INTERACTION ARCHETYPES OF INFORMATION SEARCHES DURING ONLINE SHOPPING

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Abstract: To inform the design space of electronic commerce stores, increase the sales opportunities and convert browsers to buyers, it is imperative to understand consumers' online shopping tasks. This study postulates that consumers' shopping tasks, particularly those involving information seeking and decision making, can be classified and aggregated into a few interaction archetypes, which would require specific technical support from EC stores. Reviewing the literature, this study proposes the context-aware shopping interaction archetypes (CASIA) conceptual framework, which helps classifying shopping tasks with the characteristics of the context: customers, tasks, and products. A CASIA would differ from other CASIAs in terms of cognitive efforts, behaviors, and problems encountered in carrying out the tasks. The study proposes a naturalistic case-study methodology to validate the CASIA framework.

INTRODUCTION

Electronic commerce (EC) has continuously grown at a rapid pace, despite the dot com burst and economic slow-down in early 2000. It is estimated that online retail value will grow from 56 billions in 2003 to 139 billions in 2008 (emarketer.com, 2005). However, potential revenues of EC have yet to be fully realized. Many customers still are not satisfied with the supports they receive in their EC shopping experience. A research report released by Foreseeresult.com (2005) found that traditional retailers generally have dramatically under-utilized the opportunities to increase their sales both online and offline, and that how satisfied EC consumers over all aspects of their online experience is directly correlated to the likelihood to buy, return, and recommend. It can be inferred from the findings that if a consumer has a great experience of interactions with an e-retailer, he/she would be more inclined to purchase and return.

Can it be possible that the consumers' interactions with e-retailers during the processes of information searches and decision making can be classified and aggregated into a few key insightful archetypes for the design space of the technology in order to enhance consumers' online shopping experience? If the answer is yes, what would help characterize and thus differentiate these interaction archetypes? These are the research questions that motivate this study.

After the review of the literature which comes in the next section, this research postulates that the elements of the tasks, customers and products could help classify the shopping interaction archetypes. Tasks are manifestation of a variety of consumers' interactions with EC retailers. Excluding the *customers* in characterizing the tasks, the EC environment would not help design and provide personalization services tailored to the enhancement of an online shopping experience. Excluding the *products* in characterizing the tasks, the EC environment would not be able to customize the supports for different types of products. For example, Spiekermann (2004) found that consumer uncertainty and purchase risk could drive different navigational needs, while purchase risks are associated with product types.

A comprehensive conceptual framework in detailing the task elements with customers and products will provide a more *context-aware* EC environment that enhances consumer shopping interactions. Lieberman and Selker (2000) defines context as "all that affects the computation except the explicit inputs and outputs." In the case of EC sites, the context could cover the following, states of the user (e.g., according to the involvement of the consumer), the level of risk perception, the level of expertise about a product category, states of the products (e.g., according to product value, product complexity), states of the computational environment (e.g., interaction according to the user knowledge about the EC sites and the protocols, levels of content hierarchy, etc.), history of user-computer-environment, interaction history of user purchased products.

This research set its objective in developing a comprehensive conceptual framework that would help explore and identify the interaction archetypes of online shopping. An interaction archetype of online shopping is defined as a series of human-EC store interactions for information seeking and decision making (1) that share *similar combinations or interplays* of characteristics of task, product, and customer, (2) that differ from other series of human-EC stores interactions in terms of cognitive efforts, behaviors, and problems encountered, and (3) that require similar kinds of system support to enhance the effectiveness and efficiency of the

interactions. The answers to the research questions will help design a better EC store and thus have positive impacts in EC consumers' overall shopping experience. The answered research questions would also generate research propositions for further intellectual inquires to contribute to theoretical advancement.

LITERATURE REVIEW

Utilization focus research

Utilization focus research that uses user attitudes and beliefs to predict the utilization of information systems, such as Technology Acceptance Models (TAM) (David, 1989), has been one of the most dominant theoretical models in studying consumer acceptance of EC. Goodhue and Thompson (1995) criticized that utilization focus research often lacks explicit recognition that more utilization of a system will not necessarily lead to higher performance. The variations of the TAM models in the EC context have incorporated dependent variables, such as unplanned purchase and intention to return (Koufaris, 2002; Koufaris, Kambil, and LaBarbera, 2001; Loiacono, Watson and Goodhue, 2007), purchase intention (Zhang and Prybutok, 2003). While these variables may imply the performance of the e-retailers, they often could not directly help recommend guidelines for the design space of EC shopping interactions.

For example, Loiacono, Watson and Goodhue (2007) developed WebQual, an instrument for consumer evaluation of Web sites, and showed the relative importance of the antecedents to perceived usefulness, perceived ease of use, entertainment, the three factors along with trust and response time, leading to the reuse intention toward the web sites. While very useful in the general sense for evaluation of Web sites, many of the measurements in WebQual can expose the shortcomings of the web sites (e.g., lack of trust, failure to provide tailored information), but can not help suggest solutions or design specific technology features to overcome the shortcomings (e.g., how to increase the level of trust, what kind of information to tailor for what types of customers, etc).

Context-aware consumer behavior studies

One of the missing links in the utilization focus research is the omission of the context, specifically, types of tasks, technologies, consumers, and products.

The task-technology fit theory (Goodhue and Thompson, 1995 and Goodhue, 1998) asserted that for an information technology to have a positive impact on individual performance, the technology must be utilized and has a good fit with the task it supports, where the "fit" is determined by the characteristics of both technology and tasks and the "fit" will ultimately affect utilization of the technology and thus generate impacts on performance. Lynch and Ariely (1999) found that the design of online stores could alter information search costs. Pereira (2000) observed that the types of recommendation support the customers receive would affect how they perceive satisfaction, confidence, trust, purchase, saving, and efforts. The "right" technology that fits the tasks would enhance consumers' shopping interactions.

A school of EC studies has been devoted to enhancing the design space of the technologies. For example, the effects of information presentation formats have been studied in terms of consumers product understanding (Jiang and Benbasat, 2007), shopping performance (e.g., information search time and recall of products) (Hong, Thong, and Tam, 2004), and choices of cognitive stopping rules (Browne, Pitts, and Wetherbe, 2007) with tasks (i.e., complexity, types) as a moderator.

Characteristics of consumers (e.g., product expertise) and products (e.g., types) have also been found to be moderator variables between the types of recommendation agents and affective reactions (e.g., trust. satisfaction) (Komiak and Benbasat 2006; Pereira 2000). Brucks (1985) found that consumer product class knowledge could facilitate the information acquisition and increase search sufficiency. Aggarwal and Vaidyanathan (2003) found that recommendation agents are perceived as more effective for *search goods* than for *experience goods (product types).* Consumers were more likely to follow recommendation agents' recommendations for experience products than for search products (i.e., product type as a moderator) (Senecal and Nantel 2004).

The fact that types of tasks, products, and consumers often are found as a moderator between technology use and task-outcome variables suggests that design of EC stores must consider the differences in the customers targeted, the products offered, and the tasks performed by the consumers.

A phenomenological perspective

From a phenomenological perspective, Schutz and Luckmann (1973) asserted that many experiences we have had are connected to each other conceptually and chronically. While our knowledge continues to build upon what we have known by assimilating the new knowledge and integrating it with the old, our past experience and our prior knowledge will affect how we perceive and deal with *new* situations currently and in the future. The "new" situations we encounter could be an extension or a replication with various degrees

of variance, or an inspiration, of our prior situations. Applying such a philosophy to the EC domain, shopping for the same product at different times can be a "replication" of the experience (e.g., repeating customers who enjoy the products). Furthermore, shopping for the different products can also be related; for example, a consumer buys a series of CDs of his/ her favorite singers or a consumer buys milk and cereal at the same time as the two products supplement each other for breakfast. The phenomenological perspective explains well the relationships among different shopping tasks and thus puts an emphasis in the recognition and support of *successive* shopping tasks and could help identify the opportunities for cross sales or up sales or bundling sales.

The Internet marketing practice actually corresponds with the phenomenological perspective. Rozanski, et. al. (2001) reported that an exclusive study by the Digital Customer Project and Nielsen / NetRatings finds that Internet market segmentation must take into account the wide behavioral variations exhibited by the same consumers during different sessions on the Net.

PROPOSED CONCEPTUAL FRAMEWORK

The literature review reveals the need to develop a conceptual framework that would fulfill the following premises. First, it should it should inform the design space of EC stores in order to provide a more satisfying *contexts-aware* online shopping experience. Second, informing the design space can be materialized by defining the contexts by characteristics of tasks, customers, and products and by explaining how consumers would behave and need different supports from EC stores in these contexts. Third, the contexts should also recognize the inter-associations of consumers' shopping tasks to get a more complete view of consumers' needs and actions, where *one* shopping task is defined as searching for information on *one* product/ service to make *one* selection or purchase decision in *one* session. This research aims to develop the context-aware shopping interaction archetypes (CASIA) conceptual framework that focuses on *information seeking* and *decision making* during online shopping, meeting the three premises above.
In this section, the characteristics that classify tasks, products, and consumers in the online consumer behavior literature are reviewed. Followed by is the description of the plausible task association archetypes. Then, the possible effect areas of the interaction archetypes on information seeking, decision making, and interaction behaviors are identified. Finally, the research questions derived from the conceptual frameworks are addressed.

The figure that illustrates components of the CASIA framework with research questions is presented near the end of the section.

Task characteristics

Tasks in the task-technology fit theory (Goodhue and Thompson, 1995) are broadly defined as the actions carried out by individuals in turning inputs into outputs. Campbell (1988) classified tasks in terms of (1) presence of multiple potential ways (i.e., paths) to arrive at a desired end-state, (2) presence of multiple desired outcomes (i.e., end-states) to be attained, (3) presence of conflicting interdependence among paths to multiple desired outcomes, and (4) presence of uncertain or probabilistic linkages among paths and outcomes.

Many studies have operationalized the tasks in terms of task complexity and task structure. Jiang and Benbasat (2007) classified task types with different levels of complexity, which is defined as "a function of the number of distinct acts that must be completed and the number of distinct information cues about the attributes of the task-related stimulus object an individual has to process when performing a task." Browne, Pitts, and Wetherbe (2007) used task structure (well structured vs. ill-structured), the strategy the decision maker adopts to represent the task (decompositional vs. holistic), and task complexity (low vs. high) to classify the task types. Developing the survey instrument that applies the task-technology fit theory to the B2C EC, Wells, et al. (2003) also classified task types based on task complexity and task structure. The task structure is dichotomized as goal-directed (e.g., shopping for something specific) vs. experiential (e.g., browsing). Hong, Thong and Tam (2004) classified task types as searching vs. browsing. Wells, Fuerst and Palmer (2005) directly characterized goal-directed tasks as structured, utilitarian, and mainly relying on analytic processing, and experiential tasks as .hedonistic, unstructured, mainly replying on perceptional processing.

Product characteristics

The exact nature of the product selection and purchase decision depends in part on the attributes of the product (Wright and Lynch, 1995; Smith, 1993; Deighton, 1997). Shop.org reported (2005) that the product price and quality are found as the top reasons for choice of products, which could affect how EC consumers evaluate the information.

Hassanein and Head (2005) provided a great summary of product characteristics in the literature up to date. They found that products types have been classified as (1) search products versus experience products (Xiao and Benbasat, 2007; Spiekermann, 2004),

(2) digital versus nondigital products, (3) geometric, material, or mechanical products, (4) infrequently purchased durables, frequently purchased nondurables, or entertainment products, and (5) entertainment-oriented vs. information-oriented.

Hahn and Kauffman (2002) classified products into three types: convenience goods, researched goods, and replenishment goods. Each product type is differentiated on the basis of the consumer behavior dimensions of need arousal, information search, product evaluation, purchase decision, and postpurchase evaluation. Jahng, et. al (2000, 2001) used the two dimensions, social presence vs. product presence to identify four product types: simple products, social products, experiential products, and complex products.

Venkatesh and Agarwal, (2006) and Peterson et al. (1997) claimed that the following three dimensions are more relevant to classify product types for Internet marketing: cost and frequency of purchase, value proposition (tangible vs. intangible), degrees of differentiation possible. Peterson et al. (1997) suggested that consumer decision processes and search behaviors are likely to vary in accordance with specific constellations of these three dimensions.

Product complexity is another important product characteristic, defined by four dimensions: the number of product alternatives, the number of product attributes, the variability of each product attribute, and the inter-attribute correlations (Xiao and Benbasat, 2007; Jahng, et. al, 2007).

Customer characteristics

Individual characteristics have been substantially studied as predictors of technology-related behaviors (Venkatesh et al. 2003) and consumer behaviors (Morton et al. 2001, Vakratsas 1998).

The customer characteristics that have been examined in online consumer behavior studies include gender, age, income (Venkatesh and Agarwal, 2006), personality (Jahng et. al, 2001), socioeconomic, motivational, attitudinal, Internet proficiency (Wells et. al., 2003), perceived product risk (Xiao and Benbasat, 2007), product knowledge (Jiang and Benbasat, 2007; Xiao and Benbasat, 2007), novice vs. repeat customer and product involvement (Koufaris, Kambil, and LaBarbera, 2001), abstract vs. concrete goals (Xia and Sudharshan, 2002), etc.

Task association archetypes

Based on click-stream data, Rozanski et. al. (2001) identified seven categories of user sessions: “quickies,” “just the facts,” “single mission,” “do it again,” “loitering,” “information please,” and “surfing.” They suggested that these segments marketing would be more effective than static market segmentation based on demographics and/or consumer attitudes alone.

With a similar philosophy as to examine the essences of tasks, the Multiple Information Seeking Episodes (MISE) conceptual framework identifies eight different scenarios of successive information searches. MISE was developed through reviewing the literature from multiple disciplines, including phenomenology, library and information science, human computer interaction, cognitive psychology, etc. (Lin and Belkin, 2000; Lin, 2001a, Lin 2001b) and empirically validated (Lin and Belkin, 2005; Lin, 2005). The eight task scenarios of successive information searches are based on the nature and the over-time evolution of information problems (a term, coined in the library information science discipline, to stress on the dynamic rather than static nature of “information needs”). They could be used as *a starting point* to classify and aggregate the shopping tasks into task association archetypes because they explains how a task could migrate to or transform itself into another task. Table 1 gives a brief definition of these eight information search scenarios and explains how they could be applied to explain plausible EC task association archetypes.

Interaction Behavior

While research has used click-stream data (e.g., number of pages viewed, time spent on each page, etc.) to predict task types (Moe, 2003) and purchase behavior (Sismeiro and Bucklin, 2004), different shopping interaction archetypes could result in the differences in the behavioral characteristics exhibited in the interaction process.

Information seeking

In the MISE framework, Lin and Belkin (2000, 2005) discomposed the information seeking process into sub-processes as articulation of the information problem, navigation of the information space, evaluation of search outcomes, and monitoring of the search progress. It is the cognitive efforts required and problems encountered in these sub-sub-processes that could inspire the design space to reduce the efforts and mitigate the problems.

MISE also emphasizes that tasks need to be considered beyond a single session by identifying different reasons for stopping and renewing a session. Moe (2003) also recognizes the importance of extending the view beyond a single session, employing purchasing horizon (immediate vs. future) and search behavior or task structure (directed vs. exploratory) to identify four shopping strategies or tasks: knowledge building, hedonic browsing, directed buying, and search/deliberation. Browne, Pitts, and Wetherbe (2007) identified different types of search task stopping rules, an alternative to the session stopping reasons in the MISE framework.

Decision making

Consumer decision making is constructive in nature (Bettman, Luce, and Payne, 1998). The decision-making environment in EC has changed the amount, type, and format of information available to consumers (Alba et al., 1997; Bakos, 1997). Consumers constantly process information on products, stores, and services in order to make a selection or/ and purchase decision when or after comparing them. Just as an information seeker could apply a variety of relevance criteria with various degrees of importance in evaluating information objects (e.g., Saracevic, 2007), an EC consumer could also utilize a variety of decision criteria with different weights in their decision making process when evaluating choices.

Successive session scenarios	**Definition**	**Application to EC shopping**	**Examples**
Transmuted information problems	The information problem is under formation and gets enriched, polished, elaborated with new concepts and finally changes its texture from the original state to the transmuted state.	Need to learn about products. Choices of products are uncertain and could change many times with more information gathered.	Learn more about a real estate property before making a purchase
Spawned information problems	The information problem itself spawns sub-problems that extend over the surface of the original problem and that demands a higher priority to cope with than the original problem.	Originally intend to buy product A, but find out product B and C may fit immediate needs more; it usually is applied to composite products that can be sold in parts.	Upgrade the hard drive and RAM instead of replacing the computer
Transited information problems	The information problem is transited to another; the two problems are connected in a cause-effect relationship (i.e., the result of A constitutes the cause of B).	The product bought stimulates interests in another related product.	The purchase of a house leads to the purchase of new appliances
Cultivated information problems	The searcher is trying to stay abreast of an area of information of interest.	Monitor the availability of products with general interests.	A sport fanatic keeps track of the new sport memorabilia on the market for the collection purpose
Unanswered information problems	The searcher cannot find satisfactory information objects as treatments	Could not find the desired products due to a limited amount of time or knowledge.	Cannot find the book that a friend recommends to buy
Rolled-back information problems	The problematic situation that once was thought to have been resolved actually turns out not to have been resolved.	The purchased products are not practical or usable.	Return products and/ or search for alternatives
Missing treatment	The information treatment of the information problem, once found, is not available when needed.	Re-seek for a product seen before.	Recover a lost map print-out
Anticipated information problems	The information problem has not occurred but is anticipated because some elements of the current situation match patterns of past experiences which could revive into an envisioned or planned situation in the future.	Have no immediate ‘need’ for the product, but search for information to satisfy the ‘want.’	Keep an eye open for the sale of a wide-screen TV

Table 1: Plausible task association archetypes

Figure 1: The context-aware shopping interaction archetypes conceptual framework (CASIA)
Note: technology support of interaction archetypes is not discussed in this article

Research questions derived from CASIA

The following research questions arise from the CASIA conceptual framework.

Research question 1: How can the single-task interaction archetypes be characterized in terms of characteristics of tasks, products, and consumers? How would consumers behave differently in their processes of information seeking and decision making due to different product types or different levels of product class knowledge?

Research question 2: Whether the eight task association archetypes are *sufficient* (e.g., are there more archetypes/ variables not identified?) and *accurate* (e.g., do they truly exist or make sense to the consumers?)?

Research question 3: How can the between-task interaction archetypes be characterized in terms of characteristics of tasks, products, consumers, and task association archetypes? How would consumers' cognitive efforts in the processes of information seeking and decision making change for different task association archetypes?

METHODOLOGY

To answer the research questions, the study undertook a naturalistic case study across 4 months to observe project participants' online shopping activities. The naturalistic approach was chosen because it is the best way to examine in depth and comprehensively the cognitive process, behavioral manifestation, and emotional responses of EC consumers' shopping activities. Questionnaire surveys cannot provide the rich and detailed information needed to answer the research questions.

Six participants were recruited to participate in the study: two undergraduate students, two graduate students, and two faculty members. To ensure that participants engage in enough shopping tasks to observe interaction archetypes, participants were pre-screened; only those who previously *frequently* shopped online and who have their personal computers were invited to participate in the study in exchange of a small monetary award ($200). The small number and homogeneity of subjects are justified because it is an exploratory case study meant to develop a large complex conceptual framework. Once the framework is developed, more controlled experiments or other research methods involving a larger number of participants, perhaps narrowing the scope to focus on specific components of the framework can be carried out to further validate the framework.

Data collection

When entering the study, participants completed a survey about their demographics and computer use. Before exiting the project, participants completed a questionnaire and followed up with an interview, sharing how they perceived the efforts required by and the usefulness of the technologies provided by EC stores and Web browsers.

Weekly in the 4-month span, the participants were interviewed via a chosen instant messenger about the processes of information seeking and decision making that occurred online within that week. For each shopping task, the participant was also asked of the rating on a 7-point scale on their efforts in the processes of information seeking and decision making (e.g., articulation, evaluation, navigation, monitoring and comparing).

Usability observation software, Morae and Novell file-sharing software, iFolder, were installed in the participants' personal computers. Morae recorded all the Web activities engaged, including the Web pages seen, the words entered into those pages, the pages added to their favorites or bookmarks, and screen captures, etc. In addition, all the Web pages viewed passed through a preconfigured proxy server. iFolder synchronized the Morae recording files and proxy log files with the investigator's computer.

Currently, the weekly interview data is being coded based on variables in the CASIA conceptual framework (e.g., types of products and tasks, problems encountered and cognitive efforts in processes of information seeking and decision making, task association archetypes, etc.) and saved into a relational database application. The behavioral data recorded by Morae will be processed and saved into the database application as well.

Data analysis

The data analysis is both qualitative and quantitative. The unit of analysis *is a shopping task, not a participant*.

To answer the research question 1, queries will be written to classify shopping tasks by customers, tasks, and products, and to analyze the concurrences (and their frequencies) of the characteristics of these entities. Those with high concurrences would be considered as candidates for single-task interaction archetypes. Content analysis will be performed to discover the patterns, characteristics, and common problems encountered in information seeking and decision making. ANOVA analysis would be used to test whether these single-task interaction archetypes differ in cognitive efforts spent in information seeking and decision making and behavioral characteristics. The results of content analysis and ANOVA would determine the final single-task interaction archetypes.

For research question 2, content analysis will be conducted to verify the plausible eight task association archetypes and identify additional archetypes.

For research question 3, queries will be written to group shopping tasks first by task association archetypes (validated in RQ 2) and then by customers, tasks, and products. Content analysis will then be employed to examine whether and how the patterns of single-task interaction archetypes can be applied to tasks in each task association archetype. ANOVA analysis could be utilized to test whether there are significant differences in behavioral characteristics and in average cognitive effort ratings among tasks grouped under different task association archetypes. The results of content analysis and ANOVA would determine the final between-task interaction archetypes.

CONCLUSION

The study has many theoretical and practical implications. Theoretically, it will enrich the body of literature on EC consumer shopping behavior with the CASIA conceptual framework, which shows how shopping tasks can be classified and aggregated into a few archetypes. Practically, from the back end of EC stores, identifying the EC shopping task archetypes can enhance electronic customer relationship management (E-CRM) by identifying and enhancing the marketing opportunities for cross sales, up sales and bundling sales. For example, the CASIA framework can rationalize and explain the specific context in which EC stores can recommend the products based on customers' past purchasing patterns. For the front-end interface of EC stores, the CASIA framework can be used as a basis for task analysis of online shopping, improving the effectiveness and efficiency of the consumers' tasks in EC stores. For example, the CAISA framework can pin down the context where EC stores could directly retrieve and present all the alternative solutions the consumers have considered previously and allow customers to expand or revise them, as opposed to re-starting their searches; effort and time can be saved to achieve efficiency.

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