Time	Effectiveness	Efficiency
Internet experience	NS	F=6.620; p=0.011**; B=.279	NS
Absorption	F=5.819; p=0.017**; B=1.406	NS	NS
Strategy type	NS	NS	F=5.838; p=0.017**
Use of animation	F=6.464; p=0.012**	NS	NS
Labels abstraction	F=6.766; p=0.010**	NS	NS
Strategy x task	F=20.044; p=0.000**	F=14.013; p=0.000**	F=40.234; p=0.000**
Strategy x labels	F=7.617; p=0.007**	NS	NS
Task x labels	F=4.726; p=0.032**	NS	NS
Animation x labels	F=9.037; p=0.003**	F=2.874; p=0.092*	F=4.356; p=0.039**

\*<0.1; \*\*<0.05

**Table 2. ANCOVA results**

ANCOVA’s results indicate that “absorption” has a positive effect on time and no effect on effectiveness and efficiency. Therefore we can conclude that absorption has a negative impact on offer retrieving performance (more time duration indicates less performance). Hypothesis H5.a is rejected and hypothesis H5.b is accepted.

MANCOVA indicates that internet experience has a significant impact on overall performance and ANCOVA’s results show that internet experience has a positive impact on effectiveness. Thus H3 is confirmed

ANCOVA’s results show also that the impact of the use of a specific strategy on time, effectiveness and efficiency depend on whether the person is carrying out an opened task or a closed one. In the case of closed task, use of links dominant strategy has a negative impact on all three performance measures and use of a search dominant strategy has a positive impact on these three dependent variables. It has an opposite effect when the person is performing an opened task (for more details about the test and interpretation of interaction effects contact the first author).

Results also indicate that there is an interaction effect between use of animation and label abstraction level. They show that use of animation has a negative impact on offer retrieving performance indicators only when it is associated with the presence of indications about subcategories. So H7 is rejected

Another important result is that the presence of indications about subcategories has a negative impact on time only when a closed task is performed or when the participant uses a search dominant strategy. So H6.a and H6.b are rejected.

## 7. DISCUSSION

The main purpose of our research is to identify the determinants of offer retrieving performance on a commercial Web site. GLM results concerning the effect of “Internet experience” and “absorption” indicate that offer retrieving performance depend on individual characteristics. In fact, we found that Internet experience has a positive impact on the capacity of the consumer to retrieve the desired product (effectiveness). This finding is in accordance with those of Hsieh-Yee (1993) presented in section 2. In addition we found no effect of product category familiarity on offer retrieving performance, what indicate that in online product retrieving process Internet knowledge is more important than product category knowledge. Concerning the absorption effect our results indicate that absorption leads to more time duration on the task accomplishment. This can be explained by the fact that individual experiencing temporal dissociation, lose track of time perceives herself as possessing ample time to complete a task (Agarwal and Karahanna, 2000)

GLM shows also that the type of strategy effect on performance is task dependent. It indicates that the use of “search dominant strategy” gives better results (less time, better effectiveness and better efficiency) than “link dominant” one in the case of closed task. It also shows that use of “link dominant strategy” better fits an opened task. These results confirm, in a site commercial context those of Tung et al. (2003) and Kim and Allen (2002) presented in section 2.

In addition, ANCOVA shows that association of animation with presence of indication about subcategories has a negative impact on offer retrieving performance. In fact, the association of animation use with the presence of

indications about subcategories lead to increase structural complexity, defined as the number of distinct information cues that must be perceived and processed (Berlyne, 1960).

This point of view is supported the fact that presence of indication about subcategories lead to more time task duration only when it is irrelevant to task accomplishment (a closed task is performed or a search dominant strategy is used). In fact a web page increases in complexity when it contains anything beyond the "essentials" (Geissler and al. 2001).

## 8. CONCLUDING COMMENTS

Our main goal was to examine product retrieving performance determinants on a commercial Web site. The results of our 2x2x2 online experimentation indicate that individual characteristics affect offer retrieving performance and that interaction between individual behaviour and site design can improve or worsen this performance.

Our findings, confirm the idea that "Complexity is the biggest inhibitor of product (site) success" (Vredenburg and al., 2002), by showing that the most complex site version (association of use of animation and additional text) leads to the worst retrieving performance.

Moreover, our results show that interaction between the type of strategy used and the nature of the task performed is the most important determinant of offer retrieving performance. They indicate that the type of strategy effect on performance is task dependent; demonstrating clearly that the use of "search dominant strategy" better fits a closed task and that use of "link dominant strategy" better fits an opened task. Another important result is that the presence of indications about subcategories has a negative impact on time only when a closed task is performed or when the participant uses a search dominant strategy.

These findings are in perfect harmony with those of Farris (2003) regarding "use-centered design". Traditional user-centered design approach focuses on the user and the user's goals in order to design a system. Use-centered design does not focus on the user or the goal as separate entities, but rather on the relationships between these entities so that the user, site design, and goal can be integrated in order to complete a task (Flach and Dominguez, 1995; Farris 2003). The current study found evidence in support of the use-centered design approach. Specifically, it was demonstrated that it is important to understand the relationship between the user, the site design, and the task.

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