

# **Effects of Web 2.0 Experience on Consumers' Online Purchase Intention: The Social Networking and Interaction Orientation Factors**

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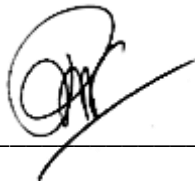
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## Attestation of authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Author's Signature: \_\_\_\_\_

A handwritten signature in black ink, consisting of a large, stylized 'Q' followed by a series of loops and a long horizontal stroke extending to the right.

Date: 26/04/2012

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## **Abstract**

This research examines the effects of Web 2.0 experience, especially the social networking and interaction orientation factors, which are likely to influence online consumers' purchase intention and buying behaviour. Based on theoretical foundations of what has been identified as Web 2.0 experience, this study proposes a research model consisting of these two factors acting as the main parameters influencing online purchase intention. These antecedents were modelled as first-order constructs with reflective indicators. The proposed model has been developed with two major objectives. The first objective is to provide insight into online consumer behaviour within the Web 2.0 e-commerce context. The second objective is to investigate the relative importance role of social networking and interaction orientation on online purchase intention.

Based on these objectives, the research first reviews the literature related to online buying behaviour, online experience and Web 2.0 experience. The review provides support for developing the research model and the hypotheses. Data collection was conducted in New Zealand through an anonymous survey of 173 students, who were asked to visit an existing Web 2.0 online store and initiate the purchase of a product, operation which was stopped before the transaction was completed. Statistical analyses using structural equation modelling (SEM) are used to validate the model and identify the relative importance of the key antecedents to online purchase intention. On the one hand, the results confirm the direct positive influence of the interaction orientation factor on purchase intention. On the other, they suggest that the relationship between the social networking factor and intention to buy is mediated by the interaction orientation factor.



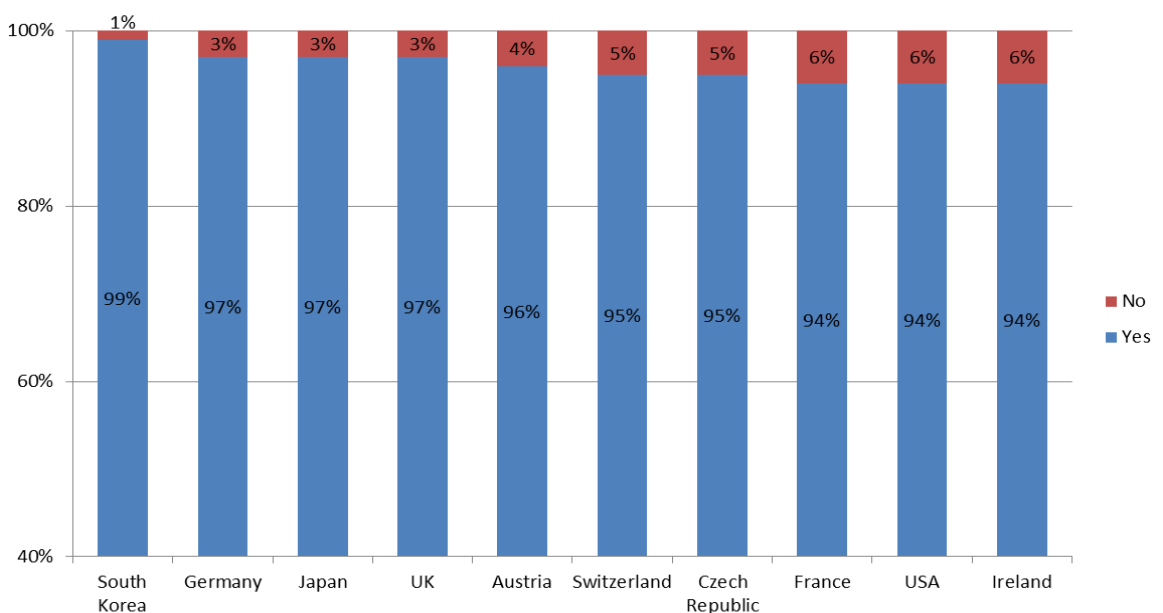
# Chapter 1 Introduction

## 1.1 Background

With more than two billion users worldwide (Internet World Stats, 2011), the World Wide Web has proven itself as a major communication and transaction medium for people all over the world (Martin et al, 2006). The fast pace of web technology innovation leads to radical changes in the way we interact and do business every day. The openness and connectivity of the Internet has also created a powerful business platform capable of changing dynamics of almost every industry (Denger, 2006). Electronic commerce, in particular, offers companies the ability to improve existing business models or create new ways of doing business (Timmers, 1999). Retailers are increasingly using the Internet to market either conventional or digital products. Some online merchants operate solely over the Internet, while others have their virtual storefront as an extension from their physical distribution channels.

Along with the increasing number of e-retailers, there seem to be also more and more online shoppers. A recent Nielsen (2008) online report indicates that more than 95 percent of online users in some countries have already experienced internet shopping. The world's most avid online shoppers are from South Korea where 99 percent of internet users have shopped online. This is closely followed by Germany, the United Kingdom and Japan (see Figure 1)

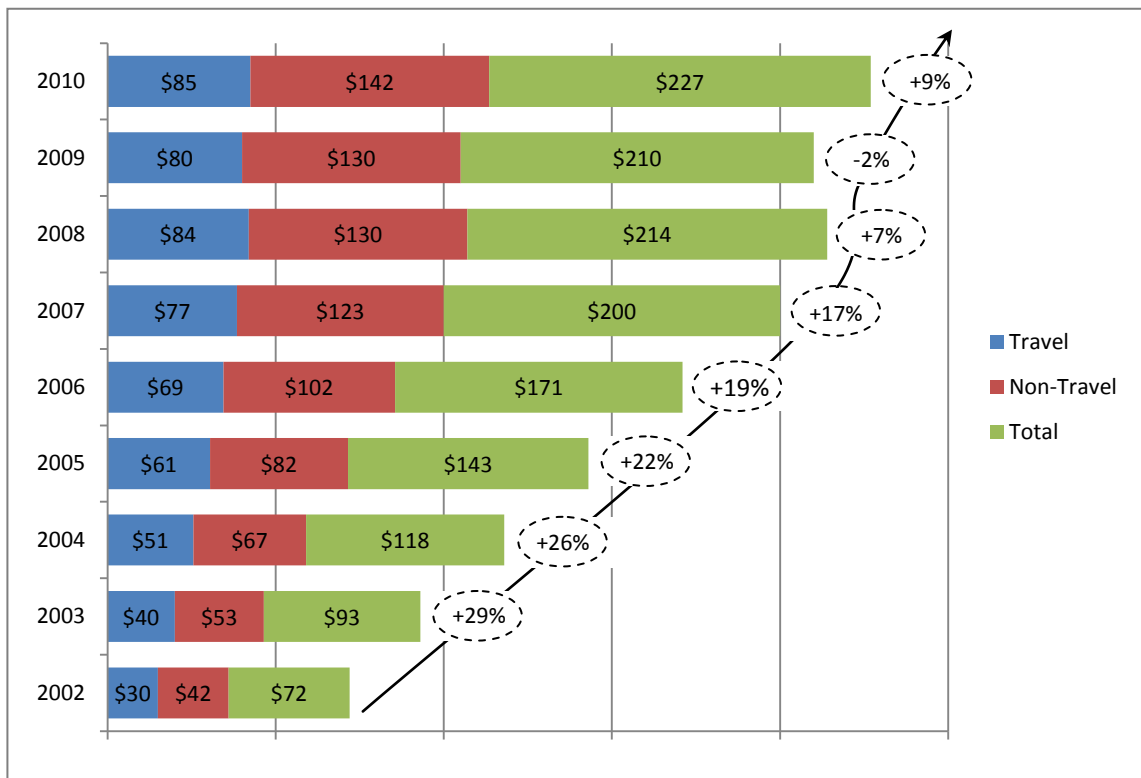
Figure 1 – Top 10 countries of online shoppers as percentage of Internet users



Source: Nielsen (2008)

The increasing number of online shoppers seems to make a great contribution to the steady growth of e-commerce retailing. In 2010, online retail sales gained \$165.4 billion in the United States alone, increasing 14.8% from \$144.1 billion in 2009, according to U.S Commerce Department (Internet Retailer, 2011). A comeScore report in February 2011 also indicates a constant increase in online sales for non-travel retail since the major dot come decline by the end of 2001 (see Figure 2)

Figure 2 – U.S e-Commerce dollar sales growth (\$ Billions)



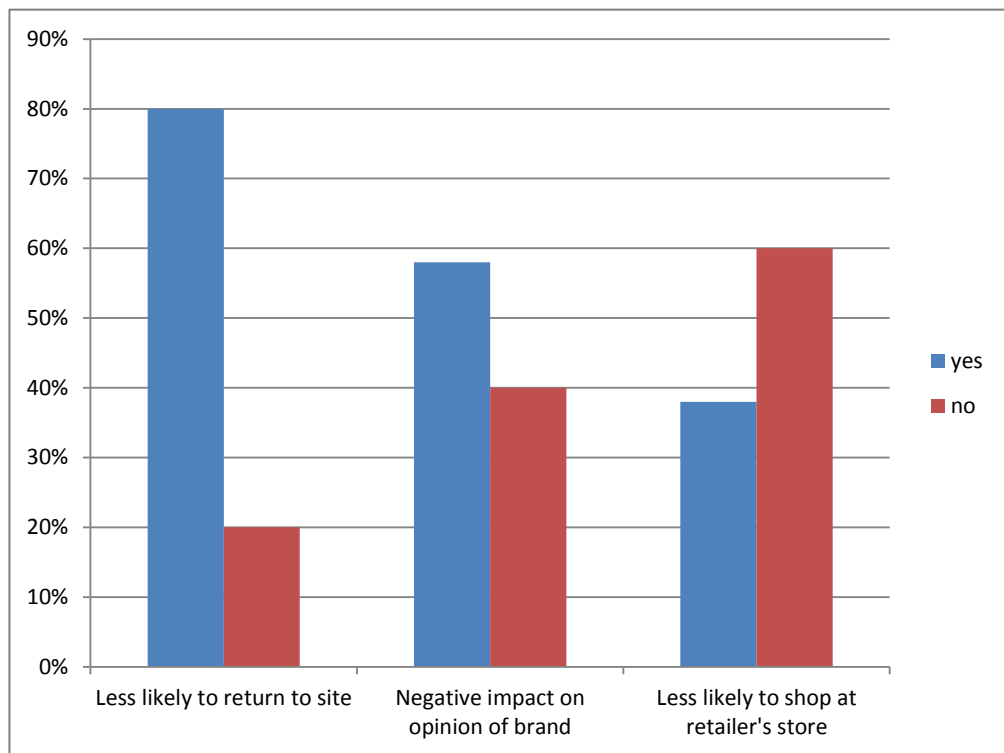
Source: comScore (2011)

Although there was a slight drop of 2% in the total online retail spending in 2009 compared to 2008 because of the global economy recession since September 2008 (Knowledge@Wharton, 2009), the e-commerce market overall has shown a remarkable recovery from 2010 (comeScore, February 2011).

Along with the promising profitability from the e-commerce market, the level of customer satisfaction with well-established e-retailers has also been increased substantially. According to the ForeSee Results (2011), nearly one-third of online retailers are considered top performers with the score of 80 or higher (on the 100-point scale). This is significantly better than 2007 result which has only four top e-retailers. Furthermore, none of e-retailers scores below 70, compared to 15 percent of the top 100 retailers scored 69 or lower in 2009.

Despite the positive result of customer satisfaction from the top e-retailers, there still remain a lot of smaller e-retailers struggling with prioritising online customer experience, which lead to poor customer satisfaction. These poor-performer e-retailers are likely to have their total dollar sales affected. In fact, a study conducted by Allurent, shows an overwhelming 80 percent of shoppers less likely to return a site where they faced frustrating shopping experience (Girard et al., 2008). The retailer’s poor online experience also accounts for nearly 40 percent of shoppers unwilling to shop at its physical store (see Figure 3). Likewise, a recent customer experience report also concludes that industries in Australia and New Zealand lose more than a third of their customers by delivering inferior customer experiences (RightNow, 2010).

Figure 3 – The consequences of frustrating shopping experiences



Source: MarketingCharts (2008)

As the e-commerce market presents a slow rebound from the economic difficulties of the last few years, the web presence has become even a more important determinant of the relationship between retailers and customers than ever before (ForeSee Results, 2011). Customers today are also getting savvier and tend to enjoy freshness and innovation without tolerance for any poor shopping experience. For these reasons, it is vital that e-retailers frequently seek to optimise their web experience as well as address any related issues such as improving usability, increasing accessibility, enhancing conversion rates, sustaining consumer loyalty, etc. Regarding these concerns, the

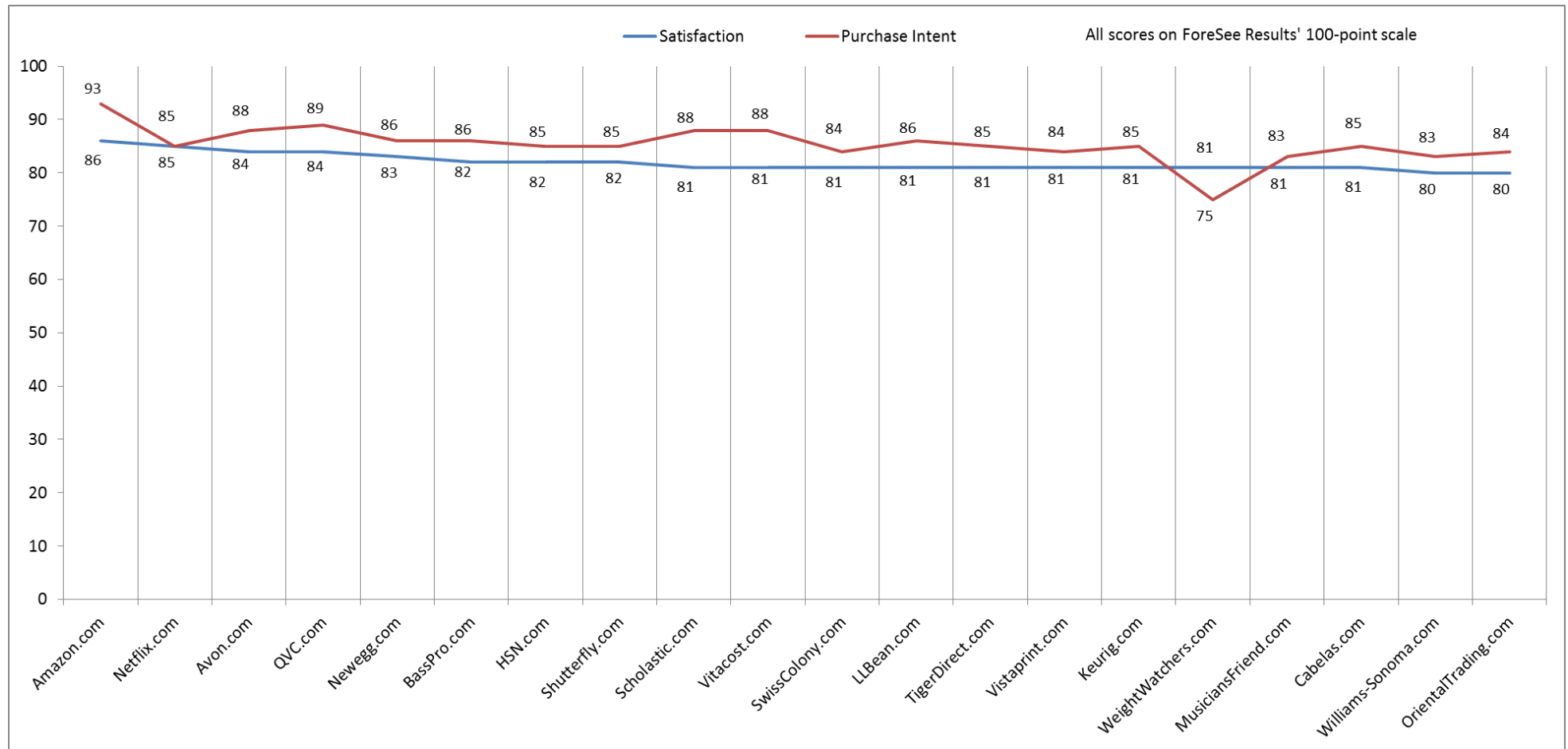
emergence of Web 2.0 presents a promising solution since it allows for a much more robust user experience than traditional websites using Web 1.0 (Jain & Ganesh, 2007). In fact, a recent survey research finds that using Web 2.0 helps businesses to increase customer satisfaction 50 percent. (McKinsey Quarterly, 2010) Likewise, more than 60 percent of respondents from another survey (MarketingCharts, April 2008) stated that they are being drawn to online retailers using Web 2.0 tools and technique. Sixty-nine percent of companies using Web 2.0 have gained measurable business benefits (McKinsey Quarterly, September 2009). According to Forrester (2008), the global enterprise Web 2.0 market is likely to reach US\$4.6 billion in 2013, representing a compound annual growth rate of 43 percent.

As the promising competitive advantages from Web 2.0 have been realised, a great number of retailers embracing Web 2.0 technology as a means of interacting and co-creating value with customers. For instance, online retailer Amazon.com has gained a significant user engagement by leveraging Web 2.0. In spite of selling products similar to other competitors like Barnes and Noble (Barnesandnoble.com) and having the same product descriptions, cover images and editorial content from their vendors, Amazon listings tend to attract more user reviews by offering invitations to participate in various ways on every virtual page. In addition, Amazon uses data captured from user activities to provide better search result as well as more relevant product suggestion to visitors (Petrassi, 2008). According to a new report from ForeSee Results (2011), Amazon, with the largest volume sales, has taken the lead in online retail satisfaction, beating Netflix - the world's largest online movie rental service who dominated top retailer list of customer satisfaction for the last six years (Mashable, 2011).

The increasing customer satisfaction from Web 2.0 experience seems to have a positive influence on consumers' purchase intention. The same ForeSee Results report (2011) has highlighted the cause-and-effect relationship between customers' online satisfaction and their purchase intent. As opposed to dissatisfied visitors, highly-satisfied visitors stated that they are 68 percent more likely to purchase online, 46 percent more likely to purchase offline, and 61 percent more likely to purchase from the same retailer again when they seek for a similar product. Highly-satisfied customers also tend to recommend the e-retailer. Figure 4 shows the relationship between the satisfaction and purchase intent scores of the top twenty performers in the report. It appears that who has high score of satisfaction also has high score of purchase intent. In other words, more satisfied customers are more likely to buy.

Figure 4 – The satisfaction and purchase intent scores of the top e-retailers 2011

Source: ForeSee Results (2011)



## **1.2 The research problem and research questions**

The background described in the previous section indicates the potential relationship between Web 2.0 experience and consumer purchase intention. Furthermore, customers today get savvier and their expectation of online experience continues to rise. Thus, to improve customer satisfaction, it is important to understand how Web 2.0 contributes to online shopping experience and its influential factors on buying behaviour of virtual consumers. In addition, since the success of an online vendor can be defined by a large number of sales being made from it (Phippen, Sheppard & Furnell, 2004), it is necessary for online vendors to seek the salient Web 2.0 factors which have a positive influence on consumer purchase intention. This necessity naturally leads to the challenges facing most of online retailers, regardless of whether they are already adopted Web 2.0 shopping experience or intend to do so. The challenges, in particular, include finding Web 2.0 experience factors influencing online consumers' purchase intention and examining the extent to which these factors influence online consumer' purchase intention.

To address these challenges, I propose a research model that suggests social networking and interaction orientation are the key Web 2.0 web experience factors influencing online purchase intention. These two factors are drawn based on the theoretical foundations of what has been identified as Web 2.0 experience, which are explained in detail in chapter 2. In the context of e-commerce, social networking factor refers to Web 2.0 tools supporting communication and user contributions to assist in the online buying and selling of product and services. Interaction orientation focuses on usability, the technical dimension that makes website interface easier and more pleasant to use. Given these two causal factors, the research problem can be framed in the following two research questions:

1. Is the social networking factor a determinant of the online consumers' intention to buy?
2. Is the interaction orientation factor a determinant of the online consumers' intention to buy?

The objectives of the research are twofold. The first objective is to empirically examine the association between the social networking and interaction orientation with online purchase intentions of consumers. The second one is to investigate the relative

importance of each of these factors in order to prioritise their significance in predicting online purchase behaviour.

### **1.3 Justification for the research**

Web 2.0, a popular and widely-used term which was first introduced by O'Reilly (2005), the founder of O'Reilly Media, goes far beyond Web buzz. In fact, its technologies and evolutionary trends not only have a strong impact on the Internet usage but also have opened many opportunities for companies to interact with customers and to create sales more effectively (Denger, 2006). The ability to provide rich user experience in Web 2.0 has been realised and continues to be employed by many business websites.

Online experience is one of the most important factors for online success, which has been recognised by many academic studies since Web 1.0 started. Novak et al. (2000) argue that compelling online experience is critical for creating competitive advantage on the Internet. Commercial commentators and business reports also regularly mention the importance of online presence quality and its impact on the online consumer behaviour (Nielsen NetRatings, 2003)

In more recent years, plenty of research has also been carried out with the purpose of identifying web experience factors affecting online consumer behaviour and how these factors contribute to the online experience. Lorenzo et al. (2007) suggest that website navigation and online product presentation are the crucial elements of a user-friendly ecommerce website and have significant effects on the shoppers' first impression of online vendor. With respect to online purchase intention, Castillo and Nicolas (2007) find that website trust and product perceived risk exert a significant influence on consumers' attitude toward the purchase on a particular ecommerce website. McCloskey (2003-2004) adds that ease of use also has an impact on whether a shopper would buy a product online while usefulness has an impact on the number of times a respondent purchases items online. Pavlou et al. (2007) find that trust, website informativeness, product diagnosticity, and social presence can help to overcome customers' perceived uncertainty in online buying. The sources of perceived uncertainty can be derived from ecommerce issues such as transmissions connections, insecure electronic payment or the potential disclosure of personal information. With respect to the perception of risk and uncertainty, Monsuwe' et al. (2004) suggest that other related

factors such as perceived behavioural control, trust, subjective norm and attitude also have a strong influence on customers' attitude toward online shopping and intention to shop online. Schaupp and Bélanger (2005) take a closer examination of these web experience factors by proposing a conceptual model suggesting that technology factors (e.g., security, usability and site design), shopping factors (e.g., trust) and product factors (e.g., product value, product customisation) affect online customer satisfaction. Table 1 provides a summary of prior research on what web experience elements drives consumers to shop online in various business disciplines. While these studies have investigated extensively a variety of website attributes (e.g., ease of use, usability, site design, trust), most of these attributes have captured a limited number of Web 2.0 characteristics. This in turn is unlikely to reveal salient factors associated with Web 2.0 in the commerce context.

Table 1 – A review of prior literature related to web experience elements affecting online consumer behaviour

Web experience elements	Study	Source
Website navigation, online product presentation	Lorenzo et al. (2007)	International Journal Internet Marketing and Advertising
Website trust, product perceived risk	Castillo & Nicolas (2007)	International Journal Internet Marketing and Advertising
Usefulness, ease of use, security concerns	MccLoskey (2003-2004)	Journal of Computer Information Systems
Perceived behavioural control, trust, subjective norm, attitude	Monsuwe' et al. (2004)	International Journal of Service Industry Management
Website informativeness, product diagnosticity, trust, social presence	Pavlou et al. (2007)	Management Information Systems Quarterly
Security, usability, site design, trust, product value	Schaupp & Bélanger (2005)	Journal of Electronic Commerce Research

An important attempt to classify web experience factors is Constantinides's (2004) taxonomy. Based on the extensive review of 48 research papers between 1997 and 2003, he proposes a comprehensive summary of web experience elements, including three main categories – i.e., content category, psychological category and functionality category – and five factors – i.e., usability, trust, interactivity, aesthetics and marketing



mix. However, these web experience factors also have a little focus on the particular characteristics of Web 2.0. Overall, although Web 2.0 has been realised and goes far beyond what Web 1.0 could offer, systematic empirical knowledge about Web 2.0 factors is very limited (Wirtz et al, 2010) and relatively little is known about how these factors influence online consumer behaviour. To address such deficiencies, the current research investigates what has been identified as Web 2.0 experience factors and examine the effects of these factors on consumer purchase intention.

#### **1.4 Thesis overview**

In order to address the research problem explained in section 1.2, this study points towards the development of a theoretical model that suggests social networking and interaction orientation are the key Web 2.0 web experience factors influencing online purchase intention. To examine the effects of these two factors on online purchase intention, the theoretical model is to be tested against the collected sample data. As a starting point, Chapter 2 starts uncovering the research problem by looking into the relevant literature from different disciplines including online buying behaviour, online experience and Web 2.0 experience. These literature findings act as a foundation upon which to develop the research model and the hypotheses as an effort to seek answers for the research questions. Next, Chapter 3 is devoted to methodology being used in the research. In particular, the step-by-step research procedures are specified; the survey instrument is developed and the data collection procedure is also discussed. Data collected from the survey is then examined and analysed based on the two-step SEM approach proposed in Chapter 4. A discussion of data analysis results, the study contributions along with the directions for future research are included in the last chapter, Chapter 5.

## **Chapter 2 Theoretical foundations and model development**

### **2.1 Introduction**

The purpose of this chapter is to review the relevant literature related to the research problem with the aim of developing the model. Within the research problem scope, the selected literature comes from the three main related areas: online buying behaviour, online experience and Web 2.0 experience. Thus, the following sections in this chapter focus on these three areas respectively. In order to seek answers to the research problem, the next section proposes a research model and specifies the hypotheses which will be empirically tested later in Chapter 4. A close review of the extant literature regarding the two Web 2.0 factors – i.e., social networking and interaction orientation will be subsequently presented.

### **2.2 Online buying behaviour**

The rapid growth of the Internet has increased dramatically the number of online shoppers and its economic importance to the present and future commercial environment in turn is frequently analysed and debated by both academics and practitioners. This has led many online vendors to realise that understanding the mechanism of virtual shopping and the behaviour of the online consumer is an important key to survive and to success in such a fast expanding virtual marketplace. The topic of online consumer behaviour has become an emerging research area with hundreds of research papers published during last years. Indicative of this is the fact that there were already more than 120 related academic papers published in 2001 alone (Cheung et al., 2003).

A review of these papers indicates that researchers are typically interested in identifying and analysing factors that in one way or another affects online consumer' behaviour (Cockburn & Wilson, 1996; Spiller & Lohse, 1997; Jarvenpaa & Todd, 1997; Degeratu et al. 2000; Childers et al., 2001, Dahan & Hauser, 2001; Eastin, 2002; Liu et al., 2003; Corbitt et al., 2003). Some researchers have also attempted to examine these factors by modelling the online buying and decision-making process (Miles et al., 2000; Liu and Arnett, 2000; Cockburn and McKenzie, 2001; Liao and Cheung, 2001; McKnight et al., 2002; Joines et al., 2003; O'Cass and Fenech, 2003). Despite the good deal of research

effort, relatively little attention has been paid to classification of these factors, specifically their simultaneous effects on the online consumers' purchase intention.

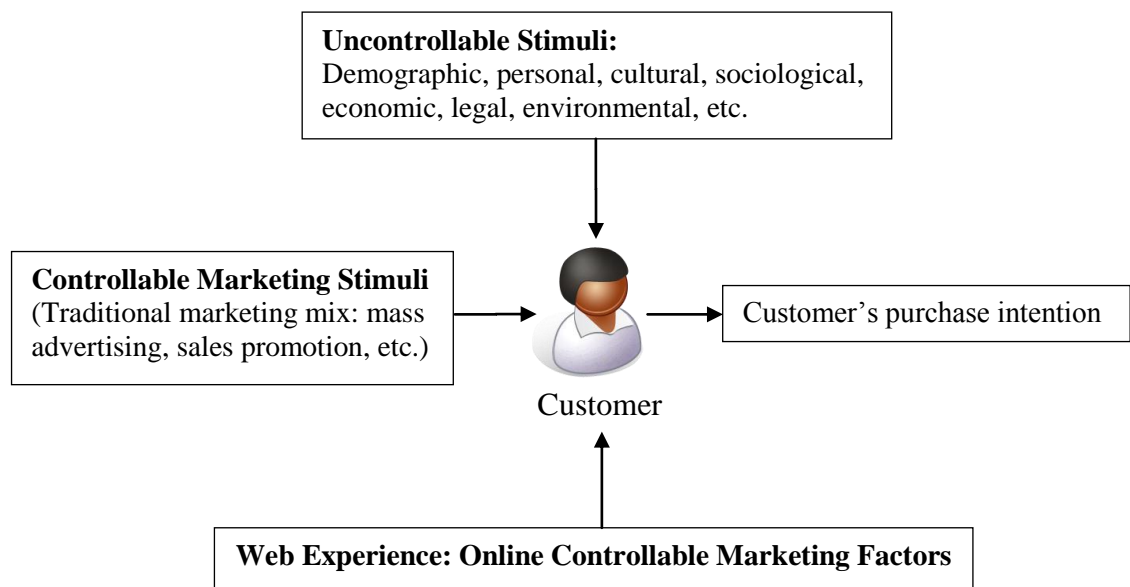
An important contribution regarding this aspect is the study of Cheung et al. (2003) who reviewed a large number of research papers on the virtual customer's behaviour. Their comprehensive findings of the literature review are categorised in two main groups consisting of uncontrollable factors (e.g., consumer characteristics and environmental influences) and controllable factors (e.g., traditional marketing). This classification contributes to the fact that there is no fundamental difference in shaping consumers' behaviour between virtual market and traditional one. In fact, both types of buyers are basically subject to influences beyond as well as under control of marketers or business vendors.

To a certain extent, most scholars also agree that the uncontrollable factors, including demographic, social, economic, cultural, psychological and other personal elements, are quite similar for both virtual and traditional consumers (Harrell and Frazier, 1999; Czinkota et al., 2000; Czinkota and Kotabe; 2001; Dibb et al., 2001; Jobber, 2001; Boyd et al., 2002; Solomon and Stuart, 2003). However, there are some essential differences when examining the nature of controllable inputs affecting consumer purchase intention online. Regarding controllable factors, it can be argued that not only online but also traditional, physical marketing activities (e.g., mass advertising, sales promotions, etc.) could influence consumer purchase decisions online. Such activities are traditionally considered as effective tools for a variety of reasons including building brand/product awareness, creating good will and attracting potential customers. Although these traditional, physical marketing activities can be employed, they are unlikely to have a significant influence on the buying and decision-making process of online consumers due to the changing nature of the virtual consumer (Urban & Hauser, 2003) and the fact the power of traditional marketing tools is rather limited especially when targeting potential global virtual consumers who are at different geographical locations (Constantinides & Geurts, 2005).

In addition, most of interactions between virtual consumers and online vendors are likely to be experienced online through the website. Hence, a logical assumption here is that online vendors can greatly influence on the potential virtual consumer decisions by delivering the proper online experience or the web experience: a mixture of online functionality, information, emotions, cues, stimuli and products/services

(Constantinides, 2002). In other words, whether virtual consumers are keen on interacting with a vendor's website and possibly transact with it will depend on the web experience presented on the website. This assumption is similar to the situation of a traditional shopper standing outside a shop which he or she has never seen before. Whether he or she will enter the shop, find products and complete a transaction will depend on a various elements such as the shop's presentation, the staff friendliness, the quality of product, the prices etc. In short, these elements together create the customer's shopping experience. Constantinides (2004) further examines this assumption by taking the web experience as a new additional input of controllable elements influencing the online consumer. Figure 5 presents an integrated model summarising the discussion so far about controllable and uncontrollable factors influencing the online consumer behaviour. It provides overall insights into how these factors affect online purchase intention.

Figure 5 – Forces influencing customer's purchase intention



Adapted from Constantinides (2004)

## 2.3 Online experience

With respect to the forces influencing customers' purchase intention (see Figure 5), this section pays particular attention to web experience force. In particular, it first identifies what is meant by online experience by seeking its definition from prior research. It is then followed by a detailed discussion about the importance of online experience in the context of e-commerce. The last subsection provides a classification of web experience

elements based on an analysis of the extant literature on the components of web experience. This analysis provides the theoretical foundation for the subsequent discussion on Web 2.0 experience.

### **2.3.1 Definition of online experience**

When customers shop online, they are not simply shoppers but also information technology users (Cho and Park, 2001). Internet shoppers may not just want to browse for products; they may also enjoy projecting themselves in a way that they can get connected to others, and interact or collaborate. Hence, it can be argued that their online experience is likely to be more complicated than the experience they have when shopping at physical stores. The online experience is defined as the total impression that virtual consumers can get when visiting an online vendor's website (Constantinides, 2004). Their total impression is the result of their exposure to a combination of notions, emotions and impulses caused by the design and other marketing elements of the online presentation. The web experience embraces various elements including visual attractiveness and functional elements like searching, browsing, selecting and transacting with the online firm.

Sites delivering high quality web experience are likely to have these elements designed and structured in ways not only attracting customer's attention but also satisfying customer's need. In contrast, websites with poor web experience not only fail to capture the attention of the virtual potential customer but also pose a risk to the survival of the online business (O'Keefe and McEachern 1998). A recent published study shows that 41 percent of shoppers are less likely to shop stores after bad online experience report (Internet Retailer, 2007). According to studies based on analysis of click-through patterns, the average time online customers spend in web pages during searching can be as low as one second in some cases (Cockburn and McKenzie 2001), while their average time spending per web site viewed can be below one minute (CyberAtlas, October 2003). Hence, to attract and retain online customers, it is necessary to present attractive and compelling web experience (Constantinides & Geurts, 2005). Novak et al. (2000) argue that compelling online experience is critical for creating competitive advantage on the Internet. Likewise, the quality of online presence plays an important role in the online consumer behaviour (Nielsen NetRatings, 2003).

### **2.3.2 Web experience elements**

In addition, the importance of online experience quality has led to an increasing number of attempts at examining the extent to which various components of web experience have an effect on consumer's buying decision. Based on a conceptual model of flow consisting of process states describing the components of a compelling online experience proposed by Hoffman and Novak (1996), Novak et al. (2000) conclude that it is possible to define its ingredients, to measure them and relate them to important marketing variables. An analysis of the extant literature on the components of web experience reveals two distinct orientations: Human-Computer Interaction (HCI) and behavioural approaches.

Scholars embracing an HCI orientation primarily pay attention to the design and usability dimension that makes the website interface more user-friendly and easier to use. This stream of research has a strong focus on the technical elements of a website that potentially influences online consumer shopping behaviours (Ranganathan & Ganapathy, 2002; Evarard & Galletta, 2005; Spiller & Lohse, 1997). For instance, Tarafdar and Zhang (2005) argue that product navigation, which is how product information is organised and indexed, and searchability, which is how easy product searching is and how quickly the search result can be produced, are the two main crucial features of an effective e-commerce website. Salaun and Flores (2001) add that the quality of information content, which is how easy the online consumer can make sense of the information (including textual and visual) presented on the website, will affect whether consumers are willing to visit an online store again. Many other authors also stress the important role of overall design (Flavin et al., 2006; Huizingh, 2000; G. Lee & Lin, 2005; Zviran et al., 2006), especially visual attractiveness of the website (Heijden, 2003) in influencing consumers' purchasing decision. Table 2 presents some relevant research findings of these technological elements from HCI stream.

Table 2 – Web technological dimensions from HCI stream literature

Study	Web technological element
Salaun & Flores (2001); Ranganathan & Ganapathy (2002)	Quality of information content
Heijden (2003)	Visual attractiveness of the website
Evarard & Galletta (2005); Spiller & Lohse (1997); Tarafdar & Zhang (2005)	Product navigation, searchability
Flavin, Guinaliu, & Gurrea (2006); Huizingh (2000); G. Lee & Lin (2005); Zviran, Glezer, & Avni (2006)	Overall design of the website

Scholars adopting the behavioural approach examine the determinants affecting customers' buying decisions in the online shopping environment. In this research stream, studies typically stress the importance of trust elements in examining online consumer purchase intention (Gefen & Straub, 2004; Kaufaris & Hampton-Sosa, 2004; Schlosser, White, & Lloyd, 2006). As customers do not physically interact with sellers and all transactions are likely to be experienced online, the researchers of this stream argue that the main requirement for the online shopping is a sense of trust between customers and online merchants (Eastlick, Lotz, & Warrington, 2006; Jarvenpaa, Tractinsky, & Vitale, 2000; Urban et al., 2000). Furthermore, the online presence also needs to be designed and implemented in a way that can minimise consumers' perceived risk in shopping online (Gefen, Karahanna, & Straub, 2003; Jarvenpaa, Tractinsky, & Vitale, 2000; Pavlou, 2003; Rattanawicha & Esichaikul, 2005).

These two research streams have also been reflected in the classification of the web experience factors proposed by Constantinides (2004). The classification provides a comprehensive summary about much of what has been done to investigate the web controllable elements influencing on the online buying behaviour. Based on the extensive review of 48 research papers between 1997 and 2003, Constantinides (2004) classifies the controllable elements into three main categories:

- Content category has a direct influence on the web experience by making website aesthetically positive and its offer attractive. It includes two factors – aesthetic and marketing mix.
- Psychological category includes the trust factor which plays an important role in persuading customers to interact online. Building trust can be achieved by

ensuring customer data privacy, providing secure transaction and frequently customer support.

- Functionality category improves online experience through good site functionalities, easy to use and interactivity. It includes usability and interactivity factor

This classification presents an inclusive picture of the web experience factors which are likely to affect or even determine the outcome of interaction between consumers and online vendors. Thus, this classification not only helps marketing practitioners to recognise the potential power of their online marketing tools, but also makes a great contribution to the body knowledge of online consumer behaviour.

## **2.4 Web 2.0 experience**

Along with the spectacular growth of the Internet, the developments associated with Web 2.0 have made an important evolutionary change to the World Wide Web. Its constituent technologies have created radically new ways for customers to interact with companies operating on the Internet. Web 2.0 has become one of the hottest buzzwords in the technology space and there is a growing trend toward using it among many online companies. However, the incremental adoption of Web 2.0 does not guarantee its term is well-understood (Constantinides & Fountain, 2007). In fact, even expert still disagree on the definition. Tim O'Reilly (2005), who is credited with the creation of the term Web 2.0, referred it as the second generation of the Internet, composing of seven core principles:

- The Web is a platform for participation, hosting services and value-added applications which enable users to get things done such as generating data content instead of simply browsing static content in traditional Web 1.0 approach. The web platform can also refer to the migration of traditional desktop services to web-based applications. An example is the Google Docs, a web-based word processing application compared to the desktop-based software like Microsoft Word.
- Harnessing collective intelligence implies the process on which the network effects occur as a result of user activity and contribution. Harnessing collective intelligence can make online business grow exponentially. Examples include eBay, whose products are the collective activities of all its users, and Facebook, whose majority of content is generated by users.



- Data stresses the important role of database management in many web-based applications. Data is considered as the Intel Inside of many modern sophisticated web-based applications. For example, NavTeq invested heavily into their database of street addresses and directions for online map services (e.g. MapQuest, maps.yahoo.com, maps.msn.com or maps.google.com).
- End of the software release cycle defines characteristics of internet software era where software is delivered as a service, not as a product. The shift from software as artifact to software as service requires software companies to have regular software maintenance (e.g., on weekly or even on daily basis). Therefore, operation must become a core competency. In addition, users must be treated as co-developers in a way that they decide whether a new software feature is adoptable.
- Lightweight programming models that leverage scripting languages in a way that more reusable code is developed, compared to traditional programming approach. This opens more opportunities for integrating services provided by others
- The ability of software to run on various platform and devices. For example, Web 2.0 applications should be designed to have optimised view not only on computer but also on a mobile phone.
- Rich and responsive user interface by leveraging AJAX technologies.

From a technical point of view, Web 2.0 is not really new as it is simply comprised of various existing technologies which have been around since the widely spread use of Web 1.0. There are no truly fundamental difference between the technologies used in Web 2.0 and Web 1.0 (Burkhardt, 2011). However, it is worth noting that the distinction between these two is actually placed on the end-user experience. Websites adopting Web 2.0 are designed to be faster, easier and more intuitive for users, compared to the use of traditional Web 1.0. A closer examination of what makes rich user experience in Web 2.0 possible reveals three general thrusts. First, Web 2.0 leverages the power of end users' computer by running some of application logic and user interface (UI) manipulation on their machine. This has improved significantly the responsiveness of the web user interface compared to previous web application architecture, where all the heavy work load of an application is placed on centralised servers. Second, information content has been separated from the UI design. This enables end users to fully concentrate on writing the information part only without any concern over programming

UI for styling their published content. Third, UI is designed to be more dynamic and highly responsive so that web applications can react as quickly as desktop applications. Hence, a significant amount of website loading time can be reduced and user experience can greatly be improved.

The rich user experience Web 2.0 plays an important role in e-commerce. In particular, traditional retailers and pure-play online retailers continue to leverage Web 2.0 technologies in an attempt to maximise their consumers' online experience. The importance of Web 2.0 in businesses' online presence has been recognised in both prior academic research and practical business application. However, the literature lacks a systematic analysis of the broad characteristics and trends associated with the Web 2.0. In particular, relatively little is known about what is actually characterised as Web 2.0 experience. One of the first attempts regarding this aspect was the taxonomy summarising Web 2.0 factors proposed by Wirtz, Schilke and Ullrich (2010). By using grounded theory to analyse the data collected from in-depth field interviews with manager from 22 different U.S and German Internet companies associated with the Web 2.0, the researchers provided a comprehensive framework of Web 2.0 characteristics, consisting of four factors ranked from the most important to the least important:

- Social networking, by which a large number of participants often create powerful influence on the assessment of certain products and services.
- Interaction orientation, which enables the firm to interact effectively with customers by leveraging a more intense and authentic communication channel between firm and customers.
- User-added value, by which user-generated content (e.g., customer feedback, products review) is leveraged fostering online collaboration and active participation among online consumers.
- Customisation and personalisation, which enhances the online experience by making it possible for Internet users to reconfigure website (e.g., changing the look and feel or functionalities) to suit their particular needs and preference.

## **2.5 Research model**

Given the emergent Web 2.0 phenomenon, there is little or no academic literature explicitly identifying what Web 2.0 factors actually are. In response to this gap, Wirtz et al. (2010) developed a comprehensive Web 2.0 framework consisting of the four

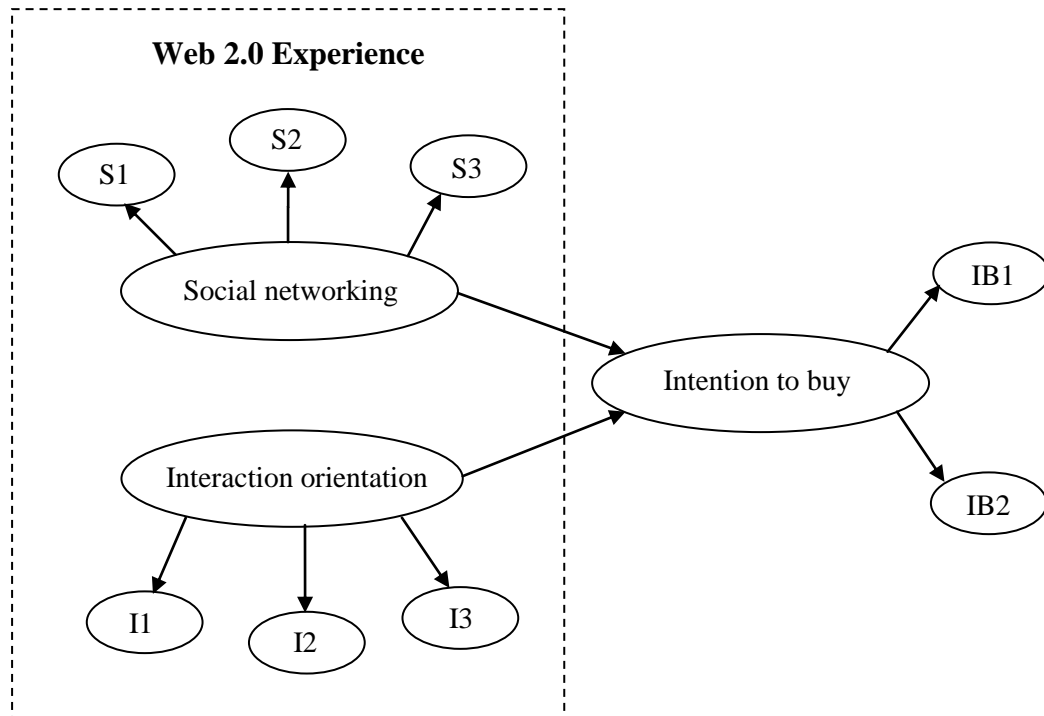
factors summarising Web 2.0 characteristics, as explained in the previous section. Their effort to identify Web 2.0 factors is supposed to be the first attempt, to the best of my knowledge, and can be further utilised as causal factors to examine their effects on online consumer behaviour.

This research is intended to examine the effects of Web 2.0 experience, especially the social networking and interaction factors, which are likely to influence online consumers' purchase intention and buying behaviour. These two factors have been selected for two main reasons. First, according to the empirical work of Wirtz et al. (2010), they have been considered as the most important factors compared to the other two Web 2.0 factors – i.e., user-added value and customisation and personalisation. Second, they also appear to be relevant factors comprising many crucial characteristics of an effective e-commerce website. For instance, social networking encapsulates social trust element which is considered as a key determinant of online purchase intention (Gefen, 2000; Jarvenpaa et al., 2000) and helps retain online customers (Reichheld & Scheffer, 2000), while the lack of it is also the main reason individuals do not shop online (Hoffman et al., 1999). Further, social networking can make a significant user engagement through its virtual word of mouth. With respect to interaction orientation, Web 2.0 websites offer a highly interactive and responsive interface which is likely to influence online customer' purchasing decision according to scholars from HCI stream (as discussed in section 2.3.2). Therefore, given the limited time and resource constraint, it is sensible for this research to focus only on the two Web 2.0 factors: social networking and interaction orientation.

In order to provide an answer to the research questions presented in section 1.2, the current study proposes a research model examining these two factors that affect consumers' online purchase intention. The model diagram is presented in Figure 6, consisting of two exogenous constructs – social networking and interaction orientation, and the endogenous construct – consumer's intention to buy. The model shows the structural relationships among the constructs through the two single-head arrows: social networking affecting intention to buy and interaction orientation affecting intention to buy. The social networking construct is indirectly observed by customer support (S1), information sharing (S2) and product rating (S3) variables, while the interaction orientation construct is indirectly observed by ordering process (I1), product searching (I2) and interaction (I3) variables. The endogenous construct – intention to buy – has

two observable variables: likely to purchase (IB1) and likely to recommend (IB2). These observable indicators will be discussed in detail in section 2.5.3.

Figure 6 – The hypothesised model



This research model is regarded as the theoretical foundation on which my entire research is based upon. To investigate the research model, the following hypotheses are further established:

H1: There is a positive relationship between social networking factor and the online consumers' intention to buy.

H2: There is a positive relationship between interaction orientation factor and the online consumers' intention to buy.

The following subsections discuss in detail the constructs included in the proposed model by reviewing prior research on social networking and interaction orientation.

### 2.5.1 Social networking

The concept of social networking has evolved from sociology studies in the late 1800s and continues to mature even today (Burkhardt, 2011). It is commonly described as structures of human online interactions which often involve dramatically increasing numbers of participants. According to Preston (2011), there are a growing number of

addicted people who live more of their lives on the social web. A recent statistic shows that social networking activities account for one of every five minutes spent online by Australians (Sperti, 2011). Harnessing Web 2.0 technologies, social networking has created a powerful environment for users to share their views, preferences, or experience with others (Trusov et al., 2009). Users typically employ social network for various reasons including self-reflection, image building, entertainment and access to relevant information. Wirtz et al. (2010) has categorised social networking characteristics into a set of four sub-factors: social identity, social trust, virtual word of mouth and consumer power. These sub-factors are subsequently discussed with more detail.

### ***Social identity***

Social identity refers to online images which Internet users are actively shaping for a sense of belonging to specific web interest group. A recent study found the 'need to belong' is one of the key drivers of social network participation (Wirtz et al, 2010). In fact, what makes social networking distinct from the other conventional tools supporting social interaction (e.g., email, chat, forums, electronic bulletin board and virtual communities) is its ability to reinforce the sense of belonging (Nabeth, 2009). In particular, user can get not only information provided by other users but also know about their activities so that the benefits of mutual engagement can be realised and accessible in a social exchange. These make it possible for users to have the feeling of being connected through interpersonal relationship, together with the possibility of gaining social approval so that they are keen to continue the interaction. The continuous interactions in turn can help people to build their unique identity which can be recognised by others. An example of such interactions can be publishing personal thoughts, pictures, and comments on products, etc., which appears to be a form of identity building.

### ***Social trust***

Social trust plays an important role in building the confidence that people will reciprocate beneficial behaviour in their interactions with others (Wirzt et al, 2011). As the notion of trust in others increases, consumers tend to think that they are far more likely to get an accurate review from a large number of other consumers, than by following on the recommendation of a paid reviewer from a typical traditional media (Melcoulton, 2011). In the context of online shopping, consumers increasingly base

their purchasing decisions on opinions provided by other users through user-generated content such as product review, product rating (Wirt et al, 2011).

O'Donovan (2009) highlights two distinct types of trust in social web application: indirect trust and direct trust. Direct trust is formed through the value, opinion or comment generated directly by users, for example feedback comments or product review. In contrast, indirect trust uses some proxy for trust information between users. Examples of such proxies include ratings, profile info, purchases and so on. The useful trust information collected from either direct or indirect trust source or from both is then aggregated into integrated systems so that more personalised user experience can be produced. An example of using such integration mechanism is Amazon.com who recommends books to millions of users every day through a recommender system, a tool for manipulating large quantities of information to suit the needs of individual users (O'Donovan, 2009).

### ***Virtual word of mouth***

Virtual word of mouth refers to the use of social content or informal information which can be transferred between different parties via electronic applications such as blogs, review system and online feedback. Such social content is found to be closely associated with subjective matters about users and every user on social network also expressed his or her personal opinion about those subjective matters (Zhang & Daughtery, 2009). Hence social networking by its nature extends further the practice of word of mouth.

According to Giesen (2011), virtual word mouth is one of the biggest changes in the history of communication. As social networking enhances the “power of voice” of consumers, the web has been transformed from an information web to a social web. This leads the Internet to increasingly become the place where users all go for word of mouth. A recent statistics shows that eight in every ten Australian consumers actively share their personal thought and recommendation online (Digital PR, 2011). Likewise, Smith (2011) reports every online American consumer generates 2,841 impressions each year regarding products and services.

While virtual word of mouth offers a great deal of information, it may not necessarily lead consumers to have a better decision. Begly (2011) argues that the abundance of information online may even result in poorer choices since consumers may get

overwhelmed and have less time to justify their decision. However, she highlights the importance role of such abundant information in their decision-making machinery to what is latest, not what is more important or interesting. As facing with information abundance online, consumers are likely to draw their attention to the most recent user-generated comment. Hence, regardless of uncertainty in the quality of peer information, it is indisputable that online word mouth is an attractive source for consumers' decision-making.

As people continue to seek valuable peer information, virtual word of mouth has also become an indispensable marketing tool for promoting products, brand or services (Cao et al., 2009). Sperti (2010) reports that 86 percent of online Australian are looking to fellow Internet users for opinions and information about products, services and brands. Borrud (2011) also notes that the best possible marketing is a recommendation from a friend. As word of mouth continues to play an important role in the market force, there is exponential growth of online shopping websites leveraging Web 2.0 to facilitate consumer collaboration. This enables consumers to perform a wide range of social features such as product review, product rating, sharing/ referring a product to friends. Regardless of whether these word-of-mouth features help to generate more sales not, they generate numerous opportunities for online marketers to gain better understanding of what consumers want.

### ***Consumer power***

The enhancement of consumer power can be seen as a side effect of the rising interaction between consumers. Harnessing social networking, consumers are empowered to participate and generate content. This means they are no longer passive shoppers who are only the recipients of vendors' communications (Stewart & Pavlou, 2002). The Web has increasingly become the place where individual opinion and advocacy are a driving commercial and social force. This signals a new era in consumer culture where the power has been shifted from organisation to individual, introducing collaboration as a theme for future business model. Online shoppers who are keen to increase their level of empowerment can leverage advanced tools to seek for products (Deck & Wilson, 2006; Sen et al., 2006), to obtain relevant information provided by other users for defending against discriminatory marketing initiatives (Acquisti & Varian, 2005), and to propagate their opinions among other consumers (Carl, 2006).

### **2.5.2 Interaction orientation**

Interaction orientation focuses on enhancing the firms' effectiveness in dealing with customer demand through a more intense and authentic dialogue between firm and customer (Wirtz et al., 2010), allowing customers to enter into direct, two-way communication at anytime (Lim et al., 2004). In the context of online shopping, interactivity not only plays an important role in forming a consumer's attitude towards an e-retailer (Merrilees & Fry, 2002) but also has a significant impact on the perceived quality of the website (Ghose & Dou, 1998) and adoption of e-commerce (Meuter et al, 2000).

Based on an extensive literature review on Internet interaction, Mechant & Evens (2009) reveal three distinct perspectives on interactivity emerged during the last decades. The first one is communication, which considers interaction as a core feature of dynamic communication process extending traditional one-way communication. The second one is described as the structural perspective, which conceives interactivity as a feature of media technology. The third one focuses on the extent to which Internet users perceive the interactive affordances. While these perspectives provide a good overview of what has been identified as Internet interactivity, they lack sufficient detail to reflect Web 2.0 characteristics. To fill this gap, Wirtz et al. (2010) specify four important aspects of interaction orientation in Web 2.0: customer centricity, interaction configuration, customer response and cooperative value generation. The following subsections discuss these aspects in more details.

#### ***Customer centricity***

The concept of customer centricity itself is not new since it has been discussed for more than 50 years (Shah et al., 2006). The concept stresses the important role of customers who determine what a business is and what business should do in order to fulfil customer needs (Levitt, 1960). In the context of Web 2.0, customer centricity places customers' interactions at the centre stage and view them as the focal point of all business activities. A closer examination of literature related to customer centricity reveals that a great attention has been paid to customer-related factors during the last decade, such as customer satisfaction (Oliver, 1999), customer service (Parasuraman & Grewal, 2000) and customer loyalty (Kumar & Shah, 2004). The underlying insight from this literature suggests the ultimate goal of customer centricity is not about how to



sell products, but rather on how to create value for the customer and in turn creating value for the firm, indicating the dual value creation (Boulding et al., 2005).

### ***Interaction configuration***

The interaction process should be structured in the way it can address what information is exchanged, and with whom, and for what reasons. Given Web 2.0 capability, relevant interaction configurations bring not only richer but also more personalised user experience, which in turn help the firms not only to make a distinction from the others but also to build long-term customer relationships (Wirtz et al., 2010). A typical example of interaction configuration in many online shopping websites is that users can either subscribe or unsubscribe newsletters or information sent by vendors to users through their email. In addition, since interaction configurations offer users the ability to control their expected interactivity, it actually increases user empowerment, along with better user experience.

### ***Customer response***

Customer response stresses the firm's ability to handle the dialog from customers. In particular, the firms should be capable of reacting and responding to individual customer feedback at the same time codifying the acquired information for future improvement in customer dialog (Wirtz et al., 2010). Satish et al. (2004) highlights two dimensions of customer response capability: customer response expertise and customer response speed. While customer response expertise refers to the extent to which the responses from organisation fulfil customer needs, customer response speed refers to how quickly its responses are delivered to customers. It has been considered that customer response expertise is more important than customer response speed (Jayachandran, 2004). This means that customers typically concern more about the extent to which responses can bring value to them, rather than how quickly responses can reach them. For instance, quick responses but useless to customers may not be as tolerable as slow responses but useful. While Web 2.0 enabled websites can provide responsive interaction and help users to get immediate feedback in some cases (e.g., automatically sending notification based on time or user activity), the usefulness of feedback itself is still dependent on those who generate it. Although Web 2.0 tools have less control over the quality of feedback content, they can offer users the ability to rate other users' feedback or comment so that useful customer responses can be recognised.

### ***Cooperative value generation***

Cooperative value generation refers to the ability of a company to integrate customers into business transactions for competitive advantage (Wirtz et al., 2010). In the context of online shopping, cooperative value generation enables companies to obtain useful information such as information on how to improve products, services and processes, which can be utilised to develop or sustain business marketing strategies. Current academic debates on internet uses highlight two types of internet users (Aguiton & Cardon, 2007). The first are mainly concerned with maximising his or her personal interest (e.g., searching information, buying and selling for a better price, gaining reputation, etc.). This type of users may provide useful user activity statistics which can be captured for cooperative value generation. In contrast, the second are considered as altruist individuals who are motivated by collective concerns (e.g., public interest, knowledge sharing, product review, etc.). Their cooperative value can be obtained directly through their user-generated contents.

### **2.5.3 Construct measurement**

According to Hair et al. (2009), a good measurement theory is necessary to obtain useful results from testing hypotheses involving the structural relationships among constructs. Hence it is important to operationalise the model constructs with their appropriate measurable indicators from which a survey instrument can be developed for data collection later. Given the full research model presented in Figure 6, the model constructs (social networking, interaction orientation and intention to buy) and their associated indicators (S1, S2, S3, I1, I2, I3, IB1 and IB2) have been identified. These indicators have been selected through a scale development procedure, which is explained in section 3.3. In addition, each of indicators (S1, S2, S3, I1, I2 and I3) measuring exogenous constructs has a close link to the sub-factors of its corresponding constructs. Below discusses in detail each indicator as well as its relation to the sub-factors explained in sections 2.5.1 and 2.5.2.

#### ***Indicators for social networking construct***

- Customer support (S1) deals with the features relating to the general information about the company, FAQs, support information and contact details. There is a close connection between such information and the social trust sub-factor. In fact, customer support information is essential because lacking of them may lead potential customers to distrust the e-commerce vendor (Shen & Eder, 2011). For

instance, the availability of company address and telephone number is crucial to show the company is a real entity with real people so consumers can contact when necessary (Warrington et al., 2000). In addition, the professional appearance of customer support information also plays an important role in building trust. For instance, such presentation features as proper grammar, correct spelling, accurate and concise information can help to reduce uncertainty of online buying (Rattanawicha & Esichaikul, 2005; Warrington et al., 2000).

- Information sharing (S2) refers to the extent to which product information can be easily shared among online shoppers. Social shopping sites such as Kaboodle and ThisNext were developed to enable consumers to share shopping advice and recommendations with likeminded individuals (Shen & Eder, 2011). Such sharing feature is a form of virtual word of mouth which online vendors can leverage to promote products. As shopper continues to share product information with others, their opinions also increasingly become a driving commercial force which plays an important role in others' purchase decision. Thus, consumer power on ecommerce is actually enhanced. The level of social trust placed on the product is also increased. In particular, shoppers are more likely to trust information shared by a large number of other consumers than any other type of advertising (Melcoulton, 2011). By sharing the same product information, it potentially forms a group of shoppers who are a fan of a particular product. This in turn helps to build social identity among these shoppers.
- Product rating (S3) enables users to quickly reflect how they have a liked (or disliked) a product by rating on a scale (e.g., 1 to 5 star scale). Similar to information sharing, product rating is also a form of virtual of mouth which can increase consumer power, social trust and social identity to a certain extent. Product rating feature has become popular in many social commerce websites like epinion.com (Lee & Lee, 2009; Park, Lee & Han, 2007).

### ***Indicators for interaction orientation construct***

- Ordering process (I1) is a core feature of an e-commerce website. In fact, it is the feature that makes an e-commerce website distinct from other information-only websites. Ordering process should have customer-centric design, which is operated from customers' point of view. Poorly-designed ordering process (e.g., having too many steps, lacking of SSL (secure sockets layer) security icon, etc.)

can lead to shopping cart abandonment – a problem which a shopper enters the shopping basket and leaves before completing the checkout. Hence, a clear and understandable ordering process is recommended for an effective e-commerce website (Gefen et al., 2003). Through the ordering process, customer activities may provide useful statistics which can be captured for cooperative value generation. Such generated cooperative value may be helpful for online vendors. For instance, it can provide a better understanding of the reasons for shopping cart abandonment. Ordering feature should also provide reasonable interaction configurations (e.g., payment type, delivery options, currency, etc.) so that shoppers can have more control on adjusting order details to suit their needs.

- Product searching (I2) is a crucial feature of an effective e-commerce website and an essential element of site usability (Lorenzo et al., 2009). Many studies found that usability is a very important attribute for achieving desirable interaction and behavioural responses (e.g., Childers et al., 2001; Eroglu et al., 2003; O’Cass & Fenech, 2003). Good search facilities should enable users to find product with ease can greatly enhance usability. In fact, the underlying approach of usable product searching is customer centric since the feature is designed based on customers’ needs when seeking a particular product. With customer centric design, product searching can help to reduce the effort consumers expend and increase online purchase intention (Richard, 2005). An example of customer centric design is autocomplete feature on product searching that can provide suggestions while users type into the search field. As part of usability enhancement, product searching can also offer users various interaction configurations (e.g., filtering search results by categories, product prices, colour, etc.). Customers’ cooperative value can also be generated by capturing information (e.g., keywords, search conditions) users are seeking. Such cooperative value is helpful for online vendors to understand more what customers need so that they can set up appropriate marketing plan as well as provide more relevant products.
- Interaction (I3) refers to ease-of-use dimension which an e-commerce website facilitates shoppers’ effort to interact with the website. Ease-of-use dimension is typically based on customer centricity, focusing on the way customers perceive usefulness and ease of use when interacting with the site. Many scholars (e.g. Gefen et al., 2003; Pavlou, 2003; Venkatesh & Davis, 2000) note that customers who find the website user-friendly, quick and easy to interact with, are more

likely to perceive the site as useful and easy to use. The perceived usefulness and ease of use in turn lead consumers to view the site more favourably and perceive as being more trustworthy. Another aspect regarding ease-of-use interaction is the extent to which website allow users to control their expected interactivity by providing relevant interaction configurations (e.g., personalised interface theme, options to receive newsletters through email, etc.). Compared with Web 1.0, Web 2.0 ecommerce websites are likely to provide better customer response speed by leveraging AJAX technology. This, hence, enables customers to have desktop-like experience when interacting with online store websites.

***Indicators for intention to buy construct***

- Likely to purchase (IB1) refers to the possibility that users decide to make a purchase. This scaled item was used to measure intention to buy by many scholars (e.g., Gefen & Straub, 2000; Taylor & Todd, 1995; Hassanein & Head, 2006; Kim & Kim, 2005; Pavlou, 2003)
- Likely to recommend (IB2) refers to the possibility that users decide to recommend their friend the online vendor they are visiting (Kim & Kim, 2005).

Table 3 below summarises the links between the indicators and the sub factors which have been discussed above.

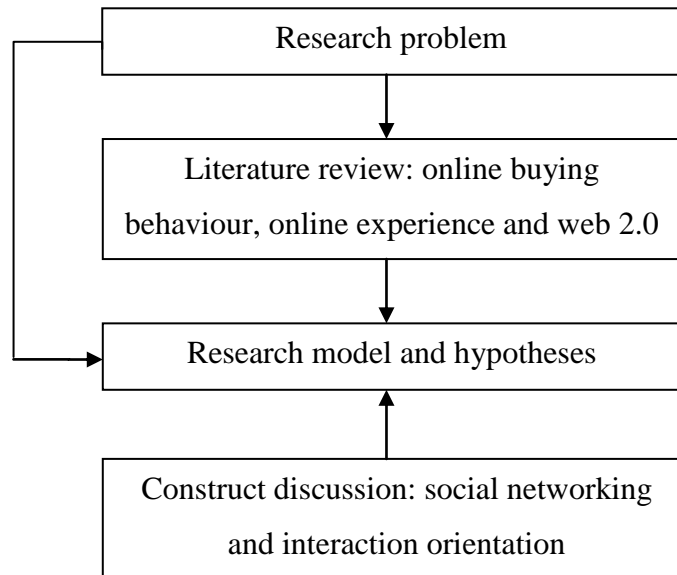
Table 3 – The links between the indicators and the sub-factors

Constructs	Indicators	Link to sub-factors
Social networking	Customer support (S1)	Social trust
	Information sharing (S2)	Virtual word of mouth, social trust, consumer power, social identity
	Product rating (S3)	Virtual word of mouth, social trust, consumer power, social identity
Interaction orientation	Ordering process (I1)	Customer centricity, interaction configuration, cooperative value generation
	Product searching (I2)	Customer centricity, interaction configuration, cooperative value generation
	Interaction (I3)	Customer centricity, interaction configuration, customer response

## 2.6 Chapter conclusion

As summarised in the diagram of Figure 7 below, Chapter 2 first reviews relevant literature topics with reference to the research problem. The literature review resulted in a proposed model hypothesising two causal relationships: social networking influencing on intention to buy and interaction orientation influencing on intention to buy. The two selected Web 2.0 factors are derived from the Web 2.0 factor model developed by Wirtz et al (2010). Each factor itself holds a different set of sub-factors which have been mentioned in sections 2.5.1 and 2.5.2.

Figure 7 – Links between the research problem and the proposed model



## **Chapter 3 Methodology**

### **3.1 Introduction**

Given the proposed model specified in Chapter 2, in order to further examine this model it is essential to clarify the methodology which the study follows. Thus, the main purpose of this chapter is to outline the methodology used in detail, along with justifications why certain research procedures should be taken. In particular, to identify an appropriate research methodology for the study, this chapter first discusses the conventional methods used to test hypotheses regarding the causal structure of prior online consumer behaviour models. It then outlines the research procedures which this study follows. The rest of the chapter discusses the scale development procedure including instrument design, and data collection as part of the research procedures.

### **3.2 Justification for the adopted methodology**

Structural equation modelling (SEM) has many appealing characteristics which makes it particularly appropriate for the present research. First, it takes a confirmatory instead of an exploratory approach to data analysis, which makes it fit quite well with hypothesis testing. In contrast, most other multivariate techniques are typically exploratory (e.g., exploratory factor analysis) (Byrne, 2010). Second, since SEM is able to provide explicit estimates of the error variance parameters, it can handle measurement error problem much better than traditional multivariate procedures (e.g., those using regression) which tend to assume errors in the explanatory variables vanish. Finally, while the traditional methods tend to utilise observed measurements only, SEM allows researchers to incorporate both unobserved and observed variables which is the case of the research model shown in Figure 6. For all these reasons, it is sensible to choose SEM as a preferred data analysis method for testing hypotheses in this research model.

A review of similar studies on online consumer behaviour (see Table 4) also shows that SEM is a favourable method for analysing online behavioural models involving structural relationships. For instance, Saeed and Sinnappan (2010) used SEM to test the causal relationships existing in a studied model comprising four constructs (perceived usefulness, perceived ease-of-use, perceived media richness and behavioural intention). More complicated models including more than seven constructs (e.g., Gefen et al., 2003; Ranganathan & Jha, 2007; Pavlou et al., 2007) were also tested by using SEM analysis.

Table 4 – A review of methodology from similar studies on online consumer behaviour

Authors	Instrument	Subjects	Procedure	Analytical techniques	Software package
Constantinides & Geurts (2005)	Experimental survey, five-point scale	85 students including undergraduates, PhD students and post-doctoral researchers	Subjects are given a hypothetical scenario assuming that they are interested to find and buy the new camera in the Internet. They are free to search and buy from any online shop as long as they can identify three online shops: the one they decide to buy from, a second one as the second best choice and the third one which they are unlikely to make the purchase. For each online shop, they have to complete a separate set of 25 questions regarding their perceptions as to the performance of each website.	Regression	n/a
Delafrooz et al. (2009)	Questionnaire survey, five-point scales	500 randomly-selected students get invitation but approximately 405 willing to participate in data collection and only 370 usable for data analysis	A self-administered questionnaire is distributed to subjects.	Pearson correlation and multiple regression	n/a



Table 4 – A review of methodology from similar studies on online consumer behaviour (continued)

Authors	Instrument	Subjects	Procedure	Analytical techniques	Software package
Ranganathan & Jha (2007)	Questionnaire survey, seven-point scale	409 individuals found in public places like malls, computer shops and electronic stores are administered the survey. Only 214 responses with recent prior online shopping experience are considered for analysis	Subjects are requested to rate the level of their agreement with the items in relation to their online shopping experience. They are also asked to complete questions about their online shopping intention and some demographic questions including their Internet and online shopping experience.	SEM	AMOS
Alam et al. (2008)	Questionnaire survey, six-point Likert scales	3 academic experts involved in the pre-test, and 550 undergraduates participating in the main data collection; but only 496 responses are usable for data analysis	Subjects are required to complete the questionnaire consisting of three parts. The first part consists of questions about their Internet usage habits. The second part is about questions measuring all the variables including two questions used to measure the online shopping. The last part asks about demographic characteristics of the subjects.	Regression and ANOVA	n/a
Jarvenpaa et al. (2000)	Experiential survey, seven-point Likert scales	184 undergraduate and MBA students	After completing demographic questionnaire, they are asked to visit seven ecommerce websites and complete a multi-item scale	SEM	AMOS

Table 4 – A review of methodology from similar studies on online consumer behaviour (continued)

Authors	Instrument	Subjects	Procedure	Analytical techniques	Software package
Saeed & Sinnappan (2010)	Online survey	122 valid responses obtained from academic-centric participants who have been involved in educational activities using blogs, podcasts and Second Life.	Subjects are invited to participate in the survey using a number of possible venues including educators and researchers mailing lists, personal invitations to educational groups and advertising within Second Life.	SEM	PLS
Pavlou et al. (2007)	2 separate online surveys – one for online book purchasing, the other for online prescription filling ; five-point Likert scales	From a list of 1000 online purchased customers, 268 responses for the survey for book and 253 responses for the survey for prescription filling	Subjects get invited by email asking to visit relevant commercial websites for both studies. They are asked to find and buy a particular book or a prescription drug respectively. After a month, they get in touch to follow up their actual purchases.	SEM	PLS
Gefen et al. (2003)	Questionnaire survey, seven-point Likert scales	72 undergraduate students involved in the pre-test, and 172 undergraduates and 41 graduate students participating in the main data collection	Subjects are required to complete the questionnaire based on their prior shopping experience at online book/CD vendor. Responses from those who have purchased in the Internet are excluded	SEM	LISREL

Table 4 – A review of methodology from similar studies on online consumer behaviour (continued)

Authors	Instrument	Subjects	Procedure	Analytical techniques	Software package
Ha & Stoel (2009)	Pretest: Online survey: 40 eTailQ items, seven-point Likert scales	120 undergraduate students participating in data collection	Subjects are requested to complete the questionnaire consisting of four parts: e-shopping experience, e-shopping quality, TAM variables of trust, shopping enjoyment, ease of use, usefulness, attitude towards e-shopping and intention to use-shopping; and demographic information.	EFA and CFA	AMOS
	Main survey: Online survey	2500 students are randomly contacted but only 385 students participating in data collection and 298 responses are usable for data analysis	Subjects are randomly invited to participate through email containing the survey URL. Two follow-up reminders are emailed at five-day intervals. Subjects are asked questions using measurements refined from the pretest	SEM	AMOS
Shen & Eder (2009)	Online survey, seven-point Likert scales	64 undergraduate business students participating in the main data collection, but only 46 usable for data analysis	Subjects are given an assignment asking them to explore a specific social shopping site under assumption that they have money and want to buy something online. They are then expected to write up and submit a short essay reflecting on this website. Next, they are asked to conduct an online survey	SEM	SmartPLS

Table 4 – A review of methodology from similar studies on online consumer behaviour (continued)

Authors	Instrument	Subjects	Procedure	Analytical techniques	Software package
Cheung & Lee (2008)	Experimental online survey, seven-point Likert scales  A real watch selling website  www.easywatch.com  A custom-created online customer discussion forum website	93 undergraduate and 57 postgraduate students participating in data collection	Subjects are given a hypothetical scenario and asked to visit a real watch selling website. Subjects are divided into the three experimental groups. The first group or the control group is asked to view the website for about 15 minutes before completing an online questionnaire. The two treatment groups are asked view the watch website while logging and browsing through an online consumer discussion forum consisting of customer reviews (positive reviews for the treatment group 1 and negative review for the treatment group 2) for 10 minutes, before completing the online questionnaire	SEM	PLS

A closer examination of the research approach taken in the studies shown in Table 4 also reveals that most of studies follow the positivist paradigm where research model and hypotheses are developed from literature review, followed by scale development procedure including instrument design so that data can be collected and then analysed by SEM. I espouse the approach. This means that the extensive literature review is to be completed first and the model is then developed with its associated hypotheses. Next, the model constructs need to be operationalised by identifying appropriate scaled items so that the constructs can be measured. When constructs are defined with its associated measurable variables, the survey instrument is then developed for data collection following by data analysis. Figure 8 below shows the step-by-step research procedures which are used in this study.

Figure 8 – Research procedures



Up to this point, the literature review has been discussed and the research model has been specified with its associated hypotheses (see Chapter 2). With respect to the research procedures, scale development procedure and data collection are subsequently presented.

### 3.3 Scale development procedure

Conventionally, there are three critical issues existing in the scale development procedure used for building models: content validity, reliability and construct validity (Churchill, 1979; Bagozzi & Philips, 1982; Boudreau et al., 2001). Content validity examines the degree to which the items represent the constructs in a given model (Nunnally & Bernstein, 1994). Reliability refers to how consistently the items compose a scale (Hair, Anderson, Tatham, & Black, 1998). Construct validity, a set of quantitative measures of the scale including convergent, discriminant, and predictive validity (Bagozzi, 1980; Boudreau et al., 2001), indicates how accurately the scale measures the model construct (Hair et al., 1998).

In particular, content validity is built through two steps. First, a number of relevant items are drawn from the literature review to operationalise the model constructs. In the case of lacking relevant items, new scale items have been developed. Second, all the

proposed items have been pre-tested by a scholar who is considered to be expert in the field. This is to validate the instrument and minimise the ambiguity and misunderstanding which may be caused by the use of words. The reliability is tested by examining the reliability coefficient alpha (or Cronbach's alpha). The construct validity is established via confirmatory factor analysis.

### **3.3.1 Instrument design**

Given a set of relevant indicators (S1, S2, S3, I1, I2, I3, IB1, IB2) drawn from the literature, the result of operationalising individual model construct presented in Table 5 includes these indicators in relation to its associated construct and equivalent survey item. These indicators are gleaned from either a number of prior studies or new scale development. Each indicator's survey item is measured on five-point Likert scale. The full research model including the constructs and their associated set of indicators is presented in the Figure 6.

Table 5 shows how the indicators have been operationalised. Thus, the survey design (shown in Appendix 1) is divided into two parts. The first part includes questions about basic demographic characteristics (e.g., age, gender, etc.) and questions about the participants' experience in using the Internet for online purchase and their frequency of online shopping. The quantitative data collected from this part is used for descriptive analysis. The second part of the questionnaire first presents respondents with a hypothetical scenario assuming that they are interested to buy a 16GB USB. The participants are then asked to start purchasing the product by visiting an existing New Zealand online vendor whose website address is provided on the survey. This activity is accompanied by instructions indicating that the ordering procedure must be interrupted before proceeding to confirm the purchase to minimise the risk of unintentional purchase, which could only be completed if participants intentionally enter their valid credit card details and hit the submit button. After this exercise, participants are asked to complete the rest of questionnaire items adapted from Table 5. Specifically, the questionnaire requested the respondents to rate the level of their agreement with the items in relation to their online shopping experience provided by the online vendor. The respondents rated each item on a scale of 1 to 5, where 1 represented strongly disagree, and 5 represented strongly agree.

Table 5 – Operationalisation result of studied constructs

Construct	Name	Survey Item	Supporting Literature
Social networking (S)	Customer support (S1)	The site provides excellent customer support (e.g., FAQs, support information and contact details).	Shen & Eder(2011)
	Information sharing (S2)	It is easy to share the product information I am looking for with friends.	New Scale
	Product rating (S3)	The site's product rating is helpful.	New Scale
Interaction orientation (I)	Ordering process (I1)	The site's ordering process is clear and understandable.	Gefen et al.(2003)
	Product searching (I2)	It is easy to find the product I am looking for in this online shop.	Lorenzo et al.(2009)
	Interaction (I3)	The website is user-friendly, quick and easy to interact with.	Gefen et al.(2003); Pavlou (2003); Venkatesh & Davis (2000)
Intention to buy (IB)	Likely to purchase (IB1)	Based on the shopping experience provided by the website, how likely would you be to purchase the product from this online vendor?	Gefen & Straub (2000); Taylor & Todd (1995); Hassanein & Head (2006); Kim & Kim(2005) ; Pavlou (2003)
	Likely to recommend (IB2)	Based on the shopping experience provided by the website, how likely would you recommend this online vendor to your friends?	Kim & Kim (2005)

### **3.4 Data collection**

Given research procedures outlined in Figure 8, this section focuses on discussing data collection procedure. In particular, it first provides justification for using anonymous paper-based survey as data collection instrument and students as the research subjects. This is then followed by the detailed discussion on the recruitment process and the sample data.

#### **3.4.1 Instrument and subjects**

The use of surveys has been recognised as an appropriate data collection instrument for research dealing with online consumer behaviour (Zhou, Dai & Zhang, 2007). The prepared survey instrument was pre-tested by an AUT lecturer who is considered an expert in the field. This is to validate the instrument and minimise the ambiguity and misunderstanding which may be caused by the use of words or the order of questions.

A review of the similar studies (as shown in Table 4) also indicates that the questionnaires are typically used by prior research through either self-selected mode or experimental design. In addition, the appropriateness of student sample in a web context was also demonstrated by Gallagher, Forster and Parsons (2001) as students are typically younger people who often have better experience with the web (Danaher & Mullarkey, 2003; Sorce, et al., 2005). Hence, the use of students as participants is useful in the particular Web 2.0 context since it is still relatively new medium. A great deal of empirical studies on online consumer behaviour have also used students as their sampling subjects (Bridges & Florsheim, 2008; Elliot & Speck, 2005; Gefen et al., 2003; Jarvenpaa et al., 2000; Lee & Huddleston, 2006). Data was collected through an anonymous paper-based survey distributed among undergraduate and postgraduate AUT students in November 2011.

I decided to choose New Zealand to collect data for the following reasons. First, the increasing number of Internet users in New Zealand provides a bright prospect for e-commerce markets. According to Internet World Stats (March 2011), there were about 3.6 million of Internet users in New Zealand in March 2011, representing 83.9 percent of the population. This was up by 333.7 percent compared to 2000. Hence, there are supposed to be a great number of potential online purchasers who are willing to spend money over the Internet (Shergill & Chen, 2005). Second, while holding a small domestic market, New Zealand is considered as one of the most advanced countries



with high level of technology adoption, compared to the rest of the developed world (Wallace et al., 2001). In particular, the New Zealand retail sector has been regarded as the most rapid adopter of Internet technology (Doolin et al., 2003). Most New Zealand online shops are normally extensions of physical shops – i.e., bricks and mortar – and just a few are online shops only. Last but not least, the survey was conducted at AUT where most students are literate, educated, technologically savvy netizens who are supposed to be well familiar with survey techniques and online shopping.

As explained in section 3.3.1, participants were asked to visit an existing e-commerce website – [www.ascent.co.nz](http://www.ascent.co.nz). This website is owned by Ascent Technology Ltd, a New Zealand owned and operated company selling software and computer-related hardware. The website was selected for three reasons. First, the website has incorporated many of the Web 2.0 characteristics shown in Table 5. For instance, the website enables shoppers to share product information to friends by using its built-in sending email facility or posting information on Twitter, an online social networking service. Along with customer support information, the website also displays the various product ratings (e.g., supplier rating, general rating, delivery rating and after-sales support rating). Secondly, with respect to the risk of unintentional purchase, one could argue that it may be more prudent to use a hypothetical website designed specifically for this research rather than to use one belonging to a real business. However, it is not practical in this research since building such hypothetical website having the all necessary functionalities is likely to require a significant development effort from a technical point of view. Given the limited resources available, using a hypothetical website, therefore, was unrealistic. Furthermore, using a real shopping website is likely to maximise the participants' exposure to an e-commerce environment. I have to disclose that I have no commercial interest or association of any type with this company.

### **3.4.2 Recruitment process**

Participants were recruited by means of advertisements (see Appendix 3) which were placed on the noticeboards at AUT campuses in November 2011 to invite students to participate in this survey. Their participation was on a voluntary basis and completely anonymous. The survey was conducted at either the open labs or computer-based classrooms where students could visit an online store as parts of the survey requirements. The students were offered incentives in the form of a gift voucher valued at \$200 to be raffled among the participants. Regarding the value of this incentive, it is

considered not only meeting the research budget constraints but also sufficient to motivate participation while not so excessive that participants may make up the responses just to get the incentive.

The students who wanted to take part in the research study were given a survey form (see Appendix 1), along with the Participant Information Sheet (see Appendix 2) containing brief information about this research project. Since an anonymous questionnaire is the only involved research instrument, to obtain consent of participants, the following statement was included at the top of the questionnaire: “Completion of this questionnaire will be taken as indicating your consent to participate”. When participants finish the survey, they could fill out their email address on a separated form to enter into the draw if they wished. The only information collected from participants was hence their email address, which was used for prize draw purpose only. To assure anonymity, the email address was collected in a way that it was not possible to find out its connected answered survey. The anonymous collection was possible by using two separated boxes placed outside the open labs/computer-based classrooms – one box for participants’ completed survey and the other for their email address form.

### **3.4.3 Sample data**

According to Stevens (1996), it is advisable to have 15 cases per predictor in standard least squares multiple regression analysis. As SEM is a combination of factor analysis and multiple regression, the recommendation of 15 cases per measured variable should be still applicable in SEM. In addition, Bentler and Chou (1987) suggest a minimum of five cases per parameter estimate (instead of per measured variable). Since a measured variable typically has at least one associated path coefficient together with its error term or variance estimate, their suggestion does support the minimum of 15 cases per measured variable. A more general advice from Loehlin (1992) is that SEM model with two to four factors should be planned to have at least 100 cases or even better with 200 if possible.

With a smaller sample size, SEM analysis is likely to meet various problems including more convergence failures, negative error variance estimates for measured variables and lowered accuracy of parameter estimates (Kline, 2011). When data are not normally distributed, missing or invalid in some ways, larger sample size is typically required. Hence the researcher should go beyond these minimum sample recommendations (Garson, 2011). The research model presents two exogenous factors (i.e., social

networking and interaction orientation) and one endogenous factor (i.e., intention to buy). Since the research model consists of three factors associated with eight different indicators in total, the sample size between 120 and 200 should be ideal.

A total of 173 responses were obtained. A closer review of sample data reveals one invalid questionnaire and five with missing data, occupying only 3.5 percent of the total collected data. According to Roth (1994), if the proportion of case with missing data is five percent or less, listwise deletion may be acceptable. In addition, the incomplete data appeared to be completely random which meets the underlying condition in using listwise deletion method (Arbuckle, 1996; Brown, 1994). Given all these characteristics, the incomplete responses can be ignored and their loss resulting from listwise deletion should not a problem in data analysis. Therefore, listwise deletion method was applied for handling missing or invalid data, leaving only 167 valid responses, which is still sufficient to carry SEM analysis. The next step was to code survey data so that it could be stored electronically (SPSS format in this study). The data was then to be inspected and analysed by SPSS 18.0 program and AMOS 18.0, a software package for performing SEM.

### **3.5 Chapter conclusion**

Through a review of similar research on online consumer behaviour, Chapter 3 has provided justifications for choosing SEM as an appropriate data analysis method. The step-by-step research procedures (shown in Figure 8) have been outlined, providing a clear path which the research process follows. A discussion on scale development procedure has been provided, along with an explanation on the instrument has been designed. The chapter also covers data collection procedure including justifications for using survey instrument and student subjects along with discussion on the recruitment process and the ideal sample size. Data collection resulted in a total of 167 valid responses which will be examined in the next chapter.

## **Chapter 4 Findings**

### **4.1 Introduction**

Given the research methodology specified in Chapter 3, this chapter presents the data analysis, which is also the last step of the research procedures (see Figure 8). The purpose of this chapter is to seek answers for the two research questions put forward in Chapter 1 by testing the two hypotheses specified in Chapter 2. As part of the data analysis process, this chapter firstly examines the sample data before applying structural equation modelling method to analyse data. In particular, descriptive statistics of demographics and shopping frequencies of participants on online shopping are evaluated, followed by identification of any possible outliers. The sample data is then examined for normal distribution and the reliability test is also carried to ensure the internal consistency between the indicators and their associated constructs. Next, the descriptive information is included to cover the demographics and shopping frequencies of participants on online shopping. Finally, the core structural equation modelling techniques using AMOS software are presented to assess the extent to which the proposed model fits data.

### **4.2 Data examination**

Like any statistical method, SEM features a number of assumptions which should be met or at least approximated to ensure trustworthy results (Kline, 2011). Given 167 questionnaires deemed valid for data analysis, this section hence further examines the extent to which data meet these assumptions. In particular, the following data issues are examined: outliers, data normality and reliability.

#### **4.2.1 Demographics and shopping frequencies of participants on online shopping**

The table 6 shows the descriptive statistics of demographics and shopping frequencies. Given the total of 167 valid responses, the gender distribution among the participants is relatively equal with 87 males and 80 females. In addition, the majority of them (79.0%) are young, with the age between 18 and 25. A large percentage of participants (69.5%) have made a purchase on the Internet during the last twelve months; 44 participants (26.3%) have not and only seven (4.2%) simply do not remember whether they have made any online purchase or not. Regarding the extent to which the participants have

sought for online product during the last six months, the majority (13.2 % always, 28.7% often and 37.7% sometimes) are keen on seeking product online and only a few have paid less interest – 7.2% never and 13.2% seldom. Overall the participant descriptive statistics shows that the majority of participants are young Internet users who have experience in online shopping.

Table 6 – Participant descriptive statistics

		Frequency	Percent
Gender	Male	87	52.1
	Female	80	47.9
Age	18-25	132	79.0
	26-30	20	12.0
	31-40	14	8.4
	41-50	1	0.6
Have you bought anything on the Internet during the last 12 months?	Yes	116	69.5
	No	44	26.3
	I don't remember	7	4.2
Have you visited an online shopping website during the last six months to find the products you want to buy?	Never	12	7.2
	Seldom	22	13.2
	Sometimes	63	37.7
	Often	48	28.7
	Always	22	13.2

#### 4.2.2 Identification of outliers

Outliers are considered as cases whose scores are unusually high or low compared to all the others in a particular set of data (Byrne, 2010). A common method used in detecting outliers is the computation of the squared Mahalanobis distance ( $D^2$ ) for each case. Appendix 4 reports the result of outlier statistics in decreasing ranking order of  $D^2$  value. The result shows that there are no outlying cases whose  $D^2$  value standing distinctively apart from all the other  $D^2$  value. In addition, the gaps in  $D^2$  value among these cases are considered similar and relatively small. For example, the gap in  $D^2$  value between the furthest case from the centroid (case #105,  $D^2= 27.002$ ) and the second

case (case #54,  $D^2=26.404$ ) is 0.598, which is not a big difference compared to the other gaps. Given the same justification for the other gaps, the result presented in the Appendix 4 shows minimal evidence of serious multivariate outliers.

#### 4.2.3 Data normality check

A multivariate normal distribution is an important assumption when conducting SEM analysis in general and in the use of Amos in particular (Arbuckle, 2007). Thus, it is essential to check whether the data are multivariate normal before conducting SEM. The assessment of multivariate normality often deals with the issues related to skewness and kurtosis. The Table 7 presents skewness and kurtosis of each observable.

Table 7 – Assessment of normality (Group number 1)

Variable	min	max	skew	c.r.	kurtosis	c.r.
I1	1.000	5.000	-.481	-2.538	-.022	-.059
I2	1.000	5.000	-.664	-3.505	.129	.340
I3	1.000	5.000	-.680	-3.586	.543	1.431
IB1	1.000	5.000	-.653	-3.444	.894	2.357
IB2	1.000	5.000	-.323	-1.707	.521	1.375
S1	1.000	5.000	-.263	-1.387	-.134	-.353
S2	1.000	5.000	-.345	-1.819	-.167	-.439
S3	1.000	5.000	-.231	-1.221	-.155	-.410
Multivariate					10.451	5.339

As shown, the positive values of univariate kurtosis range from 0.129 to 0.894 and the negative values range from -0.022 to -0.167. According to West et al. (1995), no items here are substantially kurtotic since their univariate kurtosis value is less than 0.7. However, they do note that the multivariate distribution can still be multivariate nonnormal regardless of whether the distribution of observed variables is univariate normal. As a result, an investigation into the index of multivariate kurtosis and its critical ratio is required. According to the Table 7, Mardia's (1970) normalised estimate of multivariate kurtosis value is found to be 10.451. This significant positive value provides evidence that data are certainly multivariate nonnormal. In addition, its

equivalent critical ratio of 5.339 (in excess of 5.00) is also suggestive of nonnormality in the sample (Bentler, 2005).

One common approach to handling nonnormality is to use bootstrapping technique (West et al., 1995; Byrne, 2010). The basic principle underlying the bootstrap procedure is its ability to generate multiple subsamples from original sample so that parameter distribution relative to each of these spawned samples can be examined (Bollen & Long, 1993). This enables researchers to assess the stability of parameter estimates and report their values with a greater degree of accuracy (Byrne, 2010). In addition, the bootstrap sampling distribution is also rendered without assumptions of normality (Zhu, 1997), making it an ideal method for dealing with nonnormal data. Therefore, in the next step, the SEM procedures are carried with the support of bootstrapping as an aid to nonnormal data (for an extensive discussion of the bootstrap procedure, please refer to Byrne, 2010; Bollen & Long, 1993)

#### 4.2.4 Reliability test

Reliability test provides an indication of internal reliability of indicators used to measure constructs. In other words, it assesses how highly interrelated the indicators are used together to measure their associated construct (Hair et al., 2009). Given the recommended Cronbach's alpha greater than 0.7 (Kline, 2011), Table 8 shows acceptable reliability, with the highest coefficient alpha of 0.837 for intention to buy and 0.718, 0.702 for social networking and interaction orientation respectively.

Table 8 – Reliability of measurement items (N=167)

Construct	Item	Item code	$\alpha$
Social networking	Customer support	S1	0.718
	Information sharing	S2	
	Product rating	S3	
Interaction orientation	Ordering process	I1	0.702
	Product searching	I2	
	Interaction	I3	
Intention to buy	Likely to purchase	IB1	0.837
	Likely to recommend	IB2	

### **4.3 Structural equation modelling**

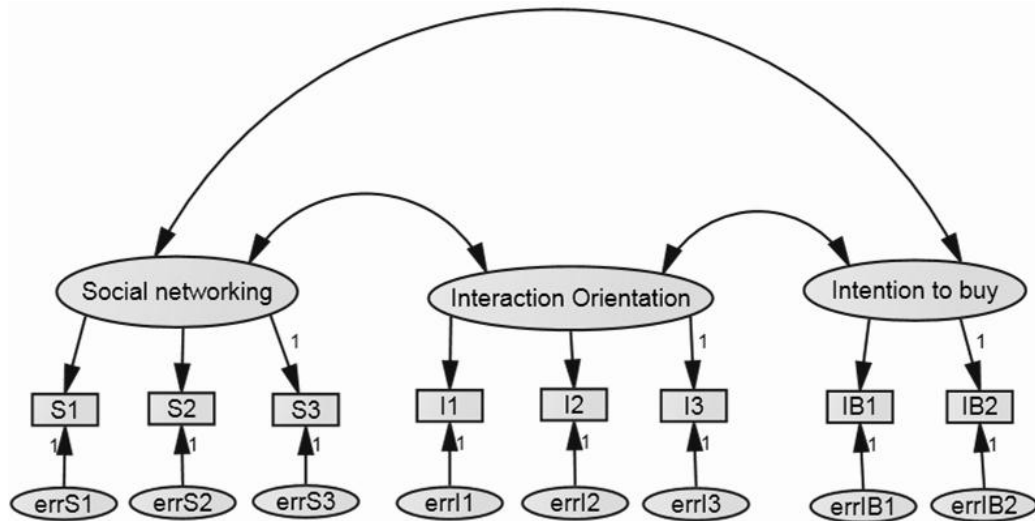
In general, a SEM model is comprised of two submodels: a measurement model and a structural model (Byrne, 2010). While the measurement model defines relationships between the observed variables and the latent constructs, the structural model presents the relationships among the latent constructs. Given the full research model shown in Figure 6, its measurement model and structural model are subsequently presented in the section 4.3.1. and 4.3.2. For testing the validity of the proposed structural model, it is critical to test the measurement model before full model evaluation (Byrne, 2001). This two-step SEM process has also been considered as a good practice in the conduct of SEM analysis (Schumacker & Lomax, 2010; Hair et al., 2009). The purpose of this section is therefore twofold. First, confirmatory factor analysis (CFA) procedures are employed to examine the measurement model which includes the observed variables and the latent constructs. This is to test how well the observed variables can measure their associated latent constructs. Second, the causal structure of the proposed model is examined to assess the extent to which these latent constructed are related.

#### **4.3.1 Confirmatory factor analysis (CFA)**

A visual diagram depicting the measurement model (or CFA model) is shown in Figure 9. The model presents eight observed variables –i.e., S1, S2, S3, I1, I2, I3, IB1 and IB2- and three latent constructs –i.e., Social networking, Interaction orientation and Intention to buy. For the purpose of CFA, all constructs are allowed to correlate with all other constructs while the measured variables are allowed to load on only one construct each and the error terms (Byrne, 2010) – i.e., errS1, errS2, errS3, errI1, errI2, errI3, errIB1 and errIB2 are not allowed to relate to any other observed variables. For the sake of model identification, the 1's were assigned to selected arrows by Amos program (Byrne, 2010).



Figure 9 – Measurement model (CFA model) modelling in Amos



Given the data violated the assumption of multivariate normality, model fit was first assessed using the Bollen-Stine bootstrap method (Bollen & Stine, 1992), along with the traditional indices of overall fit including the root mean square error of approximation (RMSEA), normal fit index (NFI), comparative fit index (CFI), goodness-of-fit index (GFI), and adjusted goodness-of-fit-index (AGFI). P-values and confidence intervals were estimated using bias-corrected methods. In place of the usual maximum likelihood based p-value, the Bollen-Stine p-value was performed to assess overall model fit. Given 2000 bootstrap replications from AMOS, the Bollen-Stine statistics finds that the model fit worse than expected in 248 of the 2000 samples, or  $248/2000 = 0.124$ , which is the obtained p-value of overall model fit. The measurement model hence fits data well with a conventional significant level of .05. In addition, fit indices of the model reported in the Table 9 below indicate that the model provides a good fit to the data. In particular, the NFI, CFI, GFI are greater than 0.96 and RMSEA is significantly lower than 0.08. The bootstrap procedure results in a Chi-square statistic of 26.747 with 17 degrees of freedom and a probability value greater than 0.05, indicating the model has an adequate fit. Therefore, given the Bollen-Stine bootstrap result and the satisfactory fit indices in relation to our simple model with a small sample (n=167), the measurement model fits data reasonably well.

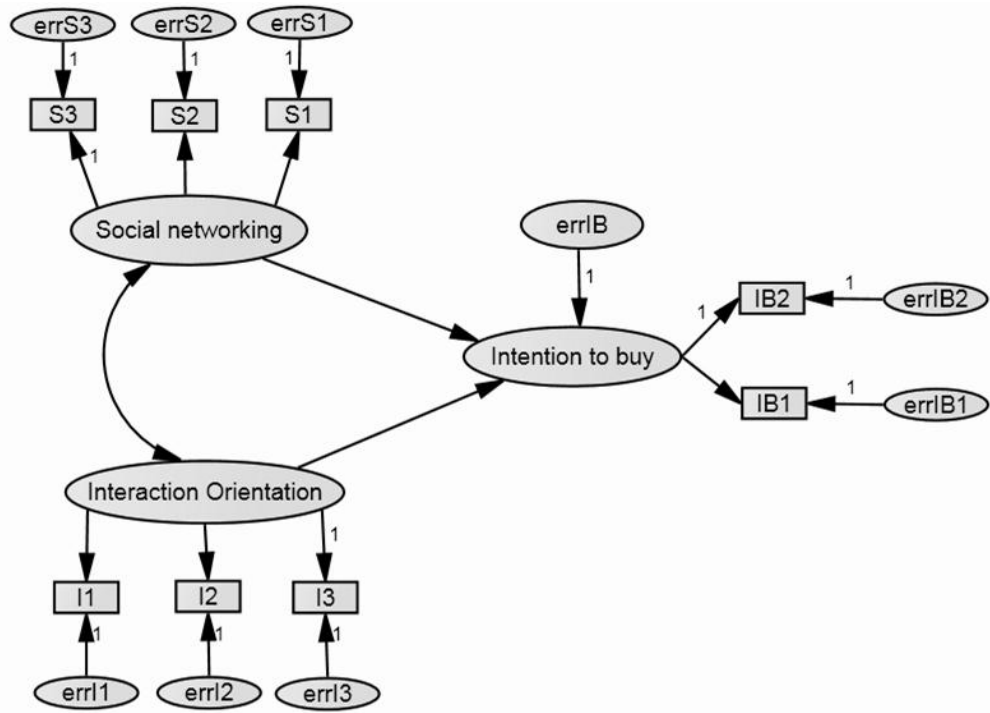
Table 9 – Selected goodness of fit statistics: AMOS output (n=167) and recommended guidelines

Fit Index	Bootstrapping test	Guidelines
RMSEA	0.059	<0.08
NFI	0.963	>0.90
CFI	0.986	>0.90
GFI	0.960	>0.90
AGFI	0.915	>0.90

#### 4.3.2 Structural model testing

Figure 10 shows the structural model. For the purpose of testing the structural model in AMOS, it is important to note that the double-headed arrow between the social networking and interaction orientation factors were added to the original hypothesised model (shown in Figure 6), representing correlation among them. This is the requirement in AMOS for the exogenous constructs which have not specified their causal relationship. In fact, lacking of specifying the double-head arrow between these factors will lead AMOS to raise a related error message (Byrne, 2010). Based on Lee-Hershberger replacing rules (Hershberger, 1994), the structural model in this case is considered as an equivalent model of CFA model. In fact, they statistically have the same fitted variance-covariance matrix, chi-square values, degree of freedom and fit indices. Hence, the structural model should fit data as well as the CFA model does.

Figure 10 – Structural model modelling in Amos



However, a review of the estimates from the bootstrap procedure (shown in Table 10) shows social networking does not affect intention to buy ( $P=0.562$ , C.R.  $< 1.96$ ) while interaction orientation has significant impact on intention to buy ( $P=0.022$ , C.R.  $> 1.96$ ). As a result, the proposed structural model is not supported.

Table 10 – AMOS text output for bootstrapped samples: maximum likelihood estimates

	Estimate	S.E.	C.R.	P	Label
IB ← Social networking	.233	.402	.580	.562	par_6
IB ← Interaction orientation	.795	.346	2.297	.022	par_8
IB2 ← Intention to buy	1.000				
IB1 ← Intention to buy	1.018	.071	14.418	***	par_1
I3 ← Interaction orientation	1.000				
I2 ← Interaction orientation	.902	.106	8.490	***	par_2
I1 ← Interaction orientation	.919	.107	8.550	***	par_3
S1 ← Social networking	1.081	.124	8.732	***	par_4
S2 ← Social networking	.982	.133	7.390	***	par_5
S3 ← Social networking	1.000				

In addition, by comparing the correlational relationships from CFA model with the structural relationship (see Table 11), a significant estimate of correlational relationship between social networking and interaction orientation is found. This suggests that model improvement might be possible with the addition of a causal relationship between social networking and interaction orientation.

Table 11 – Comparison of structural relationships with CFA correlational relationships.

Structural model		CFA model	
Structural relationship	Standardized parameter estimate	Comparable correlational relationship	Standardised parameter estimate
H1: S → IB	0.212	S correlated IB	1.032
H2: I → IB	0.889	I correlated IB	1.084
S correlated I	0.923	S correlated I	0.923
Note: S= Social networking; I=Interaction orientation; IB=Intention to buy			

A closer examination of the relevant extant literature also reveals the possible relationship between social networking and interaction orientation. According to the social exchange theory (Thibaut & Kelly, 1959), people interact with others if they have good reasons for it. The social networking factor including its sub-factors – social identity, social trust, virtual word of mouth, consumer power – holds many reasons for being able to encourage people to interact more on the Internet in general and on e-commerce websites in particular. First, through the use of social identity as an online image, social networking reinforces a sense of belonging among users in a way that the benefits of mutual engagement can be realised so that users are keen to interact and their unique identity in turn is developed. Second, websites with a high level of social trust are likely to attract a great deal of user involvement. According to Mutz (2005), social trust plays an important role in reducing the transaction costs in interacting with others. Using an experimental design embedded in a national survey, she further suggests that the level of generalised social trust will have a significant influence on the level of user interaction with e-commerce websites. Although an e-commerce website typically involves no actual interaction with other people, social trust can be built through social presence which can be embedded in a website (Gefen & Straub, 2004). In particular, a form of social identity (e.g., photo of people, welcoming customer by name, subsequent personalised email communication, among others) has a great contribution to social

presence which in turn can enhance not only social trust but also user engagement. Third, given the virtual word-of-mouth diffusion, the benefit of sharing peer information or user-generated content has been realised. This can act as incentives for user to continue the interaction either sharing their own social content or seeking other peers' opinion. Lastly, the enhancement of consumer power through the social networking platform has made individual user increasingly become a key driver in commercial and social force. Users are offered more effective tools to interact on the web, regardless of whether they seek for product information or share their opinion to public. In addition to holding such many reasons, the sub-factors also have close links to the indicators measuring social networking construct, which is explained in section 2.5.3. Therefore, it is possible to argue that social networking has positive influence on interaction orientation.

As a result, adding the causal relationship from social networking to interaction orientation could reasonably improve the model fit. Therefore, the best alternative model in this case is supposed to have social networking affecting intention to buy through interaction orientation. Given this theoretical justification, I feel confident that I can proceed further in analysing whether an alternative model (i.e., one that hypothesises that social networking influences positively interaction orientation) provides an improvement in the model fit. This empirical examination is conducted in the next section.

#### **4.3.3 Model respecification**

Figure 11 presents schematically the diagram of the alternative model where social networking affects intention to buy through interaction orientation. The bootstrap procedure is performed, along with goodness-of-fit measures examination to verify the alternative model fit. The bootstrap procedure results in a Chi-square statistic of 26.956 with 18 degrees of freedom ( $p > 0.05$ ). Table 12 shows the comparison of the selected model fit statistics (i.e., RMSEA, NFI, CFI, GFI and AGFI) between the original model and the alternative model. As shown, all the model fit statistics of the alternative model not only meet the recommended standard value but also imply a better model fit. In particular, while its NFI and GFI are similar to the values of the original model, its RMSEA is smaller and the CFI, AGFI are bigger. Thus, given the reported fit indices within the criteria for goodness-of-fit, the alternative model fits the data marginally better the original model does.

Figure 11 – The alternative model

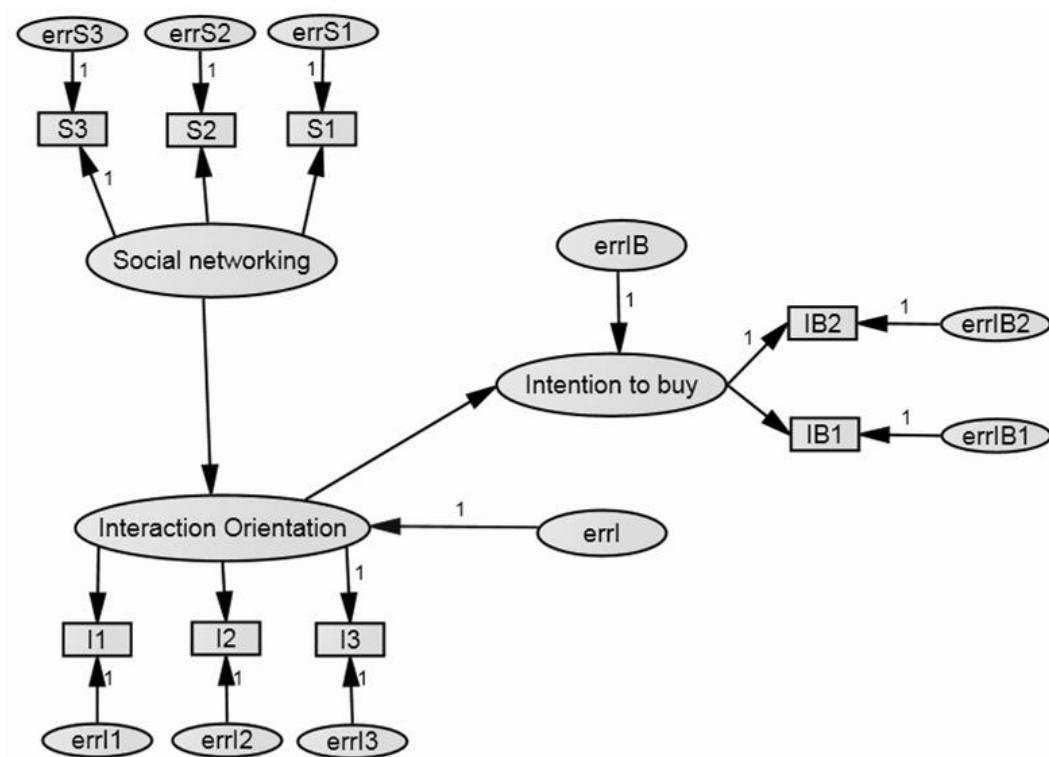


Table 12 – Comparison of selected goodness of fit statistics between the original model and the alternative model: AMOS output (n=167) and recommended guidelines

Fit Index	Original model	Alternative model	Guidelines
RMSEA	0.059	0.055	<0.08
NFI	0.963	0.963	>0.90
CFI	0.986	0.987	>0.90
GFI	0.960	0.960	>0.90
AGFI	0.915	0.920	>0.90

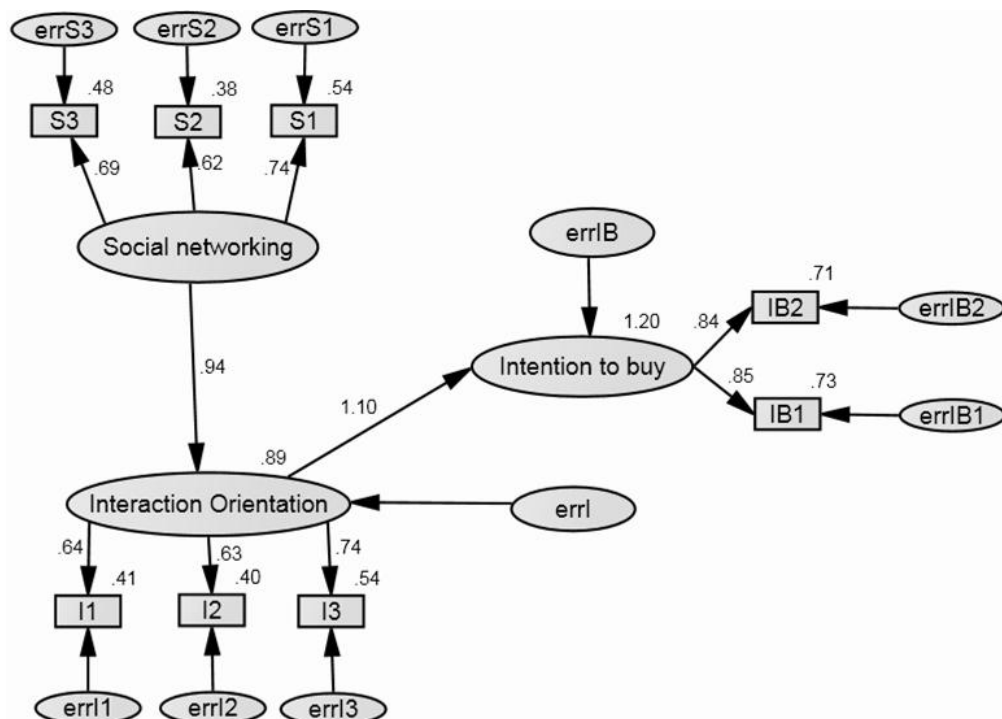
A review of the estimates from the bootstrapping procedure (based on the maximum likelihood estimates) in Table 13 below also demonstrates that interaction orientation greatly mediates social networking to intention to buy. In particular, social networking significantly affects interaction orientation ( $P=.000$ ) and interaction orientation exerts a significant impact on intention to buy ( $P=.000$ ). The estimates for the casual paths of the model are presented schematically in the Figure 12 below. As shown in Figure 12, the social networking exerts a significant indirect effect on intention to buy via interaction

orientation; the estimate for the indirect causal path from social networking (0.94 x 1.10) equals to 1.038. As a result, this alternative model is considered as the superior model and confirms that social networking affects intention to buy through interaction orientation.

Table 13 – AMOS text output for bootstrapped samples: maximum likelihood estimates

			Estimate	S.E.	C.R.	P	Label
I	<---	S	1.148	.148	7.761	***	par_6
IB	<---	I	.992	.086	11.517	***	par_7
IB2	<---	IB	1.000				
IB1	<---	IB	1.019	.071	14.420	***	par_1
I3	<---	I	1.000				
I2	<---	I	.904	.108	8.395	***	par_2
I1	<---	I	.924	.108	8.534	***	par_3
S1	<---	S	1.085	.124	8.741	***	par_4
S2	<---	S	.985	.133	7.395	***	par_5
S3	<---	S	1.000				

Figure 12 – AMOS graphic output for the hypothesised model: path coefficients (standard errors)



#### **4.4 Conclusion**

Based on the conventional two-step approach in SEM, data analysis has been carried for the purpose of testing the two hypotheses mentioned in Chapter 2, from data examination to SEM model testing. The data examination procedures first applied listwise deletion for handling missing/invalid data, resulting only 167 data items deemed valid for data analysis. While there is no compelling evidence of serious multivariate outliers, a multivariate non-normal distribution has been detected, leading the bootstrap procedures to be applied along with SEM model testing. Based on the criteria for goodness-of-fit indexes, the reported fit indices (e.g., RMSEA, NFI, CFI, GFI and AGFI) indicate that both CFA and structural models generally fits the data. However, a closer examination on the estimates resulting from the bootstrap procedure reveals that social networking does not affect intention to buy while the interaction orientation does have a positive influence on the intention to buy. This hence proves that the original SEM model is not supported by the evidence, leading the model to be re-specified with aim to seek the best possible alternative model. Given the theoretical support and the empirical testing result, the model re-specification has confirmed the alternative model, whose social networking affects intention to buy through interaction orientation, explains better the nature of the relationship between these constructs.



## Chapter 5 Conclusions

### 5.1 Introduction

Given the research problem and research questions explained in Chapter 1, the research model and hypotheses have been developed based on literature review in Chapter 2. Adopting the research methodology described in Chapter 3, data analysis was conducted in Chapter 4 in an attempt to examine the extent to which social networking and interaction orientation influence on purchase intention. In particular, the research model has been examined and the hypotheses have been tested, leading to the respecified model. Based on these findings in Chapter 4, this final chapter first seek to provide the answers to the research questions. Implications for theory and practice are then discussed as an effort to explain in detail the research contributions before providing important directions for future research.

### 5.2 The answers to the research questions

The current study has hypothesised that the social networking and interaction orientation have positive effects on purchase intention. According to the data analysis results in Chapter 4, Table 14 shows the results of this hypothesised relationship.

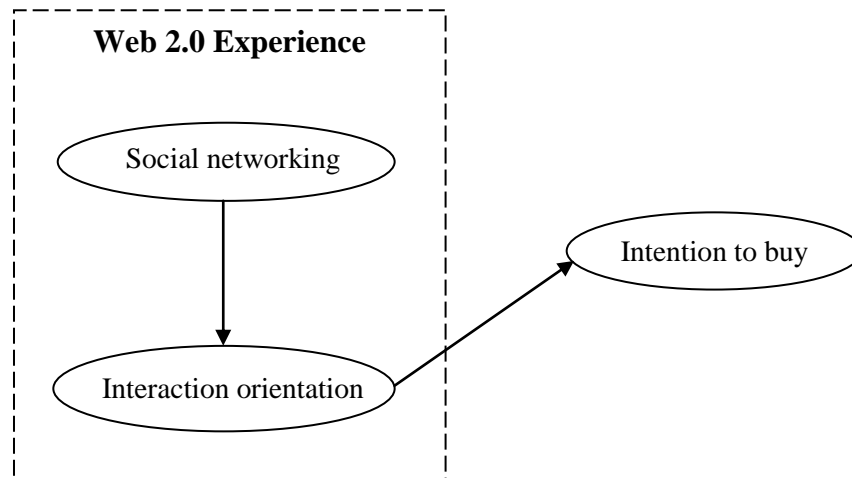
Table 14 – Results of testing hypotheses

Hypotheses	Result
H1: There is a positive relationship between social networking factor and the online consumers' intention to buy.	Not supported
H2: There is a positive relationship between interaction orientation factor and the online consumers' intention to buy.	Supported

Using the two-step SEM approach, some conclusions can be extracted. First, it is confirmed that interaction orientation has direct positive influence on intention to buy, as described by hypothesis H2. However, hypothesis H1 has not been supported. This means social networking does not have direct significant effect on intention to buy. Third, the result of model re-specification provides evidence that interaction orientation significantly mediates social networking on intention to buy. In other words, it is found that social networking affect indirectly intention to buy through interaction orientation. This finding highlights the important role of interaction orientation in online consumer

behaviour and Web 2.0 experience. Figure 13 schematically presents the alternative research model which has been modified based on the result of model respecification.

Figure 13 – The alternative model



### 5.3 Implications for theory and practice

Consistent with the results of prior studies – e.g., Lorenzo et al. (2007); Schaupp & B elanger (2005); Evarard & Galletta (2005); Flavin, Guinaliu, & Gurrea (2006) – in the traditional Web 1.0 context, this study confirms interaction orientation affects purchase intention in the Web 2.0 context. The unexpected finding that social networking affects purchase intention through interaction orientation raises two interesting issues for future research. First, it suggests that future research on online consumer behaviour in the Web 2.0 environment should pay great attention to the role of interaction orientation. Second, the significant effect of social networking on interaction orientation reveals the possibility to enhance purchase intention and interactivity on the website through social networking features, which future research can inspect further regarding this aspect.

In order to deliver the virtual quality that online customer expects today, e-markets and web site designers should understand the important role of Web 2.0 experience. This study, in particular, highlights the importance role of the two Web 2.0 factors – social networking and interaction orientation. Virtual marketers should also recognise the power and function of the available social networking tools and learn how to apply these efficiently in order to enhance website’s interactivity and the customers’ purchase intention. Regarding this aspect, an important question emerging is how these virtual marketers know which social networking tools are relevant to their particular ecommerce site. Based on the research findings and the scale development procedure,

excellent customer support, easy-to-use product information sharing and helpful product rating are typically crucial elements of a social-enabled ecommerce website. In addition, to employ more social networking capability, virtual markets should first determine which aspects of social networking – i.e., social identity, social trust, virtual word mouth, and consumer power – their online stores need to improve. They then can try out to employ a particular social networking tool and test user reactions to that tool.

#### **5.4 Directions for future research**

The scope of the current research is limited to only the two Web 2.0 factors – social networking and interaction orientation. Future research can broaden this scope by examining the full Web 2.0 factor model including the other two factors proposed by Wirtz et al (2010): used-added value and customisation/personalisation. It is interesting to see whether the full examination brings consistent result with regard to the examination of the only two main factors. In addition, the unexpected finding that interaction orientation mediates social networking on purchase intention prompt interesting questions regarding the possible causal linkages among the four Web 2.0 factors in relation to purchase intention.

All the hypotheses have been tested and the result of model respecification has suggested an alternative model suggesting that social networking affects purchase intention through interaction orientation. Although the alternative model has been empirically tested and shows a better model fit compared to the original research model, the results have been interpreted with cautious confidence. In fact, although the suggested relationship between social networking and interaction orientation is sensible, future research should add more relevant theoretical support regarding this relationship and test the respecified model against new sample data for its consistency and generalisability.

With respect to data collection, the demographic statistics reveals that this sample data was restricted to young students in New Zealand with the majority aged between 18 and 25, representing 79% research population. Although there should be less concern for generalisability of the results as most students are technology shoppers familiar with online shopping and Web 2.0 in particular, future research may want to increase the diversity of participants by including different groups in term of age brackets, occupation, exposure to technology, etc. Collecting data in other developing countries

rather than developed countries like New Zealand can also offer interesting insights to this topic.

Since the survey was conducted during the exam period which may potentially cause distracting thoughts affecting students' answer decision. In addition, given a short data collection time frame, the current study offers the respondents a promising high value gift with the aim of getting decent responses. However, busy respondents may provide answers without enough thought for the sake of being in the draw win the valuable gift. While there are only few missing and invalid responses, the valid responses do hold non-normal data distribution. Future data collection procedures should avoid collecting data during the period which may potentially distract respondents. In addition, monetary incentives should not be offered at too high value and a generous timeframe to collect data should be reserved if possible.

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## Appendix 1 – Survey questionnaire

**Research project**  
***Effects of Web 2.0 Experience on  
Consumers' Online Purchase  
Intention: The Social Networking and  
Interaction Orientation Factors***



Completion of this questionnaire will be taken as indicating your consent to participate

### Part A: General Information

1. What is your gender? Please tick one.

Male

Female

Prefer not to disclose

2. What is your age? Please tick one.

18-25

26-30

31-40

41-50

51-60

60+

3. Have you bought anything on the Internet during the last 12 months? Please tick one.

Yes

No

I don't remember

4. Have you visited an online shopping website during the last six months to find the products you want to buy? Please tick one

Never

Seldom

Sometimes

Often

Always

### Part B:

Imagine that you are interested to buy a 16GB USB. Please go to [www.ascent.co.nz](http://www.ascent.co.nz) and take a few minutes to perform the following tasks

1. Please search a 16GB USB. You are free to choose the model yourself and there is also no restriction as to how you search for the product.
2. After you find the USB you would like to buy, please start ordering process until the point that you have to confirm the purchase by giving your credit card number or any other personal information necessary for the payment. **DO NOT ORDER THE PRODUCT: At this point you must interrupt the ordering procedure.**

Please complete the following questions. You are free to visit back to the website if you wish when completing these questions.

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Approved by the Auckland University of Technology Ethics Committee on the 10<sup>th</sup> of October 2011

AUTEC Reference number 11/267

*From question 5 to 10, please specify in the scale of 1 (Fully disagree) to 5 (Fully agree) to what degree the issues mentioned below played an important role in your decision whether or not to buy the product from this online vendor.*

5. The site's ordering process is clear and understandable.

Fully disagree Fully agree  
 1    2    3    4    5

6. The site's product rating is helpful.

Fully disagree Fully agree  
 1    2    3    4    5

7. It is easy to find the product I am looking for in this online shop.

Fully disagree Fully agree  
 1    2    3    4    5

8. It is easy to share the product information I am looking for with friends.

Fully disagree Fully agree  
 1    2    3    4    5

9. The website is user-friendly, quick and easy to interact with.

Fully disagree Fully agree  
 1    2    3    4    5

10. The site provides excellent customer support (e.g., FAQs, support information and contact details)

Fully disagree Fully agree  
 1    2    3    4    5

***Please note that the product price must not be taken into account when completing the question 11 and 12.***

11. Based on the shopping experience provided by the website, how likely would you be to purchase the product from this online vendor? ( please tick one)

Very likely    Likely    Less likely    Unlikely    Very unlikely

12. Based on the shopping experience provided by the website, how likely would you recommend this online vendor to your friends? ( please tick one)

Very likely    Likely    Less likely    Unlikely    Very unlikely

## Appendix 2 – Participant information sheet

# Participant Information Sheet



### Date Information Sheet Produced

25 October 2011

### Project Title

Effects of web 2.0 experience on consumers' online purchase intention: the social networking and interaction orientation factors.

### An Invitation

My name is Phat Tri Huynh, a master student at AUT University. I would like to invite you to participate in this research. Your participation is entirely voluntary.

### What is the purpose of this research?

The purpose of this research is to examine the effects of two different elements, social networking and interaction orientation, of Web 2.0 experience on the buying behaviour of virtual consumers, specifically on their intention to buy from e-retailers

### How was I identified and why am I being invited to participate in this research?

You have been selected to participate simply because you are an AUT student. If you have ever bought anything online, your participation will be very much appreciated.

### What will happen in this research?

You are invited to complete an anonymous questionnaire, which will take you approximately 15 minutes.

### What are the discomforts and risks?

There are no discomforts and risks associated with this research

### What are the benefits?

You will be entered in a draw to win a gift voucher valued at \$200. We need your email address to notify you if you are the winner. This address is collected at the end of the survey in such a way that it is not connected to your answers, so your anonymity is assured.

In addition, your participation will also benefit the researcher as the data gathered will not only add to the body of knowledge about online shopping behaviour but also contribute toward a master thesis from AUT University.

### How will my privacy be protected?

This is an anonymous questionnaire; your name will not be recorded on the survey form. The information supplied in the questionnaire will be securely maintained on a password-only computer file for access only by the researcher and his supervisor, Dr. Antonio Díaz Andrade.

### What are the costs of participating in this research?

There are no costs to you whatsoever, except of a maximum of 15 minutes of your time.

### What opportunity do I have to consider this invitation?

You may want to take more time to decide whether or not to participate in this research project. You are under no obligation to complete the questionnaire. Likewise, if you prefer not to answer any question on the survey, you are free to do so.

### How do I agree to participate in this research?

By completing this questionnaire, you are indicating your consent to participate in the research.

### Will I receive feedback on the results of this research?

A summary of the research findings will be available on an AUT website on the completion of this research. Alternatively, you are welcome to email Phat Tri Huynh, if you wish to receive a copy of the results of the research.

**What do I do if I have concerns about this research?**

Any concerns regarding the nature of this project should be notified in the first instance to the researcher's supervisor, Dr. Antonio Díaz Andrade, [antonio.diaz@aut.ac.nz](mailto:antonio.diaz@aut.ac.nz), 921-9999 ext. 5804

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEK, Rosemary Godbold, [rosemary.godbold@aut.ac.nz](mailto:rosemary.godbold@aut.ac.nz), 921-9999 ext. 8044.

**Whom do I contact for further information about this research?**

Research's contact details:

Phat Tri Huynh  
GI 147 Hobson Street  
Auckland Central  
Mobile: 0210 455 687  
Email: [hdn5330@aut.ac.nz](mailto:hdn5330@aut.ac.nz) or  
[triphath85@yahoo.com](mailto:triphath85@yahoo.com)

Supervisor's contact details:

Dr. Antonio Díaz Andrade  
Faculty of Business and Law  
Senior Lecturer in Business Information  
Systems  
42 Wakefield St. – Room WF917  
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Telephone: (09) 921-9999 ext. 5804  
Fax: (09) 921-9940  
Email: [antonio.diaz@aut.ac.nz](mailto:antonio.diaz@aut.ac.nz)

Approved by the Auckland University of Technology Ethics Committee on \_\_\_\_\_, AUTEK Reference number \_\_\_\_\_.



## Appendix 3 – Advertisement

Dear students,

**Would you like to enter into a draw to win a gift voucher valued at \$200?**

If you would, please take few minutes to complete a short two-page survey about the consumers' online purchase intention.

To participate in the survey, **please simply come to the open lab, located at WA building, opposite to the AUT library from 9am- 12pm, any day before 20<sup>th</sup> of December.** The survey forms will be available there for you to complete so please ask.

Your participation is completely anonymous and voluntary. The draw winner will be notified through his or her email by the 31<sup>st</sup> of December.

Best Regards,

Phat Tri Huynh

## Appendix 4 – AMOS output: Detection of Outliers among cases

Observations farthest from the centroid (Mahalanobis distance) (Group number 1)

Observation number	Mahalanobis d-squared	p1	p2
105	27.002	.001	.111
54	26.404	.001	.010
118	24.418	.002	.004
27	23.437	.003	.001
50	22.272	.004	.001
52	20.038	.010	.008
166	19.624	.012	.004
5	18.732	.016	.007
22	18.343	.019	.005
79	17.898	.022	.004
99	17.155	.029	.009
157	17.146	.029	.003
42	17.042	.030	.002
158	16.943	.031	.001
159	15.358	.053	.031
156	14.086	.080	.255
134	13.902	.084	.244
165	13.686	.090	.250
115	13.454	.097	.268
49	13.395	.099	.216
15	13.304	.102	.183
34	13.014	.111	.233
30	12.746	.121	.284
31	12.658	.124	.253

Observation number	Mahalanobis d-squared	p1	p2
87	12.565	.128	.227
55	12.322	.137	.277
151	12.241	.141	.248
44	11.851	.158	.397
16	11.801	.160	.350
1	11.792	.161	.282
72	11.741	.163	.244
25	11.694	.165	.207
3	11.302	.185	.369
58	11.241	.188	.337
4	11.036	.200	.404
108	10.915	.207	.417
73	10.904	.207	.352
26	10.805	.213	.352
94	10.711	.219	.349
91	10.633	.223	.336
104	10.424	.237	.422
109	10.249	.248	.488
53	10.095	.258	.541
103	9.960	.268	.580
10	9.956	.268	.514
8	9.919	.271	.475
82	9.721	.285	.572
144	9.585	.295	.618
40	9.537	.299	.592
145	9.467	.304	.585
139	9.444	.306	.539

Observation number	Mahalanobis d-squared	p1	p2
152	9.376	.312	.532
76	9.364	.313	.476
101	9.264	.321	.498
106	9.094	.334	.584
32	9.061	.337	.549
61	8.903	.351	.626
37	8.787	.361	.667
51	8.573	.380	.782
142	8.572	.380	.732
39	8.531	.383	.711
19	8.519	.384	.665
67	8.466	.389	.654
129	8.179	.416	.827
102	8.102	.424	.835
131	8.052	.428	.827
20	7.997	.434	.823
13	7.964	.437	.803
160	7.872	.446	.825
48	7.853	.448	.795
112	7.849	.448	.752
83	7.477	.486	.933
148	7.448	.489	.923
69	7.415	.493	.913
36	7.372	.497	.906
33	7.255	.509	.931
2	7.239	.511	.914
132	6.986	.538	.972

Observation number	Mahalanobis d-squared	p1	p2
162	6.986	.538	.961
86	6.878	.550	.972
75	6.682	.571	.990
7	6.674	.572	.986
65	6.674	.572	.979
29	6.666	.573	.971
24	6.570	.584	.979
43	6.570	.584	.969
119	6.500	.591	.973
141	6.388	.604	.982
80	6.372	.606	.977
97	6.339	.609	.973
122	6.289	.615	.973
153	6.263	.618	.968
140	6.256	.619	.956
78	6.208	.624	.955
155	6.205	.624	.939
154	6.191	.626	.925
110	6.017	.645	.965
163	6.017	.645	.951
121	5.933	.655	.960
66	5.922	.656	.948