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# What Makes Consumers Buy from Internet? A Longitudinal Study of Online Shopping

Moez Limayem, Mohamed Khalifa, and Anissa Frini

**Abstract**—The objective of this study is to investigate the factors affecting online shopping. A model explaining the impact of different factors on online shopping intentions and behavior is developed based on the Theory of Planned Behavior. The model is then tested empirically in a longitudinal study with two surveys. Data collected from 705 consumers indicate that subjective norms, attitude, and beliefs concerning the consequences of online shopping have significant effects on consumers' intentions to buy online. Behavioral control and intentions significantly influenced online shopping behavior. The results also provide strong support for the positive effects of personal innovativeness on attitude and intentions to shop online. The implications of the findings for theory and practice are discussed.

**Index Terms**—e-commerce, online shopping, TPB.

## I. INTRODUCTION

THE use of the Internet as a shopping and purchasing medium has seen unprecedented growth. Most experts expect the global electronic market to dramatically impact commerce in the twenty first century. Jaffray [1] estimates the total volume of cybersales to reach \$201 billion in 2001 and Forrester Research [2] predicts electronic commerce activities to reach \$327 billion in 2002 worldwide. Activmedia [3] forecasts Web revenues to amount to \$1.2 trillion in 2002.

In addition to this tremendous growth, the characteristics of the global electronic market constitute a unique opportunity for companies to more efficiently reach existing and potential customers by replacing traditional retail stores with Web-based businesses. Many physical obstacles hinder companies in their efforts to reach global markets. Therefore, the World Wide Web (WWW) enables businesses to explore new markets that otherwise cannot be reached. Consequently, Electronic Commerce (EC) has emerged as the most important way of doing business for years to come. This term was first used by Kalakota and Whinston [4]. They state that EC has two distinct forms: Business-to-business and business-to consumer. Much of the growth in revenues from transactions over the Internet has been achieved from business-to-business exchanges leading to the accumulation of an impressive body of knowledge and expertise in the area of business-to-business EC [5], [6]. Unfortunately, this is not the case for business-to-consumer EC. With the exception of software, hardware, travel services, and few other niche areas, shopping on the Internet is far from

universal even among people who spend long hours online [7], [8]. A recent survey reported by Krochmal [9], found that only 18% of U.S. households have made a purchase online. Moreover, many companies already practicing EC are having a difficult time generating satisfactory profits. For example, many e-companies such as Amazon.com have successfully attracted much attention but have not been able to convert their competitive advantage into tangible profit [10].

Selling in cyberspace is very different from selling in physical markets, and it requires a critical understanding of consumer behavior and how new technologies challenge the traditional assumptions underlying conventional theories and models. Butler and Peppard [11], for example, explain the failure of IBM's sponsored Web shopping malls by the *naive* comprehension of the true nature of consumer behavior on the net. A critical understanding of this behavior in cyberspace, as in the physical world, cannot be achieved without a good appreciation of the factors affecting the purchase decision. If cybermarketers know how consumers make these decisions, they can adjust their marketing strategies to fit this new way of selling in order to convert their potential customers to real ones and retain them. Similarly, Web site designers, who are faced with the difficult question of how to design pages to make them not only popular but also effective in increasing sales, can benefit from such an understanding.

This research has two primary objectives. The first objective is to use current behavioral theories in the elaboration of a model that can identify key factors influencing purchasing on the web. Such a model should also explain the relationship between individuals' intentions to buy from the web and the actual behavior of purchasing online. The second objective is to conduct a longitudinal study to empirically test the validity of the proposed model. This study therefore enhances our understanding of consumer behavior on the Web and leads to valuable implications to marketers and managers on how to develop effective strategies to win the battles of cyber competition. The findings of this study should also help Web designers in their difficult task of designing sites that must compete with millions of other sites on the Web.

This paper is presented as follows. Section II reviews the current literature on consumer behavior on the web. Section III presents the theoretical foundations of our research model. Section IV outlines the research methodology and describes the data analysis. Section V presents the results, while Section VI discusses these results and their implications for researchers and practitioners. Finally, Section VII concludes this paper by describing the limitations of the current study and by providing several suggestions for future research in this area.

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## II. LITERATURE REVIEW

Several researchers have tried during the last few years to investigate consumers' perceptions of the obstacles hindering the development of online shopping. Jarvenpaa and Todd [12] surveyed consumer reactions to Web-based stores using a sample of 220 shoppers. They found, for example, that 31% of respondents were disappointed with product variety and 80% had at least one negative comment about customer service on the Web. Spiller and Lohse [13] reported the results of a survey investigating 35 attributes of 137 Internet retail stores to provide a classification of the strategies used in Web-based marketing. Most of their results confirmed the findings of Jarvenpaa and Todd [14] in their survey of consumer reactions to electronic shopping on the WWW. Rhee and Riggins [15] explored the relationship between Internet users' experience with online shopping and their perceptions of how well Web-based vendors support three types of consumer activities: pre-purchase interactions, purchase consummation, and post-purchase activities. They found that consumers with online purchasing experience believe that Web-based businesses support all these three activities. However, users who only seek information about products and services do not regard Web-based business as supporting their informational needs.

Several recent studies have explored the predictors of online buying. Liang and Huang [16] for example found that online shopping adoption depends on the type of the product, the perceived risk, and the consumer's experience. Similarly, [17] argued that the two most important obstacles to online shopping are the lack of security as well as network reliability. This conclusion was confirmed by [18], who found that consumers hesitate to use their credit number for online shopping because they are afraid that the number will be stolen. Another survey conducted by Forrester also found that many consumers consider that lack of security is one of the main factors inhibiting them from engaging in online purchasing [19].

Web page design characteristics were also found to affect consumers' decisions to buy online. Ho and Wu [20] found that homepage presentation is a major antecedent of customer satisfaction. Other antecedents were logical support, technological characteristics (i.e. hardware and software), information characteristics, and product characteristics. Dholakia and Rego [21] investigated the factors that make commercial Web pages popular. They found that a high daily hit-rate is strongly influenced by the number of updates made to the Web site in the preceding three-month period. The number of links to other Web sites was also found to attract visitors' traffic. Lohse and Spiller [22] used a regression model to predict store traffic and sales revenues as a function of interface design features and store navigation features. The findings indicated that including additional products in the store and adding a FAQ section attract more traffic. Providing a feedback section for the customers lead to lower traffic but resulted in higher sales. Finally, they found that improved product lists significantly affected sales.

Lohse *et al.* [23] conducted a survey to determine the predictors of online buying. They found that the typical consumer leads a *wired* lifestyle and is time *starved*. Therefore, they rec-

ommended making Web sites more convenient to buy standard or repeat purchase items by providing customized information to make quick purchase decisions. The authors also stressed the need for an easy checkout process. Gehrke and Turban [24] presented the results of a literature survey indicating that the main categories for successful Website design are: page loading speed, business content, navigation efficiency, security, and marketing/customer focus. Finally, Raman and Leckenby [25] investigated the factors affecting the duration of visits to Web sites. They found that, when subjects attached utilitarian value to Web ads, they tended to spend more time at the Web site. Also, Web interaction (the degree to which consumers like and enjoy their Web browsing experience) negatively affected the duration of visit. They explained this rather unexpected result by the fact that individuals, who use the Web very often, are likely to develop efficient navigation patterns and effective search strategies than those who do not use the Web extensively. Therefore, experienced users who enjoy the Web and use it frequently are more likely to spend shorter time in Web sites.

Several conclusions can be drawn from this review of the empirical studies on online consumer behavior. First, this important area of research is still in its infancy as most of these studies were conducted in 1998 and 1999. As a result, the literature is rather fragmented and we still lack a good understanding of the factors affecting consumers' decision to buy from the Web. Butler and Peppard [26] eloquently express the need for such understanding:

*"Whether in the cyber-world or the physical world, the heart of marketing management is understanding consumers and their behavior patterns."* (p. 608)

This lack of understanding caused a wide confusion regarding what is really happening, how much potential there is, and what companies should be doing to take advantage of online shopping. As a result, commerce on the Net has turned out to be baffling, even to experienced managers and marketers [27].

Second, most of the empirical studies in this area, if not all of them, are cross-sectional. Therefore, they do not capture the essence of the dynamic online shopping phenomenon. The repeated surveys conducted by Georgia Institute of Technology's Graphics, Visualization, and Usability Center attest to the changing nature of WWW shopping over time [28]. Moreover, many researchers emphasize the need for longitudinal studies to better understand online shopping (e.g., [29], [30])

Finally, existing studies ignored several other important factors that can affect consumers' decisions to purchase from the Web. For example, the role of consumers' innovativeness has not been investigated despite its importance. Personal innovativeness was found to transform consumer actions from static, routinized purchasing to dynamic and continually changing behavior [31]. Hirschman [32] confirmed the importance of this concept by stating that:

*"Few concepts in the behavioral sciences have as much immediate relevance to consumer behavior as innovativeness. The propensities of consumers to adopt novel products, whether they are ideas, goods, or services, can play an important role of theories of brand loyalty, decision making, preference, and communication."*(p. 283)

This study attempts to remedy to the three deficiencies detected in the literature review. It enhances our understanding of the factors affecting online shopping by using a more comprehensive behavioral model and taking into consideration the important concept of personal innovativeness. Moreover, by conducting a longitudinal study, we explore the link between intentions and the actual behavior of online shopping.

### III. RESEARCH MODEL

Shopping on the Internet is a voluntary individual behavior that can be explained by behavioral theories such as the theory of reasoned action (TRA) proposed by Fishbein and Ajzen [33], the theory of planned behavior (TPB) proposed by Ajzen [34] or Triandis' [35] model. The TRA argues that behavior is preceded by intentions and that intentions are determined by the individual's attitude toward the behavior and the individual's subjective norms (i.e., social influence). The TPB extends the TRA to account for conditions where individuals do not have complete control over their behavior. It argues that perceived behavioral control (the individual's perception of his/her ability to perform the behavior) influences both intentions and behavior. Triandis' model is similar to the TPB in modeling intentions and facilitating conditions as direct antecedents of behavior. In addition, Triandis' model posits that behavior is also affected by habits and arousal. It contains aspects that are directly related to an individual (genetic factors, personality, habits, attitudes, behavioral intentions, and behavior) and others that are related to an individual's environment (culture, social situation, social norms, facilitating conditions, etc.). Although Triandis' model is more comprehensive than the TPB, several of its constructs are difficult to operationalize.

We chose to base our research model (depicted in Fig. 1) on the TPB not only because the TPB's constructs are easier to operationalize, but also because this theory has received substantial empirical support in information systems and other domains as well (e.g., [36]–[39]). We also augment the TPB with two new constructs: personal innovativeness and perceived consequences. Hence, our research model includes all the hypothesized links of the TPB as well as the new links that we would like to explore in this research. The new links represent the effects of personal innovativeness and perceived consequences. Since the TPB model is well established, we will focus our discussion on the new links.

Rogers and Shoemaker [41] and Rogers [42] conceptualize the “personal innovativeness” construct as the degree and speed of adoption of innovation by an individual. This construct has been of particular interest in innovation diffusion research in general [43], [44] and the domain of marketing in particular [45]–[47]. It has recently been applied to the domain of information technology (i.e., [48]). Personal innovativeness is a personality trait that is possessed by all individuals to a greater or lesser degree [49], as “some people characteristically adapt while others characteristically innovate” [50, p. 624]. Shopping on the Internet is an innovative behavior that is more likely to be adopted by innovators than noninnovators. It is thus important to include this construct in order to account for individual differences. Its inclusion has important implications for both

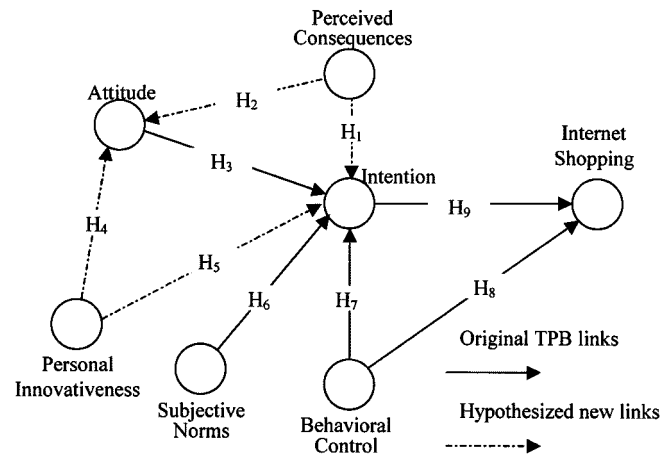


Fig. 1. Theoretical model.

theory and practice. From a theoretical perspective, the inclusion of personal innovativeness furthers our understanding of the role of personality traits in innovation adoption [51]. From the perspective of practice, the identification of individuals who are more likely to adopt online shopping can be very valuable for marketing purposes, e.g., market segmentation and targeted marketing.

We hypothesize that personal innovativeness has both direct and indirect effects, mediated by attitude, on intentions of innovation adoption. The indirect effect implies that innovative individuals are more likely to be favorable toward online shopping, which in turn affects positively their intentions to shop on the Internet. Petrof [52] specifically emphasizes the important role of personality traits in consumers' attitude formation. Personal innovativeness, being a personality characteristic [53], should hence facilitate the formation of a favorable attitude toward an innovative behavior such as online shopping. Further support for this relationship comes from Feaster [54] who considers innovativeness to be a positive attitude toward change and from Roehrich [55] who considers it as an important attitudinal dimension. The direct link between innovativeness and intentions, on the other hand, is meant to capture possible effects that are not completely mediated by attitude.

The other new links that we added to the TPB are the ones representing the potential effects of “perceived consequences.” This construct is borrowed from Triandis' [56] model. According to Triandis, each act or behavior is perceived as having a potential outcome that can be either positive or negative. An individual's choice of behavior is based on the probability that an action will provoke a specific consequence. We decided to include this construct because we are interested in identifying the specific consequences of online shopping that drive individuals to perform this behavior. The TRA and the TPB claim that beliefs such as perceived consequences are completely mediated by attitude. For this reason, Taylor and Todd [57] modeled a similar construct, perceived usefulness, as an antecedent of attitude. Triandis, on the other hand, modeled perceived consequences as a direct antecedent of intentions. We believe that perceived consequences have both direct and indirect effects on intentions, the indirect effects being mediated by attitude. An innovative individual may be favorable toward

TABLE I  
SUMMARY OF THE HYPHTHESES

Hypotheses	Description
H <sub>1</sub>	There is a positive relationship between Perceived Consequences and Intention
H <sub>2</sub>	There is a positive relationship between Perceived Consequences and Attitude
H <sub>3</sub>	There is a positive relationship between Attitude and Intention
H <sub>4</sub>	There is a positive relationship between Personal Innovativeness and Attitude
H <sub>5</sub>	There is a positive relationship between Personal Innovativeness and Intention
H <sub>6</sub>	There is a positive relationship between Subjective Norms and Intention
H <sub>7</sub>	There is a positive relationship between Behavioral Control and Intention
H <sub>8</sub>	There is a positive relationship between Behavioral Control and Internet Shopping
H <sub>9</sub>	There is a positive relationship between Intention and Internet Shopping

online shopping, but will not adopt it if he/she perceives some important negative consequences. This view is consistent with the technology acceptance model [58], which posits perceived usefulness as an antecedent to both attitude and intentions. Table I summarizes all the hypotheses investigated in this study.

#### IV. METHODOLOGY

The research methodology consisted of three stages:

- 1) belief elicitation,
- 2) survey of intentions and beliefs, and
- 3) survey of behavior (online shopping).

The purpose of the first stage is to elicit beliefs regarding the consequences of online shopping, subjective norms (social factors) influencing such behavior, as well as behavioral control (i.e., self-efficacy and facilitating conditions). The elicited beliefs were used to develop the measurement models of these constructs. A survey instrument was then constructed, pre-tested and validated in a longitudinal study consisting of stages 2 and 3. The first survey was aimed at testing the links explaining intention, while the second one focused on the links explaining behavior and was administered three months after the first survey. We assumed that three months would be sufficient for individuals to act on their intentions, as several statistics show that most online shoppers buy at least once each month. The findings of the tenth survey conducted by the Graphics, Visualization and Usability (GVU) Center at Georgia Tech on October 1998, for example, showed that the frequency of purchasing online varies from less than once each month to several times each week [59]. The same survey found that 85.7% of the respondents searched the Web with the intention to buy at least once each month.

1) *Belief Elicitation*: The belief elicitation was done through a questionnaire and focus groups involving a total of 177 consumers chosen randomly from the targeted population. Such a procedure guarantees a more salient and relevant set specific to the population being studied. The subjects were asked to perform three tasks:

- 1) to specify possible consequences, both positive and negative, of online shopping;
- 2) to enumerate conditions that would facilitate the act of online shopping; and
- 3) to identify the social factors that would influence such a behavior (subjective norms).

The purpose of the belief elicitation was to complete a list of formative items measuring the “perceived consequences,” “behavioral control,” and “subjective norms” constructs that were initially compiled from the literature. Chin and Gopal [60] urged researchers to consider whether the items form the “emergent” first-order factor or constitute reflective, congeneric indicators tapping into a “latent” first-order factor. Although, we could have used reflective items validated in previous studies, we opted for formative measures in order to gain a better understanding of the specific consequences, social factors and facilitating conditions that affect intentions and subsequently online shopping. The resulting items are described in Appendix A.

*Survey 1*: The first survey was aimed at measuring intentions of online shopping, attitudes, personal innovativeness, perceived consequences, subjective norms, and behavioral control. 6110 consumers were chosen randomly from four Internet-Based directories and solicited to participate in this study. Table II presents a list of these directories. We did not use the postal service as the means of distribution, instead we relied on an Internet-based survey administration system. This method consisted of e-mailing the potential participants a message introducing the survey and directing them to a private WWW address containing the survey. Once the person has completed the questionnaire, the responses were automatically sent to a database. Pitkow and Recker [61] present all the advantage of this surveying method.

The respondents were told that they would be asked to answer a second questionnaire in three months time and that in order to match the first questionnaire with the second one they had to specify the last five digits of their phone number. This method allowed us to keep the survey anonymous while being able to

TABLE II  
INTERNET DIRECTORIES USED IN THIS STUDY

Directory Address	Number of Addresses randomly selected
<a href="http://www.globetrotter.net/gt/coin/bottin.asp">http://www.globetrotter.net/gt/coin/bottin.asp</a>	3662
<a href="http://www.utexas.edu/world/personal/">http://www.utexas.edu/world/personal/</a>	1874
<a href="http://www.lespac.com/">http://www.lespac.com/</a>	521
<a href="http://www.reseaubec.com/">http://www.reseaubec.com/</a>	53
Number of individuals contacted : 6110	
Number of individuals who answered the first questionnaire: 1410	
Number of individuals who answered both questionnaires : 705	
Response Rate : 11.5%	

match the answers of the same individual. A total of 1410 answered the first survey.

*Survey 2:* An e-mail message was sent to all the 6110 consumers originally selected to participate in this study, urging those who responded to the first questionnaire to answer the second one. This second questionnaire included only one question intended to measure the level of online shopping done by the respondents since answering the first questionnaire. Only 705 of those who responded in the first round returned the second questionnaire (as indicated by the last four digits of their phone numbers). Table III describes the demographic profile of the respondents.

#### A. Measures

To insure measurement reliability while operationalizing our research constructs, we tried to choose those items that had been validated in previous research. This was possible for all reflective items. Specifically, the instrument developed and validated by Hurt *et al.* [62] was used to measure personal innovativeness. Attitudes, Intentions and actual behavior were assessed using measures adapted from previous TPB studies (e.g., [63]–[67]). Subjective norms, perceived consequences and behavioral control were measured with formative items resulting from the belief elicitation and complemented by our review of the relevant literature.

According to Ajzen [68] the construct of perceived behavioral control reflects beliefs regarding the availability of resources and opportunities for performing the behavior as well as the existence of internal/external factors that may impede the behavior. Hence, we agree with Taylor and Todd's [69] decomposition of perceived behavioral control into "facilitating conditions" [70] and the internal notion of individual "self-efficacy" [71]. Self-efficacy was assessed with one formative measure evaluating the ability of an individual to navigate on the Web. Facilitating conditions were measured with five other formative measures. As explained earlier, the usage of formative items was intentional, as it allowed us to identify the specific behavioral control factors, perceived consequences, and subjective norms factors that drove intentions and the act of online shopping. All items, both reflective and formative, and their measurement scales are in Appendix A.

TABLE III  
DEMOGRAPHICS

Category	Percentage (%)
Age	
Less than 20 years	10
20 – 35 years	49
35 – 50 years	23
Greater than 50 years	16
Missing values	2
Education	
Bachelor	37
Master	18
Ph.D.	10
Others	32
Missing values	3
Annual Income	
Less than 20,000 USD	27
20,000 – 35,000 USD	24
35,000 – 50,000 USD	21
Greater than 20,000 USD	19
Missing values	9
Number of Purchase within 3 Months	
None	26
1 – 5 purchase(s)	36
5 – 10 purchases	16
10 – 15 purchases	6
15 – 20 purchases	2
Over 20 purchases	8
Missing values	6

#### B. Data Analysis

The analysis of the data was done in a holistic manner using partial least squares (PLS). The PLS procedure [72] has been gaining interest and use among researchers in recent years because of its ability to model latent constructs under conditions of nonnormality and small to medium sample sizes [73]–[75]. It allows the researchers to both specify the relationships among the conceptual factors of interest and the measures underlying each construct. The result of such a procedure is a simultaneous analysis of 1) how well the measures relate to each construct and 2) whether the hypothesized relationships at the theoretical level are empirically confirmed. This ability to include multiple measures for each construct also provides more accurate estimates of the paths among constructs which is typically biased downward by measurement error when using techniques such as multiple regression. Furthermore, due to the formative nature of some of the measures used (discussed below) and nonnormality of the data, LISREL analysis was not appropriate [76]. Thus, PLS-Graph version 2.91.02 [77] was used to perform the analysis. Tests of significance for all paths were conducted using the bootstrap resampling procedure [78]. For reflective measures, all items are viewed as parallel measures capturing the same construct of interests. Thus, the standard approach for evaluation, where all path loadings from construct to measures are expected to be strong (i.e., 0.70 or higher), is used. In the case of formative measures, all item measures can be independent of one another since they are viewed as items that create the "emergent factor." Thus, high loadings are not necessarily true and reliability assessments such as Cronbach's alpha are not applicable. Under this situation, Chin [79] suggests that the weights of each item be used to assess how much it contributes to the overall factor. For the reflective measures, rather than using

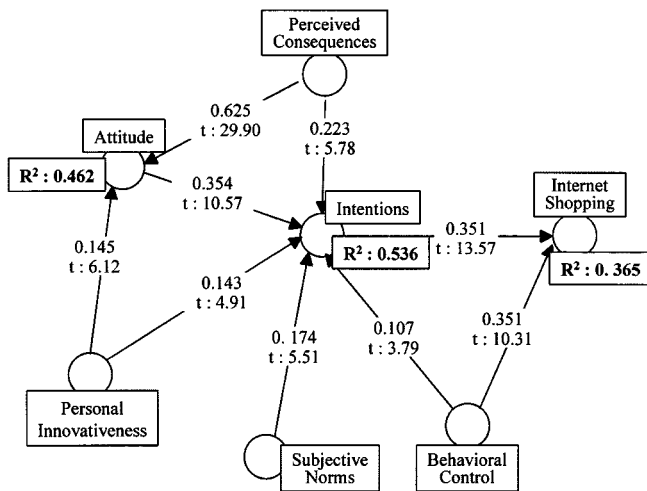


Fig. 2. Results.

Cronbach's alpha, which represents a lower bound estimate of internal consistency due to its assumption of equal weightings of items, a better estimate can be gained using the composite reliability formula [80].

## V. RESULTS

Fig. 2 provides the results of testing the structural links of the proposed research model using PLS analysis. The estimated path effects (standardized) are given along with the associated t-value. All path coefficients are significant at the 99% significance level providing strong support for all the hypothesized relationships. These results represent yet another confirmation of the appropriateness of the TPB for explaining voluntary individual behavior in general and a strong indication of its applicability to online shopping in particular. The results also provide strong support for the new links added to the TPB representing the effects of personal innovativeness and perceived consequences.

The effects of the two antecedents of online shopping (i.e., intentions and behavioral control) accounted for over 36% of the variance in this variable. Behavioral control and intentions had equally important effects, with similar path coefficients (0.35 for both). This represents an indication of the importance of self-efficacy and facilitating conditions in encouraging individuals to act on their intention to shop on the Internet.

The effects of the five antecedents of intentions (i.e., perceived consequences, attitude, personal innovativeness, subjective norms and behavioral control) accounted for over 53% of the variance in this variable. This is an indication of the good explanatory power of the model for intentions. Attitude had the strongest effect with a path coefficient of 0.35 emphasizing the important role of an individual's attitude in driving his/her intentions toward online shopping.

The significance of the effects of innovativeness and perceived consequences indicates the importance of these two constructs in shaping attitude and intentions. Perceived consequences had a strong effect on attitude with a path coefficient of 0.62 and relatively weaker (though significant) effect on

intentions with a path coefficient of 0.22. Personal innovativeness had equally important effects on attitude and intentions with similar path coefficients (0.143 for the link with intentions and 0.145 for the link with attitude). These results indicate that an important part of the effects of both personal innovativeness and perceived consequences is mediated by attitude. In fact, over 46% of the variance in attitude is explained by personal innovativeness and perceived consequences.

Table IV provides information concerning the weights and loadings of the measures to their respective constructs. As discussed earlier, weights should be interpreted for formative measure while loadings for reflective. For all constructs with multiple reflective measures, all items have reasonably high loadings (i.e., above 0.70) with the majority above 0.80 therefore demonstrating convergent validity. Furthermore, all reflective measures were found to be significant ( $p < 0.01$ ).

In the case of formative measures, all items for behavioral control, two out of three items for subjective norms (social influence) and five out of seven items for perceived consequences were found to contribute significantly to the formation of their respective construct.

For subjective norms, while media and family influences were significant, friends' influence did not make a difference. The influence of the media had a considerable weight of 0.67 as compared to only 0.35 for family influence. For perceived consequences, the items that did not make a difference included: risk of privacy violation and improved convenience of shopping. All other items, i.e., cheaper prices, risk of security breach, comparative shopping, better customer service and saving time were significant with cheaper prices and risk of security breach having the most important weights (0.59 and  $-0.52$ , respectively). For behavioral control, all items, i.e., ability to navigate the Internet, site accessibility, web page loading speed, navigation efficiency, product description, and transaction efficiency were significant with site accessibility and transaction efficiency having the most important weights (0.51 and 0.47, respectively).

## VI. DISCUSSION

The purpose of this study was to use and refine TPB in order to investigate factors that motivate online shopping. The findings present a strong support to the existing theoretical links of TPB as well as to the ones that were newly hypothesized in this study. Specifically, we found that intentions and behavioral control equally influence online shopping behavior. Therefore, we caution researchers not to stop their investigation at intention, assuming that behavior will automatically follow. We believe that significant theoretical and practical contributions can be made by investigating the antecedents of behavior. Similarly, assuming that intentions alone lead to behavior could be misleading. Our study shows that behavioral control (e.g., self-efficacy and facilitating conditions) is as important as intentions in influencing online shopping behavior.

The results show also that attitude toward online shopping had the strongest effect on the intentions to shop online. Therefore, it becomes essential to examine the factors affecting attitude formation. This study sheds some light on the antecedents of attitude toward online shopping. Precisely, the results indicate

TABLE IV  
CONSTRUCT WEIGHTS AND LOADINGS

Factor	Variable	Weight	Loading	st. error	t-value
Online shopping	Number of purchases		1.0000	0.0000	0.0000
Intentions	Intentions 1		0.9466	0.0060	158.7837
	Intentions 2		0.9414	0.0083	113.8120
	Intentions 3		0.9678	0.0030	325.5648
Attitude	Attitude 1		0.8403	0.0114	73.4322
	Attitude 2		0.7641	0.0215	35.4581
	Attitude 3		0.8085	0.0185	43.8042
	Attitude 4		0.8537	0.0097	88.1408
Personal Innovativeness	Personal innovativeness 1		0.8084	0.0208	38.8217
	Personal innovativeness 2		0.8087	0.0226	35.8231
	Personal innovativeness 3		0.8775	0.0102	86.0044
	Personal innovativeness 4		0.7286	0.0277	26.3008
Behavioral Control	Site accessibility	0.5143		0.0674	7.6288
	Web page loading speed	0.2530		0.0588	4.3025
	Ability to navigate on the Web	0.1451		0.0665	2.1812
	Product description	0.3142		0.0592	5.3032
	Transaction efficiency	0.4754		0.0655	7.2531
	Navigation efficiency	0.2068		0.0592	3.4953
Subjective norms	Family influence	0.3550		0.0988	3.5924
	Media influence	0.6750		0.0915	7.3810
	Friends' influence	0.1044		0.0975	1.0704 ns
Perceived Consequences	Cheaper prices	0.5951		0.0347	17.1279
	Risk of security breach	-0.5258		0.0362	14.5220
	Comparative shopping	0.0646		0.0381	1.6963
	Convenient shopping	0.0554		0.0568	0.9747 ns
	Risk of privacy violation	-0.0456		0.0478	0.9539 ns
	Improved customer service	0.1101		0.0452	2.4334
	Saving time	0.1447		0.0446	3.2446

that perceived consequences and personal innovativeness explain as much as 46% of the variance in attitudes toward online shopping. It was found that personal innovativeness has both direct and indirect effects, mediated by attitude, on intentions of online shopping. Therefore, innovative consumers are more likely to be favorable toward online shopping. These consumers represent a key market segment that many marketers should identify and profile for several reasons. First, sales to early online buyers constitute a positive cash flow for the company eager to quickly recover the expenses of selling online. Early adopters may be also heavy users in many product fields [81]. Second, successful sales to innovators could result in online market leadership and may even raise barriers to entry making it harder for other competitors to enter the same cyber market. Third, the innovative online buyers can provide useful feedback to the company about the whole online purchasing experience, highlighting deficiencies or suggesting improvements. Finally, the online innovative buyers can help promote the Web site to other Internet users. It is becoming common to see many online buyers linking their favorite cyber stores to their personal Web pages.

Similar to personal innovativeness, perceived consequences were found to significantly affect attitude and intentions to shop online. As indicated by the weight of its formative measure (see Table IV), paying cheaper prices appears to be the most important perceived consequence of online shopping. Therefore, companies should convert the savings in the operational costs resulting from electronic commerce to the consumers.

They should also offer discounts, coupons, and other incentives [82]. Moreover, results show that security breaches continue to constitute an important negative perceived consequence of online shopping, confirming findings in earlier studies such as Gehrke and Turban [83] and Ho and Wu [83]. Even though Internet security is now more a psychological than a financial or a technological problem [85], nervous online shoppers must be reassured that the transactions are protected [86]. Web designers and marketers should implement security measures such as encryptions, Secure Sockets Layer (SSL), and secure payment systems. They should also publicize to potential online shoppers their own security policies. For instance, adding the statement "Secure Server" can increase customers' confidence [87].

The results also indicated that the "possibility of saving time" was also an important perceived consequence of online shopping. Bellman *et al.* (Forthcoming) found that the amount of discretionary time available to shoppers is an important predictor of online buying. If the checkout process, for example, is more complicated than necessary, customers might get frustrated and the sales can be easily lost [88]. Thus, web designers should make it easy and quick for online shoppers to review and empty all or part of the content of the shopping cart. The use of consistent menus to allow online customers to review and change the content of the shopping cart from all the pages of the site is highly recommended [89].

Improved customer service was also found to be a significant perceived consequence of online shopping. Customer service



and support should cover pre-purchase interactions, purchase, and post-purchase activities. Rhee and Riggins [90] found that consumers with online purchasing experiences believe that web-based businesses support all these three phases. However, users who only seek information about products and services do not regard web-based business as supporting their informational needs. Jarvenpaa and Todd [91] found that 80% had at least one negative comment about online customer services. Offering guarantees and warranties is an effective way of improving online shopping customer service and makes commercial web pages popular [92]. Lohsee and Spiller [93] found that adding a frequently asked questions (FAQ) section about the company and its products was associated with more cyberstore traffic and higher sales.

Finally, the last perceived consequence that was found to be significant in this study is “comparative shopping.” This is consistent with Rowley’s [94] argument that most customers expect to be able to compare available products and their prices from a variety of different online stores. Therefore, web designers should allow online shoppers to easily select attributes to compare between the company’s products and other competing brands. Dholakia and Rego [95] argue that showing the specific advantages of the company’s product is an important indication of the quality of the information content of commercial web pages.

The link between behavioral control and online shopping behavior was significant. Self-efficacy, as assessed by a formative measure indicating the ability to navigate on the web, was significant. This result was expected since online shopping is only possible for consumers who are able to use the web. Several facilitating conditions were also significant. First, site accessibility turned out to be the most important factor facilitating online shopping. As shown in Table IV, this formative measure had the highest weight compared to all other facilitating conditions. This result is consistent with the findings of Lohse and Spiller [96] indicating that promotion of web sites generated traffic and sales. They also found that a higher number of “store entrances” lead to an increase of the number of web site visitors and produced higher sales. Moreover, Dholakia and Rego [97] found that the number of links to a commercial home page from other web sites resulted in a significant increase of its daily hit-rate. Marketers can promote their business web sites by including their links in other cybermalls, by negotiating reciprocal links with other commercial web sites, and by submitting the web site addresses to important search engines.

The second facilitating condition that was significant is a reasonable web site loading speed. This results confirmed the findings of the multiple surveys conducted by the Graphics, Visualization and Usability (GVU) Center at Georgia Tech which have consistently shown that slow loading speed is one of the major complaints of web shoppers [98]. Gehrke and Turban [99] urge web designers to keep site loading speed to a minimum by keeping graphics simple and meaningful, limiting the use of unnecessary animation and multimedia plug-in requirements, using thumbnails, providing a “text-only” option, continuously monitoring the server and the Internet routes, and finally allowing text to load first followed by graphics.

The third significant facilitating condition was “good product description.” Lohse and Spiller [100] found that improved

product lists had an important impact on sales. They recommend including product pictures to supplement these lists. Ho and Wu [101] also found that valuable and accurate product descriptions lead to higher online customers’ satisfaction. In short, getting the right product information motivates the consumer to act. Providing and managing such information with clear and concise text coupled with appropriate pictures is essential and constitutes the primary role of the web designers and the marketers.

The fourth formative measure that was a significant facilitating condition was “transaction efficiency.” This result is consistent with the finding of Ho and Wu [102] indicating that the quality of the logical support during online transactions leads to higher customer satisfaction. In addition to the fast retrieval of information and the ease of the payment discussed earlier, web designers and marketers should not forget the delivery component of the transactions. Prompt delivery of the merchandise is also very important to online customers’ perceptions [103].

The final facilitating condition that was found to be significant was the navigation efficiency. Many authors emphasize the importance of this factor. Lohse and Spiller [104], for example, urged web designers to carefully think of their online store layout in order to facilitate navigation. They found that product list navigation alone explained as much as 61% of sales and 7% of the traffic. They illustrate the importance of efficient navigation by citing several comments from frustrated consumers such as “this is not for computer illiterate people” and “I had places I wanted to go but couldn’t understand how.” Hyperlinks facilitate the access to relevant information and help users drill down to more details if needed. These links should be well labeled, consistent, and accurate (not broken). A commercial site with many underlying links should provide a map site and an effective search engine in the site itself [105].

The final result that is worth discussing is the significant link between subjective norms and intentions to shop online. Kraut *et al.* [106] also found that individuals use the Internet more if they have a more socially supportive environment, including friends and relatives who are also Internet users. What is new in this study is that, in addition to the importance of the family influence, the media turned out to be a significant social factor influencing intentions to shop online. Therefore, online businesses should promote their sites on the radio and TV, as well as in newspapers and trade journals.

## VII. CONCLUSION

The purpose of this study was to investigate the factors affecting online shopping intentions and behavior. The overall results indicate that the Theory of Planned Behavior provides a good understanding of these factors. Coupling belief elicitation with prior research allowed us to obtain a salient set of formative measures that resulted in interesting practical implications for web designers and marketers about the critical drivers of behavioral control, subjective norms, and perceived consequences of online shopping. The results also show strong support for the importance of considering the personal innovativeness construct in the online shopping context. The use of a longitudinal approach toward data acquisition provided a stronger causal understanding of the factors affecting online shopping intentions

and behavior. Nonetheless, approximately 64% of the variance in this behavior remain unexplained. Future research should use more elaborate models incorporating additional antecedent factors beyond intentions and behavioral control.

This study, like all others, is not without its limitations. It is important to recognize that online shopping behavior was self-reported and was assessed only once, three months from the time intentions were measured. Moreover, we did not evaluate the breadth of this behavior (i.e., the variety of products bought) or its change over time. We realize that it is important for businesses to sell but what is probably more important is to retain their customers for repeated purchases. Future research should use actual measures of online shopping behavior and assess the number of purchases as well as the number of products bought over time.

APPENDIX A  
MEASURES

All items used the following response scale (shown at the bottom of the page).

1) *Subjective Norms*: In the belief elicitation phase, the subjects identified three specific social factors that are likely to influence their online shopping intentions and behavior. These were “family,” “media” and “friends.” A Likert-type scale with five levels (1 = Strongly disagree to 5 = Strongly agree) was used for these three formative items.

For each of the following statements, please answer by an X in the box that best represents your level of agreement or disagreement.

- The members of my family (e.g., parents, spouse, children) think that I should make purchases through the Web
- The media frequently suggest to us to make purchases through the Web
- My friends think that I should make purchases through the Web

2) *Attitude*: Four reflective items were used to measure the respondents’ attitude toward online shopping. A Likert-type scale with five levels (1 = Strongly disagree to 5 = Strongly agree) was employed.

For each of the following, please answer by an X in the box that best represents your level of agreement or disagreement.

- Attitude 1. Online shopping is a good idea.
- Attitude 2. I like to shop through the Web.
- Attitude 3. Purchasing through the Web is enjoyable.
- Attitude 4. Online shopping is exciting.

3) *Intentions*: Three reflective items measuring the intention of the respondent to shop through the Web in the near future were used. A Likert-type scale with five levels (1 = Strongly disagree to 5 = Strongly agree) was employed.

For each of the following, please answer by an X in the box that best represents your level of agreement or disagreement.

- Intention 1: I intend to purchase through the Web in the near future (i.e., next three months).
- Intention 2: It is likely that I will purchase through the Web in the near future.
- Intention 3: I expect to purchase through the Web in the near future (i.e., next three months).

4) *Perceived Consequences*: A total of seven important consequences of online shopping for the consumer were identified from the literature and the belief elicitation. A Likert-type scale with five levels (1 = Strongly disagree to 5 = Strongly agree) was used for all these formative items.

For each of the following statements, please answer by an X in the box that best represents your level of agreement or disagreement.

- Purchasing through the Web allows me to save money, as I can buy the same or similar products at cheaper prices than regular stores.
- Shopping on the Web is more convenient than regular shopping, as I can do it anytime and anywhere.
- Buying on the Internet facilitates comparative shopping, as I can easily compare alternative products according to several attributes online.
- Security breach is a major problem for purchasing through the Web.
- I can get a better service (pre-sale, sale and post-sale) from Internet stores than from regular stores.
- I can save time by shopping through the Web.
- Privacy violation is a major problem for purchasing through the Web.

5) *Behavioral Control*: Six items representing both self-efficacy and facilitating conditions were identified from the literature and the belief elicitation. A Likert-type scale with five levels (1 = Strongly disagree to 5 = Strongly agree) was used for all of these formative items.

For each of the following statements, please answer by an X in the box that best represents your level of agreement or disagreement.

- I am able to navigate on the Web without any help.
- The loading speed of the Web pages of the Internet stores where I usually shop (or will shop) is (will be) appropriate.
- The Web sites of the Internet stores where I usually shop (or will shop) are (will be) easily accessible, e.g., through search engines, cyber malls, and Web ads.
- Products of the Internet stores where I usually shop (or will shop) are (will be) well described, e.g., appropriate information and pictures.

Strongly	Disagree	Neutral	Agree	Strongly
Disagree				Agree

- The Web sites of the Internet stores where I usually shop (or will shop) are (will be) easy to navigate.
- Transaction processing in Internet stores where I usually shop (or will shop) are (will be) efficient, e.g., fast retrieval of information and payment processing and delivery.

6) *Personal Innovativeness*: This scale was adapted from the instrument developed and validated by Hurt *et al.* 1977). A Likert-type scale with five levels (1 = Strongly disagree to 5 = Strongly agree) was used to measure four reflective items.

For each of the following, please answer by an X in the box that best represents your level of agreement or disagreement.

Innovativeness 1. I am generally cautious about accepting new ideas.

Innovativeness 2. I find it stimulating to be original in my thinking and behavior.

Innovativeness 3. I am challenged by ambiguities and unsolved problems.

Innovativeness 4. I must see other people using innovations before I will consider them.

7) *Online shopping behavior*: This construct was measured by a single item representing the number of purchases that the respondents did through the Web since the first survey.

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