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Factors influencing consumers' adoption of electronic shopping: findings from a meta-analysis

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ABSTRACT

E-commerce has significantly reshaped consumers' shopping processes and habits. The need to understand the key drivers of online shopping adoption has received a noticeable attention and fueled a rich strand of studies. The purpose of this research is to summarize this growing volume of evidence through the first comprehensive meta-analysis on the antecedent factors of e-commerce acceptance, to derive actionable insights for managers and researchers. The study draws upon the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), which have been broadly validated in e-commerce literature, and integrates them with relevant constructs that support the integration of cross-disciplinary studies in the online shopping environment. Three dependent variables (attitude toward online shopping, purchase intention, purchase behavior) and eighteen antecedent factors classified into four categories (perceived channel characteristics, website characteristics, social influence, consumer characteristics) are included in the proposed framework. 1,710 effect sizes across 183 studies on a total sample size of 671,689 shoppers are synthetized.

The study explicitly clarified several key contributions to the understanding of the dynamics of adoption of online shopping. Results suggest that all subsets of predictors are strongly related to attitude and purchase intention while a reduced number of antecedent factors displays a significant impact on purchase behavior. Meta-analytic structural equation modeling is used to test the theoretical framework that adds to the understanding of the dominant drivers of adoption. Furthermore, moderator analysis is carried out. Implications for online shopping research and practice, and an agenda for future research are finally presented.

Keywords: E-commerce, electronic shopping, online shopping, adoption, drivers, consumer behavior, meta-analysis

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INTRODUCTION

During the last two decades, Information and Communication Technologies (ICT) has evolved dramatically and revolutionized the ground rules of businesses in many industries. Among various impacts of ICT, the Internet and its impact on marketing channels has received unprecedented interests. E-commerce has transformed the whole shopping experience, with a significant and rising growth rate in online retail sales, which is expected to reach 17.5% by 2021. However, there are many challenges that must be overcome, if online shopping is to reach its full potential. In particular, several unresolved issues still remain in the understanding of consumers online shopping behaviors. Chapter 1 elaborates on these research gaps to present the research objective and contributions. The purpose is to synthetize the abundance of accumulated empirical findings on the antecedent factors of online shopping adoption through a meta-analytic review. An integration across different disciplines is pursued and a new conceptual model is developed and tested, to establish the generalizability of the predictors-outcome variables relationships. Eighteen antecedents, classified within four categories (perceived channel characteristics, website characteristics, social influence and consumer characteristics) and three dependent variables that encapsulate consumer adoption of online shopping (attitude towards online shopping, purchase intention, purchase behavior) are investigated. The meta-analytic technique is chosen as appropriate to systematically and quantitatively examining this body of existing research. The chapter introduces to the e-commerce phenomenon and adoption of electronic commerce by consumers through a brief literature review and further presents the research architecture and key terms.

Chapter 2 adds to the conceptual background depicted in the previous chapter with a comprehensive overview of literature pertaining to the drivers of consumers' adoption of electronic shopping. The theoretical foundation of this study consists of the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), as the two theories has been widely applied, validated and referred to in the primary studies and they have shed light on the understanding of antecedent factors of adoption since the formative years of e-commerce. Drawing upon different theories, fourteen additional determinants related frequently enough ($n \geq 5$) to the most studied outcome variable, i.e., purchase intention, are identified and included in the research framework presented. Such an extension is essential to foster the predictive power of the model and to capture the intricate and interdisciplinary nature of the study of online buying behaviors. In total, eighteen antecedent factors and their relationships with three outcome variables are investigated, framing them in the following taxonomy: perceived channel characteristics, website characteristics, social influence and consumer characteristics. Finally, specific hypotheses are formulated.

Chapter 3 provides an overview of the meta-analytic procedures utilized and describes the decision points faced in data analysis. After presenting the rationale, highlights and limitations of the selected methodology, the following steps of meta-analysis are discussed: data collection and coding, computation of bivariate correlation coefficients, moderator analysis and meta-analytic structural equation modeling. In the data collection and coding stage, sources, search strategies, criteria of inclusion and coding process are described. The final database contains 146 articles, with 183 studies, 1,710 effect sizes on 210 relationships, a total sample size of 671,689 shoppers and timespan 1999-2017. Given the complex data structure and the dependent nature of the effect sizes, multivariate techniques are then adapted. Bivariate correlation coefficients are first computed, using a hierarchical random-effects model for each pair of constructs. Heterogeneity and publication bias are assessed employing the pertinent statistics. As high heterogeneity for most of the investigated relations is detected, a series of meta-regressions are conducted to test moderation effects through a hierarchical mixed-effects model. Finally, a baseline and extended model are tested using meta-analytic structural equation modeling (MASEM).

Chapter 4 and 5 present the findings, discuss the implications for theory and practice and end with limitations and directions for future research. Insights from the first stage of analysis reveal the difference in magnitude and significance of the antecedent factors across the dimensions of attitude, purchase intention and purchase behavior, meaning that managers can leverage different variables for diverse yet intertwined goals. Moreover, the technological perspective is important but not exhaustive. The moderator analysis shows how the type of dependent variable consistently explains a significant amount of the variance and few other remarkable patterns, specifically related to e-service and international delivery, and to the use of students' samples. Finally, building on and mirroring the results of the meta-analytic bivariate correlations, the structural equation models enrich the analysis providing an overall view of the most important antecedent factors and their relations with the dependent variables, deriving a model conceptualization not tested in any primary study.

In summary, this research makes important contributions to the understanding of the dynamics of adoption of online shopping, revealing the different impact of predictors on attitude, purchase intention and behavior. Overall, the findings may inspire marketing researchers to continue expanding knowledge of online shopping behavior in new directions and may benefit practitioners in marketing products and services online.

CHAPTER 1

FROM PHYSICAL TO DIGITAL: E-COMMERCE INCEPTION AND EVOLUTION

Conceptual Background

Electronic Commerce Literature

There is no doubt about the revolutionary impact of Information and Communication Technologies (ICT) and digital connectivity on the ground rules of businesses and on the global consumer behavior in the past two decades (Jarvenpaa and Todd, 1996; Doherty and Ellis-Chadwick, 2006, 2010; Leeflang et al., 2014, Nielsen, November 2018). The need to systematize this new topic from a theoretical perspective has received the deserved attention and fueled a rich strand of studies. In particular, the Internet's World Wide Web as a strategic information technology and its use in marketing have been investigated with unprecedented interest.

The most notable impact of the Internet is the one on marketing channels, representing a new and revolutionary sales channel and thus changing the whole retail experience and consumer habits (Jarvenpaa and Todd, 1996; Alba et al., 1997; Peterson et al., 1997; Doherty and Ellis-Chadwick, 2006, 2010; Rigby, 2011; Leeflang et al., 2014). Rigby (2011) postulates a shift of paradigm in the world of retailing, like others waves of change that reshaped the retailing landscape every fifty years or so. Indeed, the unique characteristics of the Internet such as easy and illimited access, flexibility, speed, enhanced interactivity, ability to communicate large amounts of information, cost efficiency and the potential for global connectivity provide companies with the capability to transform consumers' shopping experience (Basu and Muylle, 2003; Evanschitzky et al., 2004; Doherty and Ellis-Chadwick, 2006, 2010). As a flexible new retail channel, Internet enables to provide a vast amount of information, facilitate two-way interactive communication with customers, promote and sell goods and services and collect market research data, thus addressing individual consumers (Doherty and Ellis-Chadwick, 2006, 2010).

Given its potential to reconfigure business processes and its highly innovative nature, electronic commerce has attracted great consideration and the engagement of academics, managers and the popular press, since its inception in the 1990s (Wareham et al., 2005; Doherty and Ellis-Chadwick, 2006, 2010). The emerging body of literature has sought to investigate the growth, nature and impacts of Internet retailing and web marketing and is extremely extensive and diverse, having technical, logistical, commercial, strategic, behavioral, social and legal implications and thus addressing a broad variety of themes and disciplines. Moreover, whereas the media focus on electronic commerce seems to rise and fall with the dot.com boom and failures, academic research

has tracked the evolution of the phenomenon and many related journals have been published (Wareham et al., 2005).

According to the definition provided by OECD an e-commerce transaction is:

> *"The sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or services do not have to be conducted online. An e-commerce transaction can be between enterprises, households, individuals, governments, and other public or private organisations. To be included are orders made over the web, extranet or electronic data interchange. The type is defined by the method of placing the order. To be excluded are orders made by telephone calls, facsimile or manually typed e-mail."*

In this work a narrower definition is considered, including only business-to-consumer (B2C) transactions. Furthermore, terms "electronic commerce", "online shopping", "Internet retailing", "Internet shopping" are used interchangeably as it is in the literature.

The emergence of B2C Internet retailing date back to the mid-1990s with the first attempts of some innovative companies to trade online. However, its advent had been predicted by Doddy and Davidson in 1967, who described a scenario where consumers use computer terminals to order their goods directly from a central distribution facility, noting the implications for marketing channels, advertising and packaging. When this vision became a reality, the ability of the Internet to reshape the retailing world and its immediate advantages – i.e., global reach, ease of access, interactivity, no constrictions of location or time, ability to communicate large amounts of information, cost efficiency – where immediately recognized and triggered the explosion of the activity and the above-mentioned interest by the press, business people and academics. The potential for a multilateral communication and interactions, its impact on advertising, marketing research and traditional marketing channels and the revenue generation prospective for companies were all debated topics (Burke et al., 1992; Lanham, 1993; Ainscough, 1996; Berthon et al., 1996; Burke, 1996; Hoffman and Novak, 1996; Urban et al., 1996, 1997; Alba et al., 1997; Peterson et al., 1997; Jones and Vijayasarathy, 1998).

Peterson et al. (1997) examined the implications of the Internet on consumer marketing and behavior, defining it as a "market discontinuity" whose impacts are not easily predictable. Their aim was to provide a framework for future analyses and predictions and to discuss two popular issues at that time: disintermediation and price competition. They predicted that, eventually, most of the revenues generated through the Internet would originate by selling more to existing customers and by attracting new ones. Alba et al. (1997) discussed the impacts of interactive home shopping on the

distribution channel members' behavior. Advantages for consumers were identified mostly in terms of information acquisition such as the availability of a vast number of alternatives, screening capacity and enhanced information quantity and quality. Benefits for retailers consist of distribution efficiency, assortments of complementary merchandise, collection and utilization of customer information, presentation of information and the ability to offer unique merchandise. Implications for retail industry were examined, such as the impact on competition with catalog and store-based retailer, the disintermediation phenomenon and implications for branding. Hoffman and Novak (1996) introduced a new model of communication for hypermedia computer-mediated environments, applying the concept of flow as a crucial component in consumer-firm interactions on the Web. In this emerging media environment, new bases for market segmentation and a new approach to consumer-oriented marketing are crucial elements for firms to succeed. Similarly, Rayport and Sviokla (1995) discussed the implications for businesses, exploring the concept of the virtual value chain. As every business competes both in a physical world of resources and in a virtual world made of information, managers need to create and extract value with information along the virtual value chain. Finally, an important work considering the consumer perspective is the one of Jarvenpaa and Todd (1996). Through an open-ended survey of two hundred and twenty shoppers they identified factors affecting online shopping behavior from the literature on retail patronage decisions in traditional channels, grouping them in four categories: product perceptions, shopping experience, customer service and perceived consumer risk.

Even though the tone of the literature was positive, significant barriers and drawbacks were also discussed. Jones and Vijayasarathy (1998) empirical investigation, which primary aimed at exploring differences in individuals' perceptions of Internet catalog shopping and more traditional print catalog shopping, highlighted some unfavorable feelings of Internet security. Consumers in their sample worried about misuse of credit card numbers and questioned the legitimacy of some Internet businesses. The authors also noted that Internet security had received a disproportionate amount of coverage in the popular press primarily because of the huge public interest generated by the rapid growth of the Internet. In a similar vein, Peterson et al. (1997) recognized transaction security and privacy as high-profile issues. According to the authors, transaction security was a minor concern, resolvable in the short terms thanks to innovations in authentication and payment technologies. Indeed, advances in encryption and payment systems, established brand names and initiatives to promote safety and legitimacy could have mitigated the problem. A more complicated matter involved network privacy and the willingness of consumers to share information, that requires a government intervention. Their assumption was that the issue will be resolved in the short term. However, privacy and data rights are still main issues to date, with data protection law

currently failing to protect data subjects from the novel risks of inferential analytics (Wachter and Mittelstadt, 2019).

A useful review about early predictions on electronic commerce can be found in Doherty and Ellis-Chadwick (2010), who identifies three broad themes: the threat to the high street, the radically different marketplace and the leaders and laggards in the electronic business context. The speculated threat to the high street was perceived to be coming from disintermediation, pure-play retailers and cannibalization of existing offline operations. The predictions about the nature of the new marketplace included: the shift to one-to-one marketing, the impact on margin brought by a perfect competition, the minimal access barriers and the impact of new electronic intermediaries. As far as it concerns the leaders and laggards in the Internet revolution, the literature explored who were likely to be the vanguard, both on companies and consumers sides. Regarding this point, the early commentary and predictions had mainly a supply-side orientation, addressing the uptake of electronic commerce by retailers, while relatively few studies were aimed at exploring consumers online behaviors and characteristics. This stream of research was deeply developed later on and related literature represents the grounds of this work, further described in the next paragraphs.

A rethinking of early predictions and electronic commerce in general emerged after the dot.com bubble, which gave rise to the Internet second and more sustainable period of growth. As a matter of fact, the year 2000, which started with much promise for dot.com retailers given the high market capitalization, brought a stock market correction and several pure-play retailers filed for bankruptcy and shut down their operations (Mahajan et al., 2002; Doherty and Ellis-Chadwick, 2010). The press proposed a number of reasons for the failures included: venture capitalists' overenthusiasm for Internet technology, the lack of a sustainable business model, questionable profit potential, high customer acquisition costs and the lack of management expertise and experience (Mahajan et al., 2002). Most of the companies were virtual retailers (pure plays) while established retailers were hesitant due to fears about cannibalization, security and doubts about reliability of the Internet as a sales channel. Offline retailing expertise was among the proposed reasons of well performances, together with the offer of digital goods as opposed to physical products, search goods as opposed to experiential goods, existing products as opposed to new products, customization of products and the presence of a relatively larger number of alliances (Mahajan et al., 2002). Despite the slow initial response, eventually established retailer embraced the virtual channel, giving rise to a potentially extremely rewarding “multi-channel” strategy, providing their customers information, goods, services, and support through two or more synchronized channels (Rangaswamy and Van Bruggen, 2005; Neslin et al., 2006). As a consequence, “multi-channel” marketing started to appear in 2000s as research topic, followed by

the term “omni-channel” in recent years, meaning that the consumer shopping experience is holistic and merges the various channels as touchpoints. The evolution is driven by the increased deployment of new technologies such as smart mobile devices, social networks and in-store technological solutions (Leeflang et al., 2014; Piotrowicz and Cuthbertson, 2014). The topic triggered the interest of academics and has been deeply explored both on retailers and consumers side. A complete review of related literature can be found in Verhoef et al. (2015).

Nowadays pure-play and click-and-mortar retailers coexist in this growing and fast-evolving environment. Consumers have responded enthusiastically to business innovations and the growth rate of online retail sales over the past two decades has been significant and sustained, exceeding those of traditional channels, with optimistic predictions for the future. Online shopping is a well-established economic reality, being one of the most important marketplaces for transactions of goods and services, although in continuous evolution. Today, four billion people are connected to the Internet (53% of the global population) and spend, on average, six and a half hours online, thus increasingly leading a “connected life” (Nielsen, November 2018). Global online sales in 2018 were 2.8 trillion US dollars, 11.9% of total retail sales which is expected to reach 17.5% by 2021 (Nielsen, November 2018; Statista, 2019). As a matter of fact, over 2.14 billion people worldwide are expected to buy goods and services online in 2021, up from the 1.79 billion global digital buyers in 2018. The fastest growing e-commerce markets are located in Asia, thanks to the explosion of connectivity and digital developments, with China showing the highest online shopping penetration rate in 2017 - 23.1% of total retail sales (Nielsen, November 2018; Statista, 2019). Moreover, Korea is the most advanced e-commerce market in the world and India will rank first in terms of e-commerce development with a compound annual growth rate of 17.8% in the period 2019 to 2023 according to forecast, compared to the 8.9% globally (Nielsen, November 2017; Statista, 2019). Markets at an earlier stage of e-commerce development are Latin America, Africa/Middle East and parts of Southeast Asia (Nielsen, November 2017, November 2018). Consumers are increasingly open and willing to try new things online and different options for purchasing, payment or delivery, with 31% of consumers globally already using online for home delivery (Nielsen, November 2018). Desktop PCs are still the most employed devices for placing online shopping orders but mobile devices, especially smartphones, are catching up, with 17% of 2018 shoppers that bought once per week on mobile phones, compared to the 20% that bought on desktops and 12% on tablets (Garcia, March 2018; Statista, 2019).

Academic research has tracked the evolution of e-commerce and several literature reviews have been published since its inception to look into the large and disparate body of literature, identifying research streams.

Wareham et al. (2005) highlighted the interdisciplinary nature of electronic commerce research and the great diversity of topics, identifying four main areas: B2B, B2C, strategy, and technology adoption. However, their review included only IS journals. Doherty and Ellis-Chadwick (2006) felt this gap and conducted a systematic review, targeting a sample of influential journals, and identified three broad categories: the retailer perspective, the consumer perspective and the technological perspective. The first considers the adoption of e-commerce by retailers, including market potential, factors affecting the acceptance and managerial challenges. The consumer perspective addresses the impact of e-commerce on decision-making process, trying to identify the profile of Internet shoppers, factors affecting the embracing and characteristics of the online shopping experience. Lastly, the technological perspective explores the design and technological characteristics of websites and the e-commerce infrastructure. Zhang and Liu (2011) provide a review of ubiquitous commerce research, defining it as "the next phase of commerce, which is initiated by e-commerce and propagated by m-commerce". Such a perspective is outside the scope of this work.

Although the consumer perspective was not the main area of interest at the inception of electronic commerce, it received considerable attention since 2000s and a large number of both empirical and theoretical studies about online consumer behavior has been published in various disciplines (e.g., marketing and communication, economics, information technology/systems and computer science). Reviews and related literature concerning the consumer perspective, which is the focus of this work, are discussed in the next paragraph.

Consumer Perspective and Individual Adoption of Online Shopping

Despite the initial supply-side focus of electronic commerce literature, the consumer perspective represents today a main area of interest and an extensive body of literature has been published, which provides insights into online shopping behaviors, the shopping process and a variety of factors affecting online shopping (Chang et al., 2005; Zhou et al., 2007; Doherty and Ellis-Chadwick, 2006, 2010). Given the interdisciplinary nature of the topic, researches are quite widespread among a range of disciplines, including marketing, psychology, economics, business and management and information systems and several attempts have been made to provide a coherent and comprehensive model of online shopping behavior.

Of remarkable importance is the individual adoption of online shopping. Literature addresses a wide array of variables or antecedent factors that influence a range of dependent variables related to online consumer behavior. In particular, attitude toward online shopping, purchase intention, purchase behavior, satisfaction and customer loyalty are among the most studied

outcome variables (Saeed et al., 2003; Chang et al., 2005; Doherty and Ellis-Chadwick, 2006, 2010). In general, studies have included variables on an ad hoc basis and researchers have mainly relied on the TAM-Technology Acceptance Model (Davis, 1989; Davis et al., 1989), the TRA-Theory of Reasoned Action (Fishbein and Ajzen, 1975), the TPB-Theory of Planned Behavior (Ajzen, 1985; Ajzen, 1991) and IDT-Innovation Diffusion Theory (Rogers, 1995) to structure new investigations (Saeed et al., 2003; Chang et al., 2005; Wareham et al., 2005; Doherty and Ellis-Chadwick, 2006).

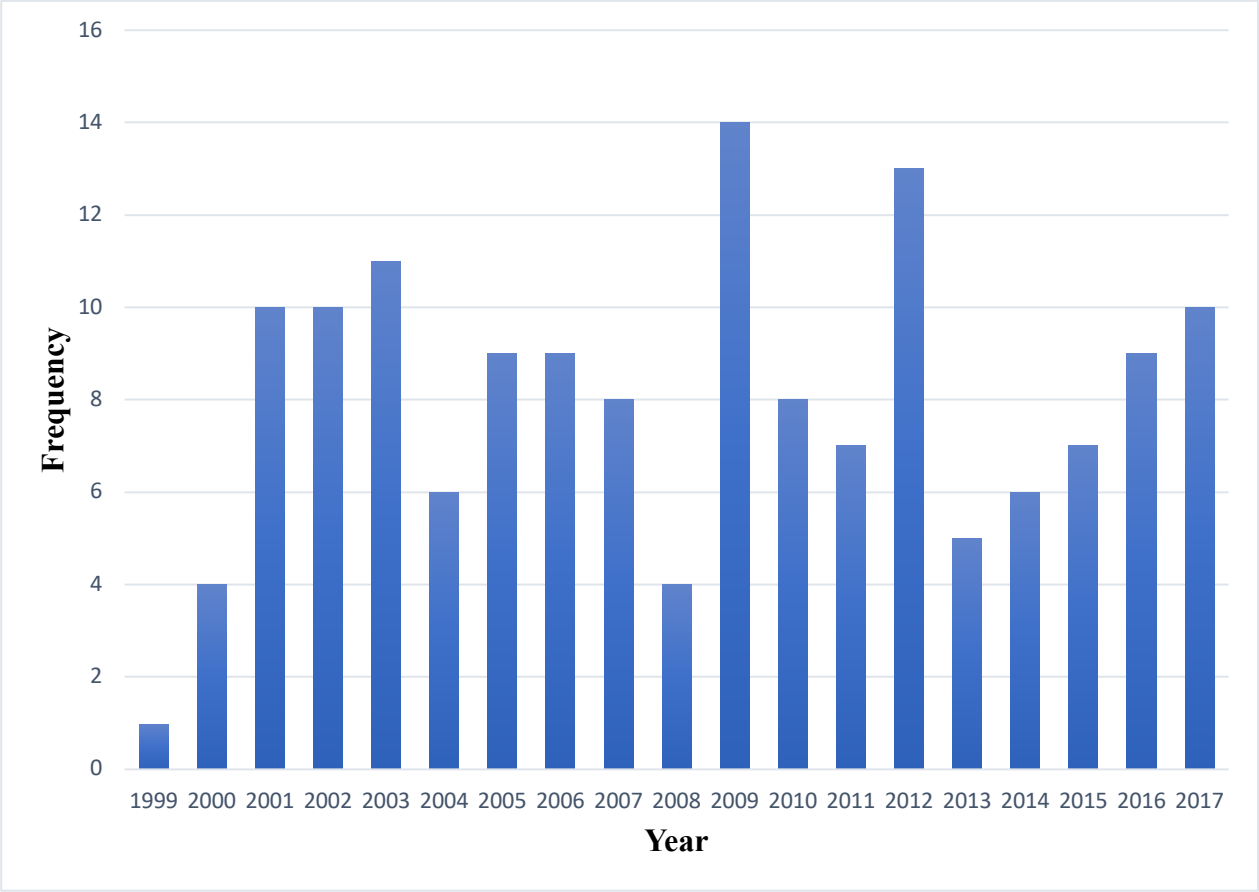
Jarvenpaa and Todd (1996, 1997) were the first to distinguish between the *technology-centered view* and the *consumer-oriented view* of consumer acceptance of online shopping. The technology-centered view explains impediments to adoption by examining technology-based factor, for example slow Internet connection, insecure electronic payments, system usability, and lack of sociability along the shopping trip. On the other hand, the consumer-oriented view considers functional advantages of adoption such as access to better products, higher levels of service, or wider assortments. The two views are not necessary contradicting each other but rather coexist. Adopting a consumer perspective, the authors' starting point were those factors that have influenced retail patronage decisions in traditional channels, grouping the variables in four categories: product perceptions, shopping experience, customer service and consumer risk. Among perceptions of the product they identified price, variety and product quality as the most influential determinants. The shopping experience factor on the World Wide Web were translated into effort, compatibility and playfulness. The customer service dimensions were the ones developed by Parasuraman et al. (1985, 1988, 1991) for the offline environment: responsiveness, reliability, tangibility, empathy and assurance. Finally, perceived risk was the result of economic, social, performance, and personal components to which they added privacy risk, as a potentially important influencing element for online transactions. This is one of the first valuable classification of the drivers of online shopping behavior, subsequently extended and developed by other researchers. The results, purely exploratory at this stage of e-commerce development, showed that consumers were impressed by the breadth of online stores but disappointed with the depth of a merchant's offerings and perceived the potential for time savings and reduced effort compared with traditional channels. The shopping experience was considered enjoyable but also frustrating and nearly everyone complained about some aspect of the customer service. Finally, perceived risk was considered a barrier but not as important as other factors.

Other early exploratory empirical studies started to understand key drivers and barriers for adoption of the Web for shopping purposes. For example, Jones and Vijayasarathy (1998) found that there were significant differences in individuals' perceptions of Internet catalog shopping and

print catalog shopping, and two factors, personality and important other people, might have played an important role in online shopping decisions. Other perspectives have considered the impact of consumers demographics such as age, gender, income and education (Li et al. 1999; Fenech and O'Cass, 2001; Verhoef and Langerak, 2001; Brown et al., 2003), cognitive/psychological characteristics (Novak et al. 2000; Fenech and O'Cass, 2001; Lynch and Beck, 2001) and shopping orientations (Donthu and Garcia, 1999; Li et al. 1999; Fenech and O'Cass, 2001; Brown et al. 2003). Trust has been recognized as an important antecedent of intended shopping behavior (Pavlou, 2001; Pavlou, 2003; Gefen and Straub, 2003; Gefen et al., 2003), with reputation being a significant determinant of it (Jarvenpaa et al., 2000; De Ruyter et al., 2001). Also World Wide Web security and perceived risk have received considerable attention (Bhatnagar et al., 2000; Jarvenpaa et al., 2000; De Ruyter et al., 2001; Fenech and O'Cass, 2001; Liao and Cheung, 2001; Pavlou, 2001; Salisbury et al., 2001; Featherman and Pavlou, 2003; Pavlou, 2003). The integration of some of these factors with variables from TAM (perceived ease of use, perceived usefulness), TPB (attitude, subjective norm, perceived behavioral control) and IDT (mainly relative advantage, compatibility, complexity) started to be explored (Battacherjee, 2000; De Ruyter et al., 2001; Fenech and O'Cass, 2001; Pavlou, 2001; Salisbury et al., 2001; Verhoef and Langerak, 2001; Koufaris, 2002; Featherman and Pavlou, 2003; Pavlou, 2003; Gefen and Straub, 2003; Gefen et al., 2003).

Since early 2000 the number of empirical studies in journals, books and conference proceeding grew rapidly and constantly, as shown in Figure 1. This extensive volume of research has been developed across a variety of disciplines and study contexts, addressing the relations between antecedent factors and online shopping adoption by consumers. A plethora of drivers has been identified, with mixed or heterogeneous results about their impact on outcome variables such as attitude, purchase intention or actual purchase.

Figure 1 Frequency of articles by year



As mentioned, valuable literature reviews have been published following the need to critically synthetize this body of literature. Classification proposed for the drivers in online shopping adoption are several yet similar.

Doherty and Ellis-Chadwick (2006, 2010) distinguished between "classification variables" and "character variables". Classification variables are essentially demographics, that is any personal attributes that tend to remain static throughout an individual's lifetime, or evolve slowly over time such as age, gender, income, education. Those variables are not generally modified by the experience of online shopping and, while in the early days of e-commerce consumers tended to be younger, male and better educated, the demographic profile does not represent today a valuable classification to distinguish between online and offline shoppers. In contrast, it is still useful to explore the impact of psychographic, perception and behavioral variables, which the authors labeled as character variables. These are any attributes of a consumers' perceptions, beliefs and attitudes that might influence their online behavior, and in particular their intention to shop. These factors range from personal characteristics such as innovativeness, risk aversion and Internet experience, variables derived from widely adopted theoretical frameworks, such as perceived ease of use and perceived useful of the online channel, perceived behavioral control and social influence, and

variables adapted from retail patronage literature in offline channels, such as convenience, merchandise quality and website layout. Character variables affect the individual online behavior and may be modified over time as consumers experience the online browsing and buying process. The authors highlighted some critics to this body of literature, for example the over-reliance upon convenience samples, typically university students, and upon consumers' self-assessment of their experiences and the dependency on quantitative techniques, that point to the associations between different combinations of variables but provide limited understanding of why these arise.

A first review and meta-analysis of the drivers of online consumer behavior was proposed by Saeed et al. (2003), although they focused only on information systems literature and they relied on bivariate meta-analytic correlations, not testing their integrative framework. The authors presented their review around three related categories of the dependent variables, which are Web use, online purchase, and post-purchase and identified four mediating perceptual variables – perceived ease of use, perceived usefulness, trust and shopping enjoyment – and six categories of predictor variables: system quality, information quality, service quality, vendor and channel characteristics, consumer demographics and social context. A more recent meta-analytic review in the online environment focused on the antecedents and consequences of online trust, showing significant relationships (Kim and Peterson, 2017). Among consequences the authors included satisfaction, attitude, purchase intention, repeat purchase intention, intention to use website, and loyalty. Additional analyses on moderators such as study design, website type, sample type and type of items used to measure trust indicated that the relationships between online trust and its respective antecedents and consequences are more complex and subtle than previously thought. The authors relied on the test on bivariate meta-analytic correlations and moderator analysis, not building a holistic framework.

Perea y Monsuwé et al., (2004) present a qualitative review and framework of the drivers of consumers' attitudes toward online shopping and intention to shop online. Grounding on the Technology Acceptance Model (TAM), their review proposes that the two dependent variables are influenced not only by ease of use, usefulness and enjoyment but also by other exogenous factors like consumer traits, situational factors, product characteristics, previous online shopping experiences, and trust in online shopping. Further, the authors investigate the differences, similarities, advantages, and disadvantages of online shopping compared to traditional shopping, stating that online shopping provides consumers with added value but can also withhold them from certain sources of value. Therefore, consumers are not necessarily choosing one shopping channel over another. Turning to implications, the authors call for further research to determine which

factors in the framework have the most significant effect on behavioral intention to shop online, possibly leading to a new conceptual framework.

A comprehensive qualitative review about antecedent factors of intention to use and actual use of online shopping was then proposed by Chang et al. (2005), later extended by Zhou et al. (2007). The authors selected empirical articles that investigate online shopping adoption, considering attitude, intention, or actual use, for a total of forty-five studies. Following Jarvenpaa and Todd (1996) scheme, they build their classification framework of antecedent factors of intention or usage of online shopping and attitude toward online shopping around three major categories: perceived characteristics of the web as a sales channel, characteristics of the customers and characteristics of the website or products, with sub-categories in each. The authors included variables broadly investigated and unique variables, examined only in one study, which are the majority. Sub-categories of perceived characteristics of the web as a sales channel are: perceived risk, relative advantage, online shopping experience, service quality and trust. Website and product characteristics are formed of risk reduction measure, website features and product characteristics. Finally, sub-categories of consumer characteristics are identified in: consumer shopping orientations, demographic variables, computer/Internet knowledge and usage, consumer innovativeness and psychological variables. The reference model proposed is quite exhaustive and detailed, including both the association among antecedent factors and intention to use and usage of online shopping and the relations among antecedents. The review found that most factors have been studied only once and for those investigated further the impact has often been mixed or inconclusive. Pointing to the need of fully investigating many important variables neglected so far, the authors delineated some methodological recommendations. First, they highlighted the importance of adapting traditional scales and developing new set of dimensions to increase the psychometric properties of the scales. Second, the characteristics of the products choose should be carefully controlled, as product category impacts the intention to buy online.

Zhou et al. (2007), adopting a consumer-oriented view of online shopping, extended the framework of Chang et al. (2005) into a reference model called OSAM-Online Shopping Acceptance Model to predict consumer acceptance of online shopping. Grounded in TAM, their model incorporated consumer factors from traditional retailing and marketing theories. Although such a holistic view is useful to provide an in-depth analysis of consumer factors associated with online shopping acceptance and helps reconcile conflicting findings, the authors did not test their model, thus providing only a road map for future research and practice in the online environment. Indeed, they highlighted the need for a meta-analysis on the topic and identified research issues, such as a deeper understanding of the hedonic motivation, shopping orientations, risk reduction

measures; the effect of online experience, consumer acceptance of e-services, consumer loyalty, resource constraints; the impact of product characteristics; the evolution of consumer acceptance of online shopping over time; and an integration with mobile commerce studies.

Statement of the Problem and Purpose

The importance of e-commerce is undoubted, with global online sales representing 11.9% of total retail sales and forecasts that indicate extraordinary growth rates continuing to emerge (Nielsen, November 2018; Statista, 2019). Accordingly, understanding online shopping behavior is a critical issue for managers to target, attract and retain consumers to their commercial website.

Despite the widespread attention devoted to the drivers of online shopping behavior, several unresolved issues still remain, therefore complicating the effort to translate academic findings into a valuable guidance for managers.

Firstly, more than two hundred different antecedent factors have been identified in the literature and a good deal of them have been studied only once. Variables were often included on a seemingly ad hoc basis, pointing to the associations between different combinations of determinants and outcome variables, but with limited understanding of why these arise (Chang et al., 2005; Doherty and Ellis-Chadwick, 2006). This increased amount of research has provided the need and means for a meta-analysis on the multitude of factors that have been reported in the quest to identify the key drivers of e-commerce adoption.

Secondly, there is no consensus on the most important antecedent factors of online channel use, as their impact has often been mixed or inconclusive across studies. For example, while the relationships among perceived ease of use, perceived usefulness, attitude and intention to purchase are well established and significant (Devaraj et al., 2002; Gefen et al., 2003; Pavlou and Fygenson, 2006), the impact of other variables, such as perceived risk, shows discrepancies in the direction and magnitude of the effects for the same predictor variables (e.g., Pavlou, 2003; Andrews and Bianchi, 2013; Chang et al., 2016; Faqih, 2016).

Thirdly, studies are fragmented across a range of disciplines, including marketing, psychology, economics, business and management and information systems, highlighting the interdisciplinary nature of the topic and its technical, logistical, commercial, strategic, social and legal implications.

Finally, all previous reviews have drawbacks, whether focusing on one stream of literature (e.g., Saeed et al., 2003) or not providing a comprehensive quantitative synthesis, limiting the analysis to the qualitative perspective (Chang et al., 2005; Doherty and Ellis-Chadwick, 2006, 2010; Zhou et al., 2007).

Therefore, it would be helpful to establish the generalizability of the relationships between the intention to use and actual use of the online channel and the constructs to which they are most frequently related, while embedding these predictor variables within a comprehensive conceptual framework. The purpose of this study is to fill this void, integrating the abundance of accumulated findings across research streams through a meta-analytic review, and to derive and test a coherent framework that may contribute to the knowledge of antecedent factors relevant to online shopping.

While a complete coverage of all issues and potential variables is not feasible nor convenient due to the huge amount of empirical findings and its dispersion across various disciplines, an attempt has been made to include as many research findings as possible, that meet the inclusion criteria for the meta-analysis listed in the methodology section. Findings from 146 articles and 183 studies conducted from 1999 to 2017 are integrated, with a final number of 1,710 effect sizes related to three dependent variables: (1) attitude towards online shopping, (2) intention to purchase online and (3) actual purchase behavior online. The effects of eighteen antecedent factors are assessed, and a taxonomy developed, grounded in existing frameworks found in the literature (e.g., Chang et al., 2005), to place specific antecedent factors within four categories: perceived channel characteristics, website characteristics, social influence and consumer characteristics.

Significance of the Study

Given the purpose and the methodology chosen, this study contributes to the online shopping literature in at least three important ways.

Firstly, previous fragmented findings across different disciplines are synthesized and consolidated, identifying a large number of predictor variables, and next including the most investigated in the literature.

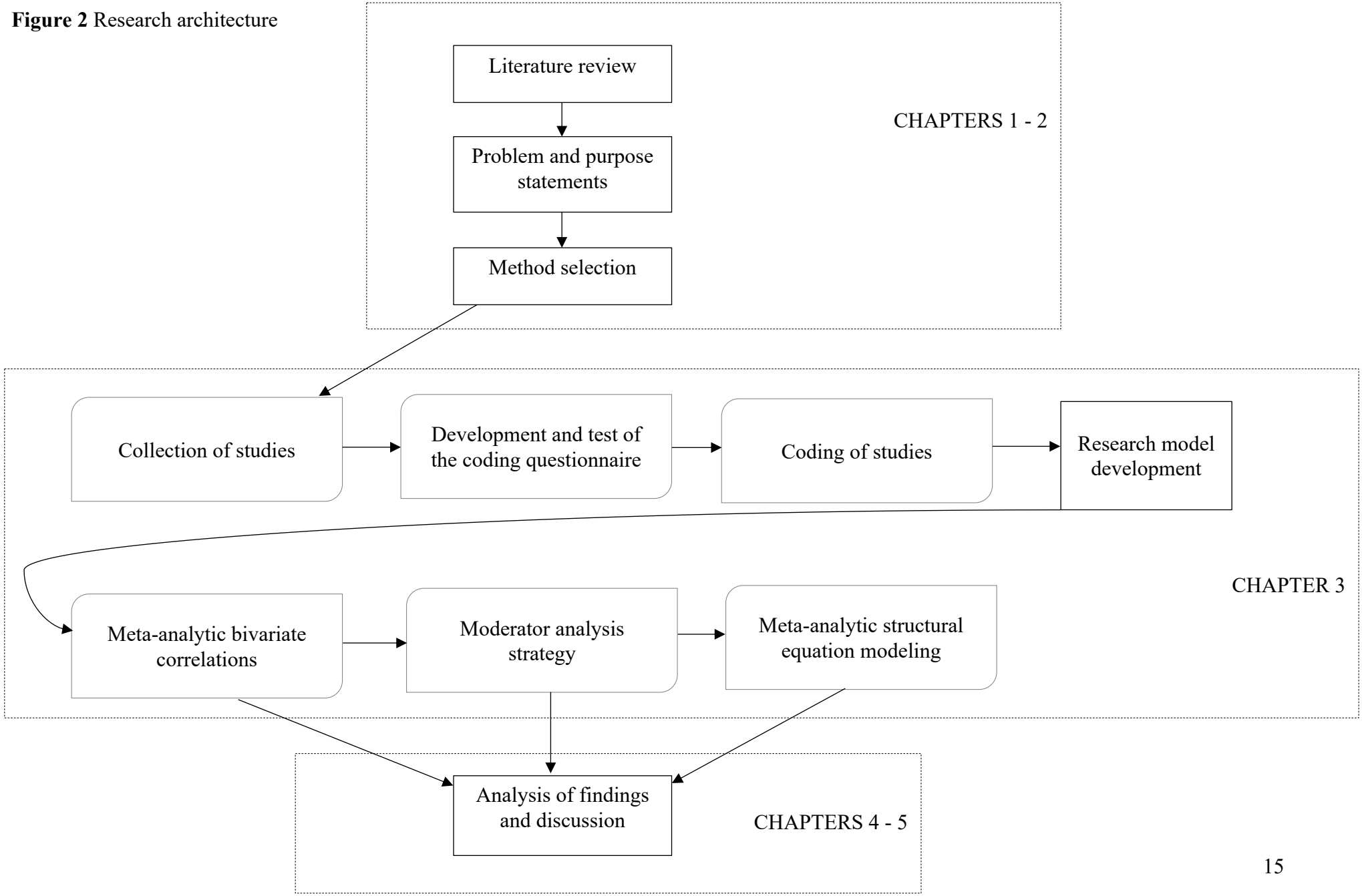
Secondly, the robustness of the effects across study contexts and research designs is evaluated, considering eight potential methodological and contextual characteristics that could moderate the relations of interest.

Thirdly, a theoretical framework grounded on theories of TAM and TPB is built and extended with relevant constructs for online shopping adoption using meta-analytic structural equation modeling. Such an effort is valuable to understand better the online marketing strategies that are most effective for building a successful e-commerce website and the conditions in which those strategies are more likely to generate positive performances.

Research Architecture

The research design was implemented according to the flow chart provided in Figure 2. Statement of the problem and purpose were developed as a result of a careful review of literature in the field of online shopping. Selection of the appropriate methodology and the development of hypotheses followed the research gap identified.

Figure 2 Research architecture



Definition of Terms

An understanding of terms that apply to this study is essential. Within this section, complete definitions and sources of all terms are provided.

TRA-Theory of Reasoned Action: theory introduced to predict and understand an individual's behavior (Fishbein and Ajzen, 1975) which assumes that most actions of social relevance are under volitional control. Consistent with this assumption, a person's behavior is determined by his/her intention to perform the behavior and that this intention is, in turn, a function of his/her attitude toward the behavior and his/her subjective norm.

TPB-Theory of Planned Behavior: theory designed to predict and explain human behavior in specific contexts, extending original TRA limitations in dealing with behaviors over which people have incomplete volitional control (Ajzen, 1985, 1991).

TAM-Technology Acceptance Model: model introduced by Davis (1986, 1989) to predict user acceptance of computers and widely used in explaining technology acceptance behaviors, including e-commerce adoption. Grounding on Fishbein and Ajzen's (1975) TRA, the original TAM identifies two fundamental constructs of system use: (a) perceived usefulness and (b) perceived ease of use.

Attitude toward online shopping: the extent to which a consumer evaluates online shopping affirmatively or negatively, measured in terms of individual preferences and interests via feelings and evaluations regarding e-shopping outcomes (Fishbein and Ajzen, 1975; Pavlou and Fygenson, 2006).

Convenience: the customer's perception of time and effort saved involved in online shopping (Berry et al., 2002; Choudhury and Karahanna, 2008; Gupta and Kim, 2010).

Enjoyment: the extent to which online shopping is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated (Davis et al, 1992; Teo, 2001).

Information quality: the degree to which information provided by a website facilitates the consumer's evaluation of products to complete online purchasing (Choudhury and Karahanna, 2008; Kim et al., 2008; Lim et al., 2012).

Innovativeness: the individual's predisposition to seek novelty or to be receptive to new ideas (Rogers, 1995; Goldsmith, 2001).

Perceived behavioral control: Ajzen (1991) defines such construct as "people's perception of the ease or difficulty of performing the behavior of interest". In the online environment it is the person's perception of the ease or difficulty of making a product purchase online and it is

compatible with the determinants of perceived self-efficacy, controllability and facilitating conditions.

Perceived ease of use: Davis (1989) defines it as "the degree to which a person believes that using a particular system would be free of effort". For the purpose of this study, the factor is defined as the extent to which a consumer believes that online shopping will be free of effort (Pavlou, 2003; Chiu et al., 2009).

Perceived price: the perceived level of monetary savings when making a product purchase online (Fenech and O'Cass, 2001; Gupta and Kim, 2010; Chiu et al., 2014).

Perceived risk: the consumer's belief regarding the probability of gains or losses associated with purchasing goods or services online (Featherman and Pavlou, 2003; Forsythe and Shi, 2003).

Perceived usefulness: "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). For the purpose of this study, it is defined as the extent to which a consumer believes that using online shopping will enhance his/her transaction performance (Pavlou, 2003, Chiu et al., 2009).

Previous experience: past purchase experiences on the Internet and with other in-home shopping formats (Rogers, 1995; Shim et al., 2001; Sin and Tse; 2002).

Privacy concerns: the consumer's general concern about how organizations collect, store, use and protect personal information (Jarvenpaa and Todd, 1996; George, 2002).

Purchase behavior: frequency of use of the online channel to make a product purchase, based on past experiences (Ajzen, 1991; George, 2002; Pavlou, 2003).

Purchase intention: likelihood that a consumer would use the online channel to make a product purchase (Ajzen, 1991; Gefen et al., 2003; Kim and Park, 2005). Intention to transact and willingness to buy are used with an analogous meaning.

Service quality: the customer overall evaluation and judgment regarding the excellence of service provision delivered by and via a website (Parasuraman et al., 2005; Xu et al., 2013).

Subjective norm: Fishbein and Ajzen (1975) define subjective norm as "the person's perception that most people who are important to him think he should or should not perform the behavior in question". In the online environment is the person's perception that most people who are important to her/him think she/he should or should not purchase online (Shim et al., 2001).

System security: the extent to which consumers believes that the Web is secure for transmitting sensitive information (Pavlou, 2001; Salisbury et al., 2001).

Trust: the belief that allows consumers to willingly become vulnerable to Web retailers after having taken the retailers' characteristics into consideration (Mayer et al., 1995; McKnight et al., 2002; Pavlou, 2003).

Website design: the sum of all visible and audible cues consciously designed to create positive effects and favorable consumer responses (Eroglu et al, 2001; Koo and Ju, 2010).

Chapter Summary

E-commerce has revolutionized the whole retail experience and shopping habits and represents today a well-established marketplace with exceptional growing rates. Given its importance, the incredible interest devoted to the topic by academics is not surprising. In particular, identifying and understanding the drivers of online shopping adoption still is a critical issue to develop effective marketing strategies aimed at targeting, attracting and retaining consumers to a commercial website. This research project integrates the abundance of previous findings on online shopping adoption into a comprehensive conceptual framework, using meta-analysis. Predictor variables related to the most investigate outcome variables are identified, synthetized and evaluated. The rationale for conducting this study lies on the unresolved issues left by individual studies and previous reviews. The chapter aims at acquainting the readers with the holistic picture before elaborating on the research theme in the subsequent chapters.

CHAPTER 2

LITERATURE REVIEW

Theoretical Framework

Antecedents related to electronic commerce adoption identified in literature have rarely been tested in a comprehensive framework and some have been treated as control variables. Different sets of antecedent factors and outcome variables have been investigated but with limited comprehension of the underlying sources. To organize this large number of antecedent factors, this study adopts the following taxonomy: (1) perceived channel characteristics, which pertain to features of the Web as a sales channel; (2) website characteristics, which pertain to the attributes specific to the website; (3) social influence, which pertains to the influence of important others during the shopping experience; and (4) consumer characteristics, which pertain to individual differences such as demographics and psychological variables.

Given the validity and popularity of TAM and TPB in explaining e-commerce adoption, this research entirely adopts the two theories and extend them with other relevant constructs that are expected to influence online shopping adoption. The following sections discuss the two theoretical frameworks and examine other important antecedents derived from different theories, classified in the four macro-categories. A research model is proposed, and hypotheses are stated. Table 1 provides definitions, aliases and related hypotheses.

Table 1 Definitions and expected effect of antecedent factors on e-commerce adoption

Variable	*Definition*	*Aliases*	*Related Hypotheses*
DV			
Attitude toward online shopping	The extent to which a consumer evaluates online shopping affirmatively or negatively	Attitude toward Internet shopping, attitude toward the shopping medium	-
Purchase intention	Likelihood that a consumer would use the online channel to make a product purchase	Intention to transact, willingness to buy, intention to adopt, intention to use	-
Purchase behavior	Frequency of use of the online channel to make a product purchase, based on past experiences	Actual use, purchase choice, usage behavior, actual transaction behavior, Internet purchasing	-
Perceived Channel Characteristics			
Perceived System Quality			
Perceived ease of use	The extent to which a consumer believes that online shopping will be free of effort	-	H1
Perceived usefulness	The extent to which a consumer believes that using online shopping will enhance his/her transaction performance	-	H2
Convenience	The customer's perception of the time and effort saved involved in online shopping	-	H5
Perceived price	The perceived level of monetary savings when making a product purchase online	Perceived price, price level, monetary savings, cost savings	H6
System security	The extent to which consumers believes that the Web is secure for transmitting sensitive information	Perceived security, information protection, transaction safety, system assurance	H7
Service quality			
Service quality	The customer overall evaluation and judgment regarding the excellence of service	Customer service, online store service	H8

	provision delivered by and via a website		
Perceived risk			
Perceived risk	The consumer's belief regarding the probability of gains or losses associated with purchasing goods or services online	Uncertainty	H9
Privacy concerns	The consumer's general concern about how organizations collect, store, use and protect personal information	Privacy risk	H10
Shopping experience			
Enjoyment	The extent to which online shopping is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated	Perceived playfulness, pleasure, entertainment value	H11
Trust			
Trust	The belief that allows consumers to willingly become vulnerable to Web retailers after having taken the retailers' characteristics into consideration	Trust in the store, trust in the retailer, trust in the channel	H12
Website characteristics			
Information quality	The degree to which information provided by a website facilitates the consumer's evaluation of products to complete online purchasing	Product diagnosticity, efficacy of information acquisition, information availability	H13
Website design	The sum of all visible and audible cues consciously designed to create positive effects and favorable consumer responses	Aesthetic appeal, web atmospherics, design quality	H14
Social influence			
Subjective norm	The person's perception that most people who are important to him think he should or should not purchase online	-	H3
Consumer Characteristics			
Demographic variables			
Gender	Dummy: male = 0, female = 1		H15

Age			H16
Consumer knowledge			
Previous experience	Past purchase experiences on the Internet and with other in-home shopping formats	Channel knowledge, past purchasing behavior	H17
Psychological variables			
Perceived behavioral control	The person's perception of the ease or difficulty of making a product purchase online	Self-efficacy, controllability, facilitating conditions	H4
Consumer innovativeness			
Innovativeness	The individual's predisposition to seek novelty or to be receptive to new ideas	General and domain-specific innovativeness, Novelty seeking	H18

Technology Acceptance Model

Grounded on Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA), Davis (1986, 1989) introduced TAM to predict user acceptance of computers. TAM built on TRA to specify the causal linkage of two distinct and fundamental constructs of system use - perceived usefulness and perceived ease of use - to users' attitudes, behavioral intention and actual behavior. Although TAM was initially designed to model information systems usage in the workplace, it has been successfully applied and validated across many areas, including e-commerce (e.g., Devaraj et al., 2002; Gefen and Straub, 2003; Pavlou, 2003; Lin, 2007; Chiu et al., 2009), level of expertise, and countries and has been shown to be a parsimonious yet robust model of technology acceptance behaviors (Gefen and Straub, 2003). Moreover, a number of meta-analysis on TAM has been published (e.g., King and He, 2006; Schepers and Wetzels, 2007), highlighting the importance of the model. TAM posits that actual system use is determined by users' behavioral intention to use it, which is in turn influenced by their attitude. Attitude towards using the system is jointly determined by perceived usefulness and perceived ease of use, which influences intended acceptance through its effect on perceived usefulness. The attitude-intention-behavior causality and the relations with and between perceived ease of use and perceived usefulness have proven valid in the online shopping environment, although the coefficients and goodness of fit statistics vary across studies.

Behavioral intentions are motivational factors that capture how hard people are willing to try to perform a behavior (Ajzen, 1991). In the context of online shopping they translate into the *intention to purchase*, which is the likelihood that a consumer would use the online channel to make a product purchase (Gefen et al., 2003; Kim and Park, 2005). Intention to transact and willingness to buy are used with an analogous meaning. Intention to perform a behavior is the proximal cause of such a behavior, which is *purchase behavior* on the Web. *Attitude toward the behavior* is defined as "an individual's positive or negative feelings about performing the target behavior" (Fishbein and Ajzen, 1975, p. 216) and it is based on a person's salient beliefs regarding the perceived outcomes of performing a behavior. Attitude is directly related to behavioral intention because people will only intend to perform behavior toward which they have positive feelings. Therefore, *attitude toward online shopping* is the extent to which a consumer evaluates online shopping affirmatively or negatively, measured in terms of individual preferences and interests via feelings and evaluations regarding e-shopping outcomes (Pavlou and Fygenson, 2006). The idea that consumption can be forecasted by intentions and attitudes holds considerable appeal for online retailers, as they try to anticipate the desires and demands of the consumers. Scales to measure the three outcome variables refer to online shopping in general or to specific websites.

Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance her/his job performance" (Davis, 1989, p. 320), which is a measure of the individual's subjective assessment of the utility offered by the new IT in a specific task-related setting (Davis, 1989). In the context of e-shopping, consumers evaluate their online shopping performance in terms of the associated benefits and costs, including maximizing convenience and minimizing transaction time, therefore perceived usefulness translates into the extent to which a consumer believes that using the online channel would enhance the effectiveness in purchasing products or services (Pavlou, 2003, Chiu et al., 2009). *Perceived ease of use* refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320), which is an indicator of the cognitive effort needed to learn and to utilize the new IT. Applied to online consumer behavior, it represents the degree to which a Web interface is perceived to be easy to understand, learn and operate. If a website has a well-designed user interface and facilitates the transaction process, consumers are likely to believe that online shopping is free of effort (Pavlou, 2003; Chiu et al., 2009). According to TAM, perceived ease of use primarily influences behavioral intention through its effect on perceived usefulness, thus a website perceived to be easier to use is more likely to induce perceptions of usefulness and contributes to increased performance. This effect has been supported by the majority of studies (e.g., Devaraj et al., 2002; Gefen and Straub, 2003; Pavlou, 2003).

Although TAM consistently explains a substantial proportion of the variance in purchase intention and behavior, it focuses exclusively on the technological perspective. Therefore, prior research suggested an extension with additional variables in order to improve its specificity and explanatory power in online shopping adoption behaviors (e.g., Gefen et al., 2003; Pavlou, 2003).

Theory of Planned Behavior

TPB was designed to predict and explain human behavior in specific contexts, extending the original TRA limitations in dealing with behaviors over which people have incomplete volitional control (Ajzen, 1985, 1991). It posits that an additional variable, perceived behavioral control, predicts behavioral intentions in conjunction with attitude and subjective norm, with a high degree of accuracy. These intentions subsequently influence actual behavior in combination with perceived behavioral control. The main difference from TAM is that TPB takes into account external factors, while the main focus of TAM is on users' internal perceptions.

Subjective norm, as defined by Fishbein and Ajzen (1975, p. 302), is "the person's perception that most people who are important to him think he should or should not perform the behavior in question" and is a function of normative beliefs. It refers to the influence of the social

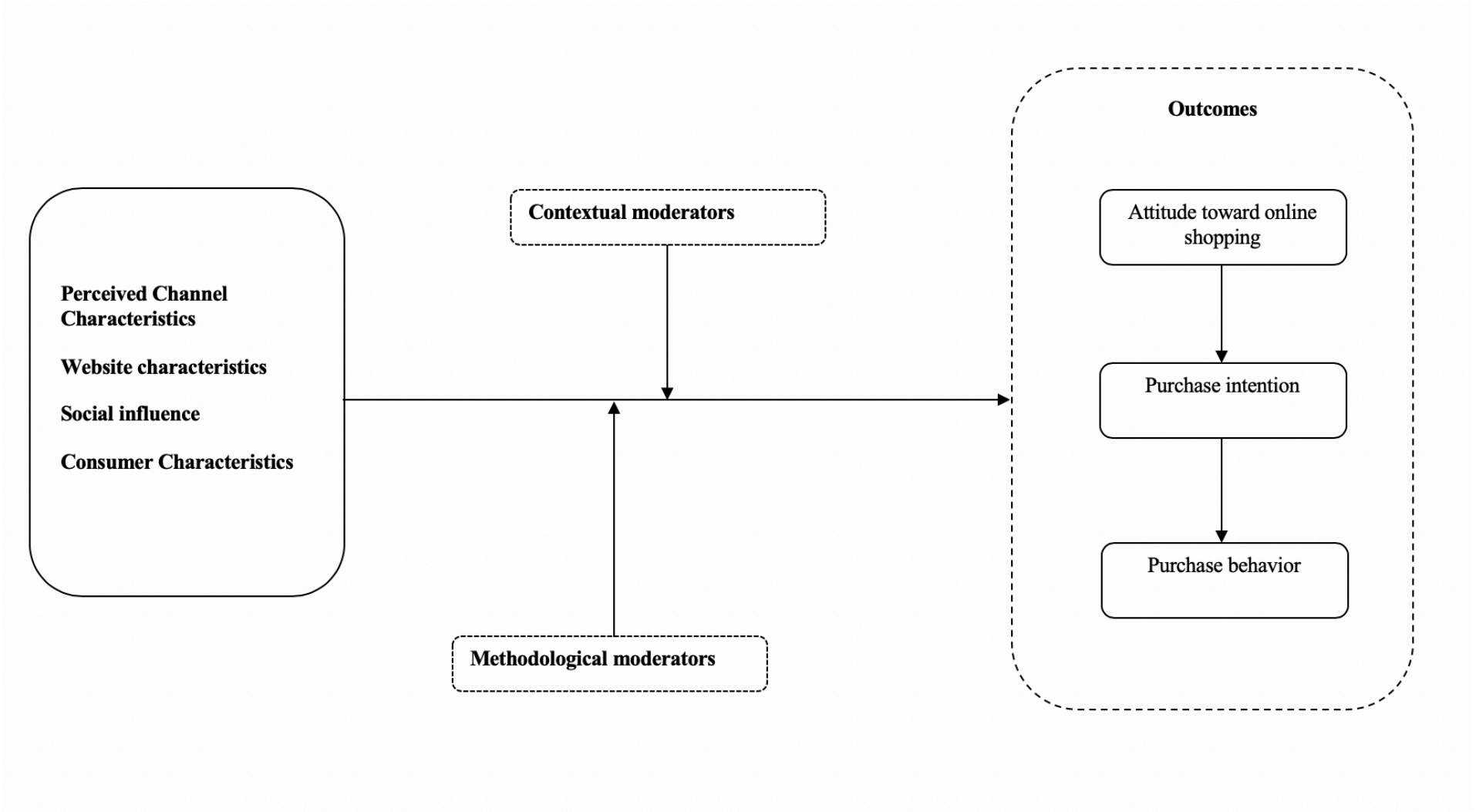
environment on behavior and the perceived social pressure of specific referent individuals or groups. Subjective norm directly translates in the online environment by asking respondents to rate the extent to which important others would approve or disapprove the product purchase on the online channel (Shim et al., 2001). Initially excluded from TAM because of its uncertain theoretical and psychometric status (Davis, Davis et al., 1989), the role of subjective norm was reconsidered by Venkatesh and Davis (2000). Its impact on online purchase intention has been, however, mixed and not always significant (e.g., Pavlou and Fygenson, 2006; Lin, 2007; Lian and Yen, 2014).

Perceived behavioral control refers to "people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991, p. 183). The aspect of ease or difficulty relates to whether or not a person perceives that he/she possesses the requisite resources and opportunities necessary to perform the behavior in question, that is a subjective degree of control over the performance of a behavior. The concept of perceived behavioral control is useful where the achievement of behavioral goals is contingent on external and internal resources. Since its introduction, there has been some ambiguity surrounding the unidimensional or multidimensional nature of perceived behavioral control and constructs with similar meaning have been identified. For example, it is most compatible with Bandura's concept of perceived self-efficacy (Bandura, 1977, 1982) and comparable to the constructs of controllability and facilitating conditions or factors (e.g., Pavlou and Fygenson, 2006; Lin, 2007). A unitary definition is therefore utilized in this study. Perceived behavioral control plays an important part in TPB as its addition to TRA has resulted in meaningful improvements in the prediction of intentions (Ajzen, 1991).

Antecedents of e-Commerce Adoption: Model Conceptualization

Besides construct from established model, other variables influencing electronic commerce adoption have been extensively investigated by many researchers. This study proposes a conceptualization framework to categorize and synthesize the numerous antecedent factors in a coherent manner, as it is presented in Figure 3. Eighteen determinants which are related frequently enough ($n \geq 5$) to the most studied outcome variable, i.e., purchase intention, were included, with an extension to two other important outcomes: attitude toward online shopping and purchase behavior. Determinants pertaining to perceived channel characteristics, website characteristics and consumer characteristics are described in the next paragraphs.

Figure 3 Research model



Perceived Channel Characteristics

Antecedent factors related to perceived system quality, service quality, perceived risk, trust and shopping experience are included in perceived characteristics of the Web as a sales channel. Beside ease of use and usefulness, consumers perceive the quality of the online channel depending on its convenience, price and system security.

Convenience in the buying process has been found to be one of the most important determinants in retail store patronage and other direct shopping methods and its importance has been emphasized in virtual environments (Jarvenpaa and Todd, 1996; Berry et al., 2002; Kolsaker et al., 2004; Choudhury and Karahanna, 2008). Shopping on the Web provides convenience in various ways related to the reduced physical effort involved, expanded store hours, ease of conducting searches and ordering, flexible delivery options and payment methods, and quick and efficient checkouts (Gupta and Kim, 2010). Although multiple authors note its multidimensional nature and the nuances in the meaning of convenience largely result from the addition of new perspectives on the topic (e.g., Berry et al., 2002), convenience in the electronic marketplace is manifested in time savings and effort economization, as experienced by consumers. Therefore, convenience is defined as a customer's perception of the time and effort saved by shopping at an online store (Berry et al., 2002; Choudhury and Karahanna, 2008; Gupta and Kim, 2010). According to mental accounting theory, greater convenience means less mental and physical energy expended in obtaining a product, which reduces the time and effort (non-monetary aspects of transaction utility), thereby increasing transaction utility. Especially for routine items, customers would be motivated to make purchase decisions based on time savings and reduced hassles, making convenience of primary importance (Gupta and Kim, 2010).

Together with convenience, *perceived price* has traditionally been considered a key predictor of customer choice in the retailing environment (Pan and Zinkhan, 2006). It has been regarded as either a monetary sacrifice for obtaining a product/service or an indicator of the quality of a product (Zeithaml, 1988; Rao and Monroe, 1989). As electronic marketplaces allow consumers to quickly browse products and easily compare prices across multiple e-vendors, the effect of price on behavioral intentions is expected to be more influential than in the offline environment (Kim et al., 2012; Faqih, 2016). In this study, a definition of perceived price as low prices or cost savings is adopted, which translates into the perceived level of monetary savings when making a product purchase online (Fenech and O'Cass, 2001; Gupta and Kim, 2010; Chiu et al., 2014). Still, consumers' responsiveness to low prices may be heterogeneous and the effect of price has not always been found to be significant in prior studies (e.g., Kim et al., 2012). Although money savings are still a priority to most customers and price issues has been found to accelerate e-

commerce adoption process, even price-sensitive customers do not always purchase from vendors offering the lowest prices (Gupta and Kim, 2010; Faqih, 2016). An explanation might be that when limited diagnostic information about product quality is available, consumers tend to make more use of price as a quality cue (Zeithaml, 1988; Urbany et al., 1997). However, when product quality remains constant across different vendors, consumers online are expected to choose the lowest price.

The open and global nature of the Web exposes online transactional activities to high degree of vulnerability, uncertainty and insecurity. Consequently, *system security* has been extensively addressed as a key driver of adoption since the inception of the e-commerce (e. g. Jones and Vijayasarathy, 1998; Salisbury et al., 2001). Security is defined as the extent to which consumers believe that the Web is reliable for transmitting sensitive information. As a matter of fact, online transactions require consumers' personal and credit card details thereby raising concerns about misuse of these information and the legitimacy of some Internet businesses. It is important to note that security perceptions are subject both to the Web vendors' actions to protect their security and to the ability of the Internet infrastructure to facilitate safe transmissions and storage of consumer information (Pavlou, 2001). Moreover, these perceptions may differ by context, with the magnitude of the effect on online shopping adoption being intensified in the financial services context (Montoya-Weiss et al., 2003). System security is closely related to privacy and, although some authors propose and unitary view of the two constructs (e.g., Pavlou and Fygenson, 2006), others suggest that consumers independently value privacy and security (Kim et al., 2008). Therefore, the construct of privacy concerns is distinguished and discussed together with risk perceptions. System security has a positive influence on adoption, since consumers overcome psychological barriers to purchasing online when they feel comfortable that the e-vendor will protect their personal information. Perceptions of security evolve as customers gain experience with online shopping and companies have increasingly implemented and promoted security and privacy protection mechanisms - such as privacy policies, safe shopping guarantees, encryption, authentication – and legislative actions have occurred aimed at protecting data rights over the past decades, although data breaches and data protection law still represents main issues (Wachter and Mittelstadt, 2019).

The study of *service quality* was pioneered by marketing scholars (Parasuraman et al., 1985, 1988, 1991) and has been a highly relevant construct within customer service contexts and retail patronage studies (Baker et al., 2002; Pan and Zinkhan, 2006). A perception of service quality results from a comparison of expectations and performance on the quality of the service interactions with a vendor. The most widely applied scale for measuring service quality is SERVQUAL, a 45-item instrument developed by Parasuraman and colleagues (1985, 1988, 1991) to evaluate customer

expectations and perceptions of service quality in service and retailing organizations. There are five dimensions underlying the items: tangibility, reliability, empathy, responsiveness, and assurance. These five dimensions have been incorporated into service quality research for the last twenty years. The concept naturally translates into the domain of online retailing (Parasuraman et al., 2005) where the potential of customization of the services provided during the purchasing process (finding, ordering, and delivering) is maximized. With the increasing service functionalities delivered by a website, the importance of service quality has been stressed by IS-Information Systems scholars (Xu et al., 2013) and the construct has been included in DeLone and McLean's (2003) updated IS success model, which explicitly identified the need to incorporate service quality in any assessment of IS achievement. Indeed, service quality has been underscored as a fundamental criterion of success for online companies (Shankar et al. 2003; Xu et al., 2013), as it has been shown to boost online channel usage (e.g.,, Devaraj et al., 2002), increase loyalty to websites (e.g.,, Gefen, 2002), and enhance customer satisfaction with a website (e.g.,, DeLone and McLean, 2003). Following Parasuraman et al. (2005), service quality is defined as customers' overall evaluations and judgments regarding the excellence of service provision delivered via a website.

Among consumers' risk perceptions two relevant constructs are considered in this study: perceived risk and privacy concerns.

From their very beginning, consumer behavior studies have considered and analyzed the role of *perceived risk* in customers' buying decision process (Bauer, 1960; Cunningham, 1967) and the distant and impersonal nature of the online environment has rendered risk an inevitable element of e-commerce (Pavlou, 2003). Compared to traditional retailing, online shopping involves additional vulnerabilities, uncertainties and complexities due to the spatial separation between buyers and sellers, the inability to inspect the product before purchase, security problems and the impersonal nature of the online medium. In fact, in the case of a brick-and-mortar retail store, consumers can walk into the store and usually touch, feel, and try the product before deciding whether to purchase it. This immediately reduces the amount of perceived risk, and probably strengthens customers' positive opinions about the store. In contrast, when purchasing from an Internet store, a customer has to provide substantial personal and confidential information to conclude the transaction, hoping that the transaction will be processed completely and accurately and waiting for days until the product or service is delivered. Consumers are, therefore, attentive to risk in online transactions, and such risk may influence their decisions about whether or not to purchase online. Given their ability to limit Internet shopping adoption, risk factors have been heavily investigated in the literature and, despite the diffusion of B2C e-commerce, consumers continue to perceive purchasing on the Internet as risky (Pavlou, 2003; Gefen et al., 2003; Andrews and Bianchi, 2013; Chiu et al., 2014).

Perceived risk is usually measured as a multidimensional construct comprising the facets of performance, financial, social, psychological and time risk (Jacoby and Kaplan, 1972; Cunningham, 1967; Featherman and Pavlou, 2003; Forsythe and Shi, 2003). In the context of online shopping, performance risk is related to online shoppers' assessment of potential problems such as malfunctioning, transaction processing errors, and reliability problems, which cause products not to perform as expected. Financial risk is the possible monetary loss due to the purchase of a product of low quality or potential internet-based fraud. Social risk measures online shoppers' assessment of eventual losses to their perceived status in their social group as a result of buying a product. Psychological risk refers to the potential detriment of consumers self-esteem, peace of mind, or self-ego due to worrying or feeling frustrated as a result of buying the product. Finally, time risk is the risk that consumers may dissipate or waste time searching and waiting for the products if they make a wrong decision. This study adopts the overall definition of risk as the consumer's belief regarding the probability of gains or losses associated with purchasing goods or services online (Featherman and Pavlou, 2003; Forsythe and Shi, 2003).

Highly interrelated with security and perceived risk, the construct of *privacy concerns* refers to the consumer's general concern about how organizations collect, store, use and protect personal information, which has been identified predominantly as a major inhibitor to online shopping adoption (George, 2002; Eastlick et al., 2006). Indeed, privacy issues can cause serious problems to the safety of online activities, translating to losses for consumers, and therefore they must be addressed to enhance their confidence and promote positive attitude toward online shopping technology. Individual privacy is widely regarded as a "legal privilege" and comprises four primary areas: improper acquisition of information (e.g., preference tracking), improper use of information (e.g., third-party distribution), privacy invasion (e.g., direct mailing) and improper storage (e.g., no opting-out) (George, 2002). As for security, concerns about privacy are related both to the actions of companies and to the Internet infrastructure and regulations. However, it is difficult to determine the impact of legislative actions and privacy protection mechanisms implemented over the past decades in the fast-evolving online environment.

Factors related to the shopping experience incorporate the hedonic element of online shopping, reflecting the worth found in the shopping experience itself aside from any task-related motives, such as the set of emotional responses elicited. Here, *perceived enjoyment* is used to measure the affective aspect of online shopping. It has been extensively used in research, as a component of flow, as an addition to the TAM or in the pleasure–arousal–dominance (PAD) configuration (Davis et al, 1992; Hampton-Sosa and Koufaris, 2005; Gupta and Kim, 2007). As a matter of fact, enjoyment is a major determinant that drives users to use a new technology and

Davis et al. (1992) extended the original TAM to incorporate the hedonic aspects of technology usage. Previous research has reported evidence that enjoyment plays an important role in influencing online shopping behavior and a consumer's tendency to seek amusement via entertaining and fun experiences while shopping online may influence his/her adoption of the Internet as a mean for product shopping (Childers et al., 2001; Hampton-Sosa and Koufaris, 2005; Ha and Stoel, 2009). Following Davis et al. (1992), perceived enjoyment is considered as an additional form of intrinsic motivation of acceptance and is defined as the extent to which online shopping is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated. The construct is akin to perceived playfulness, pleasure and entertainment value, all of which capture the pleasure and fun derived from the activities on an e-commerce website.

All economic and social interactions characterized by uncertainty, vulnerability, and dependence require an element of *trust* (Jarvenpaa et al., 2000). Therefore, trust represents a vital antecedent in the online environment, which involves more uncertainties and risks than traditional shopping (Pavlou, 2001; Pavlou, 2003). The concept of trust has received attention in different social science literatures: psychology, sociology, political sciences, economics, marketing, organizational behavior and anthropology. Given its complexity, interdisciplinarity and multidimensionality, this concept has been defined and operationalized in a number of ways in relevant e-commerce literature (Gefen et al., 2003; Chang et al., 2005). Trust has been conceptualized as an overall construct, as a mechanism to reduce social complexity, and as a set of specific beliefs, including ability, benevolence, integrity, and predictability, and it has been incorporated into TAM in several ways. Moreover, most of the studies do not make a clear distinction between the underlying dimensions and the antecedents. Following Mayer et al. (1995), McKnight et al. (2002) and Pavlou (2003) proposition, trust is defined as the belief that allows consumers to willingly become vulnerable to Web retailers after having taken their characteristics into consideration. This definition is consistent with the construct of trust as a salient belief and encompasses its traditional view in a specific party (the Web retailer) and, implicitly, the confidence in the integrity of the transaction medium (the Internet infrastructure). A great number of studies have insisted that a customer's purchase intention, satisfaction, and loyalty are closely related to the building of consumer trust (e.g., Gefen et al., 2003; Pavlou 2003). To achieve this goal, an e-commerce site may signal its trustworthiness to reduce consumers' risk perceptions and increase their purchase intentions (Jarvenpaa et al., 2000). Examples of trustworthiness signals include advertising investments, reputation systems, third-party endorsements and warranties.

Website Characteristics

Drivers pertaining to attributes specific to the website are information quality and website design.

It is well recognized that information on the Internet varies a great deal in quality, ranging from highly accurate and reliable, to inaccurate and misleading and the ability to compare products and promotions around the world almost instantaneously is a key benefit of the digital medium (Kim et al., 2008). On the other hand, since online consumers must rely on limited product representations (as opposed to traditional commerce), a website's *information quality* is of utmost importance, providing a real feel for the product and enabling adequate evaluation, thus overcoming the barriers created by the lack of physical inspection (Pavlou and Fygenson, 2006; Choudhury and Karahanna, 2008). Potential buyers on the Internet are likely to be particularly attentive to the quality of information on a website because the quality of information helps them make good purchasing decisions (Kim et al., 2008). The importance of information quality was highlighted in previous IS and marketing studies and usual dimensions of information quality, derived from traditional IS literature are accuracy, completeness, understandability, currency, timeliness, and reliability (DeLone and McLean, 2003; Lim et al., 2012). Taking into consideration all the facets, information quality here refers to the degree to which the information provided by a website facilitates the consumer's evaluation of products to complete online purchasing (Choudhury and Karahanna, 2008; Kim et al., 2008; Lim et al., 2012) and captures the e-commerce content issue (DeLone and McLean, 2003). Such content should be personalized, complete, relevant, easy to understand, and secure to motivate prospective consumers to initiate transactions online.

As websites presents information in the form of text, pictures, audios, and videos, information quality naturally relates to *website design*. This construct can be traced back to IS literature and traditional retail store atmospherics (Porat and Tractinsky, 2012). Atmospherics are described as ‘‘the conscious designing of space to create certain effects in buyers. More specifically, atmospherics is the effort to design buying environments to produce specific emotional effects in the buyer that enhance purchase probability" (Kotler, 1973, p. 50). Atmospheric cues may include store layout and design, employee appearance, and musical and olfactory stimuli. Retailers have long recognized the importance of shopping environments design and have invested considerable resources in order to create an environment that induces desirable emotions in consumers. As the virtual equivalent of traditional store atmospherics, website design translates into layout, musical stimuli and design factors such as color scheme, graphics, photos, animations and texts and is therefore defined as the sum of all visible and audible cues consciously designed to create positive effects and favorable consumer responses (Eroglu et al, 2001; Koo and Ju, 2010).

Creating store atmospherics in a virtual world is more difficult compared to the physical environment and the emphasis in the formative years of website design has been on the aspects of functionality and usability rather than on aesthetics or affect (Porat and Tractinsky, 2012). However, empirical studies showed the inadequacy of this approach, as beauty was an influential aspect of websites for potential buyers (e.g., Van der Heijden, 2003; Porat and Tractinsky, 2012). As consumers cannot feel, touch, and try products, visual design richness represents a key factor positively affecting online shopping behavior and stimulated the creation of virtual modeling technologies that foster telepresence (Fiore et al., 2005).

Consumer Characteristics

Among consumers characteristics, antecedent factors considered are demographic variables like gender and age, psychological variables like perceived behavioral control, consumer knowledge operationalized as previous experience with online shopping and consumer innovativeness.

A considerable body of empirical research suggests that demographics may be related to shopping behaviors both in traditional and virtual environments (Chang et al., 2005; Pan and Zinkhan, 2006). However, findings on demographic variables are quite mixed and no consensus exists about the relationship between shoppers' demographic profiles and their attitudes toward online shopping, purchase intentions and behaviors (Chang et al., 2005; Zhou et al., 2007). *Gender* differences in online shopping have been examined from various perspectives, considering gender whether as a control variable or through a direct effect (Chang et al., 2005; Cha, 2011). Although more recent studies and reports indicate that the gender gap in purchasing products and services online is disappearing, prior existing evidence from various researches underscored the importance of gender differences. In particular, males have been found to be inclined to buy more online compared to females (e.g., Cyr and Bonanni, 2005). Suggested explanations relate to greater computer technology familiarity of men, different perceptions of risk and diverse shopping orientations, with male buyers being more convenience-oriented and less motivated by emotional and social interaction than female buyers (Teo, 2001; Dittmar et al., 2004; Zhou et al., 2007). On the other hand, some studies indicated that women are more likely to buy home furnishings, apparel and jewelry online, and they represent an important online shopper segment for these items (e.g., Goldsmith and Goldsmith, 2002). As with gender, findings about the effect of *age* are discrepant. Studies suggest that younger consumers are more knowledgeable about the Internet and end-using computing, therefore showing more favorable attitudes and intentions toward online shopping, in support of the notion that innovators tend to be younger (Rogers, 1995; Teo, 2001; Sin and Tse,

2002). However, age differences are not always significant and the knowledge gap with mature consumers is decreasing.

Consumer knowledge and experience with the medium and technology have been found to impact intention to use and actual usage of online shopping positively (e.g., Shim et al., 2001; Goldsmith and Goldsmith, 2002). Here *previous experience* refers to past purchase experiences on the Internet and with other in-home shopping formats (Shim et al., 2001; Sin and Tse; 2002). Since online shopping represents a new consumer activity, prior experience is likely to foster the development of consumers' confidence and skills that facilitate future purchases and provides important clues for judging the extent of desirability regarding next purchase (Goldsmith and Goldsmith, 2002). In fact, Rogers (1995) highlighted prior practice with an innovation as fundamental to building how-to-knowledge and enhancing trialability. Moreover, consumers who have previous experience with other in-home shopping formats (e.g., catalogs, TV shopping channels) may have accepted concepts such as: (i) ordering a product without seeing, touching or trying the real product; (ii) paying by credit card and giving information remotely; (iii) waiting for products to be delivered (Sin and Tse; 2002). Although Ajzen (1985, 1991) did not include past behavior as a predictor in TPB, other researchers pointed to the inclusion of past behavior in the model, as it significantly improves the prediction of behavior (e.g., Bentler and Speckart, 1979). The rationale lies in the influence of learned predispositions to respond on behavior, not immediately included in the concepts of attitude and intention (e.g., Bentler and Speckart, 1979).

Consumer innovativeness is the individual's predisposition to seek novelty or to be receptive to new ideas and it is regarded as a personality trait (Rogers, 1995; Goldsmith, 2001; Chang at al., 2005). Two type of personal innovativeness have been employed in the literature - general and domain-specific innovativeness; both naturally relate to online shopping, as it represents a novel activity to most consumers (Chang et al., 2005). Results on the effect of innovativeness on intention and usage of online shopping are mixed. Early studies report that innovators are more likely to shop online (e.g., Donthu and Garcia, 1999; Goldsmith, 2001). This is based on the argument that highly innovative individuals are able to cope with uncertainty and have a higher acceptance of new technologies (Rogers, 1995). However, the positive relationship between innovativeness and intention is not always significant (e.g., Sin and Tse, 2002). Understanding the relation between innovativeness and adoption behavior of online shopping is important for targeting the right customers. Rogers (1995) proposed five adopter categories - innovators, early adopters, early majority, late majority and laggards - according to the tendency of new technology adoption, which could be successfully applied to online shopping adoption.

Proposed Hypotheses

Hypotheses on the expected relationships between antecedent factors and attitude, purchase intention and purchase behavior are derived grounding on the conceptualization framework proposed in Figure 3.

TAM: perceived usefulness and perceived ease of use

Internet technology and Web interfaces used for transaction purposes have been proven to adhere to TAM predictions (Pavlou, 2003). Therefore, it is stated that perceived usefulness and perceived ease of use have a positive influence on the outcome variables, suggesting that these variables contribute to consumer adoption of e-commerce:

H1: Perceived ease of use has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

H2: Perceived usefulness has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

If the online shopping channel setup is clear, understandable and reduces the effort needed to complete the shopping process, this increases the likelihood of adoption of the medium by consumers.

TPB: subjective norm and perceived behavioral control

As a general rule, the greater the perceived behavioral control and the more favorable the subjective norm with respect to a behavior, the stronger should be an individual's intention to perform the behavior under consideration (Ajzen, 1991). Positive relations of subjective norm and perceived behavioral control with the outcome variables considered are therefore hypothesized:

H3: Subjective norm has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

H4: Perceived behavioral control has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Convenience

Convenience is related to the non-monetary aspects of transaction utility, representing customer time-and-effort perceptions about shopping online. Especially for low cost standardized items, customers would regard time savings and reduced hassles as more important than money.

Moreover, as online stores may differ in various aspects of convenience in shopping-related activities such as search, product information, ordering, payments, and delivery, customers would prefer those online stores that provide greater convenience for the same product (Gupta and Kim, 2010). Accordingly, a positive relationship between convenience and the outcome variables is postulated:

H5: Convenience has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Perceived price

Price is an important parameter for managerial attention, especially in the online environment. As in this study the aspect of price can be conceived as an individual's low price awareness, the perceived level of monetary savings when purchasing online is expected to contribute positively to online shopping adoption. Indeed, when product quality remains constant across different vendors, customers will choose the lowest price. Therefore, the following hypothesis is formulated:

H6: Perceived price has a positive impact on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

System security

System security has a favorable impact on e-commerce adoption, as customers will shop online only if they feel that their credit card numbers and other sensitive information are safe, regardless of the objective security of the Web site (Salisbury et al., 2001). Displaying security features and protection mechanisms in the website promotes the consumer’s perception of security, which consequently increases consumer’s trust and decreases the consumer’s perceived risk in completing the transaction. More formally, it is assumed that:

H7: System security positive influences a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Service quality

Service quality has been found to positive influence retail patronage in offline contexts (Pan and Zinkhan, 2006). When moving to the online environment, the imperative to provide excellent service quality is not abrogated and online vendors must discover the ways and means to provide consistent high quality services via this new medium. When the online channel is perceived to offer

high service quality, the likelihood that a consumer would use the channel to make a product purchase increases and consumers are expected to use the channel more frequently. Therefore, the following statement is proposed:

H8: Service quality has a positive effect on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Perceived risk and privacy concerns

Perceptions of risk and concerns about privacy have been proved to be major barriers of e-commerce adoption (George, 2002; Pavlou, 2003; Gefen et al., 2003; Eastlick et al., 2006; Andrews and Bianchi, 2013; Chiu et al., 2014). The increased vulnerabilities of the online channel may translate into significant losses for consumers, therefore adversely affecting their willingness to participate in online shopping activities. Consequently, the following hypotheses are formulated:

H9: Perceived risk negative influence a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

H10: Privacy concerns negatively impacts a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Perceived enjoyment

By extending the results of Davis et al. (1992) in the context of online shopping, perceived enjoyment is expected to promote e-commerce adoption through the enhancement of the shopping experience. It is straightforward that a highly enjoyable experience will increase attitudes, intentions and usage. More formally, the following statement is proposed:

H11: Perceived enjoyment has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Trust

The positive influence of trust on consumers' purchase intentions has been consistently validated in prior research (e.g., Gefen et al., 2003; Pavlou 2003). Like offline trust, online trust is one of the most effective tools for reducing uncertainty and risks and generating a sense of safety, thus functioning as a facilitator for formulating positive attitudes, purchase intentions and decisions. Accordingly, this study posits the following hypothesis:

H12: Trust positive influences a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Trustworthiness signals thus promote the adoption of online shopping by consumers.

Information quality

Given the limited product representations on which consumers can rely online, the quality of information is essential in the decision-making process. To the extent that consumers perceive that a website presents quality information (accurate, complete, understandable, updated, timely and reliable), they are more likely to have confidence that the vendor is reliable. Contextually, high quality information help reduce the levels of perceived uncertainty and risk related to an electronic commerce transaction because such information provides what is needed to conduct the transaction in a controlled manner. Therefore, the following statement is proposed:

H13: High information quality increases a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Website design

Visual design richness is highly related to information quality and past studies have confirmed that a high-quality design is more likely to prompt consumers to make purchases on the site (e.g., Gefen et al., 2003; Van Der Heijden et al., 2003). If an online shopping website presents high usability, an appealing design and interactivity elements, it creates positive emotional responses in users, thus fostering favorable consumer responses such as prolonged stay, positive attitudes and increased intention to purchase. Accordingly, a positive relationship with the outcome variables is hypothesized:

H14: Website design positively influences a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Gender and age

Findings on demographic variables like gender and age are mixed and discrepant across the literature, with no consensus about the magnitude and direction of the relationships with attitudes, intentions and behaviors (Chang et al., 2005; Zhou et al., 2007). Consequently, this study postulate that:

H15: Gender does not influence a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

H16: Age does not impact a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Previous experience

Following Rogers (1995) and the recommendation of other researchers to include past experience in TPB as it significantly improves the prediction of behavior (e.g., Bentler and Speckart, 1979), this study proposes a direct effect of previous experience on the outcome variables. Past purchase experiences both on the Internet and with other in-home shopping formats increase familiarity with the channel. More formally, it is stated that:

H17: Previous experience acts positively on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Consumer innovativeness

Although the positive relation between consumer innovativeness and the outcome variables is not always significant in previous studies, this work proposes that the degree of personal innovativeness is likely to affect the propensity of shoppers to purchase from an online store, grounding on the argument that innovators have a higher acceptance of new technologies (Rogers, 1995). Therefore, the following hypothesis is proposed:

H18: Consumer innovativeness has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior.

Chapter Summary

Chapter 2 extends the brief review of literature section from chapter 1 with a comprehensive overview of literature pertaining to the drivers of consumers' adoption of electronic shopping.

Given the interest in understandings the dynamics of online shopping adoption, there are good reasons for this study to choose the two theoretical frameworks of TAM and TPB as its starting point. Fist, the theoretical background of the two theories has been widely applied, validated and referred to in the primary studies. Second, they have shed light on the understanding of antecedent factors of adoption since the formative years of e-commerce. This provides a strong foundation for this study, as research constructs from the two theories are among the most investigated ones. Despite being extensively used, numerous researchers proposed an extension with other important variables to further improve its specificity and explanatory power in the online

shopping environment (e.g., Gefen et al., 2003; Pavlou, 2003). Relevant constructs derived from different theories were selected among the most studied and pertain to features specific to the online channel, websites and consumer characteristics. Such an extension is crucial in light of the complex and the interdisciplinary nature of the study of online buying behaviors. Therefore, based on the literature reviewed presented, the chapter proposes the research framework, which is designed to examine the main factors that influence consumers' adoption of e-shopping. Specific hypotheses are formulated for testing, using the meta-analytic procedures described in the next chapter.

CHAPTER 3

METHODOLOGY

Rationale of Meta-analysis

Since its advent, meta-analysis has become the standard methodology for synthesizing research findings in the social, behavioral, and medical sciences (e.g., Cortina, 2003; Borenstein et al., 2009; Cooper et al., 2009). The term was coined by Gene Glass in 1976 to mean the analysis of analyses, although the techniques on which meta-analysis is based were developed much earlier (Glass, 1976). The author introduced the term to differentiate it from primary analysis and secondary analysis. Primary analysis is the original analysis of data in a research study while secondary analysis involves the analysis of data that have been analyzed before, for example to check the results of previous analyses or to answer new questions. On the other hand, meta-analysis refers to "the statistical analysis of a large collection of analysis results from individual studies for the purpose of integrating the findings" (Glass, 1976, p. 3) and it represents a rigorous alternative to the narrative discussion. As a matter of fact, prior to the 1990s the task of combining data from multiple studies has been the purview of the narrative reviews, which suffer from two important limitations (Borenstein et al., 2009). The first one is the subjectivity and the lack of transparency of the approach, as the decision-making process used to synthesize the data is often not articulated by the reviewer and might vary greatly among different reviewers. The second limitation is that narrative reviews become less useful as the number of studies increases. For these reasons, scholars have been moving toward systematic reviews and meta-analysis to organize and summarize the growing amount of research evidence generated by different disciplines. The popularity has increased as too much information has been accumulating to manage easily by narrative reviews and, as Hall and Rosenthal (1995) noted, there has been a shift in perspective such that a broader and more objective view of research is emerging and the distribution of results has become of greater interest than the results of individual studies.

The first meta-analysis dates back to 1904 in the field of medicine (Simpson and Pearson, 1904), while it was not until the latter two decades of the twentieth century that meta-analysis became popular in fields such as biomedicine, behavioral sciences and the interface of the two (Rosenthal and DiMatteo, 2001). One of the first meta-analyses in the social sciences was performed by Smith and Glass (1977) to evaluate the effectiveness of psychotherapy and around the same time other researchers developed similar techniques to synthesize research findings (Rosenthal and Rubin, 1978; Schmidt and Hunter, 1977), which are now referred to as meta-analysis techniques. Since most of the research conducted in developing these techniques has taken

place during the last two decades, meta-analysis may be considered to be a relatively recent development compared to other statistical methods (Viechtbauer, 2005). With the work of Glass (1976), it became clear that meta-analysis is more than a statistical technique: *it is a methodology for systematically examining a body of research, carefully formulating hypotheses, conducting an exhaustive search and establishing inclusion/exclusion criteria for articles, recording and statistically synthesizing and combining data and effect sizes from these studies, searching for moderator and mediator variables to explain effects of interest, and reporting results* (Hedges and Olkin, 1985; Rosenthal, 1995; Rosenthal and DiMatteo, 2001; Hunter and Schmidt, 2004; Cooper at al., 2009).

Many meta-analyses have looked at relatively straightforward questions, such as whether a particular predictor relates to an outcome. The methods involve describing the results of individual studies via numerical indexes, commonly referred to as effect size estimates (e.g.,, correlation coefficient, standardized mean difference, odds ratio) and combining these estimates across studies to obtain a summary statistic. However, as the research questions or data structures become increasingly complex, these conventional univariate meta-analytic techniques may not be sufficient to handle the dependence of the effect sizes. More advanced techniques, such as multivariate meta-analysis, linked or model-driven meta-analysis, can be therefore used to analyze more complex chains of events and to handle the dependent nature of the effect sizes (Cooper at al., 2009; Cheung and Cheung, 2016). The term model-driven meta-analysis has been used to refer to meta-analyses designed to examine a particular theoretical model (Becker, 2001; Cooper et al., 2009). An example of these techniques is meta-analytic structural equation modeling or SEM-based meta-analysis, among which two approach exist nowadays, referred to MASEM (Viswesvaran and Ones, 1995; Landis, 2013; Bergh et al., 2016) and TSSEM - Two-Stage SEM – (Cheung and Chan, 2005; Cheung, 2015; Cheung and Cheung, 2016). This meta-analysis focuses on MASEM approach, which is described in later paragraphs.

Regardless of the specific technique chosen, six steps can be distinguished in a meta-analysis: problem formulation, literature search, data evaluation, data analysis, interpretation of the results and presentation of the results (Rosenthal and DiMatteo, 2001; Cooper et al., 2009). The first step involves the definition of research questions, hypotheses and operationalization of the independent and dependent variables of interest. In the literature search, studies are collected in a systematic way, attempting to find all the published and the unpublished research available. Grounding of specific criteria of inclusion/exclusion, selected studies are coded systematically. In the subsequent steps the variability among the obtained effect sizes is examined and statistical analyses are performed to combine the effects – e.g., effect sizes computation and transformation,

combination of effects using various measures of central tendency, exploration of the variability in effect sizes in terms of moderator variables, assessment of publication bias. Finally, results are interpreted and reported, narratively and visually. Reporting standard for meta-analyses in economics are provided by the MAER (Meta-Analysis of Economics Research) Network: https://www.hendrix.edu/MAER-Network/post.aspx?id=62556andblogid=51160.

Highlights and Limitations of Methodology

Meta-analysis is a prominent statistical tool in many research disciplines as it helps overcome much of the equivocation about research findings by providing a method for combining research results. As every methodology, meta-analysis is valuable for several reasons and it is subject to ongoing criticisms as well.

First of all, meta-analysis allows researchers to draw conclusions that are more accurate and more credible than the ones presented in any one primary study or in a nonquantitative, narrative review (Rosenthal and DiMatteo, 2001; Borenstein et al., 2009). Compared to narrative reviews, all decisions are clearly specified and mechanisms are transparent, although it cannot be said that the methodology is entirely objective as there is an element of subjectivity in setting rules and criteria of inclusion/exclusion. Moreover, unlike the narrative review, where reviewers implicitly assign some level of importance to each study, in meta-analysis the weights assigned to each study are based on mathematical criteria that are specified in advance. Therefore, the statistical analysis provides a transparent, objective, and replicable framework.

Rosenthal and DiMatteo (2001) identified six major advantages of meta-analysis: seeing the landscape of a research enterprise, keeping statistical significance in perspective, toward wasting no data, intimacy with the data, focused research hypotheses and identifying moderator variables. As far as it concerns the first point, meta-analysis provides the opportunity to view the whole picture in a research enterprise as it requires the careful review and analysis of all the published and the unpublished data available on a specific research question. Second, meta-analysis offers the opportunity for small and nonsignificant effects to contribute to the overall picture of the results of a research enterprise, preventing the reliance on the significance test of any singular finding as a measure of its value. Third, no data are wasted in a meta-analysis, allowing the inclusions of results from studies with samples so small that they never achieve statistical significance. Fourth, the researcher becomes very familiar with published and unpublished data in a research area, as he/she goes carefully through all research articles, not limiting the analysis to the abstracts and discussion sections of the articles. Fifth, conducting a meta-analysis is also an exercise in research precision as the accurate formulation of research questions is essential. Lastly, the inclusion of moderator

variables may point to valuable associations to explore, adding to theory development and increasing the richness of the empirical work.

Despite the prominent positive contributions, meta-analysis is also criticized. Sharpe (1997) identified three main threats to the validity of meta-analysis: mixing of dissimilar studies, publication bias, and inclusion of poor-quality studies. The mixing of dissimilar studies, also referred to as combining "apples and oranges", entails the issue the meta-analysis aggregates results from studies that measured different things, manipulated variables that vary notably in their operationalization, and tested different subject populations. It can be argued, however, that the appropriateness of the inclusion of a broad range of studies depends on the inference goal, e.g., if one wants to generalize about fruit, it is a good thing to mix apples and oranges (Rosenthal and DiMatteo, 2001; Card, 2015). Further, moderator analysis can take methodological differences into account when studies vary greatly. The second issue, publication bias, also referred to as the "file drawer" problem, relates to the well-supported suspicion that journals are more likely to publish statistically significant results than non-significant results (Rosenthal, 1979, 1995). A meta-analysist will then fail to obtain all or a representative sample of the population of studies on some topic. Moreover, meta-analyzing only the published literature may overestimate the magnitude of an effect, and possibly even find an impact where none exists. Concerns about publication bias can be addressed by searching for both published and unpublished studies, such as dissertations, unpublished manuscripts, conference presentations, and by various statistical procedures - e.g., the *fail-safe n* (Rosenthal, 1979) - but there is no consensus on which is the best ways to deal with the problem. Finally, the inclusion of poor-quality studies was labeled "garbage in, garbage out" issue and concerns the mixing of good and bad studies. This criticism can be dealt with using weighting techniques that take into account and quantify the methodological strength of each study in the analysis or grouping the studies according to their type of methodology and type of operationalization of dependent and independent variables (Rosenthal and DiMatteo, 2001).

Data Collection

The studies for this work were searched among different streams of literature that provide information on the effect of different antecedent factors on three identified dependent variables: attitude toward online shopping, purchase intention and purchase behavior. A series of search strategies were carried out to identify both published and unpublished studies. The first step included electronic full-text databases, such as Business Source Complete, ABI/INFORM, ScienceDirect, JSTOR, Emerald, ACM, IEEE Xplore, SpringerLink, Web of Science, Social Science Research Network and dissertation database ProQuest. A large set and combinations of keywords were used, including: "online shopping", "e-commerce", "Internet shopping", "web

retailing", "driver", "factor", "determinant", "antecedent", and "predictor". Second, Google Scholar search engine and the World Wide Web were used to identify other relevant working papers, books, dissertations and conference proceedings. Such sources of grey literature were included to increase the sample size and to attenuate publication bias. Although no definite solution to this problem is available and there is the possibility of overlooking potential studies, the data collection procedure attempted to obtain a complete set of both published and unpublished studies. Third, in relevant literature reviews and empirical papers deemed appropriate the references were screened to locate additional studies. When full text was not available or missing information was present, the authors were contacted.

The decision to include a specific study was based on four inclusion criteria:

(1) The study must have empirically investigated consumer behavior in online platforms, reporting on one or more antecedent factors of e-commerce adoption;

(2) The study must have examined constructs such as attitude, purchase intention and purchase behavior;

(3) Articles must have been published between 1990 and 2017, as e-commerce and online shopping are new technologies developed after 1990;

(4) Relevant effect sizes such as correlation coefficients, or other metrics that could be converted into correlations (e.g., Cohen's d, t, F), must have been available.

The search strategy and inclusion criteria resulted in a set of 155 articles. Nine articles were excluded because key information, such as sample size and measurement of the core variables, was not reported and could not be obtained. The final database contains 146 articles, with 183 studies, 1,710 effect sizes, a total sample size of 671,689 shoppers and the timespan 1999-2017. On average, 7.9 papers on online shopping adoption were published per year. The sample size used ranges from 50 to 1,370 respondents. The majority of studies were conducted in North America and Asia (36% and 38%), 11% in Europe, 3% in South America and Australia/New Zealand and 12% without specifying the country. The research streams are presented as follows: 29% of the articles come from marketing journals, 25% from information systems and computer science; 23% from business and management, 23% from economics and others, e.g., psychology, general engineering, arts and humanities. A list of the articles is provided in Appendix I.

Coding

In the coding procedure, each article was read through for information needed. An extensive coding protocol was developed and used to extract information on the effect sizes, antecedent factors, and general study characteristics. The final coding worksheet was discussed, checked and verified. With the help of two other coders the same construct definitions framed in the taxonomy

were used (see Table 1). Over 200 different variables were identified and classified based on a standardized scheme to capture the reported relations. Since a multitude of constructs were investigated in the selected studies, variables with different names may stand for similar meaning. Such constructs were merged in accordance with the terminology most commonly used in the literature and consistently with the variables in the proposed model, developing a single definition for each construct. This is the case, for example, for self-efficacy, controllability, facilitating conditions and perceived behavioral control, aggregated in the construct of perceived behavioral control, or playfulness and entertainment, included in the enjoyment construct. In the first round, ten percent of the articles were coded by each of the coders. The inter-coder overall agreement was 0.97. Any inconsistency in coding was resolved through discussion until a final consensus was reached. Next, all coding was done by a single coder.

Additional information, such as the year of the study, characteristics of the publication, investigated country, and research model was also collected. The type of research (0 = experimental; 1 = surveys and others), type of respondents (0 = non-students; 1 = students) and type of publication (0 = article in a peer reviewed journal; 1 = others) are dummy variables. Country, product category and research stream were coded as factors with multiple levels. Year of publication was coded as a continuous variable and mean-centered before conducting the analyses.

Meta-analytic Procedures

Eighteen predictor variables and three outcome variables were included in the propose model. In total, 1,710 measures on 210 relationships were included in the meta-analysis. Pearson correlation coefficient *r* was selected as the effect size metric, consistent with other meta-analyses in marketing (Pan and Zinkhan, 2006; Arts et al., 2011; Hogreve et al., 2017). If a correlation coefficient between two variables was not reported, other statistical information – such as Cohen's d, F-tests, t-tests and chi-squared tests – were used. These statistics were converted to the common correlation coefficient metric, following the formulas suggested by Wolf (1986), Rosenthal (1991), Fern and Monroe (1996), Hunter and Schmidt (2004), Cooper et al. (2009)[1]. Many studies also reported standardized regression weights, that could have been converted using the beta estimation procedures (BEPs) suggested by Peterson and Brown (2005), widely used in meta-analytic research across various fields. However, we explicitly excluded those articles reporting only standardized regression weights, despite the smaller *k,* as recommended by Roth et al. (2018). Through a series of Monte Carlo simulations, the authors suggested that the use of BEPs can decrease the accuracy of research findings in three main directions: (1) producing overly small estimates of meta-analytic

[1] Only a very small proportion of effect sizes is based on Cohen's d, t, F (3% of 1,936 effect sizes).

mean correlations, (2) yielding overly large estimates of SD and (3) misguided searches of potential moderator variables, as researchers think there is more heterogeneity in their data than there actually is. Thus, the authors urged a return to the practice of using only bi-variate correlations in meta-analysis, as it substantially outperformed the use of beta coefficients from multivariate models despite the smaller *k* and BEPs appeared to be worse than other missing data techniques (see also Aloe, 2015).

To aggregate the correlation coefficients and correct them for sampling errors a hierarchical random-effects model for each pair of constructs was adopted. The use of a random-effects model is appropriate when population parameters vary and the goal of the meta-analysis is to make inferences beyond the specific set of studies included (Field, 2003, 2005; Hedges and Vevea, 1998; Viechtbauer, 2005; Raudenbush, 2009; Schmidt, Oh and Hayes, 2009; Borenstein et al., 2009). As a matter of fact, fixed-effects models start with the assumption that the true effect size is the same in all studies and the studies are assumed to constitute the complete universe of relevant studies. This assumption is implausible, as there is no reason to assume that the true effect size is exactly the same in all the studies and the studies in the analysis represent a sample of all the possible conducted on the subject.

Further, the model accounts for the unbalanced structure of the data and multiple measurements within studies (Raudenbush and Bryk 1985, 2002; Bijmolt and Pieters, 2001; Konstantopoulos, 2011). As effect sizes are nested within studies, we expected the underlying true effects to be more similar for the same level of the grouping variable (i.e., the study) than true effects arising from different levels, because the true effects within the same level may be correlated. We accounted for these dependencies adding a random effect to the model at the study level (Konstantopoulos, 2011). This procedure uses all the available information and accounts for the nested structure in the data and it is therefore preferable to other methods (i.e., single value approach, complete set approach) which perform worse in terms of overall model recovery, parameter significance testing and parameter estimation accuracy (Bijmolt and Pieters, 2001). The same model was adopted in the subsequent step, when performing the moderator analysis strategy.

The model was estimated utilizing the restricted maximum likelihood (REML) method applying the Knapp and Hartung adjustment (Viechtbauer, 2005; DerSimonian and Kacker, 2007; Raudenbush, 2009; Viechtbauer et al., 2015). To account for differences in the precision of the effect sizes, effect sizes were weighted by the inverse variances plus an estimate of the amount of residual heterogeneity. These weights were used to calculate between-study variance, standard error and confidence interval of the mean effect, reported in Table 2. As an iterative estimator, the restricted maximum likelihood estimator is generally recommended as it reaches a good balance

between unbiasedness and efficiency (Viechtbauer, 2005; Viechtbauer et al., 2015). Moreover, REML estimate of a variance component represents an improvement over the maximum likelihood (ML) estimates, which are known to be negatively biased in many cases. In fact, restricted maximum likelihood estimates of between-study variance take into account the uncertainty about parameters, generating nearly unbiased estimates, improving standard errors, hypothesis tests, and confidence intervals and the method can be easily adapted for the meta-analytic mixed-effects model (Corbeil and Searle, 1976; Harville, 1977; Viechtbauer, 2005; DerSimonian and Kacker, 2007; Raudenbush, 2009; Viechtbauer et al., 2015). The Knapp and Hartung method was employed adjusting test statistics and confidence intervals of individual coefficients using a t-distribution with k-p degrees of freedom, over other commonly used tests in random effects model (e.g., the conventional Wald-type test, based on a standard normal distribution). Compared to other approaches, which can be very liberal and lead to a large number of unjustified significant results, the test produces more conservative and realistic inferences (Hartung and Knapp, 2001; Raudenbush, 2009). In addition, the test works well regardless of the value of the between-study variance, that is the magnitude of the unexplained heterogeneity.

As the number of effect sizes (*k*) between each driver and dependent variables varies, from a minimum of 0 to a maximum of 61, we adapted a fixed-effects model when k=1, in five cases. For relations in which no effect size could be retrieved, we could not proceed with the analysis.

In addition, a series of univariate statistics were computed, including the 95% confidence intervals, Q-statistic test and I^2 index to assess heterogeneity, and the Fail-safe N statistics (see Table 2 and Appendix II – Tables A1, A2, A3).

Confidence intervals, computed using the Knapp and Hartung method, were used to interpret the significance of mean effect size, together with the test statistics based on the t-distribution. Confidence intervals also indicate the amount of error around the estimate of the mean weighted correlations due to sampling error (Whitener 1990; Borenstein et al., 2009; Schmidt et al., 2009).

To assess the amount of heterogeneity in the set of effect sizes we used various complementary indicators, computed for each relationship: the estimate of the between-studies variance (T^2), Q statistic and I^2 index (Higgins et al., 2003; Huedo-Medina et al, 2006; Borenstein et al., 2009; Cooper et al., 2009). The amount of heterogeneity has implications regarding the interpretation of the meta-analytic findings and represents an indicator for the presence of potential moderator variables.

The between-studies variance (T^2) reflects the amount of true heterogeneity, that is how much the true population effect sizes estimated in the single studies of a meta-analysis differ

(Viechtbauer, 2005; Huedo-Medina et al., 2006; Borenstein et al., 2009). It depends on the metric of the effect size and is not sensitive to the number of studies.

The Q test defined by Cochran (1954) has been the usual way of assessing true heterogeneity and is computed by summing the squared deviations of each study's effect estimate from the overall effect estimate, weighting the contribution of each study by its inverse variance (Hedges and Olkin, 1985; Huedo-Medina et al., 2006):

$$Q = \sum w_i \, (T_i - \overline{\mathrm{T}})^2$$

where *w*i is the weighting factor for the *i*th study;

$\overline{\mathrm{T}}$ is the estimate of the mean effect size.

It tests whether the variability in the observed effect sizes or outcomes is larger than would be expected based on sampling variability alone. A significant test suggests that the true effects or outcomes are heterogeneous, pointing to the need for moderator analysis. Qualities that make this statistic useful as test of significance are that it is sensitive to the number of studies and not sensitive to the metric of the effect size index, thus leading the decision whether apparent heterogeneity is genuine. However, as the statistical power depends on the number of studies, Higgins et al. (2003) proposed the I^2 index, which is not sensitive to the metric of the effect size and it is not sensitive to the number of studies (Huedo-Medina et al., 2006; Borenstein et al., 2009). I^2 represents the ratio of true heterogeneity to total observed variation, that is between-studies variability, and it is computed dividing the difference between the result of the Q test and its degrees of freedom (k – 1) by the Q value itself, and multiplied by 100 (Higgins et al. 2003; Huedo-Medina et al., 2006; Borenstein et al., 2009):

$$I^2 = \frac{(Q - (k-1))}{Q} \; x \; 100\% \; for \; Q > (k-1); \; I^2 = \; 0 \; for \; Q \; \leq (k-1)$$

The scale of I^2 has a range of 0–1, irrespective of the scale used for the meta-analysis, where I^2=0 implies perfect homogeneity. In contrast, when I^2 is large, it is reasonable to speculate about potential causes of the variance and apply techniques such as meta-regression to try and explain it. The I^2 index and the between-studies variance are directly related but have different meanings: the between-studies variance reflects the amount of true heterogeneity while I^2 reflects the proportion of observed dispersion that is due to this heterogeneity. Advantages over the Q test are that I^2 is easily interpretable and provides a measure of the magnitude of heterogeneity, whereas the Q test reports about the statistical significance of the homogeneity hypothesis.

Finally, publication bias was addressed by computing the fail-safe N for the correlation coefficients (Rosenthal, 1979; Hunter and Schmidt, 2004). As we cannot tell how many studies have been conducted but never reported, the fail-safe N indicates the number of studies averaging

null results that would have to be added to the given set of observed outcomes to reduce the significance level to a target alpha level, here p =.05. This number of filed studies, or the tolerance for future null results, is assessed to check whether a publication bias affected the results.

Table 2 summarize the findings, showing for each pairwise relationship the number of correlations and the number of studies, the cumulative sample size, the weighted mean correlation and standard error, the between-studies variance (T^2), the fail-safe N at p =.05 and the scale-free index of heterogeneity (I^2). Further in the Appendix (Tables A1, A2, A3) results are presented for each dependent variable (attitude, purchase intention, purchase behavior) reporting also the results of the Q test for homogeneity, 95% confidence interval and the test statistic using the Knapp and Hartung method.

The results of the Q test and the I^2 index suggest that most relations are heterogeneous. Therefore, potential sources of the reported differences in effect sizes are examined next.

Moderator Analysis Strategy

To test the proposed moderation effects, meta-regression procedures adapting a hierarchical mixed-effects meta-analytic model – that accounts for statistical dependencies among effect sizes based on the same subject samples, extending the random-effects model (Bijmolt and Pieters, 2001; Konstantopoulos, 2011) – were utilized. As the results the Q test and the I^2 index indicates high heterogeneity for most of the investigated relations, such an analysis is useful to explain this heterogeneity and explore if moderators may affect the size and direction of the reported relationship.

Separate meta-analytic syntheses were conducted for each driver, regressing the meta-analytic correlations on the different moderator variables. To enhance the explanatory power of the analysis, the effect sizes were aggregated for the three dependent variables, adding the dependent variable as a moderator and testing if there are significative differences in the effects among attitude, purchase intention and purchase behavior. As meta-regression requires an appropriately large ratio of studies to covariates (Borenstein et al., 2009), moderating analyses were conducted on the drivers for which at least twenty study effects were available (for all the dependent variables together), which are: perceived ease of use, perceived usefulness, price, convenience, system security, service quality, perceived risk, privacy concerns, enjoyment, trust, information quality, website design, subjective norm, previous experience, perceived behavioral control and innovativeness.

Eight potential moderating variables, related to contextual and methodological factors, were investigated. First, we examined whether the effect sizes differ between the dependent variables:

attitude, purchase intention and purchase behavior. Selected contextual moderators include: country of investigation, aggregated in Western countries, Eastern countries and unspecified; product type, which includes tangible goods, intangible goods, services, mixed or unspecified; research stream, in particular marketing and communication, economics, business and management, information technology and computer science and others (including psychology, general engineering, arts and humanities etc.); and year of publication (mean-centered). Among the methodological moderators one dummy variable for type of research (experimental versus surveys and others), one for type of respondents (non-students versus students) and type of publication (article in a peer reviewed journal versus others) were included. If a set of relations showed insufficient variation on a particular moderator, it was excluded from the analysis (indicated as 'non-applicable' [n/a] in Table 4).

To test the proposed moderation effects, the random-effects model was extended into a hierarchical mixed-effects meta-analytic model, that controls for heterogeneity both within and between studies (Bijmolt and Pieters, 2001; Raudenbush, 2009; Konstantopoulos, 2011). The model may be expressed as:

$$y_{rs} = \sum_{k=1}^{K} \beta_k X_{k,rs} + e_{rs} + u_s$$

where $X_{k,rs}$ are coded moderators, with k = 1,….., K, for each study (*s*) that reported one or more relationships (r = 1,…..,R_s and $\sum_{s=1}^{S} R_s$ reflects the total number of relationships found);

β_k are regression coefficients capturing the association between moderators and effect sizes y_{rs};

e_{rs} and u_s are the within- and between-study error terms, assumed to have a normal distribution with a mean of zero and variances σ_e^2 and σ_u^2 respectively.

No intercept β_0 was included in the model, therefore the coefficients for the dependent variable moderator represent the meta-analytic average effect sizes for each level (Cheung, 2015; Polanin et al., 2017). Table 4 summarizes the findings of the moderator analysis for each driver. Significance test of individual coefficients was conducted using the alternative method described by Knapp and Hartung (2003). The test is an adjustment to the standard Wald-type tests typically used in mixed-effects meta-regression models and uses a t-distribution with *k-p* degrees of freedom. This procedure leads to tests with better statistical properties i.e., better control of the Type I error rate (Knapp and Hartung, 2003; Higgins and Thompson, 2004; Viechtbauer et al., 2015).

Effect sizes within a study share values on several moderators e.g., year of publication, while they may differ on other moderator variables e.g., product type. Under this model, we assume a distribution of effect sizes for any given value of the moderators, testing the null hypothesis that the mean is the same for all values of the moderating variables. The variance component, test for residual heterogeneity and omnibus test of moderators were computed for each relation. Results are displayed in Table A4 (Appendix III). The variance σ^2 reflects the variability in the true effects not accounted for by the moderators in the model (Raudenbush, 2009; Viechtbauer et al., 2015). While without moderators in the model we used the Cochran's *Q*-test (Cochran, 1954) as one of the indicators for heterogeneity, here the *Q_E*-test for residual heterogeneity is employed to test whether the variability in the observed effect sizes not accounted for by the moderator variables is larger than would be expected based on sampling variability (and the given covariances among the sampling errors) alone. To test the impact of moderators simultaneously we used an F-distribution with m and k-p degrees of freedom, where p represents the total number of model coefficients, following the Knapp and Hartung adjustment (Knapp and Hartung, 2003; Raudenbush, 2009). The F-test serves as an omnibus test of the hypothesis that all the βs are zero. Since no intercept is included in the model, the omnibus test includes all the coefficients including the first.

A series of additional analyses were performed. First, the extent of multicollinearity in the model was checked by calculating the Generalized variance inflation factors (GVIF) for each regression model, which is comparable to the square root of the variance inflation factor (VIF) for one degree of freedom (Df=1) (Fox and Monette, 1992). GVIF^(1/(2*Df)), where Df is the number of coefficients in the subset, was utilized to make GVIFs comparable across dimensions. In an iterative process, the moderator with the highest value of GVIF^(1/(2*Df)) was excluded and the model re-estimated, until all moderators had a cutoff value of 3. The majority of GVIF^(1/(2*Df)) values are <2 across all regressions, with the highest reported values of 2.755 and 2.598 being for Research type and Publication type, thus collinearity does not severely inflate the variance associated with parameter estimates (Table A5, Appendix II). Second, the profile likelihood plots of the variance components of the model were checked, which is useful whenever fitting more complicated, multilevel models (Viechtbauer, 2010). All profile likelihood plots for each driver were peaked at the respective parameter estimates and the log likelihoods decrease as the values of the component move away from the actual REML estimates, indicating that the variance component is identifiable. Finally, as we ran an omnibus test for all model coefficients together, we tested the significance of each categorical moderator individually with an F-test and related p-value and we ran all pairwise comparisons (contrasts) between the levels of the DV factor. To adjust p-values for

the contrasts we used Holm's method, which provides strong control of the family-wise error rate but is not as overly conservative as the Bonferroni correction (Holm, 1979).

Findings suggest that at least part of the heterogeneity in the true effects is related to some of the predictors included in the model, as it will be discussed in more detail in the next chapter.

Structural Equation Modeling Strategy

To test the theoretical framework and add to the understanding of the contribution of the antecedent factors to e-commerce adoption, a meta-analytic structural equation modeling, also referred to as MASEM, with LISREL 8.80 was used. The insights derived from combination of meta-analysis (MA) and structural equation modeling (SEM) can help explore the boundaries, structure, and weaknesses of theoretical models and determine the explanatory and predictive adequacy of theories in advancing the field's knowledge (Viswesvaran and Ones, 1995; Cooper et al., 2009; Landis, 2013; Jak, 2015; Bergh et al., 2016).

Meta-analysis represents an extremely useful technique to quantitatively summarize a body of work in a research domain (Glass, 1976; Rosenthal, 1995; Hunter and Schmidt, 2004) and the issues related to the methodology were discussed in the previous paragraphs. However, meta-analysis assesses one element of a theoretical model at a time, typically through a bivariate correlation coefficient, thus being unable to provide higher-level assessments (Viswesvaran and Ones, 1995; Cooper et al., 2009; Landis, 2013; Jak, 2015; Bergh et al., 2016). The integration with structural equation modeling, which is an extension of several multivariate techniques such as multiple regression and factor analysis that allows to simultaneously test multiple relationships while providing statistical efficiency (Jöreskog, 1973; Hair et al., 1995), enables researchers to take all the available information from an entire stream of research and use them as the basis for testing complex models, asking about chains of connections among predictors and outcomes (Viswesvaran and Ones, 1995; Cooper et al., 2009; Landis, 2013; Jak, 2015; Bergh et al., 2016). Major advantages consist of the opportunity to test structural models not tested in any primary study; more stable parameter estimates and fit statistic, as meta-analytic correlations are generated from larger samples; the possibility to test intermediate mechanism in a chain of relationships and to compare alternative theoretical models; the maximization of external validity, because it includes all the available data for a particular relationship (Viswesvaran and Ones, 1995; Landis, 2013; Bergh et al., 2016). MASEM is also subject to several limitations and potential problem unique to this framework, such as missing values in the correlation matrix, sample size to use, values to use in the diagonal of the matrix, the difficulties with testing moderation, correlation matrix that fails to be positive definite and the inability to make strong, casual inferences based on data from non-experimental studies (Viswesvaran and Ones, 1995; Landis, 2013; Bergh et al., 2016). Judgment

calls on the part of the research are needed for every potential problem or decision point. Despite these limitations, MASEM represents a more powerful technique than traditional meta-analysis.

To estimate the model, the meta-analytic generated correlations coefficient matrix and the harmonic mean size were used as input. The use of the harmonic mean is preferable, as it is consistent with the literature on unweighted analysis of variance and it balances the influence of smaller and larger values (Viswesvaran and Ones, 1995; Landis, 2013; Bergh et al., 2016). Two decision points regarding the correlation matrix had to be faced in performing SEM: missing values and a non-positive definite meta-analytic matrix (Cudeck, 1989; Viswesvaran and Ones, 1995; Cheung and Chan, 2005; Landis, 2013; Bergh et al., 2016; Sheng et al., 2016). Missing values arise because not all the studies report correlational data about the interrelationships among the predictor variables while a non-positive definite correlation matrix, i.e., ill-defined matrix including zero or negative eigenvalues, may originate from several sources associated to the fact that each study contains a different set of variables, e.g., sampling variation, presence of empty cells, highly correlated variables (Cheung and Chan, 2005; Landis, 2013; Bergh et al., 2016; Sheng et al., 2016). As the correlations matrix of this study contains full data for only a subset of the predictors and highly correlated variables were identified, a conservative approach was adopted, reducing the set of variables and estimating a more parsimonious framework. The final correlation matrix is displayed in Table 7.

Firstly, a baseline model, grounded on the widely accepted TAM and TPB was tested; secondly, this model was extended with relevant constructs and verified. Table 5 contains the findings and Figures 4-5 report the proposed models. Latent variables are conventionally represented by ellipses and the relationships among them by single-headed arrows. Path coefficients and multiple goodness of fit statistics were analyzed.

Chapter Summary

This chapter provides detailed explanation in relation to the decisions made regarding the methodological approach in the present study. In particular, the discussion covers the choice and rationale of the selected methodology, data collection and coding method, and the procedures followed in the three steps of data analysis.

Meta-analysis represents a prominent statistical tool for systematically examining a body of research, providing the opportunity to view the whole picture in a research enterprise. Multivariate techniques are chosen to analyze the more complex data structures and to handle the dependent nature of the effect sizes. The methodology presents numerous advantages, but it is subject to ongoing criticisms as well, like mixing of dissimilar studies, publication bias, and inclusion of poor quality studies, properly dealt with in the procedure. The first step of literature search and coding is

carefully described, listing sources and search strategies utilized and the criteria of inclusion. The final database contains 146 articles, with 183 studies, 1,710 effect sizes on 210 relationships, a total sample size of 671,689 shoppers and timespan 1999-2017. The relationships between the eighteen predictor variables and three outcome variables (attitude toward online shopping, purchase intention, purchase behavior) are first analyzed using bivariate correlation coefficients, adapting a hierarchical random-effects model for each pair of constructs. Between-study variance, standard errors, confidence intervals, Q-statistic tests, I^2 indices and the Fail-safe N statistics are computed to assess heterogeneity and publication bias. Second, as the results the Q test and the I^2 index indicates high heterogeneity for most of the investigated relations, a series of meta-regressions are conducted to test moderation effects and try to explain this heterogeneity. The random-effects model is extended to a hierarchical mixed-effects meta-analytic model in this step. Eight moderating variables are investigated: the dependent variable, country of investigation, product type, research stream, year of publication, type of research, type of respondents and type of publication. Variance component, test for residual heterogeneity and omnibus test of moderators are computed and a series of additional analyses performed are detailed. Finally, the meta-analytic structural equation modeling is described. Two theoretical frameworks are tested using the meta-analytic generated correlations coefficient matrix and the harmonic mean size as input: a baseline model that grounds on TAM and TPB and an extended model that includes other relevant constructs. This section also includes a description of decision points faced in dealing with missing values and a non-positive definite correlation matrix.

The next chapter present the findings from the multivariate meta-analytic models.

CHAPTER 4

ANALYSIS OF FINDINGS

Bivariate Meta-analytic Correlations Results

This section presents the results of the first step of the data analysis. Table 2 summarizes the effect sizes of the bivariate relations between the proposed antecedent factors and the outcome variables, computed adapting a hierarchical random-effects model for each pair of constructs. Further in Appendix III (Tables A1, A2, A3) results are presented for each dependent variable, reporting also the results of the Q test for homogeneity, 95% confidence interval and the test statistic using the Knapp and Hartung method.

Confidence intervals and the test statistics based on the t-distribution, were used to establish the significance of the effects. The estimate of the between-studies variance (T^2), Q statistic and I^2 index were used to assess the amount of heterogeneity in the set of effect sizes (Higgins et al., 2003; Huedo-Medina et al, 2006; Borenstein et al., 2009; Cooper et al., 2009). In particular, the significant Q test of homogeneity and the high index I^2, which is scale-free, suggest that sampling error alone accounts for a modest proportion of variability across studies, calling for a moderator analysis that might account for this heterogeneity. Furthermore, the high file-safe Ns suggest that the findings of this study are robust against publication bias, with 47 out of 54 relationships exceeding the Rosenthal's (1979) tolerance level of $5 \times k + 10$, where k is the number of correlations. Fail-safe Ns below tolerance levels are found for age in all the outcome variables and service quality, privacy concerns, information quality and gender for purchase behavior.

Purchase intention represents the most investigated dependent variable, with a range of 6 to 61 effect sizes per relationship. The data reveal that the greatest attention has been directed at capturing the effects of trust ($k = 88$ for all the outcome variables), perceived behavioral control ($k = 69$), perceived usefulness ($k = 65$), perceived ease of use ($k = 62$) and perceived risk ($k = 60$), perhaps because they represent classical variables from established theories. Overall, all groups of predictors - perceived channel characteristics, website characteristics, social influence, consumer characteristics – exhibit relatively large or moderate effect sizes to explain consumers' e-commerce adoption, providing first evidence that e-commerce literature has been effective in identifying key drivers of adoption.

For purchase intention the bivariate analyses support most of the predictions, except for perceived price, privacy concerns, and gender and age, which are not statistically significant at conventional probability levels ($p > .05$). Among perceived channel characteristics, results display the strongest effect sizes for perceived usefulness ($r = .517$, $p < .001$) and perceived ease of use ($r =$

.474, p < .001), in accordance with most extant studies employing TAM (Gefen and Straub, 2003; Pavlou, 2003). Both website design and information quality are important factors among the website characteristics (r = .398, p < .001 and r = .348, p < .001 respectively). Subjective norm shows a significant positive impact (r = .418, p < .001) and consumer characteristics other than demographics (i.e., previous experience, perceived behavioral control, innovativeness) are equally relevant (r ranging from .351 to .386, p < .001).

Regarding the actual purchase, fewer antecedent factors displays a significant impact. Among perceived channel characteristics, the strongest averaged effect sizes appear for perceived price (r = .380, p < .001), followed by convenience (r = .303, p < .05), perceived usefulness (r = .237, p < .001), trust (r = .222, p < .01), perceived ease of use (r = .171, p < .05) and privacy concerns (r = -.191, p < .001). However, the number of correlations is significantly lower for some relationships, including perceived price. Findings suggest that website characteristics, together with demographic variables (gender and age), are not relevant factors for purchase behavior. Finally, subjective norm (r =.267, p < .05), previous experience (r =.386, p < .01), perceived behavioral control (r =.227, p < .01), and innovativeness (r =.295, p < .01) display similar positive results to those of purchase intention. Comprehensively, correlations for this outcome are weaker compare to attitudes and intentions.

Most antecedent factors of attitude toward online shopping shows a significant effect, except for perceived price, convenience and perceived risk. Overall, enjoyment displays the strongest averaged correlation (r = .644, p < .001), followed by service quality (r = .620, p < .01) and perceived usefulness (r = .607, p < .001). All groups of antecedents prove to be important, including website characteristics, which display strong effects (r = .488, p < .01 for information quality and r = .448, p < .001 for website design) and demographics: favorable attitudes toward online shopping tend to decrease with age and for females, though this result should be interpreted with caution given the small number of effect sizes.

Table 2 Meta-analytic results of core relationships

	Attitude							Purchase Intention							Purchase Behavior					
	k	n	N	r (se)	T^2	I^2	n_{fs}	k	n	N	r (se)	T^2	I^2	n_{fs}	k	n	N	r (se)	T^2	I^2	n_{fs}
Perceived Channel Characteristics																					
Perceived Ease of Use	14	13	5732	.484 (.031)***	.010	.913	10487	41	35	12448	.474 (.026)***	.020	.927	61884	7	7	3185	.171 (.067)*	.024	.917	144
Perceived Usefulness	14	13	5888	.607 (.037)***	.016	.946	30278	40	37	12326	.517 (.029)***	.026	.936	77621	11	10	5837	.237 (.048)***	.018	.906	1434
Perceived Price	2	2	936	.439 (.105)	.021	.926	223	17	15	8309	.119 (.105)	.164	.995	106	1[a]	1	566	.380 (.036)***	N.A.	.000	41
Convenience	3	3	1821	.560 (.135)	.054	.987	657	16	13	6150	.458 (.079)***	.078	.976	7027	6	4	2783	.303 (.103)*	.041	.948	371
System security	5	5	1262	.406 (.126)*	.077	.972	530	23	18	8158	.283 (.054)***	.050	.970	5072	5	5	2908	.197 (.119)	.055	.978	54
Service quality	4	4	1984	.620 (.050)**	.009	.916	2958	18	15	7613	.398 (.050)***	.036	.964	9748	3	3	1941	.025 (.023)	.000	.818	0
Perceived risk	13	12	3911	-.189 (.091)	.096	.978	904	41	36	16535	-.192 (.060)**	.115	.987	12620	6	6	2450	-.086 (.180)	.161	.986	49
Privacy concerns	1[a]	1	1194	-.275 (.027)***	N.A.	.000	39	26	10	12249	-.167 (.105)	.087	.962	525	1[a]	1	1194	-.119 (.029)***	N.A.	.000	6
Enjoyment	8	8	2088	.644 (.033)***	.007	.838	6589	22	20	9548	.430 (.044)***	.036	.960	17669	3	3	2147	.257 (.164)	.078	.990	105
Trust	21	13	4797	.481 (.055)***	.038	.941	9531	61	47	17238	.441 (.029)***	.034	.944	72172	6	6	2327	.222 (.055)**	.012	.829	275
Website Characteristics																					
Information quality	9	6	2677	.448 (.091)**	.048	.964	2611	25	18	9062	.348 (.055)***	.052	.974	13122	3	3	1942	.129 (.073)	.009	.675	17
Website design	9	6	2919	.488 (.018)***	.001	.132	3672	19	12	7197	.398 (.052)***	.031	.939	14668	4	2	3260	.296 (.261)	.136	.994	122
Social Influence																					
Subjective norm	14	11	4685	.405 (.039)***	.015	.883	5392	23	17	9265	.418 (.027)***	.010	.862	17166	6	5	2960	.267 (.092)*	.041	.955	713
Consumer Characteristics																					
Gender	1[a]	1	80	.748 (.050)***	N.A.	.000	84	10	8	3302	.115 (.062)	.027	.845	81	5	5	3595	-.057 (.068)	.022	.921	7
Age	1[a]	1	355	-.180 (.051)***	N.A.	.000	4	6	6	2081	-.021 (.042)	.007	.726	0	4	4	2573	.079 (.020)	.000	.105	11
Previous experience	5	5	2649	.465 (.075)**	.027	.967	1613	20	15	7713	.376 (.051)***	.034	.965	11951	8	6	4804	.386 (.102)**	.061	.992	4209
Perceived Behavioral Control	20	10	6980	.450 (.040)***	.014	.904	8599	35	23	13105	.386 (.044)***	.043	.969	25792	14	10	7337	.227 (.070)**	.042	.965	2724
Innovativeness	6	4	3864	.257 (.077)*	.022	.897	768	16	11	4040	.351 (.041)***	.017	.903	3192	13	6	5391	.295 (.081)**	.037	.925	1260

[a] fixed effect model (significance test based on z-value)
* $p < .05$
** $p < .01$
*** $p < .001$
Notes: k = number of correlations per relation; n = number of studies; N = cumulative sample size; r (se) = weighted mean correlation (standard error); T^2 = between-studies variance; I^2 = scale-free index of heterogeneity; n_{fs} = fail-safe n, p =.05 (Rosenthal, 1979).

Results of Hypotheses Testing

Table 3 displays the results of hypotheses testing. Some of the drivers are important for all the outcome variables, providing complete support to the related hypotheses, namely perceived ease of use, perceived usefulness, trust, subjective norm, previous experience, perceived behavioral control and innovativeness. In contrast, other antecedent factors prove to be important only for one outcome variable, not supporting the hypotheses in the case of gender and age, which are significant drivers of attitude, and partially supporting the hypotheses for perceived price, which shows a significant impact only on purchase behavior, and perceived risk, significant solely for purchase intention. Convenience, system security, service quality, privacy concerns, enjoyment, information quality and website designed display a significant impact on two of the proposed outcome variables, partially supporting the related hypotheses.

Table 3 Results of hypotheses testing

	Hypothesis	Result
H1	Perceived ease of use has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Supported
H2	Perceived usefulness has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Supported
H3	Subjective norm has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Supported
H4	Perceived behavioral control has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Supported
H5	Convenience has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H6	Perceived price has a positive impact on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H7	System security positive influences a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H8	Service quality has a positive effect on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H9	Perceived risk negative influence a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H10	Privacy concerns negatively impacts a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H11	Perceived enjoyment has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H12	Trust positive influences a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Supported
H13	High information quality increases a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H14	Website design positively influences a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Partially supported
H15	Gender does not influence a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Not supported
H16	Age does not impact a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Not supported
H17	Previous experience acts positively on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Supported
H18	Consumer innovativeness has a positive influence on a) attitude toward online shopping, b) purchase intention and c) purchase behavior	Supported

H1 and H2: Perceived usefulness and perceived ease of use

The variables drawn from the TAM shows a significant positive influence on attitude toward online shopping, purchase intention and purchase behavior, supporting H1 and H2.

Both perceived ease of use and perceived usefulness display the strongest effect on attitude ($r = .484$ and $r = .607$ respectively, $p < .001$), followed by purchase intention ($r = .474$ and $r = .517$, $p < .001$) and purchase behavior ($r = .171$, $p < .05$ and $r = .237$, $p < .001$). Collectively, the results imply that when consumers perceive that online shopping is free of effort and enhance the effectiveness in purchasing, they have more positive feelings toward the channel, they are more likely to make a product purchase online and they will buy more frequently. Moreover, the two constructs represent the most important drivers for purchase intention. The findings provide further evidence that TAM can be successfully employed to explain consumer online behavior (Pavlou, 2003). Most of the studies utilizing TAM (e.g., Devaraj et al. 2002; Pavlou, 2003, Gefen and Straub, 2003, Chiu et al., 2009) supported the direct effect of perceived ease of use on perceived usefulness, as the increased ease of use leads to improved performance (Venkatesh and Davis, 2000). This relationship will be tested in the meta-analytic SEM framework.

H3 and H4: Subjective norm and perceived behavioral control

The results of H3 and H4 are supported by the data, as both subjective norm and perceived behavioral control show a significant positive impact on the three outcome variables. Therefore, the consumer's perceptions of approval from his/her reference group and of possession of resources and opportunities necessary to buy online increase positive feelings toward online shopping, the likelihood of making a product purchase online and the frequency of use of the online channel to purchase.

Subjective norm exerts the strongest influence on purchase intention ($r = .418$, $p < .001$), followed by attitude ($r = .405$, $p < .001$) and purchase behavior ($r = .267$, $p < .05$), supporting the prominent role of social influence on adoption of online shopping despite the mixed findings of the primary studies (e.g., Pavlou and Fygenson, 2006; Lin, 2007; Lian and Yen, 2014). On the other hand, perceived behavioral control is found to be more strongly associated with attitude ($r = .450$, $p < .001$) than with purchase intention ($r = .386$, $p < .001$) and purchase behavior ($r = .227$, $p < .001$), representing one of the most important consumer characteristics influencing the adoption. Indeed, online shopping requires skills, opportunities, and resources and thus does not occur merely because consumers decide to act (Shim et al., 2001).

H5: Convenience

In H5, convenience is found to be significantly related to purchase intention ($r = .458$, $p < .001$) and purchase behavior ($r = .303$, $p < .05$) but no to attitude. Therefore, H5 is partially supported. Time savings and effort economization, as perceived by consumers, enhance the likelihood of buying online and the frequency of online purchases, and, for the same product, customers would prefer whichever online store offers the greater convenience. Moreover, convenience is found to be one of the most important determinants of both purchase intention and purchase behavior, in agreement with previous studies (e.g., Kolsaker et al., 2004; Choudhury and Karahanna, 2008; Gupta and Kim, 2010).

H6: Perceived price

The results of H6 indicate that the proposed relationships are rejected, except for the one between perceived price and purchase behavior ($r = .380$, $p < .001$). Indeed, the perceived level of monetary savings represents the most important driver of the actual behavior, but this result must be interpreted with caution, as only one effect size is meta-analyzed. Thence, H6 is partially supported and perceived price do not figure as an important antecedent factor of adoption. A possible explanation might be that when consumers are uncertain about product quality, they interpret price as a quality signal (Zeithaml, 1988; Urbany et al., 1997) and even as a cue of store quality, as online stores selling at exceptionally low prices may be branded as fake stores (Gupta and Kim, 2010).

H7: System security

In H7, the results reveal that system security positive influences attitude toward online shopping ($r = .406$, $p < .05$) and purchase intention ($r = .283$, $p < .001$) but the influence is not statistically significant for purchase behavior, thus partially supporting the predictions. Providing customers with a sense of security through protection mechanisms and activities to promote the legitimacy of the Internet business is still fundamental to generate consumers' positive feelings and evaluations and to augment the probability of purchasing online, as it was demonstrated at the inception of the e-commerce (e. g. Jones and Vijayasarathy, 1998; Salisbury et al., 2001).

H8: Service quality

Service quality shows a positive correlation with both attitude toward online shopping ($r = .620$, $p < .01$) and purchase intention ($r = .398$, $p < .001$), partially supporting H8. Moreover, service quality represents the second most important driver of attitude, following enjoyment. Thus, the excellence of service provision delivered by and via a website represent an essential factor to influence consumers' positive feelings toward online shopping and, consequently, their likelihood of making a product purchase online, as stressed by both marketing (e.g., Devaraj et al., 2002;

Shankar et al. 2003; Parasuraman et al., 2005) and IS-Information Systems scholars (e.g., DeLone and McLean, 2003; Xu et al., 2013).

H9 and H10: Perceived risk and privacy concerns

In H9 and H10, the results relative to the two constructs of consumers' risk perceptions are partially supported by the data. Perceived risk, as the general consumer's belief regarding the probability of gains or losses associated with purchasing online, is negatively and significantly correlated with purchase intention ($r = .192$, $p < .01$), but the relation is not significant for attitude and purchase behavior. On the other hand, the more specific concern about privacy has a significant negative impact on attitude ($r = -.275$, $p < .001$) and purchase behavior ($r = -.119$, $p < .001$), although the Fail-safe N for this relationship is below the tolerance level. The findings suggest that uncertainty reduction is still a component in consumer adoption of e-commerce that deserves attention, particularly to enhance the probability of online purchases, and that the Web vendor's ability to safeguard personal information from privacy breaches is critical to promote favorable attitudes toward online shopping, as underscored by the literature (e.g., George, 2002; Pavlou, 2003; Gefen et al., 2003; Eastlick et al., 2006). The findings are even more important in light of the novel risks of inferential analytics and the ongoing debate on data rights and data protection laws (Wachter and Mittelstadt, 2019).

H11: Perceived enjoyment

The results of H11 are partially supported by the data, as enjoyment has a significant favorable impact on attitude toward online shopping ($r = .644$, $p < .001$) and purchase intention ($r = .430$, $p < .001$). Furthermore, the amusement and pleasure deriving from online shopping proves to be the most important factor influencing attitude. These results suggest that online shopping has important hedonic elements that supplement any anticipated utilitarian outcomes (Ahn et al., 2007; Ha and Stoel, 2009). Thus, through its ability to enhance the shopping experience, perceived enjoyment represents a primary driver of adoption.

H12: Trust

The relationships proposed in H12 are supported by the data, as trust positive influences attitude toward online shopping ($r = .481$, $p < .001$), purchase intention ($r = .441$, $p < .001$) and purchase behavior ($r = .222$, $p < .01$). It also represents one of the most important drivers for all three outcome variables, validating its role of vital antecedent of adoption of online shopping (Pavlou, 2001; Gefen et al., 2003; Pavlou, 2003). Given the increased uncertainty and vulnerability

of the online environment, trust is a mechanism to reduce complexity and trustworthiness signals can effective build consumer online trust (Jarvenpaa et al., 2000).

H13: Information quality

Information quality exhibits a significant positive influence on both attitude ($r = .448$, $p < .01$) and purchase intention ($r = .348$, $p < .001$), hence partially supporting H13. As e-commerce has elevated content to higher levels of significance, information quality is a key benefit of online shopping due to being able to help buyers to make decisions and to cope with uncertainties about the potential positive or negative consequences (DeLone and McLean, 2003; Park and Stoel, 2005; Chiu et al., 2014). In particular, it promotes positive feelings and evaluations in consumers, with a consequent increasing in the probability of making purchases online.

H14: Website design

In H14, results are similar to those of information quality, to which website design is related. Indeed, the sum of all visible and audible cues creates positive effects and attitudes ($r = .488$, $p < .001$), which are instrumental in inducing consumer favorable responses, such as purchase intention ($r = .398$, $p < .001$). H14 is therefore partially supported. Further, the effects for website design are larger compared to those of information quality. These findings suggest that the visual design richness is a key factor in molding the experience of online shopping.

H15 and H16: Gender and age

The results of H15 and H16 indicates that the relationships are partially rejected. Both gender and age are significantly correlated with attitude toward online shopping ($r = .748$ and $r = -.180$ respectively, $p < .001$) but not with purchase intention and purchase behavior. Females and males harbor diverse perceptions toward online shopping, with men showing more favorable evaluations than women, in accordance with some previous evidence (Dittmar et al., 2004; Cyr and Bonanni, 2005). Further, younger consumers display more positive feelings toward buying online, in line with the suggested explanation that innovators tend to be younger (Rogers, 1995; Teo, 2001; Sin and Tse, 2002). However, more positive attitudes do not translate into more favorable intentions and purchase decisions. These results should be interpreted with caution given the small number of effect sizes meta-analyzed.

H17: Previous experience

H17 is supported, with past purchase experiences on the Internet and with other in-home shopping formats significantly and positively influencing attitude toward online shopping ($r = .465$, $p < .01$), purchase behavior ($r = .386$, $p < .01$) and purchase intention ($r = .376$, $p < .001$). These

findings confirm prior evidence that previous experience establishes a powerful predictor of future actions (e.g., Shim et al., 2001; Goldsmith and Goldsmith, 2002; Sin and Tse; 2002) and should be included in TPB, as it significantly improves the prediction of behavior (e.g., Bentler and Speckart, 1979). Thus, previous experience represents an important factor influencing adoption.

H18: Consumer innovativeness

The proposed relationships in H18 are supported by the data. Innovativeness is a relevant personality trait that positive influences purchase intention ($r = .351$, $p < .001$), purchase behavior ($r = .295$, $p < .01$) and attitude ($r = .257$, $p < .05$). These results imply that innovators not only show more positive beliefs about the online channel, but they are more likely to make a product purchase online and they will buy more frequently, resolving mixed findings in primary studies (e.g., Donthu and Garcia, 1999; Goldsmith, 2001; Sin and Tse, 2002). Results are consistent with Rogers (1995) argument that highly innovative individuals are able to cope with uncertainty and have a higher acceptance of new technologies.

Moderator Analyses Results

In this section, results of the meta-regression procedures are presented. Table 4 provides the results for the moderator analyses on antecedent factors for which at least twenty effect sizes were available ([n/a], 'non-applicable' means that a set of relations showed insufficient variation on a particular moderator and thus it was excluded from the analysis). Further in Appendix III (Table A4) variance component, test for residual heterogeneity and omnibus test of moderators are reported. The hierarchical random-effects model was extended into a mixed-effects model for each driver, where the effect sizes were aggregated for the three dependent variables and the dependent variable added as a moderator to enhance the explanatory power of the analysis.

The significance of individual model coefficients was evaluated using the alternative t-test described by Knapp and Hartung (2003). The adjustment was applied also to test the impact of moderators simultaneously, which led to F-test, also called omnibus test of moderators (Knapp and Hartung, 2003; Viechtbauer et al., 2015). Results displayed in Table A4 indicate that the hypothesis that all the βs are zero can be rejected, except for perceived price. This implies that at least part of the heterogeneity in the true effects is related to some of the moderators included in the models, even though not all of them are significant. Variance component σ^2 and the test for residual heterogeneity were evaluated to assess the variability in the true effects not accounted for by the moderators in the model. The test is significant for all the antecedent factors, possibly indicating that other moderators not considered in the model are influencing the relationships. However, selected contextual and methodological moderators partly explain the variation of effect sizes

reported in the literature. The eight potential moderators differ greatly in magnitude and consistency across predictors, with few exceptions.

First, the type of dependent variable - attitude toward online shopping, purchase intention and purchase behavior – accounts for a statistically significant amount of the variance as expected, mirroring the results of the bivariate analyses. Only for perceived price, service quality and information quality, the outcome variable does not moderate the effect. In some regression models, particularly for perceived usefulness, convenience, system security, trust, subjective norm, previous experience, perceived behavioral control and innovativeness, all the three levels of the dependent variable are significantly different. In the other models, one or two levels show significance.

Regarding contextual moderators, few patterns are evident across the data. The country of investigation shows a significant effect limited to subjective norm, meaning that the effect of social influence is more pronounced in Eastern countries. Most of the studied effects do not vary systematically according to the type of product, though there are a few exceptions. First, the negative effect of privacy concerns and the positive effect of website design on adoption are amplified for services. Product type also moderates the effect sizes for website design, previous experience and innovativeness, when product categories in the studies are mixed or unspecified. Year of publication and research stream do not show a consistent pattern across the data. Year is significant only for system security while the effects are stronger for convenience in economics journals and for innovativeness in information technology and computer science journals and others streams of literature (including psychology, general engineering, arts and humanities).

Concerning the methodological moderators (research type, respondents, publication type), results display few significant effects, inconsistent across antecedent factors. The type of research (experimental versus surveys and others) does not show a significant moderator effect for any of the drivers, while the journal quality moderates the effects only for system security, suggesting that this is more influential in publications other than articles in peer reviewed journals. Finally, few antecedent factors exhibit significant differences according to the type of respondents, namely service quality, privacy concerns, website design and innovativeness. The use of student samples turns in an upward bias in the strength of relationships compared to non-students.

Despite the inconsistency of the moderator analyses results, additional insights can be derived from a model-driven meta-analysis using structural equation modeling.

Table 4 Meta-analytic regression results of the moderator analyses

					Perceived Channel Characteristics						
	Driver	Perceived Ease of Use	Perceived Usefulness	Perceived Price	Convenience	System security	Service quality	Perceived risk	Privacy concerns	Enjoyment	Trust
Moderator	**k (n)**	62 (38)	65 (41)	20 (16)	25 (20)	33 (21)	25 (17)	60 (37)	28 (9)	33 (25)	88 (51)
DV (Purchase intention, Purchase behavior, Attitude)	PI	.474***	.523***	-.173	.554**	.686*	.302	-.419	-.176	.277	.501***
	PB	.172	.263*	-.141	.722**	.671*	-.208	-.614*	-.151	.181	.355***
	ATT	.469***	.594***	-.214	.870***	.771**	.364	-.422	-.307*	.435*	.554***
Country (Western, Eastern, Uspecified)	Eastern	-.033	-.101	-.478	-.196	.095	.171	-.020	-.069	-.082	.050
	Unspecified	-.151	-.196	-.473	.051	-.273	n/a	.159	-.002	.081	-.003
Product type (Tangible, Intangible, Service, Mixed & Unspecified)	Intangible	n/a	n/a	n/a	n/a	n/a	-.066	n/a	n/a	n/a	n/a
	Service	-.122	-.094	.272	-.045	-.278	-.028	-.036	-.348**	-.088	-.039
	Mixed&Unspecified	-.086	.006	.577	-.102	-.244	-.047	-.082	.205	-.066	.049
Research stream (Marketing & Communication, Economics, Business & management, IS, Others)	Economics	n/a	n/a	-.741	1.062**	-.239	n/a	.490	n/a	n/a	-.177
	Business & management	.033	.035	.638	.119	.056	.016	.275	n/a	.217	-.056
	IS	.150*	.092	-.487	-.096	-.056	.100	.075	n/a	.081	-.091
	Others	.014	.024	.375	.241	-.018	-.154	.111	n/a	.073	-.001
Year		.009	.001	.054	-.013	.016	-.002	.012	.024**	.015	-.002
Research type (0 = Experimental; 1 = Surveys and others)		.065	.033	n/a	n/a	-.267	.027	.144	n/a	.057	-.103
Respondents (0 = Non-students; 1 = Students)		-.026	-.002	.755	n/a	.022	.146*	.062	.247**	.121	.036
Publication type (0 = Article in a peer reviewed journal; 1 = Others)		-.032	-.057	.053	-.294	.238**	-.058	.068	n/a	.045	.070

* $p < .05$
** $p < .01$
*** $p < .001$
Notes: k (n) = number of relationships (number of studies); PI = Purchase Intention; PB = Purchase Behavior; ATT = Attitude; n/a = not applicable.

Table 4 Meta-Analytic Regression Results of the Moderator Analyses *(continues)*

		Website Characteristics		Social influence	Consumer Characteristics				
	Driver	Information quality	Website design	Subjective norm	Gender	Age	Previous experience	Perceived Behavioral Control	Innovativeness
Moderator	**k (n)**	37 (20)	32 (16)	43 (19)	16 (14)	11 (11)	33 (17)	69 (27)	35 (14)
DV (Purchase intention, Purchase behavior, Attitude)	PI	.159	-.058	.309**	n/a	n/a	.639**	.378***	.280***
	PB	.068	-1.120*	.242*	n/a	n/a	.738***	.270**	.215**
	ATT	.209	-.067	.299**	n/a	n/a	.529**	.392***	.353***
Country (Western, Eastern, Uspecified)	Eastern	-.229	-.372	.1733*	n/a	n/a	-.191	.068	.047
	Unspecified	-.128	.202	-.154	n/a	n/a	-.010	n/a	n/a
Product type (Tangible, Intangible, Service, Mixed & Unspecified)	Intangible	n/a	.485	n/a	n/a	n/a	n/a	n/a	n/a
	Service	-.093	1.177***	.087	n/a	n/a	.010	-.093	-.122
	Mixed&Unspecified	-.024	.909**	-.083	n/a	n/a	.104*	-.125	-.236**
Research stream (Marketing & Communication, Economics, Business & management, IS, Others)	Economics	n/a	n/a	-.084	n/a	n/a	n/a	.111	-.018
	Business & management	-.238	-.170	-.019	n/a	n/a	-.091	-.078	-.175
	IS	.038	.094	.170	n/a	n/a	-.281	.216	.220**
	Others	.173	-.070	.188	n/a	n/a	-.067	.138	.209*
Year		.017	-.023	-.006	n/a	n/a	n/a	.006	n/a
Research type (0 = Experimental; 1 = Surveys and others)		.309	-.138	n/a	n/a	n/a	-.161	n/a	n/a
Respondents (0 = Non-students; 1 = Students)		-.018	.520***	.027	n/a	n/a	-.146	.088	.225**
Publication type (0 = Article in a peer reviewed journal; 1 = Others)		-.011	-.331	-.012	n/a	n/a	.187	-.148	-.011

* $p < .05$
** $p < .01$
*** $p < .001$
Notes: k (n) = number of relationships (number of studies); PI = Purchase Intention; PB = Purchase Behavior; ATT = Attitude; n/a = not applicable.

Structural Equation Modeling Results

This section illustrates the results of meta-analytic structural equation modeling (MASEM) with LISREL 8.80. The analysis started with a baseline model that includes constructs from TAM and TPB, then the model was extended with additional paths corresponding to relevant antecedent factors. Table 5 and 6 display the findings and Figures 4-5 report the proposed models.

Table 5 Structural Equation Modeling Results for Baseline and Extended Model

	Baseline model (TAM and TPB)		**Extended model**	
Path	*B*	t	*B*	t
Attitude --> Purchase intention	.407 (.016)*	25.174	.306 (.029)*	10.377
Purchase Intention --> Purchase behavior	.439 (.014)*	31.198	.323 (.026)*	12.540
Perceived usefulness --> Attitude	.541 (.016)*	33.318	.441 (.028)*	15.646
Perceived usefulness --> Purchase intention	.201 (.016)*	11.981	.141 (.028)*	4.957
Perceived ease of use --> Perceived usefulness	.680 (.011)*	60.613	.696 (.020)*	35.749
Perceived ease of use --> Attitude	.196 (.016)*	12.125	.037 (.036)	1.013
Subjective Norm --> Purchase intention	.186 (.012)*	14.853	.171 (.022)*	7.487
Perceived behavioral control --> Purchase Intention	.081 (.013)*	6.159	.056 (.024)*	2.329
Perceived behavioral control --> Purchase behavior	.057 (.014)*	4.083	-	
Perceived risk --> Attitude			-0.120 (.021)	-0.569
Perceived risk --> Purchase intention			-.140 (.021)*	-6.647
Trust --> Attitude			.214 (.024)*	8.700
Trust --> Purchase intention			.069 (.026)*	2.617
Previous experience --> Purchase intention			.085 (.023)*	3.657
Previous experience --> Purchase behavior			.237 (.025)*	9.427
Innovativeness --> Purchase intention			.140 (.022)*	6.248
Innovativeness --> Purchase behavior			.102 (.025)*	4.012
Information quality --> Attitude			.068 (.025)*	2.626
Website design --> Attitude			.156 (.029)*	5.348
χ2 (d.f.)	1528.413 (10)**		1108.835 (24)**	
CFI	0.937		0.948	
GFI	0.937		0.920	
SRMR	0.075		0.050	
RMSEA	0.168		0.152	

*p<.05
** p < .01
Notes: n (harmonic mean) = Model 1: 6,183; Model 2: 1,964; CFI = Comparative Fit Index; GFI = Goodness of Fit Index; SRMR = Standardized Root Mean Residual; RMSEA = Root Mean Square Error of Approximation.

Table 6 Results of the Mediation Analyses for Extended Model

Relationship	Mediator	Direct Effect	Indirect Effect	Total Effect	Ratio (Indirect/Total)	95% CI	
						Lower	Upper
Perceived ease of use --> Attitude	Perceived usefulness	.037	.304*	.340*	89%	.266	.349
Perceived usefulness --> Purchase intention	Attitude	.141*	.132*	.271*	49%	.065	.119
Trust --> Purchase intention	Attitude	.069*	.064*	.132*	48%	.030	.061
Previous experience --> Purchase behavior	Purchase intention	.237*	.027*	.264*	10%	.013	.041
Innovativeness --> Purchase behavior	Purchase intention	.102*	.045*	.147*	31%	-.026	.012

*p<.05

MASEM represents a powerful technique, that enables to investigate complex structural models not tested in any primary study, utilizing the available information from an entire stream of research, with the caution that no strong, casual inferences can be drawn from non-experimental data (Viswesvaran and Ones, 1995; Landis, 2013; Bergh et al., 2016).

The analysis started from the meta-analytic generated correlation matrix. Two issues, commonly encountered in this framework, had to be faced - missing values among the antecedents and a non-positive definite meta-analytic matrix. As a result, the set of variables was reduced, and a smaller framework estimated. The correlation matrix was used as an input to estimate the model, together with the harmonic mean size, following Viswesvaran and Ones (1995), Landis (2013) and Bergh et al. (2016). The correlation matrix of the extended model is displayed in Table 7. Thirteen constructs, of which nine are exogeneous – perceived ease of use, risk, trust, information quality, website design, subjective norm, previous experience, perceived behavioral control, innovativeness - and four endogenous – perceived usefulness, attitude toward online shopping, purchase intention, purchase behavior - were examined. The significance of the relationships between the constructs was examined based on t-values associated with the path coefficients – a significant relationship shows a t-value greater that the critical value ($p < .05$, t-value = 1.96).

Table 7 Correlation matrix

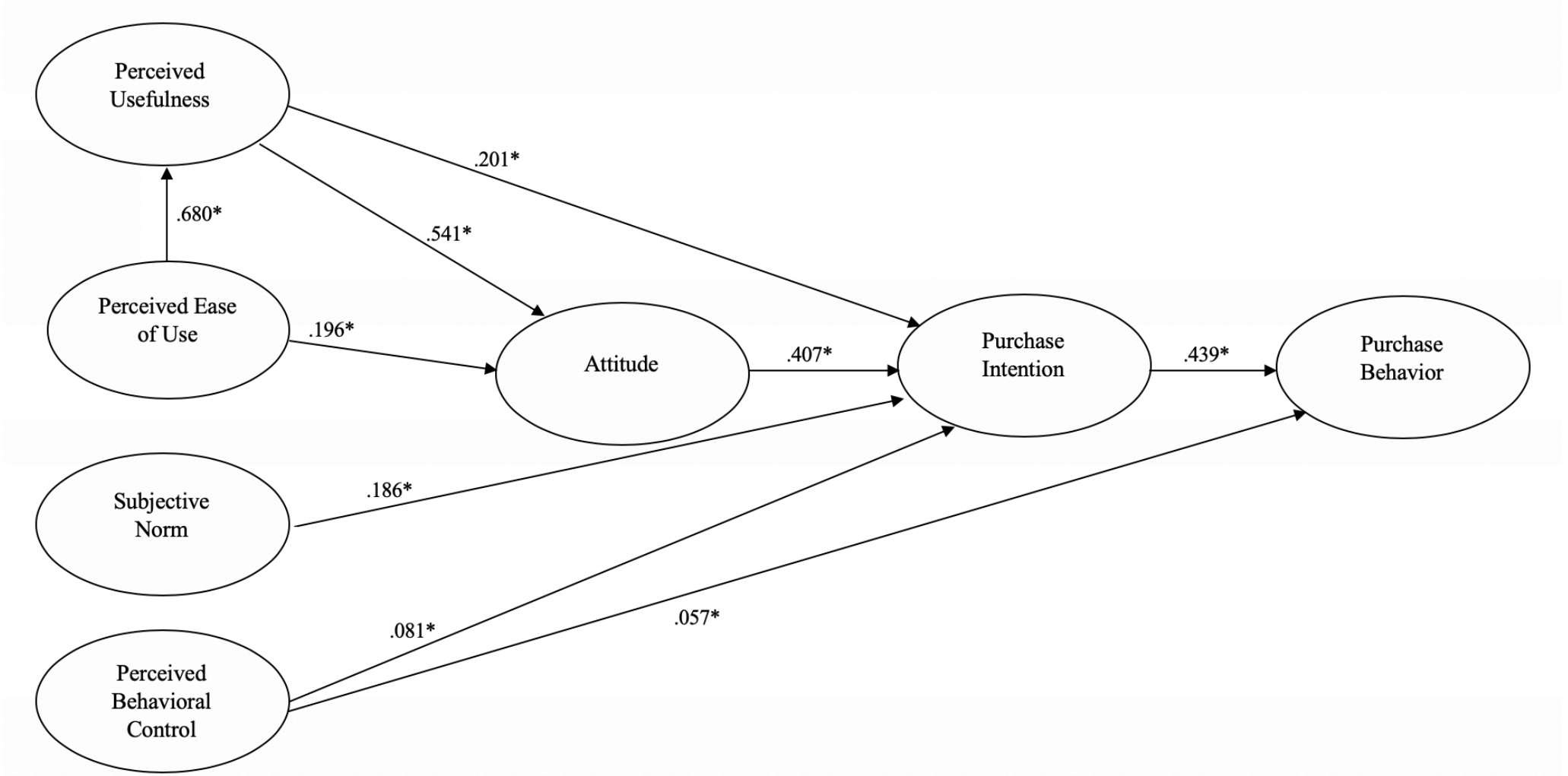
	PU	*ATT*	*PI*	*PB*	*PEOU*	*SN*	*PBC*	*RISK*	*TRUST*	*EXP*	*INNO*	*INFO*	*WD*
PU	1.000												
ATT	0.607	1.000											
PI	0.517	0.570	1.000										
PB	0.237	0.473	0.408	1.000									
PEOU	0.600	0.484	0.474	0.171	1.000								
SN	0.403	0.405	0.418	0.267	0.372	1.000							
PBC	0.404	0.450	0.386	0.227	0.504	0.373	1.000						
RISK	-0.144	-0.189	-0.192	-0.086	-0.179	0.033	0.106	1.000					
TRUST	0.421	0.481	0.441	0.222	0.471	0.379	0.331	-0.204	1.000				
EXP	0.342	0.465	0.376	0.386	0.553	0.212	0.334	0.087	0.305	1.000			
INNO	0.281	0.257	0.351	0.295	0.469	0.268	0.356	0.055	0.286	0.334	1.000		
INFO	0.496	0.448	0.348	0.129	0.504	0.131	0.212	0.033	0.399	0.382	0.233	1.000	
WD	0.476	0.488	0.398	0.296	0.554	0.170	0.243	-0.330	0.498	0.551	0.363	0.452	1.000

Notes: PU = Perceived usefulness; ATT = Attitude toward online shopping; PI = Purchase intention; PB = Purchase behavior; PEOU = Perceived ease of use; SN = Subjective norm; PBC = Perceived behavioral control; EXP = Previous experience; RISK = Perceived risk; TRUST = Trust; INNO = Innovativeness; INFO = Information quality; WD = Website design

The evaluation of model adequacy was based on the most popular goodness-of-fit statistics: Chi-square (χ^2) (Jöreskog, 1969; Hu and Bentler, 1999); Comparative Fit Index (CFI) (Bentler, 1990; Hu and Bentler, 1999); Goodness of Fit Index (GFI) (Jöreskog and Sörbom, 1989; Bollen and Long, 1993); Adjusted Goodness of Fit Index (AGFI) (Jöreskog and Sörbom, 1989; Bollen and Long, 1993); Standardized Root Mean Residual (SRMR) (Hu and Bentler, 1995; Hu and Bentler, 1999); Root Mean Square Error of Approximation (RMSEA) (Browne and Cudeck, 1993; MacCallum et al., 1996; Hu and Bentler, 1999). Cut-off criteria and recommended guidelines were followed to assess model-data fit: CFI, GFI and AGFI values greater than .90; SRMR values closer to .00 and not greater than .08; RMSEA values not greater than .09. The harmonic mean size (n) of the baseline model is 6183 while the one of the extended model is 1964.

The results of the baseline model reveal that the proposed path structure is meaningful. The goodness-of-fit indices indicate that the fit is moderately acceptable ($\chi^2(10) = 1528.413$; Comparative Fit Index = .937; Goodness of Fit Index = .933; Adjusted Goodness of Fit Index = .792; Standardized Root Mean Residual = .0747; Root Mean Square Error of Approximation = .168, AIC = 1615.606), except for an inadequate value of RMSEA. A possible explanation might be that the index may perform less optimally when there are large sample sizes and relatively small degrees of freedom (Quintana and Maxwell, 1999). All hypothesized core relationships are significant ($p < .05$). Actual purchase online is determined by purchase intention ($\beta = .439$), which in turn is influenced by consumers' attitude toward online shopping ($\beta = .407$). Perceived ease of use directly impacts attitude ($\beta = .196$). Perceived usefulness predicts both attitude ($\beta = .541$) and purchase intention ($\beta = .201$). As far as it concerns consumers' internal perceptions related to TPB, subjective norm has a significant influence on purchase intention ($\beta = .186$) while perceived behavioral control has an impact on both intention ($\beta = .081$) and behavior ($\beta = .057$). Mediation effects were also tested, revealing that two out of three mediations are significant. Attitude mediates the relationship between perceived usefulness and purchase intention (.216; 95% CI = [.199, .241]) and perceived usefulness mediates the effect of perceived ease of use on attitude (.369, 95% CI = [.344, .392]). In contrast, the indirect effect of perceived behavioral control on purchase behavior is not significant (.035, 95% CI = [-.076, .147]).

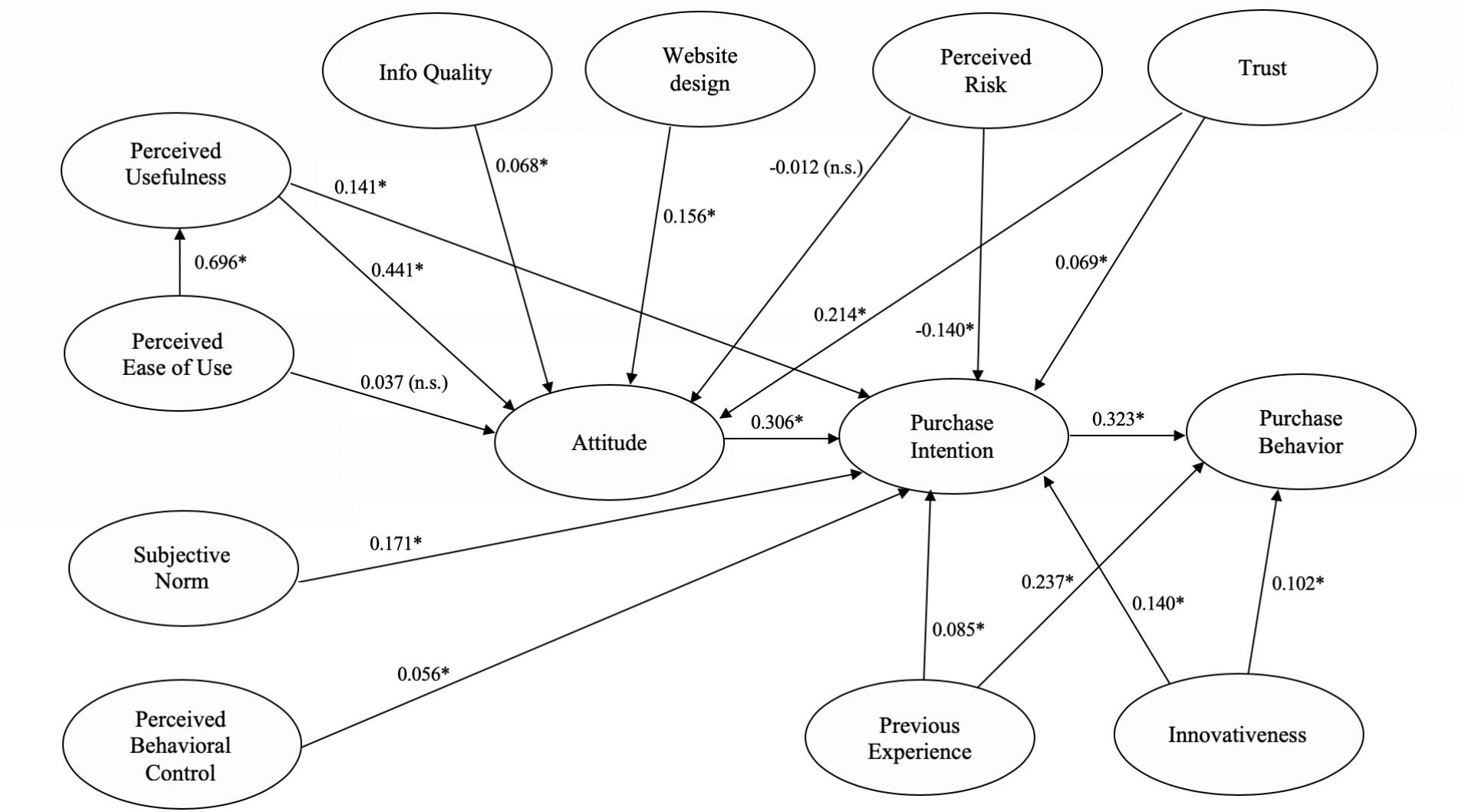
Figure 4 Baseline model (Technology Acceptance Model and Theory of Planned Behavior)



Notes: n (harmonic mean)=6183; $\chi^2(10)= 1528.413$ ($p < .01$); Comparative Fit Index (CFI) = .937; Goodness of Fit Index (GFI) = .933; Adjusted Goodness of Fit Index (AGFI) = .792; Standardized Root Mean Residual (SRMR) = .0747; Root Mean Square Error of Approximation (RMSEA) = .168.

In the extended model (Figure 5), additional paths were included corresponding to perceived risk, trust, previous experience, innovativeness, information quality and website design. Alternative models with changed path structures were re-specified until the model fit exhibited no significant improvement. Besides the value of RMSEA, the final model fit is adequate and improved compared with the baseline ($\chi^2(24) = 1108.835$; Comparative Fit Index = .948; Goodness of Fit Index = .920; Adjusted Goodness of Fit Index = .697; Standardized Root Mean Residual = .0498; Root Mean Square Error of Approximation = .152, AIC = 1252.967). The relation of perceived ease of use with attitude shows no significant effect, although the impact on perceived usefulness is enhanced (β = .696) and the indirect effect through perceived usefulness is significant (.304, 95% CI = [.266, .349]). All additional relationships are significant except for the influence of perceived risk on attitude, thus exhibiting a significant negative relation only with purchase intention (β = -.140). Previous experience and innovativeness significantly impact both purchase intention (β = .085 and β = .140 respectively) and purchase behavior (β = .237 and β = .102 respectively). Trust significantly influences both attitude (β = .214) and intention (β = .069), while the quality of information and the design of the website have a positive impact on attitude toward online shopping (β = .068 and β = .156 respectively). Mediations for the extended model were also tested. The results are displayed in Table 6. All mediations are significant except for mediation of purchase intention between innovation and behavior (.045, 95% CI = [-.026, .012]). The results confirm the importance of mediators (e.g., perceived usefulness, attitude, purchase intention) when assessing the effects of online shopping predictors. While most antecedents show strong direct effects on attitude, purchase intention and behavior, other variables influence these outcome variables indirectly. For instance, perceived ease of use indirectly influences attitude through the mediating effect of perceived usefulness.

Figure 5 Extended model



*p<.05

Notes: n (harmonic mean)=1964 ; $\chi^2(24)$= 1108.835 (p < .01); Comparative Fit Index (CFI) = .948; Goodness of Fit Index (GFI) = .920; Adjusted Goodness of Fit Index (AGFI) = .697; Standardized Root Mean Residual (SRMR) = .0498; Root Mean Square Error of Approximation (RMSEA) = .152.

Chapter Summary

Chapter 5 presents the findings from the multivariate meta-analytic models. First, bivariate correlations results are presented, which represent the input for the structural equation modeling step. The discussion of the hypotheses testing explicitly clarifies several important issues on online consumer behavior. Overall, all groups of predictors - perceived channel characteristics, website characteristics, social influence, consumer characteristics – exhibit relatively large or moderate effect sizes to explain consumers' e-commerce adoption, except for website characteristics, which are not significant for purchase behavior, and demographics, significant only for attitude. Overall, the analysis reveals that the effect sizes of antecedent factors differ in magnitude and significance across the dimensions of attitude, purchase intention and purchase behavior.

Next, the chapter covers the moderator analyses results, highlighting few notable patterns. The type of dependent variable accounts for a statistically significant amount of the variance while contextual and methodological moderators partly explain the variation of effect sizes. Among contextual moderators, the country of investigation shows a significant moderating effect limited to subjective norm while product type moderates the effect sizes for privacy concerns, website design, previous experience and innovativeness. Year of publication is significant only for system security and the results related to research stream are inconsistent. Among methodological moderators the use of student samples turns in an upward bias in the strength of relationships for service quality, privacy concerns, website design and innovativeness.

Finally, the results of the baseline and extended model are displayed, revealing several similarities with the bivariate meta-analytic correlations results. In the baseline model, TAM and TPB are integrated and supported: all core relationships are significant with an acceptable fit. The extended model embodies website characteristics (information quality, website design), more perceived channel characteristics (trust, perceived risk) and consumer characteristics (previous experience, innovativeness) to foster its explanatory power and to provide a comprehensive and interdisciplinary framework of online shopping adoption, grounding on existing research. All relationships are significant except for the influence of perceived risk and perceived ease of use on attitude.

The next chapter addresses the discussion of results, drawing implications for theory and practice and concludes with limitations and suggestions for future research.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Discussion of Results

This section aims to conclude the research effort by examining how the findings contribute to the theoretical and managerial perspectives. A discussion of the limitations of the study and suggestions for future research directions follows.

Theoretical Contributions

In the past two decades, many studies have advanced the understanding of the dynamics of online shopping adoption. By synthesizing e-commerce literature in a formal way, this meta-analysis gauges the current level of knowledge and provides generalizations on the key drivers of adoption. The objective was to investigate the general strength of the most important antecedent factors, their variability related to attitude, purchase intention and actual purchase behavior, and the conditions that moderate these relationships. This study also provided the first comprehensive meta-analytic theoretical framework that may inform managers how to enhance e-commerce websites performance, leveraging different dimensions of the online marketing strategy. In doing so, this study advances the theoretical understanding of e-commerce adoption dynamics in several ways.

Firstly, the influence of antecedent factors differs in magnitude across the stages of attitudes, purchase intention and purchase behavior. Although purchase intention represents the most investigated dependent variable, the effects related to attitude are often greater in magnitude. For purchase intention all set of predictors are important. Surprisingly, perceived price is not a relevant factor for intention, in contrast to his primary role for behavior. Across all groups of drivers perceived ease of use, perceived usefulness, convenience and trust are the most influential for intention.

Furthermore, while all categories of antecedent factors are important for attitude toward online shopping and purchase intention, website characteristics do not affect the decision and frequency of online purchases. This is not surprising for website design, which can create positive emotional effects and please customers yet moves to the background compared to other attributes when it comes to the actual purchase, specifically previous experience, price and convenience, which are the principal predictors. This is also in line with findings on the influence of retail marketing-mix instruments on patronage in traditional retail settings (Blut et al., 2018). No such explanation can be provided for the quality of information, expected to be an important driver of purchase behavior. On the other hand, website characteristics seem to be dominant drivers of attitude toward online shopping, together with channel characteristics such as enjoyment and

service quality. The impact of demographic variables is marginal compared to other consumers characteristics, such as previous experience, perceived behavioral control and innovativeness, which are important for all outcome variables. Indeed, gender and age relate only to attitudes, with no translation to intentions and behaviors, in line with conflicting evidences pertaining to the impact of gender on online shopping activities already detected (Chang et al., 2005; Zhou et al., 2007). Together, these findings emphasize the differences in what affects attitude, intention and actual behavior in an e-commerce setting and provide further evidence of using TAM, TPB and additional factors to measure consumer adoption of online shopping.

Secondly, the moderating results reveal some noteworthy insights. Overall, the effects of the majority of antecedent factors differ among the dependent variables. In addition, the type of product and of respondents moderates some relationship paths. For example, product type matters when the good purchased online is a service, though only for privacy concerns and website design. This outcome may be capturing the high intangibility and greater complexity involved in e-service adoption decisions (Featherman and Pavlou, 2003). No difference was found for tangible versus intangible goods. Moreover, the higher correlations found for service quality, privacy concerns, website design and innovativeness when using students' samples are in line with other meta-analyses in marketing (e.g., Brown and Stayman, 1992; Blut et al., 2018). Results on the other moderators display few significant effects, incongruous across predictors. The country of investigation is important when examining social influence, which shows a more pronounced effect in Eastern versus Western countries. A possible explanation relates to the characterization of Eastern societies as collectivistic, more sensitive to in-group and out-group boundaries (Hofstede, 2001). This evidence deserves further investigation, considering social influence variables other than subjective norm, for example word of mouth, not included in the present meta-analysis because of an insufficient number of effect sizes. Finally, most effects have not changed systematically in the last 20 years, as the moderating effect of year is significant only for system security. Taken together, the results lend credence to the generalizability of the effects derived from the meta-analysis.

Thirdly, the comprehensive yet parsimonious conceptual framework developed thorough meta-analytic structural equation modeling presents an overall view of the most significant factors and their relationships with the outcome variables, deriving a new model conceptualization not tested in any primary study. It reveals that a subset of the statistically significant predictors can be considered dominant antecedent factors of e-commerce adoption. The results of the baseline model analysis show that perceived ease of use, perceived usefulness, subjective norm, perceived behavioral control are all influential predictors of adoption, exhibiting significant positive effects

with the outcome variables. Further, the relationships among attitude, purchase intention and purchase behavior are strong and significant. Thereby, the core starting point of combining TAM and TPB is proved to be valid and robust in the electronic commerce setting. The theories have been tested by plenty of researches and found to be supportable in different contexts and our analysis validates and echoes these results. On the other hand, only considering constructs from the two theories is limiting, as including factors specific to the online channel, websites and additional consumer characteristics improves the viability and the explanatory power in the online shopping environment.

The extended model analysis underscores the importance of integrating TAM and TPB basic assumptions with additional factors. An examination in reference to the previously reported bivariate correlations in which the findings are based, naturally reveals many similarities in the pattern of results across both types of analysis. For example, website characteristics such as design and information quality exert a primary impact on attitude. Capitalizing on technologies that enable a pleasant and functional design, together with the display of accurate information in several forms (e.g., text, pictures, videos) certainly influences consumers' adoption. Some consumer characteristics - i.e., previous experience and innovativeness - prove to be dominant drivers of acceptance, as they determine both purchase intention and behavior. Finally, trust and perceived risk are classical variables whose inclusion significantly improves the predictive power of the model regarding attitude (for trust) and purchase intentions (for trust and risk). These findings attest to the intricate and complex nature of the e-commerce phenomenon. Although a relative few number of antecedent factors may contribute to anticipate adoption, a far-reaching perspective is imperative, as the study of online buying behaviors is multifaceted and has typically been fragmented across different disciplines from the outset (e.g., Jarvenpaa and Todd, 1996; Devaraj et al., 2002; Gupta and Kim, 2010). The findings also accent the need to ensure that the more dominant drivers are specified in future models.

Practical Implications

The findings of this meta-analysis have several implications for practitioners. In particular, they provide guidance on the importance of the many factors and dimensions that impact different outcome variables related to online shopping behavior. Such an understanding is a fundamental starting point to identify and implement appropriate online marketing strategies to target, attract and retain consumers to e-commerce platforms, therefore creating value and generating positive performances.

First of all, results imply that different variables can be successfully leveraged for various yet intertwined purposes. For example, if the focus is promoting favorable attitudes, placing more

emphasis on the quality of information provided, website atmospherics and the entertainment value offered will generally be more appropriate for triggering and enhancing interest in the commercial website. Attention should be given to websites' elements, such as image, interactivity, multimediality and to an increased user-centered design, which incorporates emotional aspects of the user's experience with technology (Henneman, 1999). The enjoyable aspect of e-shopping should be emphasized in the promotional activities as well. Of utmost importance for all customer outcomes is communicating the ease of use and usefulness of the online channel and implementing adequate and up-to-date technological solutions, both to increase consumers' perceptions of utility and ease when purchasing online and to reduce perceptions of risk. Perceived risk and privacy concerns are still a barrier to adoption, although their importance as evaluative criteria to select online shopping seems secondary.

In addition, although perceived ease of use and perceived usefulness have multiple effects, a focus solely on the technological perspective is limiting. Other elements like social influence, trust, perceived behavioral control, previous experience with online shopping and innovativeness are influential for online shopping behaviors. In particular, to stimulate the final outcome of the actual purchase, managers should acknowledge the relevance of consumers' previous experiences and innovativeness. Taking into consideration one aspect in isolation might not lead to such positive results. To leverage all predictors and specially to build consumer trust, a close collaboration is suggested between online and offline marketing managers and activities, if present. Indeed, companies may capitalize on advertising investments and the reputation systems built offline as trustworthiness signals (Jarvenpaa et al., 2000).

Second, in the context of e-service delivery, companies should give particular attention to the layout of the website and privacy policies. Greater complexity and uncertainties involved in purchasing services online resulted in an increased emphasis on further communicating the intangibles that characterize services. Privacy policies and protection mechanisms are dependent on both companies' actions and legislation, but e-service providers should accentuate the visibility of such policies and practices. This is of utmost importance in light of novel data breach risks (Wachter and Mittelstadt, 2019). These findings may also reflect the greater need to capitalize on associated knowledge, in the case of brick-and-mortar companies, to portray a reliable image (e.g., brand name, reputation system). Moreover, when delivery is international, managers should acknowledge the role of subjective norm in Eastern countries. Other tools of social influence, such as the "recommend to a friend" option, might be successfully implemented in these countries.

Finally, this study suggests whom to target most effectively when selling online. Consumers displaying higher degrees of innovativeness are likely not only to shop online more but also to

stimulate others to buy (Goldenberg et al., 2009), which is crucial given the influence of previous experiences on future purchases. Opinion leaders and innovators may therefore be targeted to increase purchases. Results also indicate that other consumer characteristics like demographics are not the finest criteria to target potential buyers. Even though younger and female consumers may show more favorable attitudes toward online shopping, age and gender do not predict purchase intention and behavior. The results may be different considering specific product categories, for example apparel (e.g., Goldsmith and Goldsmith, 2002), but this moderation could not be tested due to insufficient information.

Limitations and Directions for Further Research

This study is not without limitations, which point to fruitful areas for future research on online shopping adoption and raise new questions for managers and researchers to address.

As is widely recognized and documented in the literature (Hunter and Schmidt, 2004, Cooper et al., 2009), meta-analyses are constrained by the quality and availability of the primary studies on which they are based, and this limitation should be borne in mind when the findings are interpreted. Hence, the proposed framework should be viewed as a quantitative summary of the most investigated antecedent factors and not as an exhaustive list.

In addition, not all studies reported sufficient correlations between all the predictors. As a result, the correlation matrix used for model estimation purposes was incomplete to test all possible effects. In this respect, future studies could focus more on relationships that have received less attention, for example the effect of price and privacy concerns on attitude and purchase behavior (see Table 1). In general, drivers have been related more to purchase intention than to attitude and behavior. Moreover, among the predictors excluded for insufficient correlations there are important variables such as search intention, assortment and product quality, brand name and exchange/return policies to name a few. These factors therefore may have not received sufficient attention from researchers. Findings also highlights a need for research directed at capturing the interrelationships among the antecedent factors of adoption.

Variations in the definitions of independent variables and some interdependency among them may also have affected some of the findings. For example, some overlapping was found between system security and privacy concerns, as also recognized in previous studies (Pavlou and Fygenson, 2006; Hsu et al., 2014). Some scales used were ambiguous, as in the case of trust, which has been operationalized in a number of ways and its measure has been confused with its antecedents (Bhattacherjee, 2002; Gefen et al., 2003). Therefore, validation of the measures and of

psychometric properties of the scales used in online shopping is crucial to understand the relationships among variables.

The contextual and methodological moderators specified leave some variance unexplained. A meta-analysis is constrained to examining moderating elements that can be coded from the extant literature. That the moderating elements that could be coded do not fully account for the variance in the correlations indicates that additional methodological factors (e.g., multi-item versus single-item scales) and/or contextual factors (e.g.,, company size, additional product types) could benefit future studies in gaining a deeper understanding of the boundary conditions of online shopping adoption. Moreover, the findings are largely based on cross-sectional studies, which delimit the ability to make confident causal inferences. A reliance on cross-sectional data naturally arises from the unavailability of time-series data. However, the customer's buying decision process is affected over time. Therefore, future research should identify longitudinal and dynamic effects, also enhancing understanding of the direction of mediation mechanisms.

Finally, the focus of the present study is online shopping on traditional devices, such as desktop, ignoring other important phenomena such as mobile and social commerce, channel choice and migration between traditional and online channels. Future research could assess differences in the importance of the predictors when comparing different channels and devices in the path to purchase (e.g., Ansari et al., 2008; de Haan et al., 2018), also shedding more light on additional drivers that might be important when considering different touch points.

Conclusion

The rapid growth of electronic commerce has profoundly impacted on retail processes and consumers' shopping experience. The need to understand the key drivers of online shopping adoption has received a noticeable attention in the literature and fueled a rich strand of studies. To help managers and researchers synthesize this growing body of evidence and refine the understanding of consumers' e-shopping behavior, this study conducts the first comprehensive meta-analysis on the antecedent factors of e-commerce acceptance.

The main objective of this research was to identify and integrate the key antecedent factors that influence consumer adoption of online shopping and to derive and test a new conceptual framework. In order to accomplish this objective, the meta-analytic technique was chosen. In particular, after the literature review and the definition of the research purpose, the following steps were undertaken: a) collection of studies; b) development and test of the coding questionnaire; c) coding of studies; d) research model development; e) data analysis. The data analysis consisted of three stages. The first one was the computation of meta-analytic bivariate correlations, using a hierarchical random-effects model. Then, a hierarchical mixed-effects model was adapted in the

moderator analyses, aimed at finding potential sources of heterogeneity. Finally, meta-analytic structural equation modeling (MASEM) was used to test a baseline and extended theoretical framework.

This research was based on a broad conceptualization of consumer adoption of online shopping, which comprises three dependent variables: (1) attitude towards online shopping, (2) purchase intention and (3) purchase behavior. The effects of eighteen predictor variables were assessed for a total of 1,710 measures on 210 relationships. In so doing findings from 146 articles and 183 studies conducted from 1999 to 2017 on a total sample size of 671,689 shoppers were integrated. A taxonomy was developed to place specific antecedent factors within four categories: perceived channel characteristics, website characteristics, social influence and consumer characteristics.

The Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) have been widely applied and validated in the literature on consumer adoption of online shopping (Perea y Monsuwé et al., 2004; Chang et al., 2005), thereby they are the theoretical foundation of the current study. In particular, the proposed model seeks to take advantage of the validity and reliability of perceived ease of use, perceived usefulness, subjective norm and perceived behavioral control by adding other constructs in order to improve its predictive power and support the integration of cross-disciplinary studies in the online shopping environment.

Given the purpose and the methodology chosen, the dimensions addressed in this study can greatly assist researchers and managers in understanding how consumers initiate and adopt e-shopping. Essentially, this meta-analysis helped clarify three issues: (1) which are the most investigated and prominent antecedent factors of online shopping adoption; (2) what is their general strength and their variability related to attitude, purchase intention and purchase behavior; (3) which boundary conditions (study contexts and research designs) moderate these relationships.

The first stage of analysis revealed that e-commerce literature has been effective in identifying key drivers of adoption and that different variables can be leveraged for several yet linked purposes. Implementing up-to-date technological solutions and increasing consumers' perceptions of utility and ease when purchasing online is important for all the outcome variables and prominent to enhance purchase intention. Website characteristics and enjoyment are essential to promote favorable attitudes while a reduced number of drivers impacts on purchase behavior, with perceived price, convenience, perceived usefulness and trust among the strongest. Subjective norm and consumer characteristics such as previous experience, perceived behavioral control and innovativeness reveal to be decisive for all the outcome variables.

The moderator analysis showed how the type of dependent variable consistently explain a significant amount of the variance and few other notable patterns. Of managerial relevance is the prominence of website design and privacy policies in the context of e-service delivery and the role of social influence in Eastern countries. On the theoretical side, the pattern to highlight is related to the type of respondents, with students' samples generating higher correlations for service quality, privacy concerns, website design and innovativeness.

The model conceptualization elaborated through structural equation modeling echoes the results of the meta-analytic bivariate correlations, developing an overall view of the most significant factors and their relationships with the outcome variables, grounding on existing research. TAM and TPB are validated in the baseline model and extended with prominent antecedent factors: information quality and website design among website characteristics, trust and risk among perceived channel characteristics, previous experience and innovativeness among consumer characteristics. All additional paths are significant except for the influence of perceived risk and perceived ease of use on attitude, with a satisfactory fit. Further, all mediations are significant except for the mediation of purchase intention between innovativeness and behavior, attesting the importance of mediators when assessing the effects of online shopping predictors.

In conclusion, the overall model results have contributed to the understanding of the interplay among channel, website and consumer characteristics and social influence in explaining the dynamics of adoption of online shopping, revealing the different impact of predictors on attitude, purchase intention and behavior. Variables have been integrated and rationalized to formulate a comprehensive and justifiable model. Results highlight the complex and composite nature of consumers' online purchase decisions. Overall, the findings may inspire marketing researchers to continue expanding knowledge of online shopping behavior in new directions and may benefit practitioners in marketing products and services online.

APPENDIX I STUDIES INCLUDED IN THE META-ANALISIS

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APPENDIX II META-ANALYTIC RESULTS OF CORE RELATIONSHIPS: ADDITIONAL STATISTICS

Table A1: Meta-analytic results of core relationships for attitude

	Attitude												
										95% CI			
	k	n	N	r (se)	T^2	SDr	I^2	Q	p-value [Q]	n_{fs}	Lower	Upper	t-value	p-value [t]
Perceived Ease of Use	14	13	5732	.484 (.031)	.010	.101	.913	148.643	<.0001	10487	.418	.550	15.876	<.0001
Perceived Usefulness	14	13	5888	.607 (.037)	.016	.127	.946	242.360	<.0001	30278	.528	.686	16.539	<.0001
Perceived Price	2	2	936	.439 (.105)	.021	.144	.926	13.455	.0002	223	-.901	1.778	4.159	.1502
Convenience	3	3	1821	.560 (.135)	.054	.231	.987	151.146	<.0001	657	-.019	1.138	4.158	.0533
System security	5	5	1262	.406 (.126)	.077	.277	.972	143.169	<.0001	530	.056	.755	3.222	.0322
Service quality	4	4	1984	.620 (.050)	.009	.093	.916	35.604	<.0001	2958	.462	.779	12.423	.0011
Perceived risk	13	12	3911	-.189 (.091)	.096	.310	.978	540.978	<.0001	904	-.387	.009	-2.076	.0600
Privacy concerns	1[a]	1	1194	-.275 (.027)	N.A.	N.A.	.000	.000	1.0000	39	-.328	-.223	-10.2755[a]	<.0001
Enjoyment	8	8	2088	.644 (.033)	.007	.083	.838	43.143	<.0001	6589	.567	.722	19.630	<.0001
Trust	21	13	4797	.481 (.055)	.038	.194	.941	336.424	<.0001	9531	.366	.596	8.736	<.0001
Information quality	9	6	2677	.448 (.091)	.048	.220	.964	219.567	<.0001	2611	.238	.659	4.912	.0012
Website design	9	6	2919	.488 (.018)	.001	.024	.132	9.218	.3243	3672	.447	.529	27.363	<.0001
Subjective norm	14	11	4685	.405 (.039)	.015	.122	.883	110.994	<.0001	5392	.320	.490	10.303	<.0001
Gender	1[a]	1	80	.748 (.050)	N.A.	N.A.	.000	.000	1.0000	84	.651	.845	15.0929[a]	<.0001
Age	1[a]	1	355	-.180 (.051)	N.A.	N.A.	.000	.000	1.0000	4	-.281	-.079	-3.5001[a]	.0005
Previous experience	5	5	2649	.465 (.075)	.027	.163	.967	122.574	<.0001	1613	.258	.673	6.228	.0034
Perceived Behavioral Control	20	10	6980	.450 (.04)	.014	.119	.904	197.123	<.0001	8599	.366	.533	11.278	<.0001
Innovativeness	6	4	3864	.257 (.077)	.022	.148	.897	48.365	<.0001	768	.059	.456	3.328	.0208

[a] fixed effect model (significance test based on z-value)

Notes: k = number of correlations per relation; n = number of studies; N = cumulative sample size; r (se) = weighted mean correlation (standard error); T^2 = between-studies variance; SDr = standard deviation for r; I^2 = scale-free index of heterogeneity; Q = Q-statistic test for homogeneity; p-value [Q] = p-value for Q statistic; n_{fs} = fail-safe n, p =.05 (Rosenthal, 1979); CI = confidence interval; t-value = t-statistic (significance of r); p-value [t] = p-value fo t-statistic.

Table A2: Meta-analytic results of core relationships for purchase intention

	Purchase Intention												
										95% CI			
	k	**n**	**N**	**r (se)**	**T^2**	**SDr**	**I^2**	**Q**	**p-value [Q]**	**n_{fs}**	**Lower**	**Upper**	**t-value**	**p-value [t]**
Perceived Ease of Use	41	35	12448	.474 (.026)	.020	.142	.927	549.795	< .0001	61884	.422	.527	18.131	< .0001
Perceived Usefulness	40	37	12326	.517 (.029)	.026	.162	.936	611.974	< .0001	77621	.460	.575	18.178	< .0001
Perceived Price	17	15	8309	.119 (.105)	.164	.405	.995	3254.882	< .0001	106	-.104	.342	1.134	.2734
Convenience	16	13	6150	.458 (.079)	.078	.280	.976	619.584	< .0001	7027	.290	.627	5.811	< .0001
System security	23	18	8158	.283 (.054)	.050	.224	.970	730.197	< .0001	5072	.171	.396	5.213	< .0001
Service quality	18	15	7613	.398 (.050)	.036	.190	.964	470.086	< .0001	9748	.292	.504	7.920	< .0001
Perceived risk	41	36	16535	-.192 (.060)	.115	.339	.987	3167.673	< .0001	12620	-.312	-.072	-3.225	.0025
Privacy concerns	26	10	12249	-.167 (.105)	.087	.295	.962	662.970	< .0001	525	-.384	.050	-1.581	.1264
Enjoyment	22	20	9548	.430 (.044)	.036	.190	.960	523.599	< .0001	17669	.339	.520	9.845	< .0001
Trust	61	47	17238	.441 (.029)	.034	.183	.944	1075.283	< .0001	72172	.384	.499	15.446	< .0001
Information quality	25	18	9062	.348 (.055)	.052	.228	.974	922.122	< .0001	13122	.235	.460	6.358	< .0001
Website design	19	12	7197	.398 (.052)	.031	.175	.939	293.800	< .0001	14668	.289	.508	7.675	< .0001
Subjective norm	23	17	9265	.418 (.027)	.010	.101	.862	159.157	< .0001	17166	.363	.474	15.696	< .0001
Gender	10	8	3302	.115 (.062)	.027	.163	.845	58.136	< .0001	81	-.025	.255	1.854	.0967
Age	6	6	2081	-.0210 (.042)	.007	.084	.726	18.236	.0027	0	-.128	.086	-0.502	.6372
Previous experience	20	15	7713	.376 (.051)	.034	.185	.965	543.959	< .0001	11951	.270	.482	7.417	< .0001
Perceived Behavioral Control	35	23	13105	.386 (.044)	.043	.208	.969	1094.833	< .0001	25792	.296	.477	8.695	< .0001
Innovativeness	16	11	4040	.351 (.041)	.017	.128	.903	155.027	< .0001	3192	.263	.439	8.504	< .0001

Notes: k = number of correlations per relation; n = number of studies; N = cumulative sample size; r (se) = weighted mean correlation (standard error); T^2 = between-studies variance; SDr = standard deviation for r; I^2 = scale-free index of heterogeneity; Q = Q-statistic test for homogeneity; p-value [Q] = p-value for Q statistic; n_{fs} = fail-safe n, p =.05 (Rosenthal, 1979); CI = confidence interval; t-value = t-statistic (significance of r); p-value [t] = p-value fo t-statistic.

Table A3: Meta-analytic results of core relationships for purchase behavior

	Purchase Behavior												
										95% CI			
	k	**n**	**N**	**r (se)**	**T^2**	**SDr**	**I^2**	**Q**	**p-value [Q]**	**n_{fs}**	**Lower**	**Upper**	**t-value**	**p-value [t]**
Perceived Ease of Use	7	7	3185	.171 (.067)	.024	.156	.917	72.700	< .0001	144	.008	.334	2.5597	.0429
Perceived Usefulness	11	10	5837	.237 (.048)	.018	.136	.906	106.598	< .0001	1434	.131	.343	4.995	.0005
Perceived Price	1[a]	1	566	.380 (.036)	N.A.	N.A.	.000	.000	1.0000	41	.310	.451	10.5569[a]	< .0001
Convenience	6	4	2783	.303 (.103)	.041	.202	.948	95.768	< .0001	371	.039	.566	2.950	.0319
System security	5	5	2908	.197 (.119)	.055	.235	.978	185.408	< .0001	54	-.134	.529	1.652	.1738
Service quality	3	3	1941	.025 (.023)	.000	.000	.818	10.976	.0041	0	-.073	.122	1.090	.3894
Perceived risk	6	6	2450	-.086 (.180)	0.161	.401	.986	366.402	< .0001	49	-.550	.377	-.479	.6522
Privacy concerns	1[a]	1	1194	-.119 (.029)	N.A.	N.A.	.000	.000	1.0000	6	-.175	-.063	-4.1693[a]	< .0001
Enjoyment	3	3	2147	.257 (.164)	.078	.280	.990	194.351	< .0001	105	-.447	.961	1.572	.2567
Trust	6	6	2327	.222 (.055)	.012	.111	.829	29.255	< .0001	275	.081	.363	4.049	.0098
Information quality	3	3	1942	.129 (.073)	.009	.094	.675	6.149	.0462	17	-.183	.441	1.778	.2174
Website design	4	2	3260	.296 (.261)	.136	.369	.994	506.948	< .0001	122	-.535	1.128	1.135	.3390
Subjective norm	6	5	2960	.267 (.092)	.041	.201	.955	111.296	< .0001	713	.029	.504	2.888	.0343
Gender	5	5	3595	-.057 (.068)	.022	.147	.921	50.680	< .0001	7	-.247	.133	-.830	.4531
Age	4	4	2573	.079 (.020)	.000	.000	.105	3.350	.3407	11	.017	.142	4.051	.0571
Previous experience	8	6	4804	.386 (.102)	.061	.248	.992	921.175	< .0001	4209	.144	.628	3.775	.0069
Perceived Behavioral Control	14	10	7337	.227 (.070)	.042	.206	.965	368.791	< .0001	2724	.076	.378	3.243	.0064
Innovativeness	13	6	5391	.295 (.081)	.037	.193	.925	160.468	< .0001	1260	.119	.471	3.656	.0033

[a] fixed effect model (significance test based on z-value)

Notes: k = number of correlations per relation; n = number of studies; N = cumulative sample size; r (se) = weighted mean correlation (standard error); T^2 = between-studies variance; SDr = standard deviation for r; I^2 = scale-free index of heterogeneity; Q = Q-statistic test for homogeneity; p-value [Q] = p-value for Q statistic; n_{fs} = fail-safe n, p =.05 (Rosenthal, 1979); CI = confidence interval; t-value = t-statistic (significance of r); p-value [t] = p-value fo t-statistic.

APPENDIX III META-ANALYTIC REGRESSION RESULTS OF MODERATOR ANALYSES: ADDITIONAL STATISTICS

Table A4 Variance component, Test for Residual Heterogeneity and Omnibus Test of Moderators

		k (n)	σ^2	QE (df)	p-val (QE)	F (df1, df2)	p-val (F)
Perceived Channel Characteristics	Perceived Ease of Use	62 (38)	0.015	503.133 (48)	< .0001	44.427 (14, 48)	< .0001
	Perceived Usefulness	65 (41)	0.021	739.049 (51)	< .0001	55.413 (14, 51)	< .0001
	Perceived Price	20 (16)	0.100	245.258 (6)	< .0001	1.653 (14, 6)	0.278
	Convenience	25 (20)	0.036	n/a	n/a	13.774 (15, 19)	< .0001
	System security	33 (21)	0.020	133.064 (18)	< .0001	8.590 (15,18)	< .0001
	Service quality	25 (17)	0.066	174.809 (11)	< .0001	8.450 (14,11)	0.001
	Perceived risk	60 (37)	0.146	2877.899 (45)	< .0001	3.056 (15, 45)	0.002
	Privacy concerns	28 (9)	0.007	100.010 (19)	< .0001	13.478 (9, 19)	< .0001
	Enjoyment	33 (25)	0.040	455.379 (19)	< .0001	12.961 (14, 19)	< .0001
	Trust	88 (51)	0.034	1043.949 (73)	< .0001	22.0276 (15, 73)	< .0001
Website Characteristics	Information quality	37 (20)	0.067	909.691 (23)	< .0001	3.585 (14, 23)	0.003
	Website design	32 (16)	0.035	334.528 (17)	< .0001	26.788 (15, 17)	< .0001
Social influence	Subjective norm	43 (19)	0.014	197.762 (29)	< .0001	17.441 (14, 29)	< .0002
Consumer Characteristics	Previous experience	33 (17)	0.017	440.159 (20)	< .0001	22.882 (13, 20)	< .0001
	Perceived Behavioral Control	69 (27)	0.033	738.449 (56)	< .0001	13.254 (23, 56)	< .0001
	Innovativeness	35 (14)	0.004	176.384 (23)	< .0001	28.289 (12, 23)	< .0001

Notes: k (n) = number of relationships (number of studies); σ^2 = variance; QE (df) = Test for Residual Heterogeneity (degrees of freedom); F (df1, df2) = Test of Moderators (degrees of freedom)

Table A5 Multicollinearity checks for moderator analysis strategy

			DV	Country	Product type	Research type	Respondents	Year	Publication type	Research stream
Perceived Channel Characteristics	Perceived Ease of Use	*GVIF^(1/(2*Df))*	1.0848	1.1173	1.1752	1.1454	1.3391	1.5024	1.2405	1.1505
	Perceived Usefulness		1.1326	1.1234	1.2734	1.1786	1.2813	1.4112	1.1466	1.2111
	Perceived Price		1.5261	1.2871	1.5492	n/a	2.1132	1.6598	1.8394	1.4711
	Convenience		1.2331	1.4781	1.3137	n/a	n/a	2.1567	1.6681	1.3032
	System security		1.1862	1.6195	1.2759	1.3755	1.7748	1.9739	1.3900	1.2082
	Service quality		1.3679	1.9147	1.5086	1.9735	1.6129	2.2493	2.5978	1.6837
	Perceived risk		1.1695	1.3461	1.2686	1.2735	1.6823	2.0683	1.1149	1.1415
	Privacy concerns		1.2546	1.9893	2.0855	n/a	2.1555	1.7401	n/a	n/a
	Enjoyment		1.3502	1.3036	1.4389	1.4333	1.3488	1.7585	1.5546	1.3355
	Trust		1.0698	1.2410	1.2608	1.3517	1.3686	1.5470	1.2819	1.1651
Website Characteristics	Information quality		1.3186	1.4833	1.5912	2.3689	1.8990	1.5155	1.4907	1.4852
	Website design		2.5594	2.3531	2.4206	2.7551	2.3565	2.2124	2.5334	1.8659
Social influence	Subjective norm		1.0805	1.7378	1.3425	n/a	1.8226	2.5281	1.5972	1.3557
Consumer Characteristics	Previous experience		1.0963	1.6088	1.2258	1.5350	1.5027	n/a	1.5148	1.4442
	Perceived Behavioral Control		1.0627	1.3467	1.3199	n/a	1.4901	1.6544	1.0947	1.2604
	Innovativeness		1.2809	2.5554	1.5212	n/a	1.9444	n/a	1.6793	1.5471

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