

# **SERIE** RESEARCH MEMORANDA

e- Tam:

A revision of the Technology Acceptance Model to explain  
website revisits

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## **Abstract**

Retaining visitors at a corporate **website** is arguably one of the most important objectives for e-commerce practitioners today. Unfortunately, it is also a notoriously difficult challenge. Little theory has been developed to understand why people return - or fail to return - to websites. In this paper we address this issue by developing a theoretical framework that models the factors influencing a visitor's return to a **website**.

The framework is adapted from the Technology Acceptance Model (TAM), originally developed by Davis et al. [6, 7, 8]. A major revision involves the concept of perceived relative usefulness and perceived relative enjoyment as opposed to usefulness and enjoyment per se. This extension takes into account the notion that **websites** operate in a competitive environment, and that visitors judge the usefulness and enjoyment of a **website** relative to the competing **websites** to which they have access.

The paper discusses five propositions that are derived from the revised framework. Implications for further research and practical guidelines for electronic commerce **website** designers are also addressed.

## 1. Introduction

Website traffic is arguably one of the most important performance indicators for e-commerce practitioners. Not only does traffic reflect popularity of the website, it is also a prerequisite for generating online sales, and it provides a basis for acquiring revenue from web-based advertising agencies [ 13]. For all these reasons, many companies increasingly adopt strategies to generate more website traffic [24]. Many organisations have set traffic performance targets and most commercial website updates are now evaluated in terms of the traffic changes they induce [ 14].

The most common operationalisation of traffic is the number of visits per a certain period. This number can be subdivided into initial or “maiden” visits (the first visit people make), and revisits (their subsequent visits). For e-commerce practitioners, retaining customers and generating revisits is probably the most difficult challenge to achieve [16]. Indeed, in a rapidly changing world with ever-growing competition, online customer retention continues to be one of the most elusive topics facing the average Internet firm.

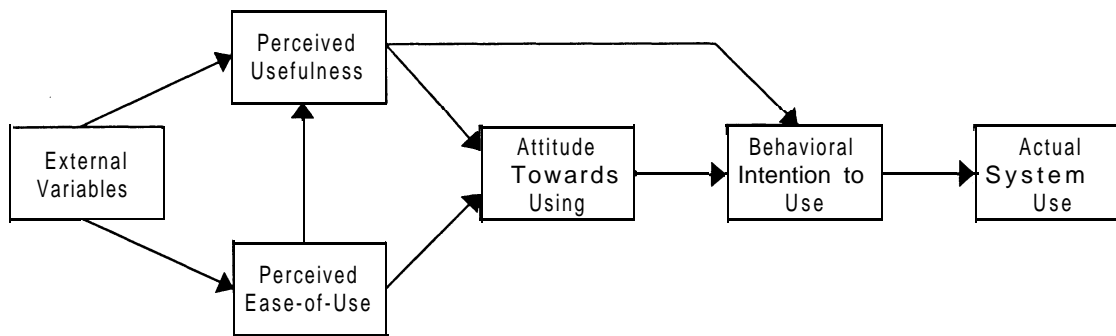
The objective of this paper is to assist e-commerce practitioners by providing more insight into the question why people do or do not revisit a particular site. To achieve this, we will develop a theoretical framework in which the factors that influence an actual website revisit are modelled. Previous research has focused on factors influencing the use of the Internet in general (e.g. [3, 15, 21, 23, 30]), or the use of the Internet for shopping [20]. There is little, if any research that has focused on visit behaviour with respect to a website specifically. Therefore, it is also relevant from a scientific point of view to develop a theoretical framework that accomplishes this.

The framework developed in this paper is derived from the Technology Acceptance Model (TAM) [6, 7]. TAM is a parsimonious, theoretically and empirically justified model to explain the acceptance of information systems. To predict website revisits it is a particularly suitable baseline. In the first place, actual revisits can be viewed as the manifest witnesses of the visitor's decision to "accept" the website. Conversely, a lack of revisits can be associated with a rejection of the website. Therefore, the determinants of acceptance and rejection are likely to be similar to those that influence the occurrence of a revisit. In the second place, TAM operates under the assumption that the user has previously had "a very brief period of interaction with a system" ([7], p. 983). Thus, TAM is particularly suitable to explain revisits because the interaction with the website would have occurred in the first visit.

The rest of this paper is organised as follows. First, the original version of the Technology Acceptance Model will be discussed. Following this is a brief review of the empirical and theoretical progress of TAM over the past years. The next section starts with an outline of the revised theoretical framework, dubbed "e-TAM". Subsequently, a number of propositions that can be derived from this framework are discussed. Research implications and implications for e-commerce professionals are discussed next. The paper ends with a number of conclusions.

## **2. Background: the Technology Acceptance Model**

The original version of the Technology Acceptance Model was put forward by Davis et al. [6, 7]. Figure 1 displays the original model.



**Figure 1 Original Technology Acceptance Model [7]**

TAM adopts the well-established causal chain of beliefs -> attitude -> intention -> behaviour that has been put forward by social psychologists Fishbein and Ajzen [2, 11], and which has become known as the Theory of Reasoned Action (TRA). Based on certain beliefs, a person forms an attitude about a certain object, on the basis of which he or she forms an intention to behave with respect to that object. The intention to behave is the sole determinant of actual behaviour.

Davis adapted the Theory of Reasoned Action by developing two key beliefs that specifically account for information system usage. The first of these beliefs is perceived usefulness, defined as “the degree to which a person believes that using a particular system would enhance his or her job performance.” ([6], p.320). The second is perceived ease-of-use, defined as “the degree to which a person believes that using a particular system would be free of effort” ([6], p.320). Moreover, TAM theorises that all other external variables, such as system-specific characteristics, are fully mediated by these two key beliefs.

Over the years, the original model has been extended in two relatively independent lines of research. The first line of research revolves around the refinement and extension of the usefulness and ease-of-use constructs. Usefulness is an example of *extrinsic motivation*. Extrinsic motivation implies that an activity is perceived to be instrumental in achieving outcomes that are distinct from the activity itself [8]. In

contrast, the second line of research focuses on extending TAM towards *intrinsic motivation*. Intrinsic motivation implies that the behaviour is conducted for no other reason than the process of performing the activity per se [8] [31]. The next section outlines the theoretical advancements of the TAM model since its original inception in each of these streams.

### *Extrinsic motivation*

Davis et al. tested the original version of TAM on the voluntary usage of a word processing program by first year U.S. MBA students [7]. They found support for a more parsimonious TAM model through the omission of the attitude construct. As theorised in TAM, perceived usefulness was a strong indicator of usage intention. Perceived ease-of-use influenced usage intention only at the early stage of adoption. Finally, usage intention reasonably predicted system usage.

Adams et al. [1] replicated a simplified version of TAM without both the attitude and intention constructs. They tested the model using two studies, one concerning the use of E-mail and voicemail systems, the other concerning three types of office-systems. They found support for the relationship between usefulness and usage, but inconsistent results for the relationship between ease-of-use and usage. Segars & Grover [26] conducted a confirmatory factor analysis on the same data and concluded that better model fit was obtained when the usefulness construct was split into usefulness and effectiveness.

Studying the acceptance of a voice-mail system by 75 U.S. subjects and a customer dial up system by 104 subjects, Subramanian [28] also found support for a direct linkage between usefulness and usage. No support was found for any of the ease-of-use relationships.

Taylor & Todd [29] contrast the Technology Acceptance Model with two models derived from the Theory of Planned Behaviour (TPB). TPB is an extension of TRA developed by Ajzen [2] and adds perceived behavioural control as determinant for intention and actual usage. The object of study involved the voluntary usage of a computing resource centre by undergraduate and graduate U.S. business students. Taylor & Todd found superior goodness-of-fit measures for the TPB models, but the addition of subjective norms and perceived behavioural control did not substantially increase the amount of variance of usage behaviour already explained by TAM (36% compared to 34%).

Venkatesh & Davis [32] studied the antecedents of perceived ease-of-use. On the basis of three experiments, they found that computer self-efficacy influenced ease-of-use positively. Objective usability of the system influenced ease-of-use after users had had hands-on experience with the system.

Recently, Venkatesh & Davis [33] introduced “TAM2”, a revised model that explores the antecedents of perceived usefulness. They included subjective norms from the original TRA and added image, job relevance, output quality and result demonstrability. The influence of subjective norms was moderated by the amount of experience and voluntariness. Venkatesh & Davis tested the model in four organisational settings: the voluntary adoption of a scheduling system, a voluntary transition to a windows-based operating system, a mandatory transition to a windows-based customer management system, and the mandatory introduction of a stock analysis system. They measured the acceptance of these systems at three points in time (pre-implementation, one month post-implementation and three months post-implementation). Support was found for all relationships between antecedents and



usefulness. Output quality and job relevance showed significant interaction in their effect on perceived usefulness.

### *Intrinsic motivation*

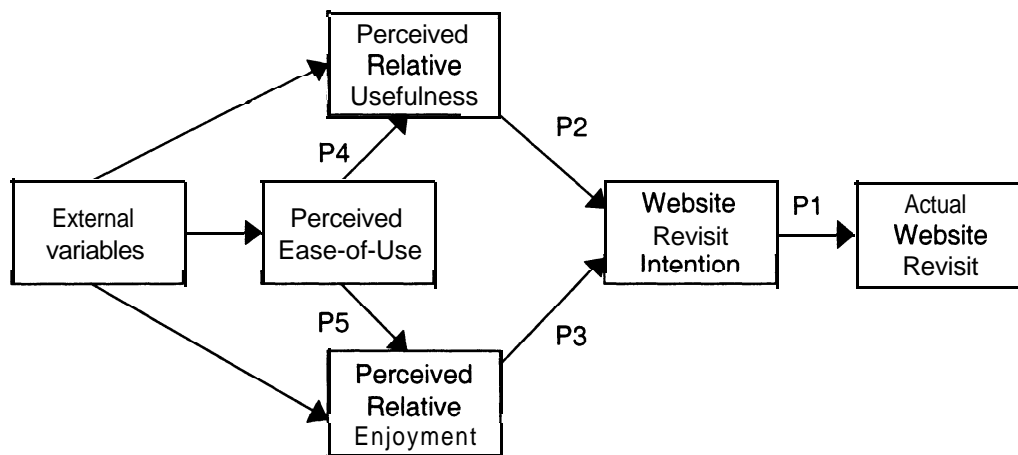
To explicitly model the role of intrinsic motivation in TAM, Davis et al. [8] introduce the concept of perceived enjoyment. Perceived enjoyment is defined as “the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated” ([8], p. 1113). Perceived enjoyment is theorised to influence usage intention directly. To test the influence of enjoyment two studies were conducted, one involving the adoption of a word-processing program by 200 U.S. MBA students and another concerned with the adoption of a graphics program by 40 U.S. MBA students. The results confirmed the strong relationship between usefulness and user intention ( $\beta = .68$  for Study 1,  $\beta = .79$  for Study 2) and a weaker relationship between enjoyment and intention ( $\beta = .16$  for Study 1,  $\beta = .15$  for Study 2). The influence of perceived ease-of-use was fully mediated through perceived usefulness and enjoyment.

Igbaria et al. [18] studied the effect of perceived enjoyment and usefulness on usage in a field study of Finnish computer users. They found strong relationships between perceived usefulness and usage, but weak, insignificant links between enjoyment and usage. Similarly, Igbaria et al. [19] studied the effect of perceived fun/enjoyment using data from 471 respondents from a diverse range of U.S. based organisations. In this study, support was found for a positive relationship between perceived fun/enjoyment and system usage. Perceived complexity (the opposite of perceived ease-of-use) was negatively correlated with perceived enjoyment.

Venkatesh [3 1] investigated the intrinsic motivations implicitly incorporated in the original version of TAM by juxtaposing two training sessions of a virtual workplace system: one that was game-based, another that was traditional. Subjects who underwent the game-based training perceived the system to be easier to use, lending support to the hypothesis that perceived enjoyment is also positively associated with ease-of-use.

### 3. Research Model Development

Our model to explain why people revisit websites is based on the advancements of TAM in “traditional” information systems described in the previous section, and it is complemented by recent theoretical and empirical findings on Internet use. Figure 2 displays the revised model, dubbed “e-TAM”.



**Figure 2 e-TAM: A revised version of TAM to explain website revisits (P-labels refer to propositions in the text)**

The reader will notice a number of differences from the original version of TAM as displayed in Figure 1. The entire model is now transposed to a **website** context. To reflect this transposition, the dependent variable Actual System Use is replaced by Actual **Website** Revisit, and Usage Intention is replaced by **Website** Revisit Intention. The Attitude construct has been excluded, following empirical evidence that the construct does not meaningfully mediate the relationships between the beliefs and intention [7]. The direct relationship between Perceived Ease-of-Use and Intention is also removed, following empirical support that such a relationship is typically insignificant [1, 8]. Perceived Usefulness is replaced by Perceived Relative Usefulness, a revision which is motivated by the presence of competition in a **website** context, and the absence of competition in the case of traditional information systems. This argument will be developed in more detail below. Finally, the model is supplemented with Perceived Relative Enjoyment, following the empirical evidence that intrinsic motivation assists in understanding usage intention, albeit to a lesser degree than Perceived Usefulness.

Constructs and propositions for the e-TAM model are developed in more detail below.

### **3.1 Intention and usage**

In line with reasoning applied in TRA and TAM, we hypothesise that there exists a direct and positive effect between **website** revisit intention and actual **website** usage. As discussed in the previous section, research on TRA and TAM has consistently found strong empirical support for this relationship: intentions can accurately explain and predict actual behaviour.

*P1: Intention to revisit positively influences actual website revisits*

Actual website revisits can be measured by the frequency and average duration of visits over a certain time period. It should be noted at this point that usage measurement has proven to be an elusive topic for information systems researchers. The measures of IT usage in the literature are varied and sometimes inconsistent (see [9] for an overview). Moreover, empirical evidence is available that supports the notion that users have trouble accurately reporting their usage of a system [27]. This makes self-reported measures to some extent suspicious, and consequently, actual measures are typically preferred.

In a website environment, actual usage measures are typically derived more easily than in a traditional information system environment. Many commercial webservers available today produce log files in which actual website behaviour per visitor is recorded. There are also many commercial packages on the market that produce meaningful reports out of these log files. These packages can be very useful in obtaining actual revisit behaviour.

### **3.2 Relative usefulness and relative enjoyment**

Previous research on the use of the World Wide Web (WWW) has found empirical support for usefulness and enjoyment as drivers of Internet usage. For example, Atkinson & Kydd [3] used a sample of 78 undergraduate business students and 84 graduate MBA students to test a model in which WWW usage was related to usefulness and enjoyment. They found that perceived enjoyment significantly

influenced WWW use for entertainment purposes ( $\beta = 0.308$ ) whereas usefulness was not significant. Similarly, perceived usefulness significantly influenced WWW use for course-related purposes ( $\beta = 0.502$ ) whereas enjoyment was not significant.

Teo et al. [30] employed a web-based survey to investigate the impact of ease-of-use, usefulness, and enjoyment on Internet use. 1370 usable responses were obtained. Their findings indicate that respondents use the Internet both through perceived usefulness and perceived enjoyment. In comparison with Atkinson & Kydd, Usefulness had a weaker effect on Frequency-of-Use ( $\beta = 0.19$ ). Similarly, the effect of Enjoyment on Frequency-of-Use, while significant, was also weaker ( $\beta = 0.09$ ).

The usefulness and enjoyment constructs appear to be reasonably explanatory for usage of traditional information systems and usage of the Internet in general. It can be argued however, that both constructs need a modification if we are to transpose them effectively to the context of websites. This modification is warranted because subtle differences exist between using a “traditional” information system, the Internet in general, and using a website.

The information systems studied by most TAM researchers are deployed in job-related contexts. In those contexts, people typically have no adequate alternative information systems at their disposal. In most cases, the only alternative would be to convert to a paper-based system. Consequently, the information systems under study face no real “competition”: no alternative systems are readily available, no competing alternatives can be freely evaluated and compared, and users can not frictionlessly switch to better alternatives when they feel that these alternatives are more useful or more enjoyable.

In contrast to this situation, many websites face substantial competition on the Internet in terms of usefulness and enjoyment. For many purposes, hundreds, if not

thousands of websites can perform the tasks that a visitor may find useful or enjoyable. Moreover, users can evaluate these websites, compare them, and switch to competing websites with almost zero friction. For these reasons, it can be argued that visitors assess the usefulness of a website *relative to* competing “useful” websites before they form intentions to revisit.

*P2: Perceived relative usefulness positively influences intention to revisit*

Similarly, we argue that visitors evaluate the enjoyment they retrieve from a website *relative to* competing “enjoyable” websites before they form an intention to revisit.

*P3: Perceived relative enjoyment positively influences intention to revisit*

Due to the competing environment for useful and enjoyable websites, *relative* usefulness, and *relative* enjoyment are argued to explain revisit intentions more strongly than usefulness and enjoyment per se.

The word “relative” has been chosen in accordance with the Relative Advantage construct from the widely established theory of innovation diffusion [25]. Rogers defines relative advantage as “the degree to which an innovation is perceived as being better than the idea it supersedes” (p. 212). It is one of the five attributes of innovations that positively affect the rate of adoption of innovations. In the IS literature, relative advantage has been conceptually associated with perceived usefulness (e.g. [1], p. 231, [29], [22]).

### 3.3 Perceived ease of use

Previous TAM research demonstrates strong empirical support for a positive relationship between perceived ease-of-use and perceived usefulness. In a **website** environment we expect this relationship to hold also: the easier a **website** is to learn, use, or navigate, the more useful it would be perceived to be *relative to* its competitors. Therefore, we propose that in a **website** environment:

*P4: Perceived ease-of-use positively influences perceived relative usefulness*

Similarly, perceived ease-of-use can be associated with perceived relative enjoyment: the easier the system is to use, the more enjoyable it is. Empirical research has also found support for this relationship in traditional settings [ 19].

*P.5: Perceived ease-of-use positively influences perceived relative enjoyment*

Perceived relative enjoyment is related to the psychological concept of “flow” [5], which is described as an “intrinsically enjoyable experience”. Flow, which has also been studied in an Internet context [ 15,231, arises under a number of conditions. One of these is the instant feedback following a person’s stimuli. It is conceivable that a **website** that is easier to use provides better feedback to a visitor’s stimuli, and consequently, leads to increased enjoyment and flow.

#### 4. Research Implications

The e-TAM framework that has been postulated in this paper has a number of implications for further research. In the first place, the model would benefit from further empirical validation in certain areas, in particular those around the constructs relative usefulness and relative enjoyment. In the second place, the e-TAM framework itself can be extended through research on the “external variables” that influence ease-of-use, relative usefulness and relative enjoyment.

An important, refutable implication of the relative usefulness and relative enjoyment modifications is that both are to account for a higher amount of explained variance in the revisit intention construct than usefulness and enjoyment per se. It is therefore recommended that further empirical research be directed towards propositions P2 and P3.

An empirical validation should involve the measurement of people’s intention to revisit, their perceptions of the usefulness and enjoyment of the website, *and* the measurement of these perceptions *when compared to other websites*. An important consideration in the further validation of these propositions is the scope and nature of the “competition”, i.e. the websites with which the website under study is competing. Of course, in the broadest sense, every website is a competitor of every other website. Moreover, users may not be familiar with competing websites simply because they have not come across them. Therefore, researchers should ask respondents specifically to compare the usefulness and enjoyment of a website with websites that 1. are known to them, and 2. provide similar functionality. Examples of competing websites can be given to guide the respondent, but care should be taken that this does not bias the responses towards the specific examples given.



A second area for research is the further exploration of “external variables”, or in other words, the antecedents of perceived relative usefulness, perceived relative enjoyment, and perceived ease-of-use. It is likely that most antecedents that have been identified in earlier TAM research can be transposed to a website-context as well. Empirical validation should not only investigate the antecedental effects, but also investigate the postulation that all influences of external variables on revisit intentions are fully mediated by relative usefulness and enjoyment.

A fruitful extension of the e-TAM framework would be the incorporation of the effects of psychological predispositions towards the key e-TAM beliefs. For example, the effects of playfulness and self-efficacy on perceived enjoyment and perceived ease-of-use have been studied in the context of traditional information systems and the Internet [3, 34]. Subjective norms [2, 29, 33], i.e. the degree to which people around an individual think he or she should perform the behaviour, may also be an important candidate, although empirical research has found that its effect is comparatively weak in voluntary settings [33].

Perhaps the most promising area of further research is in the extension of e-TAM towards the incorporation of actual website characteristics. A substantial body of research is now accumulating that categorises and classifies websites along various dimensions, e.g. [4, 10, 12, 17]. These classification and assessment frameworks provide useful descriptive information on the state of one website compared to other websites. Moreover, through the exposition of the differences in “scores”, these frameworks encourage designers to examine potential white spots in comparison with competing websites. The e-TAM framework may be complementary to this research in that it provides a means to link these dimensions towards actual revisits.

For example, an experiment can be designed in which respondents are to evaluate the e-TAM constructs on a set of websites that are clearly distinct in their website structure. A taxonomy provided by Gillenson & Sherrel [ 12] on website structures can be used to appropriately develop or select the websites. Prior to the experiment, it can be theorised that website structures influence perceived ease-of-use, and by doing so, influence revisit intention through perceived usefulness and enjoyment. The results of such an experiment would reveal what effects a website structure has on revisit intention. This would have major ramifications for website designers and researchers alike.

## **5. Practical implications**

Some practical implications can be derived from the e-TAM framework. In the first place, the framework emphasises relative usefulness and relative enjoyment over usefulness and enjoyment per se. This implies that it is useful for e-commerce practitioners to frame their website development efforts into the context of competing websites, as opposed to developing the website in isolation. In particular, website designers should assess to what extent their website features are useful and enjoyable relative to the websites with which they compete for traffic. Prescriptively therefore, the e-TAM framework suggests that competition analysis be an inherent part of the website development lifecycle.

One way to incorporate competition analysis into the website development process is by carrying out regular competition reviews. Such reviews should aim to position the features of the company's website against the features of competing websites. Furthermore, these features should be categorised and weighted in terms of

“usefulness” and “enjoyment”. To be sure, for many features the **categorisation** and **weighting** decision will be subjective. Nevertheless, a review will provide an approximate insight into the degree to which perceptions about usefulness and enjoyment will differ among competing websites. Moreover, the review may also reveal a competitor’s strategy over time in terms of its major “drivers” for revisits.

The framework also argues that people’s intentions to revisit are fully explained by relative usefulness and enjoyment beliefs. A practical implication of this argument is that it allows **website** designers to meaningfully explain changes in traffic volume before a **website** update by looking at the impact of the update on perceived usefulness and enjoyment. Prescriptively therefore, the e-TAM framework suggests that assessments of perceived relative usefulness and enjoyment be an inherent part of the **website** development cycle.

For example, a new **website** update can be evaluated by a small panel in a relatively short timeframe. The respondents in the panel can answer questions about relative usefulness and relative enjoyment and their intention to revisit the **website**. Following the panel test, regression analysis of the results can reveal to what extent each of the two key beliefs contributes to revisit intention. This is helpful in predicting the extent to which people will revisit when the **website** is publicly available online.

The situational contexts in which this model would be most fruitfully applied are those where **websites** are facing substantial competition. This holds for instance for all kinds of general and **specialised** portals, e-commerce sites, sites providing news, and “general purpose” entertainment sites. The new model is limitedly applicable for **websites** that have no real competition, such as the **website** of a university department that publishes student grades. Under those circumstances, individuals have few if any competing **websites** that they can compare the usefulness and enjoyment with. These

websites are much more like the traditional information systems used in job-related contexts, and hence, the original TAM model, without the “relative” modifications, is more likely to hold here.

## **6. Conclusion**

The objective of this paper has been to develop a revised version of the Technology Acceptance Model to understand a person’s revisit behaviour on a single website. TAM explains information system usage by recognising both extrinsic and intrinsic motivations. This has originally been done through the operationalisation of two key individual beliefs: perceived usefulness and perceived enjoyment. Furthermore, TAM theorises that the effects of perceived ease-of-use and other external variables on system use are fully mediated by these two key beliefs. This paper has modified the original TAM model by incorporating the empirical findings of previous TAM research and by adapting the key beliefs to more fully reflect a website context.

This paper makes two important theoretical contributions. To our knowledge, this is the first serious attempt to apply the TAM model in a single website context. Previous research that has applied TAM constructs to the Internet has done so by considering the use of the Internet in general [3, 23, 30]. This paper is the first to apply TAM to a more finely grained unit of analysis: the website. We believe this unit of analysis is more appropriate because it resembles the information system level of analysis familiar to TAM researchers more closely. Indeed, most if not all TAM research has been associated with the acceptance of specific information systems, not information systems in general. .

Second, the model is revised to account for the specific circumstances in which **websites** differ from traditional information systems. Our theoretical contribution revolves around the concepts of *relative* usefulness and *relative* enjoyment. By doing so, we explicitly acknowledge that **websites** - in contrast to traditional information systems - operate in a highly competitive environment. People who use the Internet are able to compare, evaluate and switch **websites** at extremely low friction costs. Therefore, a useful or an enjoyable **website** will not encourage people to revisit the **website** per se. The **website** will need to be useful and enjoyable relative to its competing alternatives. This situation, which is quite unlike the traditional information systems in use today, warrants the proposed revisions of the constructs perceived usefulness and perceived enjoyment.

Understanding why individuals return or fail to return to a **website** may continue to be an elusive topic for a while. But the e-TAM framework provides a first step by constructing a meaningful bridge between website features (and other external variables) and the actual revisits on a website. Researchers are therefore encouraged to pursue the relationships between different features and different revisit rates through this bridge.

## **Acknowledgement**

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