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**An Experimental Study on The Effect of Social Presence,  
Usability and User Control on Online Shopping Experiences**

**by**

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A thesis submitted in fulfilment of the requirements for the degree of

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University Of Sussex

Thesis submitted by Zainab Khosrowtaj for the degree of Doctor of Philosophy

## An Experimental Study on The Effect of Social Presence, Usability and User Control on Online Shopping Experiences

### **Abstract**

The research presented in this thesis presents a unique experimental environment designed to identify social components that may strengthen the social context of online shopping. This experimental environment is designed to simulate the interaction of customers' social experiences in their offline shopping tasks, e.g. when they visit stores socially to shop with friends or relatives. In collaboration with the simulation environment a fractional factorial experimental study has also been designed to explore how social and co-presence, can be built, measured and improved within online retailers' e-commerce websites. This research investigates whether social and co-presence have an impact on user perceived involvement, engagement and interactivity when socially rich elements embedded in a shopping environment are adjusted. A key element of this research investigates the social influence on customers' attitudes, including search and purchase decision behaviour, when online shopping is shared with friends or relatives.

A unique research model combining an experimental simulation and fractional factorial design of an experimental study is proposed that examines the effect of socially rich elements on social and co-presence. The proposed model also provides additional insight into the effect and consequences of social and co-presence on perceived involvement, engagement and interactivity in the online shopping experience. Specifically, a fractional factorial design of the experimental study with three interventions was planned and implemented. The experiment involved small groups of two participants who performed a group experimental task with the simulation environment in computer laboratory conditions. The fractional factorial experimental study required the design of unique structured pre- and post-test questionnaires, a novel shopping environment simulation and associated experimental tasks. The population of this research includes staff and students of the University of Sussex.

Experimental results support the hypotheses developed in this thesis. They illustrate positive correlations between three interventions and dependent variables. It was found that increased level of social presence results in higher level of experienced involvement, engagement and interactivity with the shopping channel. Also, it was found that social presence has statistically significant effect on perceived involvement and engagement. However, social presence has a main effect on perceived interactivity. In addition, it was found that increased level of social presence reduces consumers' search effort for product information, and also increased level of social presence increases the effectiveness and quality of purchase decision. This thesis demonstrates that retailers could develop innovative new online shopping channels that exploit primarily social presence, i.e. shopping with friends and relatives, to increase revenues because social presence accounts for 15% of the users' intention to buy.



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## LIST OF ACRONYMS

AE .....	Aesthetics
ASQ .....	After-Scenario Questionnaire
ANOVA .....	Analysis Of Variance
CMC.....	Computer Mediated Communication
CP.....	Co-Presence
C-REC .....	Cross-schools Research Ethics Committee
CSUQ .....	Computer System Usability Questionnaire
CRLF .....	Customer Resource Life Cycle
DOE .....	Design Of Experiment
FFD .....	Fractional Factorial Design
FHGS .....	Frequency of users asking for Help, Guidance or Suggestion
GSB.....	Google Shared Basket
GTM .....	Go To Meeting
IB.....	Intention to Buy
IM.....	Immediacy
LBE .....	Location- Based Entertainment
MU .....	Mutual Understanding
NFC.....	Need For Cognition
PB.....	Perceived Benefit
PI .....	Perceived Interactivity
PIN .....	Perceived Involvement
PSSUQ .....	Post-Study System Usability Questionnaire
QEDB.....	Quality and Effectiveness of Decision Behaviour
QUIS .....	Questionnaire of User Interaction Satisfaction
RCT.....	Randomised Control Trial
SRB .....	Search Behaviour
SP .....	Social Presence
SUS .....	System Usability Scale
SVEs .....	Shared Virtual Environments
SWS .....	Synchronised Web Surfing
TAM.....	Technology Acceptance Model
TPB .....	Theory of Planned Behaviour



TRA.....	Theory of Reasoned Action
U.....	Usability
UC .....	User Control
UES .....	User Engagement Scale
VE .....	Virtual Environment
VR.....	Virtual Reality

# CHAPTER ONE

## 1 Thesis Overview

### 1.1 Lack of sociality in online shopping experience

Current e-commerce websites do not support social and immediate interaction between their online users. Browsing the web today is mainly a solitary experience for most online users. People mostly carry out online activities in an asynchronous fashion, including shared activities on social media channels, as well as chatting and playing online games. Although solitary asynchronous online experiences are valuable, synchronous fully shared experiences lead to high engagement environments and activities that have begun to emerge.

Enabling customers to share their entire shopping journey online with someone else is critical due to two key objectives: customers' experiences and retailers' revenue opportunity. Customers in both environments of offline and online shopping share a common desire for a socially rich experience when they purchase products (Hassanein & Head, 2007). Studies of offline shopping discovered that when customers go shopping with friends or family members, they spend more time exploring the mall and make more unplanned purchases (Lueg, Ponder, Beatty, & Capella, 2006). In addition, retailers rely on revenue, customer acquisition and retention to survive. Sharing online shopping experiences can lead to a new revenue opportunity as well as higher customer engagement and retention for e-vendors.

There are significant differences between online and offline shopping. While during traditional shopping people share their experience with others, and malls are entertainment centres, online customers experience shopping activities alone (Hassanein & Head, 2007). Perhaps the most important and obvious difference is that during the online shopping experience there is less opportunity for connecting with other people and interacting with them within the same physical space, since it tends to be more "impersonal, anonymous and automated" (Cyr, Hassanein, Head, & Ikonov, 2007).

Online e-commerce applications, such as a shopping site, can be characterised by their lack of sociality when compared to shopping with family and friends in a shopping centre. One motivation for people to do shopping is to spend leisure time with friends who have a similar interest in particular products. For most people, shopping is a social activity that they tend to do with friends and family members. In particular, they enjoy it more and they engage in shopping more when they do it in the company of others (Zhu & Benbasat, 2009; Puglia, Carter, & Jain, 2000). Hassanein and Head (2007) emphasise the hedonic value of shopping and the social interaction with other humans involved in the shopping experience. They indicate that the social interaction during a shopping activity is rather more important for customers than purchasing a product itself.

Shoppers engage in shopping not only for the fulfilment of social interaction with others, but also for a second opinion about a product. Making a better decision is another reason for most people to share their shopping experience with friends or relatives, as it lets them share ideas with them to carefully evaluate products before making a purchase decision (Zhu & Benbasat, 2009). Most people, when they plan to purchase a product they are unfamiliar with, consult with people who they trust for advice. According to basic behavioural psychology, “Consumers trust their friends’ purchasing decisions more than anonymous opinions” (Guo, Wang, & Leskovec, 2011, p.157).

Despite the great importance of the role of social interaction in a world of commerce, it is widely neglected in current e-commerce systems. It is a practice of many online stores to develop their website based on usability and accessibility guidelines. Such advice is based on the functionality of a website in terms of its accessibility and usability, web developers being focussed on a website’s performance. How appealing the website is in terms of the possibility of social connections is not part of their brief (Hassanein & Head, 2007). A shop is no longer just a shelf where you can show what you have. As a shop, it is extremely important to create personalised communication and connect with online active users.

A few online stores currently integrate some social elements into their websites, for example, a number of online shops have started integrating synchronous text-based chat into their websites, which allows online customers to communicate and to share

information. However, many of them still offer a shopping experience to online users which is “functional, attribute-based, and, at the very least, unemotional” (Hassanein & Head, 2007). Online communication that customers experience on their site is not comparable to the interaction they experience during offline shopping. Therefore, how online customers socialise relative to the Internet is an important issue for the future of e-commerce (Bogdanovych, Berger, Simoff, & Sierra).

In light of the rapid development of web-based commerce, it is vital to add value to shoppers’ online experiences by building in more opportunities for social interaction, and the warmth that comes from human contact. Human interaction and sociability are being addressed in a web context at the moment by providing the means for a real “interaction with other humans” or “simulating the imagination of interacting with other humans” (Hassanein & Head, 2007, p. 690).

How online customers’ experiences and behaviour evolve and improve when their shopping experience transforms from solo to group experience is investigated in this research. Before discussing the research question, the relevant studies are presented in the next section. It is discussed how previous studies took distinctive approaches to build sense of presence through websites’ interface and facilitate customers’ interaction online.

## **1.2 Related work**

The term ‘collaborative online shopping’ was used in a previous study by Zhu, Jiang and Benbasat (2006) and it is described as “the experience where customers shop at an online store together with one or more remotely located shopping buddies at the same time” (p.2953). The objectives of collaborative shopping were specified as socialising and purchasing. The study proposes various website features including communication and navigation features to support these objectives. It argues that if an online shop provides a good fit between shopping objectives and website features, this can lead to higher customer satisfaction.

The main focus of collaborative shopping is implementing collaborative tools including communication and coordination tools in online shops. Communication is considered as an important component of collaborative shopping, which could effectively build and

manipulate trust (Kiatruangkrai, Phusayangkul, Viniyakul, Prompoon, & Kanongchaiyos, 2010). It could also effectively influence the quality of decisions that customers make on purchasing a product (Zhu, Benbasat, & Jiang, 2010).

Online collaborative shops are designed to fulfil the diverse needs of their customers, to support them with varied objectives of shopping. Depending on customers' shopping objectives, the impact of different website features is different on their shopping experience. In other words, by having features which serve the needs of customers and support social shopping, the website should be able to enhance customers' satisfaction with their overall shopping experience, which could then result in stronger shopping intention, and more repeat purchases could be made. Customers could enjoy the shared shopping process and be satisfied with the outcome of the shopping.

However, an important aspect of shopping is socialising, which happens naturally in the offline shopping experiences. The shopping environment built and developed by recent studies of collaborative shopping did not fully support sociality and engagement. The social context of online shopping has diverse components and cannot be built simply through the integration of collaborative tools, but it needs to be carefully studied and designed.

Also, measurements used in previous studies of collaborative shopping were loose and too generic. These measurements were not particularly designed to assess the sense of presence and users' behaviour in online shopping environments. Various studies of e-learning, e-commerce as well as video gaming share the same measurements. Therefore, loose measurements as well as poorly designed methodology led to findings that are too generic and insufficient.

The study by Van et al. (2012) on the shopping experience of people on retail websites investigated the impact of retail density on the shopping experience, and spending as a function of affiliation needs.<sup>1</sup> They considered the shopping trip not as a goal-oriented

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<sup>1</sup> The Need for affiliation was first viewed and presented by [David McClelland](#) and can be described as person's need for open and sociable interpersonal relationships.

lonely journey for purchasing a desired product, but as a social activity which involves fellow shoppers. They explored whether shoppers value the presence of others in the retail shopping environment and whether the presence of others has any positive or negative influence on people's shopping tendencies, considering that consumers vary regarding affiliation needs. They found that retail density has a positive impact on the shopping experience of consumers with strong affiliation needs. It is more likely for them to spend more money in order to make a positive impression.

Based on their findings, the influence of retail density on customers' shopping experience varies depending on consumer needs. Some consumers go shopping during rush hours because they value the social interaction, whereas others prefer to shop alone. The shopping experience of customers with lesser affiliation needs could be negatively affected by retail density or social interaction. This is due to the fact that customers with "low affiliation needs perceive the presence of others as a burden or constraint" (Van, Krooshoop, Verhoeven, & Pruyn, 2012).

Previous studies on peer communication and customer socialisation found that peer communication has a positive effect on adolescents' product evaluation and decision-making process (Moschis & Moore, 1979). It also positively influences the social motivations for consumption (Churchill & Moschis, 1979). In addition, it makes the shopper aware of the services and products that can be accessed, and to develop better awareness of the process of shopping (Moschis & Churchill, 1978). Sharing thoughts with others while shopping in a mall environment leads to more time spent on shopping activities, the expenditure of more money, and the formulation of plans to return to the mall in the future (Lueg, Ponder, Beatty, & Capella, 2006).

Offline shops provide an intense social interaction experience for customers, who could benefit more from multi-sensory awareness and a high level of interaction than most mediated technologies in co-located settings. Online shopping still provides lower degrees of awareness, involvement and engagement, and social presence which customers could experience and enjoy (de Kort, IJsselsteijn, & Gajadhar, 2007). The level of social presence which online customers could experience is closely related to the social context of the shopping environment, and the communication and

coordination technologies used in the web interface, as well as social and shared elements (Bostan, 2009).

The social online shop is a new concept, and it is about how the social contexts of shops are best designed and built in online stores. It is about the feeling of others being present in the same context, 'social presence'. Social presence, involvement, and engagement are the key components of building an online social shop. In a new social shopping environment, multiple online customers can join 'the shared session' and share the navigation on merchant sites, set shared goals, discuss shared knowledge, share their ideas and get involved in product evaluation and decision making. In other words, in a new social shopping environment, customers are able to share the shopping activities that they currently perform alone. Shoppers' experiences can be affected when they feel that others are present in the same online shop, and they could engage in a conversation with them and share their ideas regarding purchasing a product.

The sense of social presence is fundamental in strengthening the social context of online shops. However, the formation of social presence in an online environment could be problematic due to the constraint of communication-mediated tools. In face-to-face conversation, people use multiple sensory channels; they communicate with others not only by speaking to them but also through para-verbal and non-verbal messages. Furthermore, real people in physical space often look and behave somewhat differently to pictorial representations, which is significantly different from what they experience in online environments (de Kort, IJsselsteijn, & Poels, 2007).

A previous study on social presence in video conferencing and application sharing compares visual cues to the verbal and non-verbal communication cues conveyed by video-conferencing tools (Bradner & Mark, 2001). They found video-conferencing could provide valuable sources of information (social cues), which effectively increase the perception of social presence and improve collaboration between groups of people. As technology is able to emulate more skilfully an increasing number of the non-verbal cues used in communication, such as how people stand and where they are looking, it seems probable that social presence will increase (Casanueva & Blake).

A few studies have tried to create a perceived sense of social presence on e-commerce websites. Their evidence has shown the positive effect of particular design aspects, such as wording and images which convey a sense of sociability, on shoppers' feelings about their online experience (Hassanein & Head, 2007). For instance, they examined the impact of adding photos of smiling people, intended to give a feeling of personal and friendly human contact, on the level of social presence experienced by users (Gefena & Straubb, 2004).

How sense of social presence (SP) can be built and measured in online retailers' website, similar to trust (e.g. how Airbnb built trust on their website interface), is investigated in this study. The findings of previous studies guided this research to design a unique and comprehensive set of SP-measurements as well as build sense of SP through mediated-communication technologies. The research question of the thesis is further explained in the next section.

### **1.3 Research question**

This research aims to identify social components, which strengthen the social context of online shopping, and build a novel environment that simulates the interaction customers experience in the offline shopping experiences, e.g. when they visit stores with friends or relatives. This study explores how social presence, can be built, measured and improved within online retailers' websites. It investigates whether social presence has an impact on user perceived involvement, engagement and interactivity when socially rich elements, embedded in a shopping environment are adjusted. It also looks into the scope of social influence on customers' attitude, including search, purchase decision behaviour and intention to buy when online shopping is shared with friends or relatives.

This research examines if customers' intention to buy is influenced by the level of social presence, usability and user control embedded in the online shop. It also investigates whether group shopping results in a higher level of involvement and engagement with an online shop and future intention to buy. The main effect of independent variables and interaction between them is examined. For example, whether social presence or usability has the main effect on customers' intention to buy or whether there is an interaction between usability and user control.



This study answers the following questions:

1. How can social presence, like other important elements of shopping that achieve intense ‘trust’, be built, measured and improved within online retailers’ websites?
2. What is the impact of various levels of socially rich elements embedded in a new designed environment on social presence and its subsequent effect on customers’ attitudes towards online shopping websites?
3. Whether social presence has direct and indirect impact on perceived involvement, engagement and interactivity experienced by online customers?
4. What is the main effect of independent variables, tested in this study including social presence, user control and usability, on customers’ shopping behaviour and if there is an interaction between them?

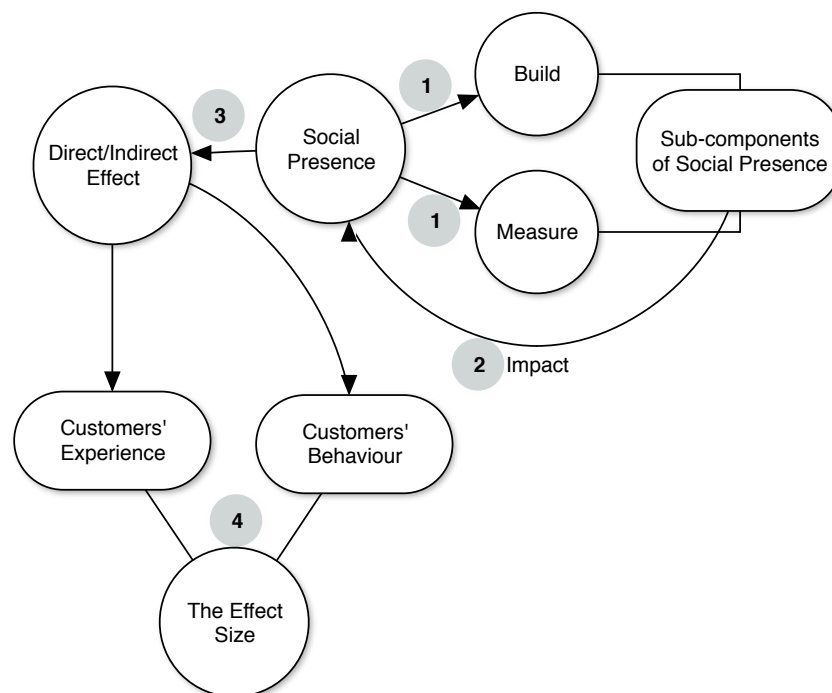


FIGURE 1-1 RESEARCH QUESTIONS

This thesis develops a range of hypothesis, detailed in chapter 3, as a starting point to investigate the research questions posed above, and presents a fractional factorial design of the experimental study with three interventions to test the hypotheses. The experiments involved small groups of two participants who performed a group

experimental task in a computer laboratory setting. Each experiment involved the design of a new structured pre and post-test questionnaire, and a novel social based shopping simulation environment and an experimental task. Appropriate subjective measures in the form of pre and post experiment questionnaires were selected. Design of experiment and experimental procedure is presented in chapter 4 and chapter 5.

#### **1.4 Contributions to knowledge**

It was expected that this thesis makes several key contributions to knowledge. Firstly, developing a unique and comprehensive set of measurements to assess the sense of social presence in online shopping environments. Followed by designing a unique experimental research model and experimental environment, which investigate the relationship between key components of online shopping, for example, usability and user engagement. It was expected that the newly developed measurements and designed research model as well as experimental environments could be replicated for various product categories and samples. In addition, it was expected to demonstrate that social presence positively influences users' shopping behaviour and shopping experiences depending on product types. The expected key contributions of this thesis are explained in detail in the following sub-sections:

##### **1. Classification and development of subjective measurements of social presence identified in online shopping experiences**

In this thesis social presence is treated as a psychological and subjective presence, and also as a multi-faceted concept, which has varying dimensions. In order to develop a unique set of measurements, which is specifically designed to test the sense of social presence in online shopping environments, it was planned to explore and identify the key components that make up social presence. Subjective measurements can then be developed based on the identified dimensions to assess experienced social presence in online shopping environments. Some of the subjective measurements of social presence were utilised from previous studies of online shopping, however the majority of the subjective measurements of SP defined in this thesis are **newly** developed measurements generated by consideration of a new theoretical framework that allowed the transposition of the subjective measurements into new survey questionnaires.

Further, it was expected to achieve a high degree of confidence that the set of subjective measurements, developed in this study, are reliable and accurate.

## **2. A new experimental research model for investigating social and co-presence in online shopping**

This thesis aims to design and implement an experimental research model composed of an ‘online shopping simulation environment’ and ‘experimental method with associated new survey questionnaires’, to provide a new framework to explore the relationship between the key components of online shops, and their influence on customers shopping behaviour. A review of the literature guided this research towards identifying six key components of online shopping. Then, hypotheses were developed to investigate the relationship between the six components. To test the hypotheses a fractional factorial experiment of three interventions (social presence, usability and user control) was designed. Also the experimental environment, which simulates the four treatment conditions, was designed and implemented.

## **3. Increasing the level of social and co-presence improves the online shopping experience.**

It was hypothesised that increased level of social presence results in higher level of experienced involvement, engagement and interactivity with the shopping channel. In addition, it was hypothesised that increased level of social presence reduces consumers’ search effort for product information, and it increases the effectiveness and quality of purchase decision. The main effect of three interventions and interaction between them was tested by an independent between groups ANOVA. It was expected to discover that social presence has statistically significant effect on dependent variables. However, it was anticipated that usability has the main effect on dependent variables. The result of hypothesis analysis, and also the main effect of three interventions on customers shopping behaviour, is presented in chapter 6 Data analysis and results.

It is explained in Chapter 7 whether this research successfully fulfils the expected contributions and also, if new discoveries throughout the research expanded the expected contributions. Outline of thesis is presented in the next section.

## **1.5 Outline of thesis**

Chapter 2 presents the theoretical foundation of social presence in online shopping experiences. In this chapter, various definitions of social presence and related theories are discussed. Multi-dimension conceptualisation of social presence in the context of online shopping is reviewed. From the review of the literature, four components of social presence were identified and used to develop the measurements of social presence in chapter 4. The last section of the chapter, ‘social cues,’ explains how social presence can be built within an online shop and how media differ in the level of social presence they convey. Also, elements that build sociality and engagement in online environments, including video gaming and online learning, are reviewed in this chapter. The chapter concludes with the chapter summary.

Chapter 3 presents the research model and development of the hypotheses. This chapter explains how and why independent and dependant variables were selected in this research and also how the hypotheses were developed and why they are important. In order to develop the hypotheses, previous studies that surveyed the relationship between social presence and other components of online shopping are reviewed. The key components of the independent variables within an online shop are reviewed and discussed as well. These components are then used to develop the measurements of independent variables in chapter 4. In addition, online customers’ shopping behaviour, including search, purchase decision and intention to buy, are discussed. This further developed the hypotheses, which are designed to examine the possible relationships between dependent and independent variables, as well as customer’s shopping behaviour. This chapter concludes with the chapter summary.

Chapter 4 presents the design of the experiment. It includes the experiment methodology, the design of a novel experimental simulation environment and experimental tasks, as well as the design of a new questionnaire. A fractional factorial experimental design is discussed in detail. This chapter explains the reasons why the FFD design was selected as the experiment methodology in this research. Further, it describes participant sampling and sampling methodology. The design of the experimental simulation environment and four experimental conditions (levels of the independent variables) are illustrated. This includes the design of low and high levels of

three independent variables (social presence, user control and usability), and also the design of an experimental task that promotes social interaction. Finally, the design of the survey questionnaire (including the pre and post-test questionnaire) and the development of the measurements of the dependent and independent variables are discussed.

Chapter 5 describes the experimental procedure. Details of the execution of the experimental task and four treatment conditions, as well as the recruitment of participants, are described in detail in this chapter. Chapter 6 presents the data analysis and findings of this study. This chapter includes participants' demographics, the data preparation, the test of reliability and validity of scales, as well as the results of the hypothesis test. Hypotheses were tested by correlation, regression and factorial ANOVA. The results of the statistical test and of the observation are presented in this chapter. Chapter 7 concludes this thesis with a summary of findings, concluding remarks, limitations and suggestions for future work.

## CHAPTER TWO

### **2 The theoretical foundation of social presence in online shopping experience**

In this chapter, the concept of social presence and related theories including ‘media richness theory’ and ‘social affordance theory’ are presented, as applied to online shopping environments. Subsequently, the varying dimensions of social presence, social cues and media that convey low and high levels of social presence are explained in detail. In addition, elements which build sociality and engagement in online environments, including video gaming and online learning, are reviewed in this chapter.

#### **2.1 Definition of online social presence and related theories**

It is worth considering, prior to reviewing definitions of social presence, that the basis of a number of theories concerning social presence can be found in ‘symbolic interactionism’ (Blumer, 1969) as well as theories of interpersonal communication in social psychology, where the term ‘social presence’ is used to explain the effects on behaviour that are caused by the actual or perceived presence of another person and by the awareness that someone else is observing.

Social presence as a concept was initially viewed and presented by Short, Williams and Christie (1976) from the perspective of social psychology. They defined ‘social presence’ as “the degree of salience of the other person in the interaction and the resulting salience of the interpersonal relationships” (p. 65). In effect, it is a measure of the perceived reality of a person in mediated communication. Other researchers took this definition of social presence by Short, Williams and Christie and defined it in a different light. According to Rice (1993), ‘social presence’ is “the measure in an interaction of awareness of another person and the recognition of interpersonal relationship as a result” (as quoted in Sung & Mayer, 2012). This concept of social presence was later carried forward by Bull (1983), who stressed the importance of a sense “when one person feels another person is ‘there’” (Bull 1983, p. 162).

The conceptualisation of this real ‘social presence’ without any mediation was described as: “another person is perceived as present or absent” (Biocca, Harms, & Burgoon, 2003, p. 460). Short, Williams and Christie (1976) might have extended the use of this term in the context of ‘mediated communication’ and it appeared accordingly in their work. It also serves as a basic framework for making comparisons between mediated and face-to-face communication as well as between different mediated communication forms (Short, Williams, & Christie, 1976; Walther, 1996).

Social presence is the feeling of ‘being with another body’. Furthermore, it is the degree of facilitation extended to a user by a medium for engaging with other users personally (Zhu, Jiang, & Benbasat, 2006). This feeling of being with others works as a precondition for users to perceive effective and cognitive social presence. Biocca, Harms, and Burgoon (2003) define social presence as the feeling of “being together with another”. It also involves related phenomena such as the models of ‘other minds’, natural reactions to social cues and self-engendered perceptions about others’ intentions.

Social presence is defined somewhat differently in relation to online interaction on websites. In this context, Cyr et al (2007) describe social presence as “the feeling of warmth and sociability within a website” (p. 43). Further, as Fulk, Schmitz, and Power, (1987) define it, is “the extent to which a medium allows users to experience others as being psychologically present” (as quoted in Hassanein & Head, 2007, p. 47). The origin of this definition can be found in the concept of ‘psychological distance,’ which stipulates that sociability is diminished in communications except face-to-face communications.

The most frequently used theoretical model in social presence research involves collecting data about people interacting through telecommunication platforms (Caldwell, Uang, & Taha, 1995; Fulk, Steinfield, Schmitz, & Power, 1987; Haythornthwaite, Wellman, & Mantei, 1995; Palmer, 1995; Rice R. E., 1993; Rice & Tyler, 1995; Short, Williams, & Christie, 1976; Trevino, Lengel, & Daft, 1987; Walther J. B., 1992; Walther & Burgoon, 1992). It is a common practice to use this theoretical framework in research revolving around the interaction between two or more than two individuals (Nowak, 2001). The intervention of telecommunication technology in social

presence creates social telepresence or mediated social presence (Biocca, Harms, & Burgoon, 2003).

To explore the concept of social presence, Short, Williams and Christie (1976) examined the variables which make up face-to-face human interaction and compared them with different communication media. They also compared different media with one another. Their findings were that the communication medium which mediated the human interaction could have an effect on the connectedness and closeness felt by the people involved, and so the participants would be led to interact with each other with different degrees of intimacy (Bulu, 2012). Intimacy and immediacy were established as two of the characteristics which support social presence, and link to feelings of familiarity in the context of social behaviour, supported by nodding, making and holding eye contact, and smiling (Yamada, 2009). They described social presence as “the degree of a given media determined by the extent to which it conveys the non-verbal cues” (Bradner & Mark, 2001, p. 1). For instance, the media of audio and text are not able to replicate some of the visual cues that are part of communications that take place in person, e.g. smiles, frowns and other facial expressions, eye contact, the use of the hands to convey meaning and how closely people choose to stand or sit next to each other (Bradner & Mark, 2001).

In practice, the concept of social presence and the design and evaluation of computer interfaces and products of media are mutually relevant. This relevance can be witnessed, especially in the fields of telecommunication, such as computer supported collaborative work and videoconferencing, entertainment (reality shows, movies and video/computer games), health care (telesurgery and telemedicine) and education (simulated training, virtual campuses and online education) (Lee, 2004). With increasing sophistication in the technologies concerning simulated interactive environments, professionals and scholars from various fields like communications, computer sciences and psychology have been forced to pay greater attention than ever to the concept of social presence.



### 2.1.1 Media richness theory

Daft and Lengel (1986) define media richness as the degree of communication capabilities provided by a specific medium to its users. According to media richness theory, social presence refers to the extent to which different media convey social cues (Bradner & Mark, 2001). Similarly, the media richness theory describes social presence as “how much a medium enables a communicator to experience communication partners as being psychologically present” (Lowry, Roberts, Romano Jr, Cheney, & Hightower, 2006).

The theory argues that the richness of the media varies; for instance, the level of social presence found in face-to-face communication is different from that found in video-conferencing, email, or paper-based mail (Bradner & Mark, 2001). It further argues that people using these different forms of communication evaluate the level of social presence involved.

This verifies the social presence theory, which claims that “media which provides visual feedback of others produce the greatest sense of social presence” (Bradner & Mark, 2001, p. 4). Smiling, nodding and gestures are some of the ways in which people convey their emotions when communicating in traditional text-based ways and through asynchronous CMC<sup>2</sup> (Computer Mediated Communication) such as email. These methods of communication are inherently devoid of social cues (Derks, Fischer, & Bos, 2008). Our understanding and realisation of the feelings of other people are influenced by social cues. In the absence of visual feedback, such as nodding, eye gazing in certain forms of CMC (text chatting and audio conferencing), the other person’s situation remains unknown.

A wide array of media has been examined in the plethora of research studies since the 1970’s. The prime aim of these studies was the comparison between different media such as audio and video, voice only and text-based communication. Furthermore, this type of research was aimed at examining the impact of different media on users compared to face-to-face normal communication. The media being investigated since

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<sup>2</sup> [CMC](#) or computer mediated communication is a process in which human interaction occurs through one or more telecommunication technologies including email, chat, instant messaging and video conferencing.

the 1970's allow people to mutually communicate to accomplish tasks which involve cooperation.

Oschman and Chapanis (1974) accomplished what could be called important leaps toward comprehending mediated communications in depth. They made comparisons between ten methods of communication and laid out the importance that audio has compared to video. Their experimental study involved tasks that could be accomplished using an audio channel only (Short, Williams, & Christie, 1976; Sellen, 1995). Conversely, the importance of a video channel is self-evident in transmitting the subtle cues witnessed in face-to-face communications (Daft & Lengel, 1986; Davis, 1989; Kraut, Galegher, Fish, & Chalfonte, 1992; Kraut, Cool, Rice, & Fish, 1994; Gnisci, Papa, & Sandra, 1999).

All sorts of communication media have different impacts on the quality of communication between customers and the information they are able to transfer in the process of shopping. According to the theory of social presence, as discussed before, being with others in an online context plays an important role in the promotion of socially meaningful interaction. Social presence is the degree to which individuals perceive others as being physically present during the communication process. The richness of the media using online shops affects the social presence and the quality of communication that co-shoppers experience (Zhu, Benbasat, & Jiang, 2010). Therefore, the communication medium which conveys a higher level of communication cues, including voice, facial expression and eye contact, will result in a higher level of social presence.

For instance, it might be beneficial to incorporate audio chats in online shops on top of the usual text-based chats in order to transfer verbal cues during communication. However, video chats could provide a higher level of social presence, which allows us to have visual as well as verbal cues. Therefore, the communication medium which results in higher perceived social presence experienced by online shoppers is a better fit with the objectives of social shops and can result in higher customers' satisfaction.

### **2.1.2 Social affordance theory**

Similar to the theory of social affordance (Stephen & Toubia, 2009), “social presence is defined as the quality of a given media that affects the degree of salience of a conversational partner in a one-to-one interaction” (Bradner & Mark, 2001, p. 1). The sociality involved in user interaction can be influenced by physical features of a user interface. ‘Social affordances’ is the term given to these physical aspects (Rozendaal, Braat, & Wensveen, 2010). According to a study by Rozendaal, et al. (2010), the “social affordances relate to how physical features allow communication, cooperation and sharing” (p. 195). They require consideration with regard to interactive environments and online collaborative learning situations.

The traditional form of online communication has been improved dramatically, due to the creation of new web-based applications. The typical examples of online communication tools are emails and video conferencing. Current communication applications are widely being used in distance learning, multi-player video gaming, social networks and online communities. The current technology of communication allows users to have synchronous conversations; this conversation can be text-based, voice or video-based.

Online users are able to share their web pages or documents with others synchronously. However, the new communication tools and synchronised web surfing are still not used in the online shopping environment, which can help shoppers while they are visiting a company’s website or doing online shopping, to get information, advice or guidance to purchase exactly what they want.

## **2.2 The varying dimensionality of social presence and social cues**

Presence is a multi-faceted concept (Lombard, 2000). When referring to a virtual environment, ‘presence’ refers to a person’s feeling of being located within or transported to a virtual environment. The virtual space gives a sense of ‘being there’. Transportation is a scale of measuring the feeling of being ‘inside’ a virtual environment (Nowak, 2001). According to Sheridan (1992), physical presence points towards the ‘sense of being’ in some specific virtual environment in literature. A psychological and subjective sense called ‘presence’ is a three dimensional concept:

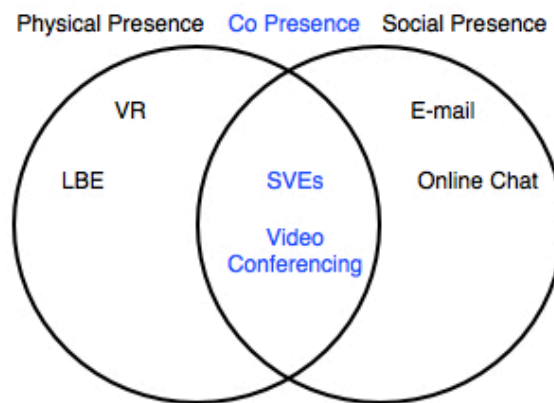
sense of 'being there', memorization of the environment corresponding to a real life 'place' and the response of the individual to the present or physically real 'there' (Slater, 1999).

According to Slater, Usoh, & Chrysanthou (1995), sense of presence is influenced by immersion, which refers to "the extent to which the computer displays are extensive, surrounding, inclusive, vivid, and matching" (p. 204). Presence is further defined by Witmer and Singer (1998) as "subjective experience of being in an environment, even when one is physically situated in another" (p. 225). Their hypothesis was that the presence was dependent upon the ability to concentrate on specific stimuli in a virtual environment, thus excluding the real life, separate stimuli. Consequently, an individual feels psychological involvement due to their attention and concentration, thus becoming engrossed with the activity. This engrossment is called 'immersion', which is the "psychological state characterized by perceiving oneself to be enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences" (Witmer & Singer, 1998, p. 227).

It is essential for individuals to feel immersed and involved in order to experience presence (Witmer & Singer, 1998). Witmer and Singer (1998) proposed that higher degrees of presence were the result of greater immersion and involvement in a virtual environment. Different terms have been used to describe this aspect of presence, like presence in the form of spatial presence (Biocca, Harms, & Burgoon, 2003), personal presence (Heeter, 1989; Slater, 1999), telepresence (Minsky, 1980; Sheridan, 1992; Steuer, 1992), and presence as transportation (Lombard & Ditton, 1997; Nowak, 2001; Bulu, 2012).

Lombard and Ditton (1997) considered a wide range of literature on the subject of presence, and provided a definition of presence as the "perceptual illusion of non-mediation" based on the commonalities between the six identified conceptualizations: "realism, immersion, transportation, social richness, social actor within medium, and medium as social actor" (as quoted in Schreer, Kauff, & Sikora, 2006). In other words, they viewed presence as the degree to which the medium in a technology-based interaction was taken notice of by the people involved in the interaction.

The different manifestations of presence noted by Lombard and Ditton (1997) can be categorized as physical or social. Physical presence is awareness of the physical parameters of the mediated environment. Social presence is the sense of joining another person in a mediated environment and interacting with that person. At the intersection of the physical and social presence, co-presence, or “a sense of being together in a shared space” (Wang & Wang, 2008). Co-presence is a combination of the essential characteristics of these two groups. The figure below (Figure 2-1) presents the interconnections between the categories of physical, social and co-presence, using several examples of media that relate to one or other category (Lombard & Ditton, 1997).



**FIGURE 2-1 THE RELATIONSHIP BETWEEN PHYSICAL, SOCIAL AND CO-PRESENCE**

Abbreviations: VR= Virtual Reality; LBE= Location-Based Entertainment; SVEs= Shared Virtual Environments.

Physical presence and social presence can clearly be usefully differentiated. The noticeable difference between the two forms of presence is communication. Communication is a fundamental component in building a sense of social presence, however it is not a prerequisite for building a feeling of physical presence. A medium can therefore create a strong sense of physical presence separate from any intentions regarding interaction. Inversely, a medium is able to cater for some social presence while lacking physical representation, for example Internet chat rooms (IJsselsteijn & Riva, 2003).

However, the two categories share some factors in common, for example, the immediacy of an interaction (Schreer, Kauff, & Sikora, 2006). Videoconferencing and

virtual environments, where a number of participants interact, are built upon on combining the sense of physical and social presence (IJsselstein & Riva, 2003). The degree to which the sharing of space enhances social presence is verifiable. As technology improves its ability to offer non-verbal aspects of communication, social presence will become intensified (IJsselstein & Riva, 2003).

Research concerning the interrelationship of different kinds of presence produces contrasting results. Some of the studies witnessed a considerably positive correlation between co-presence and place presence while examining the behaviour of smaller groups in virtual environments (Bulu, 2012; Axelsson, Abelin, Heldal, Schroeder, & Widestorm, 2001; Schroeder, 2002; Slater, Sadagic, Usoh, & Schroeder, 2000; Tromp, Bullock, Steed, Sadagic, Slater, & Frecon, 1998). Contrarily, co-presence and place presence were found to be independent with no possible mutual relationship according to some other studies (Bystrom & Barfield, 1999). Thie and Wijk (1998) noticed a positive relationship between social presence and place presence, while this positive relationship was not that significant according to another study, which found a stronger relationship between social presence and overall course design (Zhang & Ziguers, 2009).

Place presence was found, by some researchers, to be statistically independent from social presence and co-presence (Slater, Sadagic, Usoh, & Schroeder, 2000; Wang & Wang, 2008). Slater et al (2000) opined that “talking on a telephone with someone might give a strong sense of ‘being with them’ but not of being in the same place as them” (p. 41). Further, it might be possible for people to feel social presence irrespective of the minimal physical presence afforded by the medium. Conversely, medium-induced place presence can be high without any social presence (Wang & Wang, 2008). Some theories of psychological involvement support this and purport that social presence involves a judgment of the other’s intelligence. Here, the word ‘intelligence’ points towards the environment related intelligent behaviour and intention. Hence, social presence has been extended beyond awareness to stress upon the significance of something often called psychological involvement, according to some definitions (Biocca, Harms, & Burgoon, 2003).

It is unfortunate, however, that the theories of persuasion, social psychology and communication use ‘involvement’ in a very broad sense (Petty & Cacioppo, 1986). It

has an array of meanings ranging from focused attention to much more complicated psychological intricacies governing the relationships. Biocca et al (2003) endeavour to do the classification of the different shades of this general approach to defining social presence. For instance, it can be said that an inert body is physically present in a Virtual Environment, but is not socially present. This is a rather extreme example, which cannot often be found in the real world. However, it is common in virtual environments, like a 3D city. In such environments, only virtual entities are present with no signs of 'intelligence'. These entities may be presentations of any kind whether human or artificial, or inert bodies with no 'intelligence' or 'spirit' that could animate the body. While presence or awareness of another body might be enough to denote a minimum degree of physical co-presence, it doesn't seem to be equivalent to the entire concept of social presence (Biocca, Harms, & Burgoon, 2003).

However, there is similarity in the conceptual description of co-presence and social presence. Co-presence tries to gauge the feeling of another person, which is not dissimilar to the concept of social presence. The indicators of social presence include the medium's ability to make a person feel socially present. The prediction, therefore, is that there will be higher correlation between co-presence and social presence compared to the correlation between co-presence and physical presence.

Nowak (2001) differentiated forms of presence and predicted that there are correlations between them. When more co-presence or social presence is felt between partners, more physical presence is predicted to be felt as well. Similarly, it is likely for people to feel increased co-presence with the increase in the feeling of social presence. Although a positive correlation is predicted among these aspects of presence, this correlation is not unidimensional in nature.

Nowak (2001) studies how far these dimensions of presence can prove to be suitable for the evaluation of different interfaces and systems. According to the argument in his study, measuring the sense of presence, or connectedness, among users is a way of evaluating the capacity of a medium to accomplish communication goals. Nowak (2001) further states that a person successfully feeling connected to someone else also fulfils communication goals. Any medium failing to create this feeling of connectedness might fall short of achieving communication goals.

### 2.2.1 Tele presence

Telepresence is the remarkable feeling of ‘being there’ (Lee, 2004). This feeling encompasses automated self-generated reactions to spatial cues as well as imitations of mediated spaces in mind, which are instrumental in creating a semblance of place. Minsky (1980) was the first person to use the term ‘telepresence’. After Minsky, researchers have used telepresence to indicate the feeling of being transported to a technologically created remote place. According to Sheridan (1992), telepresence is a “feeling like you are actually there at the remote site of operation” (p. 120).

McLellan (1996) views telepresence as losing your sense of presence in your physical location and feeling that you are in some other place. Reeves (1991) took the lead from Rheingold (1991), who viewed telepresence as a “form of out-of-the-body experience” (p. 256) and elaborated the feeling of transportation to televised worlds by using the term ‘being there’. Slater and Usoh (1993) say that it is the “suspension of disbelief that they (users of virtual reality systems) are in a world other than where their real bodies are located” (p. 222). It has been further contended by Schloerb (1995) that telepresence is a phenomenon that makes the users feel that they are situated in a distant place.

Minsky (1980) stressed the potential feeling in human operators that teleoperating systems are taking them to a far-off workplace. He predicted the increasing sophistication in sensory feedback and simulation technologies. Also, he expected that telepresence would come up with secure and economical ways of managing high-risk operations such as nuclear power generation and mining. Telepresence would also help discover new techniques in medicine and surgery and bring the costs of transportation down. Finally, the dream of working from home would also be materialised.

In the online context, perceived telepresence plays an important role in human behaviour by helping online shoppers to interact with the web interface and providing the best representation of the rich information that shoppers require. The perception of telepresence is highly affected by the elements creating the virtual environment: the more someone is able to have control over aspects of a mediated environment and the better the environment is able to present data, the better that person’s experience of telepresence becomes (Zhu, Jiang, & Benbasat, 2006).



Lombard and Ditton (1997) and Nash et al. (2000) have reviewed technological features which influence presence. Interactivity and vividness were found to be the key constructs of these technological features in prior studies by Steuer (1992). Many empirical studies have used Steuer's framework to investigate the impact of attributes of a system on presence. For instance, Coyle and Thorson (2001) studied how interactivity and vividness influenced telepresence. Li, Daugherty and Biocca (2002) found that websites which had 3D product catalogues developed a stronger sense of telepresence compared to those websites which had 2D catalogues.

Prior research on collaborative shopping has demonstrated that having other people present is a key element when shopping in physical stores (Zhu, Jiang, & Benbasat, 2006). The importance of the creation of such presence in online shopping and the types of presence, i.e. social presence and telepresence, are essential to the success of online shopping (Zhu, Jiang, & Benbasat, 2006). In their study, 'telepresence' refers to the feeling of being physically present in a virtual shopping environment (Lee K. M., 2004).

The results of their study made theoretical contributions to identifying the role of telepresence in collaborative online shopping. They found that telepresence has a significant impact on social presence, i.e., "consumers feel more like they are interacting with their shopping buddy personally if they feel, more strongly, that they are situated in the same virtual space" (Zhu, Jiang, & Benbasat, 2006, p.7).

Although telepresence is one form of presence, it is not examined in this study. Telepresence is closely related to collaborative shops, which are created in VR environments. Creating a virtual environment similar to a physical shop also provides the sense of 'being there' but is not a prerequisite of building sociality and engagement within an online shop. Therefore, in this research study, the sense of social presence and co-presence were surveyed and examined. In this chapter, detailed components of co-presence and social presence are presented. Also, the direct relationship between social and co-presence is discussed.

### 2.2.2 Co-presence

All three forms of social presence in online communities as Cui, Wang, and Xu (2010) describe it are categorised into co-presence, involvement, and behavioural engagement. Co-presence, or awareness, denotes an online user's cognizance of the presence of other social actors. Involvement refers to the relationship created between active online users. Behavioural engagement relates to the user's emotional connection with other users (Cui, Wang, & Xu, 2010).

Slater, et al. (1996) posit that personal presence is essential to co-presence. Tromp, et al. (1998) and Slater, et al. (2000) witnessed the existence of a positive correlation between co-presence and presence during an experiment (Bulu, 2012). The existence or absence of a relationship between the two types of presence is relevant to this study. This relationship could be the result of shared factors, which effect both equally, or, it could be the result of them influencing each other.

Traditionally, presence was conceptualized in terms of 'being there'. Media attributes were also connected to presence, perceived as social 'richness'. Researchers, however, have furthered the study to 'psychological connection of minds' and have considered the sense of togetherness in conceptualizing co-presence (Nowak, 2001). Here lies the distinction between social presence and co-presence. Social presence concerns the perception of the user in regards to the medium and the quality of that specific medium, while co-presence is concerned with interactions at the psychological level (Nowak, 2001; Schroeder, 2002).

Goffman (1963) invented and defined the term co-presence and said that it was the feeling of togetherness in a virtual world which made people "accessible, available, and subject to one another" (p. 22). He made this case even stronger through his ground breaking work (Biocca, Harms, & Burgoon, 2003). He elaborated that if there was a reciprocal sense of presence between people, co-presence existed. He further spelled out that all aspects of co-presence can only be completely felt by people when they "sense that they are close enough to be perceived in whatever they are doing, including their experiencing of others, and close enough to be perceived in this sensing of being

perceived” (Goffman, 1959, p. 17). In addition, Goffman (1959) points out that co-presence “implies the reception of embodied messages” (p. 15).

Awareness of others and using basic senses, forms the basis of co-presence. The other’s body plays a central role in helping the user internalize their being and the presence of the other. The presence of another is represented by an agent, avatar or other simple device in a mediated interaction (Cassell, Sullivan, Prevost, & Churchill, 2000). Technology enhances a user’s the senses to a certain extent. The user generates an outline of the other upon their representation. This senses-based outline varies by degrees on a continuum (Biocca, Harms, & Burgoon, 2003).

According to the argument put forward by Biocca, Harms and Burgoon (2003), there is a relationship between some attributes of tele-presence and those definitions of co-presence that stress upon the feeling of sharing the same virtual environment. Many researchers purport that various forms of social presence imply the same place (Mason, 1994; McLeod, Baron, Marti, & Yoon, 1997; Sallnas, Rassmus-grohn, & Sjostrom, 2000). Co-presence and spatial presence have a few common attributes, the foremost of which is sharing the same space.

Goffman (1963) highlighted the sensory attributes of virtual environments and said that co-presence was also a sense of awareness shared by individuals sharing the same space. Specifically, “co-presence consisted of two dimensions: having a sense of feeling of other individuals, perceiving others and having a sense of feeling that others were actively perceiving us, as part of a group” (Bulu, 2012, p. 2).

Definitions of co-presence, when considering a user’s awareness of the mediated presence of another and the physical attributes of this person, incorporate the realm of mutual awareness (Biocca, Harms, & Burgoon, 2003). The user is cognizant of the presence of the other, and vice versa (Biocca, Harms, & Burgoon, 2003). This definition can be extended to incorporate types of co-presence that propose that mutual awareness has the meaning of being ‘together’ (de Greef & IJsselsteijn, 2000; Ho, Basdogan, Slater, Durlach, & Srinivasan, 1998). Taking this meaning, users are conscious of others occupying the same virtual space, and mutual awareness is considered to be at the core of social presence (Biocca, Harms, & Burgoon, 2003).

According to Nowak (2001), one can assess the capability of a medium to connect minds based on user reports of captivation and involvement. This indicates the correlation between social presence and co-presence. Social presence and perceived co-presence raise the same questions: how do users perceive the medium and their partner's involvement? How one views the involvement of their partner has an effect on their sense of presence in the environment. This emphasizes the significance of sense of presence, and provides insight into the capability of a media when it comes to connecting minds, thus in evaluating interface and design.

There are some concepts common to both co-presence and social constructs, such as mutual awareness, mutual understanding, immediacy and intimacy. This section gives consideration to the similarities and differences between co-presence and these social constructs (see Figure 2-2).

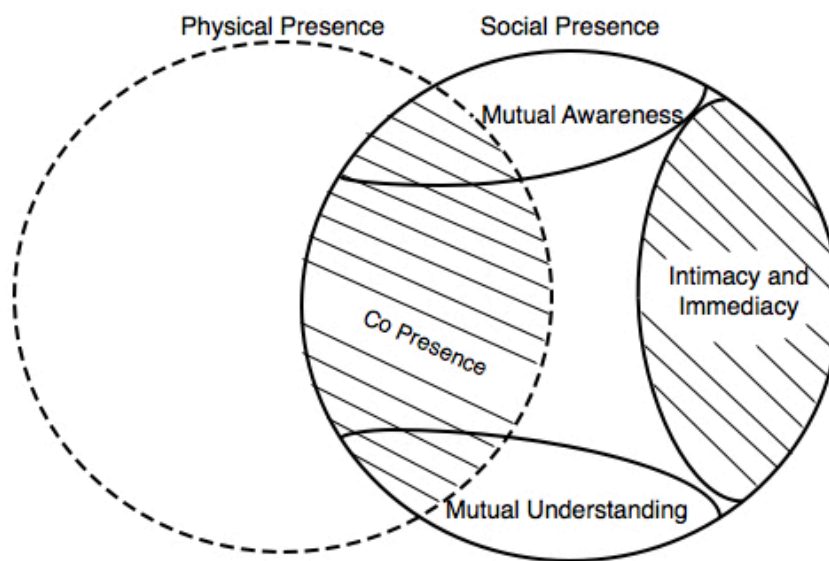


FIGURE 2-2 COMPONENTS OF SOCIAL PRESENCE

### 2.2.3 Mutual awareness

The realm of mutual awareness and definitions of co-presence merge when there is an emphasis on sensory attributes of the other. This is true for the awareness of the individuals involved: the user and the mediated other. Both of them are mutually aware of each other. Goffman (1963) contends that co-presence is much more than 'being in the same place' and that it encompasses mutual attention and awareness. Biocca, Harms

and Burgoon (2003) say, “Co-presence renders persons uniquely accessible, available and subject to one another” (p. 22).

In the light of co-presence definitions, the reactions of others verifies their existence as well as the awareness of them. These reactions also point toward their roots in symbolic interactionism, specifically in the idea that the response of the other defines the self. According to the definition by Heeter (1989), the reaction of the other to the user or the ‘self’ accompanies the awareness of the “existence of the other”. This view of co-presence every so often extends to the wider types of co-presence, according to which the phrase ‘being together’ defines mutual awareness (Biocca, Harms, & Burgoon, 2003).

According to Nowak (1999) and Ciolek (1982), awareness in terms of responsiveness and attention to others marks the essence of co-presence. People keep track of whether or not others are paying attention to them and reciprocate by being social and giving attention to them in return. They build a model specifying the attention allocated to them by others as part of the shared attention mechanism proposed by Baron-Cohen (1994) and Baron-Cohen and Swettenham, (1996). Social presence, like shared attentional mechanism, might also involve allocating attention to others when we view social presence from the perspective of access to the minds of others (Baron-Cohen & Swettenham, 1996).

According to Baron-Cohen (1996), this ‘special purpose neurocognitive mechanism’ is of prime significance in modelling the mind of the other and holds more importance than developing a theory of mind. Finally, it may not be possible to reach the zenith of co-presence if the actors involved in a mediated environment don’t respond to and become aware of what others are doing (Biocca & Harms, 2002).

#### **2.2.4 Mutual understanding**

The aspect of social presence has been further emphasized by Nowak (2000), who measured social presence by utilizing attitudinal and perceptions of emotional similarity. Despite the problem that social presence can be felt even in the absence of any similarity in views, it is relevant to note that it is possible to reach at least some

degree of mutual understanding irrespective of the limitations posed by the medium (Biocca, Harms, & Burgoon, 2003).

Considering the dynamic nature of mediated social interactions, social presence and one's mental image of the other have to be evolutionary in nature. This argument leads to the idea that a sense must develop to understand the other which may be mutual in instances of higher social presence (Biocca, Harms, & Burgoon, 2003). According to Savicki & Kelley (2000), the capacity to portray oneself, despite restraints posed by the medium, is at the heart of social presence.

### **2.2.5 Intimacy and immediacy**

The communication behaviours that can diminish the physical or psychological distance among people are called immediate behaviours (Andersen, Andersen, & Jensen, 1979). The origins of the contemporary concept of immediacy are found in the works of Mehrabian (1966), Mehrabian (1971) and Mehrabian (1981). Mehrabian initially studied linguistic or verbal immediacy, but later shifted the focus to nonverbal immediacy. Mehrabian (1971) formed his immediacy principle from his initial research, according to which "people are drawn toward persons and things they like, they evaluate highly, and prefer; they avoid or move away from things they dislike, evaluate negatively, or do not prefer" (as quoted in Richmond, McCroskey, & Johnson, 2003, p.1). This principle of immediacy was later amended by Richmond and McCroskey (2000).

Richmond and McCroskey (2000) use a distinct 'immediacy causes liking' method (the psychological motivations behind the behaviour) in their research. According to their 'principle of immediate communication,' communicators govern the responses of the receivers by assuming control of immediacy behaviours (Richmond, McCroskey, & Johnson, 2003). They propose that "the more communicators employ immediate behaviours, the more others will like, evaluate highly, and prefer such communicators; and the less communicators employ immediate behaviours, the more others will dislike, evaluate negatively, and reject such communicators" (p. 212).

Palmer (1995) finds a connection between presence and different facets of psychological presence, namely 'immediacy,' 'intimacy,' and 'involvement'. These

terms are normally used to explain behaviour, however, they also explain “a cognitive state in which individuals feel more or less directly ‘present’ in the interaction” (as quoted in Biocca, Harms, & Burgoon, 2003, p. 464). Similarly, before Palmer, Rice (1993) reiterated the classic claim of Short et al. (1976) about social psychology that social presence “is fundamentally related to two social psychology concepts: intimacy and immediacy” (p.72), Mehrabian (1972) applied these concepts to investigate the dynamics of nonverbal communication in interpersonal communication in his work on social psychology.

Weiner and Mehrabian (1968) describe immediacy as the extent to which communicators and receivers feel psychologically close to each other. The concept of immediacy behaviour is further extended by de Kort, IJsselstein, and Poels (2007) and defined as “interpersonal awareness, involvement and engagement as a result of a complex interplay of compensatory and reciprocal behaviours, which involves verbal communication as well as interpersonal distance, body orientation, gestures, and gaze direction” (p. 197). Immediate behaviour leads to less distant communications involving touching, direct body orientations and movements, and making eye contact. Immediate behaviours also promote closeness and motivate others to be more open and make disclosures (LaRose & Whitten, 2000; Mehrabian, 1981; Symons, 1996).

Nonverbal immediacy behaviour is called ‘intimacy’ (Mehrabian, 1971). There are three ways to define intimacy behaviours, according to Mehrabian (1971). These three ways complement each other. 1) They are instrumental in increasing sensory stimulation. Furthermore, multi-channelling is their distinctive characteristic. 2) They are expressive behaviours conveying attention and availability. Goffman (1966) views them as behaviour sets that convey social accessibility. 3) Whenever immediacy behaviours become intense or increase in number, they give rise to interpersonal intimacy and bring interaction partners close to each other (Andersen, 1979; Andersen, Andersen, & Jensen, 1979; Exline & Winters, 1965; Mehrabian, 1971) in relationships that show positive valence. Therefore, those approach behaviours can be referred to as immediacy behaviours, which form closeness in interpersonal communications and promote sensory stimulation (Andersen, Andersen, & Jensen, 1979).

In spite of the absence of gestures, eye contact and smiling in online communications, unlike face-to-face interactions, some alternatives are available to create a secure psychological environment and thus a sense of social presence to motivate users to become involved. These alternatives include quick responses, a friendly tone, sharing personal experiences or examples, and online postings using first names (Swan & Richardson, 2003).

### 2.2.5.1 Categorization of factors affecting presence

Four vital categories of factors, namely: control factors, realism factors, distraction factors and sensory factors (see Figure 2-3), have been recognised by Witmer and Singer (1998) on the basis of the work done by Sheridan (1992), and Held and Durlach (1992). They pointed toward the possibility of an indirect effect that these factors might have on presence. These factors might affect immersion and involvement, which might, in turn, affect presence.

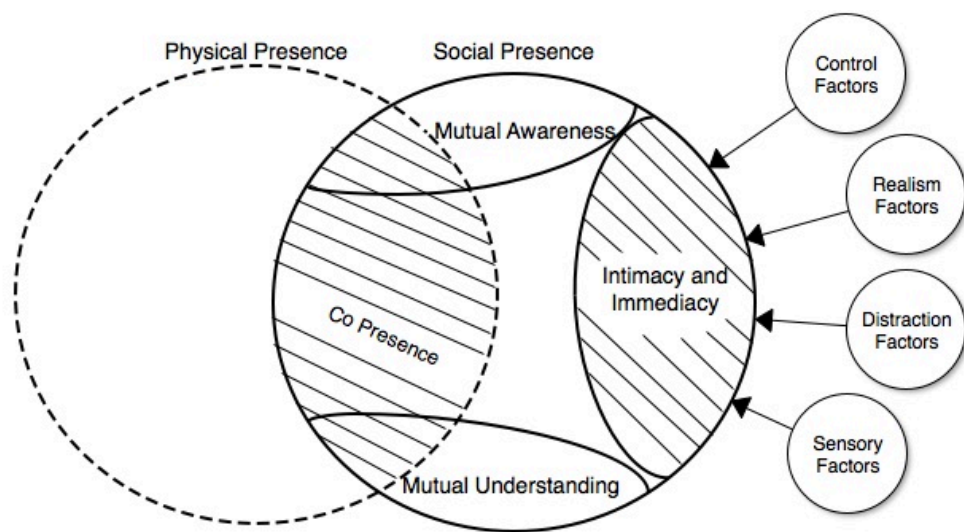


FIGURE 2-3 FACTORS AFFECTING SOCIAL PRESENCE

**1. Control factors:** Degree, mode and immediacy of control are crucial in determining the sense of presence users feel. The sense of presence increases when users control the interaction in a mediated environment. Participants feel more present in the environment if they feel in control of the interaction and consider the interaction natural (Rozendaal, Braat, & Wensveen, 2010). In addition, the immediacy of control increases the sense of presence. If a user carries out actions in an online shopping environment and there is considerable delay in experiencing the consequences of that action, the



sense of presence diminishes (Rozendaal, Braat, & Wensveen, 2010). Physical adaptability of the environment helps in increasing the sense of presence. Participants feel more present if they can alter or change things in the environment (Casanueva & Blake, 2001). Finally, the greater the ability of participants to anticipate what is coming, the greater the sense of presence they experience.

**2. *Realism factors:*** Different attributes like light, colours and content affect the feeling of reality in a scene, which, in turn, affects the sense of presence. Witmer and Singer (1998) argue against the requirement of real-world content. If the virtual environment is supposed to replicate the real world, and the actions of the users are influenced specifically by the presence or absence of physical laws, eliminating them may diminish presence.

**3. *Distraction factors:*** Insulating the participants from the distractions of the physical environment around them could increase the sense of presence. For instance, users would feel more present in the virtual environment if head-mounted displays were introduced instead of traditional computer monitors. This is because a head-mounted display would work in isolation from the real world. Interface devices that are not natural and disrupt interactions can cause a decrease in the sense of presence felt by a user in a mediated environment (Held & Durlach, 1992). Focused attention on the stimuli presented by the virtual environment can increase the sense of presence felt by participants.

**4. *Sensory factors*** and richness of the environment: The sense of presence increases if the environment conveys a sufficient amount of information. Therefore, a high amount of sensory information should give users a strong sense of presence (Casanueva & Blake, 2001). It is also important that the information presented appeals to and stimulates the senses concurrently. The presentation and consistency of multimodal information increase the sense of presence.

#### **2.2.6 The social cues**

As discussed before, the theory of social presence argues that “the media differ in the amount of social presence they afford” (Zhu, Jiang, & Benbasat, 2006, p. 2). It assumes that socially rich media convey all sorts of social clues, which encompass speech as

well as information conveyed in a non-verbal way through facial expression, posture, gestures and tone of voice, which all impart a degree of significance during an interaction (Zhu, Jiang, & Benbasat, 2006). Although current e-commerce websites do not support the actual interaction between its online users, this is not to say that social presence cannot be introduced in a number of ways into retail websites.

A few studies examine the perception of social presence on e-commerce websites by adding photos of smiling people which are believed to provide a feeling of human contact that is friendly and personal. Their evidence shows the positive effect of the use of text and images that are rich with social meaning on the perception of social presence by users, and the resulting change in their attitude (Hassanein & Head, 2007).

It is generally agreed that even though people cannot be physically present when carrying out shopping online, it is possible to create a feeling of social presence. There are many different approaches for building a sense of social presence on a retailer's website. One is through such social features as welcoming users by name when they connect to the website, and also by allowing online users to personalise the website (Gefen & Straub, 2004).

Previous research on social presence involved in video conferencing and application sharing (Bradner & Mark, 2001) suggests that the visual communication cues conveyed by video, in contrast to non-verbal ones, have an effect on the interaction. Also, there is evidence that video chat enhances the ability to demonstrate empathy, convey attitudes, and predict how the other person will respond. The media of video conferencing and application sharing are both able to present important information which assists in collaborative engagements between two or more people. Video conferencing provides information about a collaborative partner involved in video communication such as facial expression, direction and length of gaze, and body positions and movements. Application sharing presents data about the task the users are involved in, e.g. the cursor movements of users can appear on each other's screens (Bradner & Mark, 2001).

Video conferencing has been demonstrated as an effective communication medium, which would significantly impact the performance of collaborators involved in a single task. People engaged in application sharing (which is like co-browsing) also described

their feelings of being ‘inhibited’ or ‘exposed’ to others (Bradner & Mark, 2001). They described their feeling of being exposed based on the fact that their action could be viewed by the people in a group. In other words, the sense of social presence is salient when application sharing is used; however, the visible cues are not available to confirm the presence of others.

Physical features are instrumental in making and classifying mental models of people under natural and unmediated circumstances (Argyle, 1975). Similarly, the physical attributes of a person are used for recognition in unmediated interactions (Ichheiser, 1970). Hence, in a simulated environment, people’s perception of and response to the mediated environment can be affected by the physical characteristics of a virtual image. The perceived reality of the environment and presence of people is enhanced by the visual presentation of them (Taylor, 2002). Enhancement of the feeling of togetherness and the presence of others is the driving force behind equipping virtual environments with better visual presentation (Benford, Greenhalgh, Rodden, & Pycock, 2001).

One of the communication tools which is being widely used in the virtual environment is text-based CMC. Despite the potential of communication technologies such as synchronous text-based CMC to provide the means to create the sense of social presence and facilitate social interactions in online shopping environments, lean media of this type cannot provide non-verbal and contextual information, to their detriment. Most of the non-verbal cues that enhance communication of a face-to-face kind are not present in text-based CMC, such as people’s location in space, posture, body movements, facial expression and eye contact. In addition, users generally suffer from a very minimal awareness of the presence of others, ‘who may silently lurk in text-based environments’ (Redfern & Naughton, 2002). Although text-based conversation is not comparable with the level of interaction exists in face-to-face communication, it still could develop the sense of social presence within an online shopping environment. In fact, asynchronous text-based CMC can be used as a communication tool which supports social interaction and participation among online users at a very low level.

Two different communication resources which have been used in the online gaming environment are talk and text. In the traditional form of gaming, gamers communicate through a text-based channel. But a recent development in online multiplayer gaming is

integrating voice over IP technology, which is Internet-based audio conferencing. This new channel of communication has allowed gamers to speak to each other and listen to other gamers over a headset. This mainly helps when group of gamers wish to connect with each other through the voice channel while they are performing other game activities and both their hands are occupied with the control devices (e.g. keyboard or console).

The major differences between these two sorts of media are: 'talk is immediate,' and speakers can get confirmation from their audience from the reply they receive that they have been heard and there is a shared understanding of what they say. Successful talk implies 'grounding,' while text may not be picked up by the audience, and may not be 'grounded' (Halloran, Rogers, & Fitzpatrick, 2003). The previous study of online gaming found that talk is critical to game performance and that voice communication is used for several reasons, including sharing game-goals, discussing game strategy, asking or offering assistance.

A study of online gaming (Choi & Kim, 2004) emphasises the importance of designing effective social interaction in video games. It differentiated aspects of social interaction into places for communication and tools for communication. Applying this to the online shopping context means that places for communication are where co-shoppers can get together in an online situation, and tools are the features of a website which enable interactions between them to occur (Choi & Kim, 2004).

There is an agreement among many scholars about the importance and persuasiveness of nonverbal messages compared to verbal messages (Birdwhistell, 1970; Grant & Hennings, 1971; Mehrabian, 1972). Watzlawick, Beavin, and Jackson (1967) contend that nonverbal messages are predominant in relationships. Argyle and Dean (1965) further argue that the exchange of nonverbal messages between communication partners is necessary to cultivate and develop a relationship because nonverbal behaviours convey openness of channels, availability and access. Besides, the behaviours denoting interpersonal closeness are effective in conveying positive relational cues and promoting relationship maintenance (Mehrabian & Friar, 1969; Mehrabian & Ksionsky, 1970).

It is very important to consider how perception of the other person and the medium is influenced by features embedded in the online shop interface. This interface should create the sense of togetherness and connectedness. It provides people with the opportunity to create a focused connection, resulting in purposeful interactions (Nowak, 2001). It is important to explore the use and effects of new technologies in the online shopping interface. New collaborative social technologies could facilitate synchronous communication between remotely located customers to assist them in engaging in conversation. This could be text chat, voice chat or video chat conversation, by means of which they are able to share ideas and opinions about products and services, and potentially will lead to better purchase decisions

For accomplishing specific online tasks, configurations of multimedia systems have to be customised according to the tasks (Sellen, 1995). When such customisation is carried out, appropriate media have to be provided in order to achieve the goals related to the task in an effective manner, by providing a data and information exchange facility to the user in addition to the interpersonal communication experience. How different media was selected and customised according to the experimental task and goals is discussed and presented in chapter 5 ‘experimental procedure’.

### **2.3 Chapter summary**

This chapter presented the theoretical foundation of social presence relevant to online shopping experiences. The definition of social presence was reviewed from different perspectives, as well as a number of theories concerning social presence. The two relevant theories of media richness theory and social affordance theory were further discussed. This research focused mainly on those social presence theories which are centred on the concept of ‘media appropriateness’. According to media richness theory, the communication medium which conveys a higher level of communication cues, including voice, facial expression and eye contact, results in a higher level of social presence. Social affordance theory emphasises the influence of the physical features of a user interface on the sociality involved in user interaction. This interface should create a sense of togetherness and connectedness.

Social presence, as studied in this research, was considered as a multi-faceted concept. The varying dimensions of social presence were reviewed in this chapter, divided into three broad groups of physical, social and co-presence, the latter being at the intersection of physical and social presence. The differences, similarities and correlation between these three dimensions of presence were explored and discussed. It was found from the literature survey that physical presence is independent from social presence. The key distinguishing features of social and tele-presence were found to be psychological involvement and the intelligence of the entities involved in an interaction. It was decided not to examine tele-presence, as it is related to the study of VR, which was not the focus of this research.

Social presence was further explored and four major components were identified. The selected components include co-presence, mutual awareness, mutual understanding, intimacy and immediacy. These components were further examined in chapter 4, 'design of experiment,' to create a newly developed set of quantitative measurements. The new social presence measurements are a contribution of this research and are highlighted in chapter 4.

In addition, the four key factors influencing social presence were identified and discussed. These factors were further explored in chapter 3 and chapter 4 to develop the research model and design the experiment. Then social cues conveyed by different media, including verbal information and non-verbal information, were reviewed from the study of e-learning and video gaming. It was found from the literature survey that video conferencing and co-browsing are two effective mediums, which together produce the greatest sense of presence. Video communication provides social cues such as facial expressions, gestures, eye gaze, and body position, and co-browsing provides information about the task, e.g. the cursor movements of a remotely connected partner. These findings are then used in chapter 4, 'design of experiment,' to build two levels (low and high) of social presence in experimental environments.

## CHAPTER THREE

### **3 Research model and hypothesis development of social presence in online shopping experience**

This chapter presents the hypotheses and the research model developed in this study. This model is built upon the findings of related studies, which examined the effect of social presence on customers' loyalty, trust and purchase intention. The research model of this thesis expands the previous models by adding more variables such as usability, user control, perceived involvement, engagement and interactivity, as well as customers' shopping behaviour.

In order to draw hypotheses, the literature survey was conducted on the relationship between social presence and online customers' shopping experiences and shopping behaviour. 'Shopping experience' in this study refers to the experienced involvement, engagement and interactivity with the shopping channel. 'Customers' shopping behaviour' refers to search, purchase decision and purchase intent.

Also, in order to investigate the proposed hypotheses, the primary components of involvement, engagement and interactivity are reviewed and identified, as relevant to this study. These components were then used in chapter 4, 'design of experiment,' to develop a novel quantitative measurement survey to assess the level of corresponding variables.

The key variables, which have an effect on customers' shopping experiences and shopping behaviour, but were excluded from the research model and the design of the experiment, are identified from the literature survey. Identifying these variables is critical when it comes to designing an experiment because all variables that could have an effect on dependent variables which are not part of the design of the experiment should remain constant in all experimental conditions. The identified variables and their relationship with the dependent variables are discussed in this chapter and they are summarised under 'control variables' in chapter 4 'design of experiment'.

The role of involvement in customers' shopping experience and the relationship between social presence and experienced involvement is discussed and presented in the next section. The chapter continues with the importance of customers' experienced engagement and the impact that usability and social presence could have on perceived engagement. Interactivity of the shopping channel is then discussed as a third variable that could be affected by various levels of social presence and user control. Customers' shopping behaviour, including search, purchase decision and purchase intent, is discussed at the end of this chapter, with the relevant hypotheses drawn from the discussion. This chapter concludes with the chapter summary.

### **3.1 Increased level of social presence improves customers' shopping experience**

One of the key questions this research tries to answer is 'whether an increased level of social presence improves customers' online shopping experiences' To be able to answer this question, the online shopping experience of customers needed to be split into measureable components relevant to this research. The three major components selected were experienced involvement, engagement and interactivity. The reason these three variables were selected was because of the significant roles they play in making a shopping experience for online customers a rewarding experience, and also the effect they could have on customers' behaviour towards the shopping channel. It is hypothesised in this research that a highly engaged customer is affectively involved and motivated to revisit and purchase from the channel.

#### **3.1.1 Perceived involvement**

Shopping involvement is important because the more interested potential customers are in the experience, whether it be in a physical location or via the Internet, the greater the tendency to share this positive experience with their family and friends (Lueg J. E., Ponder, Beatty, & Capella, 2006). Shopping channel involvement, based on Zaichkowsky's (1985) generalised definition, is a "person's perceived personal relevance of the shopping channel based on inherent needs, values, and interests" (as quoted in Lueg J. E., Ponder, Beatty, & Capella, 2006, p. 141). Mitchell (1979) sees involvement as the degree of interest or motivation brought about by a specific situation or stimulus.



The studies of Mangleburg, Doney, and Bristol (2004), and Hassanein and Head (2007) on the social influence of shopping with friends, underlined the role of involvement with the shopping channel. These studies indicated that such involvement has a significant impact on the satisfaction of customers and leads to more time involved in the activity, increased spending and increased unplanned purchasing. Likewise Novak, Hoffman and Yung (2000), confirmed a positive relationship between involvement and overall customer shopping experiences. Wakefield & Baker (1998) found that shopping involvement has a positive effect on wanting to remain longer in the shopping location. Furthermore, more involvement results in more complete processing of information by consumers (Chandrashekar & Grewal, 2003).

Consumer socialisation plays an important role in the shopping time adolescents spend across shopping channels. Previous research on adult consumers in the traditional shopping mall found that consumers who shop in groups explore larger areas of the shopping mall. They spend more time in stores, purchase more goods and spend more money than when shopping alone (Mangleburg, Doney, & Bristol, 2004). The motivations of sharing the shopping experience with ‘purchase pals’ can be categorised into: 1) assistance, which means providing support to effectively evaluate products and make better decisions, and 2) socialising, which means getting involved in shopping activities for fun and enjoyment (Mangleburg, Doney, & Bristol, 2004). Roy (1994) found that if leisure is the reason for visiting a mall, this results in greater frequency of shopping.

According to customers’ socialisation theory, social interaction with fellow-shoppers results in sharing information about the channel and enticing others to visit the channel. This social interaction was found to be a promising socialisation factor which affects customers’ shopping behaviour across all channels (Lueg, Ponder, Beatty, & Capella, 2006). According to Lueg et al. (2006) social interaction is significantly important when it comes to the time shoppers spend online or at the shopping mall. Greater shopping time<sup>3</sup> invites users toward impulsive buying in the channel (Hoch & Loewenstein, 1991). It also influences customers’ intentions to buy, and spending level. In addition,

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<sup>3</sup> The time spent on searching and evaluating products or services refers to shopping time.

Peracchio (1992) stated that the comfort level of the consumer with the shopping channel increases with the rise of shopping time.

A study by Lueg et al (2006) discovered elements associated with customer socialisation both online and at shopping malls (Lueg, Ponder, Beatty, & Capella, 2006). These factors include time spent on the shopping channel and purchase intent. They observed that users' spend level and purchase intent is affected by interaction with fellow-shoppers at the shopping mall. Tootelian and Gaedeke (1992) discovered that when it comes to purchasing goods, recommendations by friends or relatives get priority over recommendation systems integrated into online shops.

The better customer experience can be achieved with greater experienced involvement. More involvement with the shopping channel results in more time shoppers spend to explore and experience the channel. Users' experienced involvement is renewed and reinforced if they feel that there is more substance in the content of the shop to explore. According to Richard (2005), users are prompted to become involved in the website content if the interface is vibrant and interactive. Interactivity and immersion in online communications have reasserted the importance of involvement (Childers, Carr, Peck, & Carson, 2001; Hoffman & Novak, 1996; Richard, 2005).

Without shopping involvement (as 'personal relevance' defined by Zaichkowsky's (1985) or 'interest' defined by Mitchell (1979)), buyers show less intention towards purchasing from the channel. Since involvement with the shopping channel is influenced by customers' social interaction about the channel, and the increased level of involvement has a great influence on customers' shopping behaviour, the possible relationship between social presence and perceived involvement is hypothesised as below (see Figure 3-1):

### **Hypotheses:**

- ***H1.1:*** *Increased level of social presence will result in higher level of involvement with the shopping channel*
- ***H1.2:*** *Increased level of shopping involvement positively relates to perceived engagement and perceived interactivity*

- **H1.3:** Increased level of shopping involvement positively relates to customers' search and purchase decision behaviour
- **H1.4:** Increased level of shopping involvement with the shopping channel will result in increased future intentions and perceived benefit

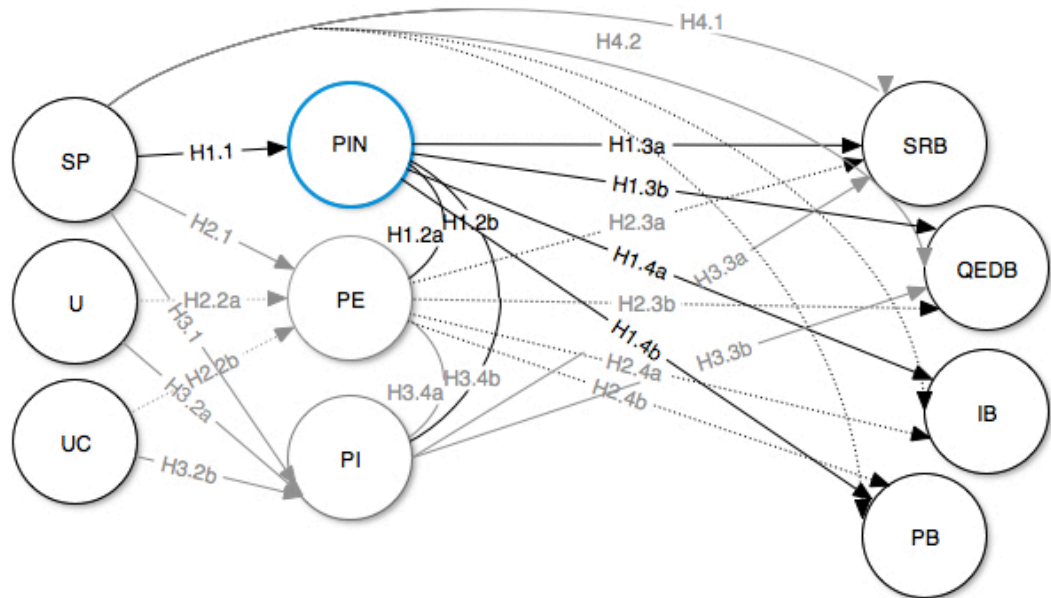


FIGURE 3-1 RESEARCH MODEL – PERCEIVED INVOLVEMENT (PIN)

This research model includes three independent and seven dependent variables. The discussed hypotheses of H1.1 – H1.4 are highlighted in the above research model. The remaining hypotheses are presented in the next sections in this chapter. Abbreviations: SP= Social Presence; U= Usability; UC= User Control; PIN= Perceived Involvement; PE= Perceived Engagement; PI= Perceived Interactivity; SRB= Search Behaviour, QEDB= Quality and Effectiveness of Decision Behaviour; IB= Intention to Buy; PB= Perceived Benefit.

### 3.1.2 Perceived engagement

Despite the effective role that engagement plays in online shopping, it has rarely been studied. Due to its emotive nature, engagement has a strong influence on bringing customers back to the website. If a user is so connected with a resource that it captivates their intellect, emotions and behaviour, either within repeated interactions or a one-time interaction, such connection is known as ‘user engagement’ (O’Brien & Toms, 2008). User engagement is not just a phenomenon that happens in a single instance of interaction, it is, rather, a relationship users build with a technological resource.

Engagement is thought to originate from ‘flow’ and that it is “flow in a more passive state,” “a subset of flow,” and “flow without user control” (Webster & Ahuja, 2006, p.665). Here, flow refers to a condition, as described by Csikszentmihalyi (1990) “in which people are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it” (as quoted in O’Brien & Toms, 2008, p. 4). Flow is a specific state of mind referring to the complete absorption of the user in the act being performed. Flow and engagement are identically positive experiences that cause users to become immersed, pay absolute attention and lose track of time during the interaction (Csikszentmihalyi, 1990). Flow and engagement share some common features like control, feedback, focused attention and interactivity.

Similarly user engagement may have some parallels with user satisfaction (Quesenbery, 2003), but user satisfaction doesn’t explain everything about user engagement and forms only a part of it (O’Brien & Toms, 2008), as suggested by the intellectual, emotional and behavioural aspects involved. The inclusion of these broader aspects in the definition of ‘user engagement’ stresses the bigger picture it represents and warrants the exploration of aspects that have not been explored or measured yet. User engagement should be taken as a qualitative experience denoting a fruitful interaction between the users and the computer (Attfield, Kazai, Lalmas, & Piwowarski, 2011).

Informational and aesthetic elements of a system interface can initiate the process of engagement. They captivate users’ attention and can push them toward engagement with the interface (O’Brien & Toms, 2008). Other elements instrumental in initiating engagement include motivation, the perception of an interaction as real, and a time limit related to using the application. Experienced sociality in interaction and group affiliation can enhance user engagement. According to a study performed by Rozendaal, Braat, & Wensveen (2010), experienced group affiliation is an important factor of user engagement and they describe as “the extent to which an individual feels a member of a social group” (p. 194).

After the point of engagement has occurred, the interest and appeal that users feel should be sustained by keeping the application appealing and interesting to users. It should make them feel attached to the interaction (O’Brien & Toms, 2008). It can be

accomplished by providing appropriate feedback, i.e. how the system is responding to their actions and making them feel connected to other people (social awareness) or to the technology (interactivity) and that they are controlling the proceedings. Therefore, the richness of social interaction and increased social awareness (social presence) becomes a source of creating positive emotions in users which can then result in higher user engagement:

**Hypothesis:**

- ***H2.1:** Increased level of social presence will result in greater users' engagement with the shopping channel*

Disengagement occurs when users terminate the use of a system, or just cease the engagement and sign off. There are several reasons for disengagement, such as distractions in the environment, while the interactivity of the application and the challenges posed by the application may be the driving forces behind disengagement. Challenge addresses the degree of effort that users think they are putting into the activity (O'Brien & Toms, 2008). The less challenge users experience, the higher the sense of engagement they feel with the shopping channel.

Disengagement can produce positive or negative emotions, determined by the outcome of the interaction. If the user feels successful because their requirements are met, disengagement has produced positive emotions. On the other hand, if users lose motivation or there is not sufficient appeal to keep using the application, disengagement produces negative feelings of uncertainty, irritation and passivity (O'Brien & Toms, 2008).

One of the challenges posed by the shopping channel, which causes disengagement could be usability issue. For example, issues with navigating the e-vendor website can result in poor user experience, low engagement with the channel and the perception of reduced control by users (O'Brien & Toms, 2008). Usability was found as a required element related to the quality of a website (Ranganathan & Ganapathy, 2002). It plays a key role in all web-based services (Flavian, Guinaliu, & Gurrea, 2006). Usefulness in regards to online shopping is defined by Dash and Saji (2008) as "the degree to which a

consumer believes that using a system from a website would provide access to useful information, comparison, and faster online shopping” (p. 36).

Extensive concept of usability concerns “the satisfaction user feels with the system along with effectiveness and user friendliness of the equipment” (Chapanis, 1991). Likewise, Gnisci, Papa, and Spedaletti (1999) considered characteristics like satisfaction and efficiency when it comes to define usability. These characteristics essentially define the inherent usability of a system (Kurosu & Kashimura, 1995) and are related with a system’s perceived benefit. Nielsen (1994) stipulates that usability relates to how easily users learn to use main features on a site and avoid errors. It is also related to how users are able to achieve their goals efficiently, effectively and to their satisfaction. According to more recent proposals, a website’s usability depends of how easy people find the interface to manage, this feature being considered one of the qualities of a site (Nielsen, 2012).

Convenience and ease of use are characteristics of a usable e-vendor who offers a seamless experience to online users. Customers appreciate the characteristics of an online shop which positively influence their sense of success. In addition, O'Brien and Toms (2008) found that perceived user control is one of the primary components of user engagement. “The page doesn’t change unless I want it to, so I’m controlling what items I’m looking at—to a certain degree. I am aware of the fact that [the online store] is desperately trying to influence those decisions, but still they are mine . . . I get to make those choices. And sometimes I won’t [purchase]” (O'Brien & Toms, 2008, p. 944). This interaction spells out the users’ need for control. Users need to perceive that they are capable and skilled enough to meet the challenges posed by specific environments.

Chapman (1997) also identified control and feedback as variables, in addition to attention, motivation, interest and aesthetic, which affect the point of engagement. Auditory, visual or tangible information about actions or their corresponding results communicated back to users is called feedback. For example, feedback from text chat, which enables remote users to interact, can be about audibility of the speaker and questions posed by people. Immediacy and mode of feedback are important elements affecting users’ engagement with the shopping channel.

Among all the factors discussed above the effect of social presence, usability and user control on experienced engagement with a shopping channel is further investigated in this study. It is tested if social interaction, perceived usability and user control has an effect on user engagement and overall shopping experiences. It is hypothesised that increased usability and user control is positively related to user engagement. Also higher user engagement results in higher purchase intention and users' satisfaction (perceived benefit) – (see Figure 3-2):

### Hypotheses:

- **H2.2:** Increased level of user control and usability associated with the shopping channel will result in higher users' engagement
- **H2.3:** Increased level of engagement with the shopping channel positively relates to customers' behaviour including search and purchase decision behaviour
- **H2.4:** Increased level of engagement with the shopping channel will result in increased future intentions and perceived benefit

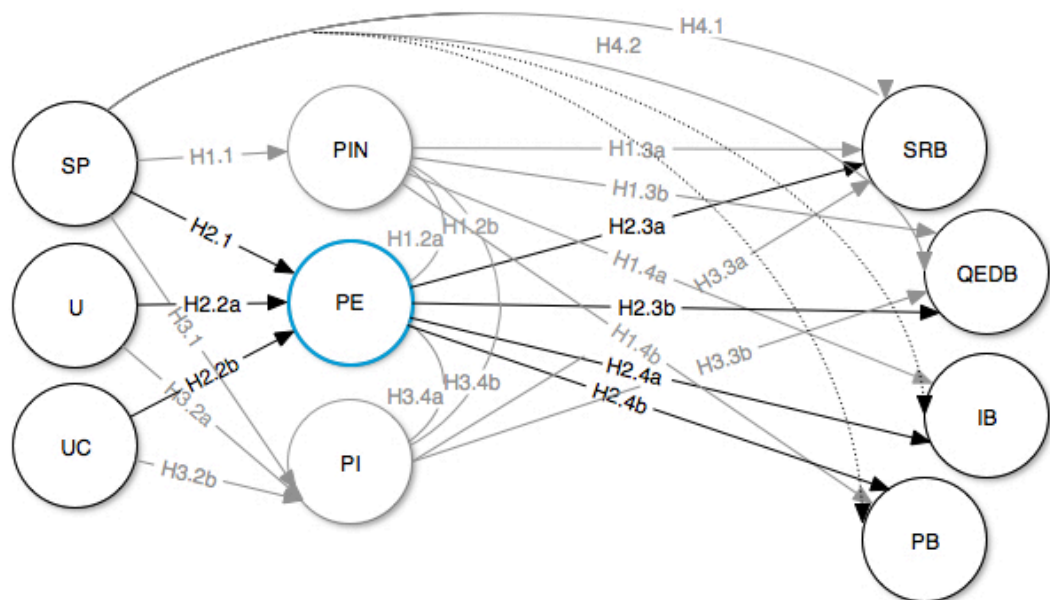


FIGURE 3-2 RESEARCH MODEL - PERCEIVED ENGAGEMENT (PE)

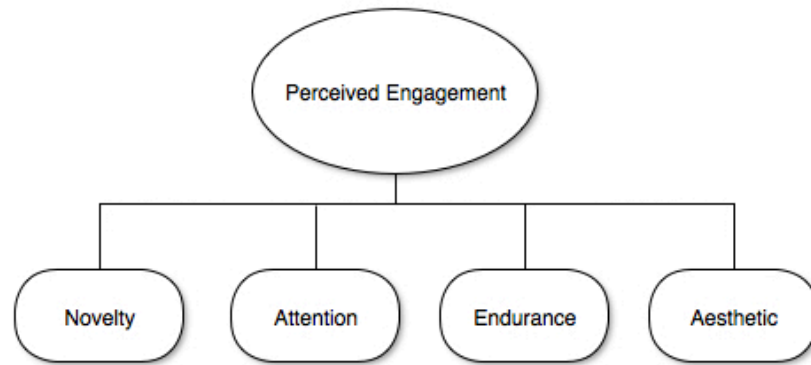
### **3.1.2.1 The key components of perceived engagement**

The primary components that build engagement was reviewed and identified by O'Brien and Toms (2008). They conducted exploratory studies in various application areas, including web searching, video games, educational web casting and online shopping, to find out how, for example, the online shopping experience could reveal more understanding about the concept of engagement. They categorized user engagement as a type of online experience that involves challenge, attentiveness, patience, positive affect, aesthetic and sensory attraction, feedback, novelty/variety, reciprocity, and perceived user control. To be able to provide online users with an engaging experience, the above attributes should be enhanced within an e-vendor website. Conversely, the lack of such attributes will result in diminishing users' engagement.

Webster and Ahuja (2004), Webster and Ho (1997) and Jacques, Preece, and Carey (1995) found that curiosity and attention, as well as novelty, challenge and feedback are attributes that characterise engagement. Similarly, Skelly et al (1994) outlined that feedback, curiosity, and challenge are the constituents of engagement (Skelly, Fries, Linnett, Nass, & Reeves, 1994). There are some other attributes, categorised by O'Brien and Toms (2008) as sensory, emotional and spatiotemporal attributes. Sensory attributes refer to interactivity and aesthetic elements, emotional refers to motivation, and spatiotemporal attributes refer to awareness (both self and external) and perception of time.

However, among all the discussed attributes of engagement, the top four components of novelty, attention, endurance and aesthetic were selected to assess the level of user engagement in this study (see Figure 3-3). Attributes such as feedback, control and challenge are considered as a form or a construct of variables tested in this study, including interactivity, user control and usability. Because the effect of these distinct variables on user engagement is investigated and also because these variables are measured individually, user engagement in this research is characterised by novelty, attention, endurance and aesthetic. From these four components, the right measurements were selected. The measurements are presented and further explored in chapter 4 'design of experiment'.





**FIGURE 3-3 KEY COMPONENTS OF PERCEIVED ENGAGEMENT**

Novelty is the tendency to lean toward captivating, new or not-so-usual elements in the surroundings. Another definition of ‘novelty’ is: unforeseen and sudden changes on the interface, which trigger users’ reaction (O’Brien, Toms, Kelloway, & Kelley, 2010). Novelty can stimulate engagement in interactive experiences because it introduces unanticipated, unknown, revealing, and novel experiences. If the design of an online shop seems captivating and appeals to users, it motivates a higher sense of engagement with the online shop (Attfield, Kazai, Lalmas, & Piwowarski, 2011).

Likewise, user attention is positively related to customer engagement with the shopping channel. ‘Attention’ refers to the concentration of mind and engrossment in an activity. Attention was evident when users felt so absorbed in online activities that they lost track of time. Such attention affects the users’ sense of time while engaged in an interactive experience (O’Brien, Toms, Kelloway, & Kelley, 2010). As a result, users underestimate the time they spend, and this increases when engagement increases. Besides time perception, attention in an engaging experience is associated with rendering people and things around irrelevant, except where engagement is, in fact, actually increased by taking part in social interaction (O’Brien & Toms, 2008; Attfield, Kazai, Lalmas, & Piwowarski, 2011).

### **3.1.3 Perceived interactivity**

Advancement in the networking technologies and their penetration into society has brought a drastic change in the design and optimization of interactive systems (Hallnas & Redstrom, 2002). Previously, interactive systems were optimized towards individual needs, however, recently they have been optimized at a group level and are therefore

designed for groups of people (Nishida, 2007). Online gaming communities are an example of a recent development of group-oriented interactive systems which allow players to interact with one another in addition to the interaction they have with the content of interactive systems (Rozendaal, Braat, & Wensveen, 2010). Also, recent design of interactive systems have replaced usability with emotionality, which focuses on elements such as fun and engagement.

Different authors have defined ‘interactivity’ from different perspectives. From the perspective of feedback, Wiener (1950) defines interactivity as a mechanism by which past performance of a system can be re-input for the purpose of controlling it. According to Williams, Rice and Rogers (1988) interactivity is “the degree to which participants in a communication process have control over, and can exchange roles in, their mutual discourse” (p. 10). Rafaeli and Sudweeks (1997) consider interactivity from the point of view of interpersonal communication and the degree to which a sequence of messages relate to the ones that come before and after, particularly to what degree subsequent messages relate to earlier messages. Communication that is in real-time, and is synchronous is key to the notion of interactivity (Kioussis, 1999; Murray, 1997; Steuer, 1992; Straubhaar & LaRose, 1996). Perceived interactivity, as it is used in this research, refers to “the degree to which the consumer perceives the website to be controllable, responsive, and synchronic” (Cui, Wang, & Xu, 2010, p. 37).

From Steuer’s (1992) point of view, an interactive medium is one which facilitates a real-time modification in the appearance and substance of a mediated environment. According to Ha & James (1998), an interactive medium fulfils the communication needs of both senders and receivers. Fortin (1997) describes the significance of communication during interactions. He defines ‘interactivity’ as the degree to which a medium of communication enables real time, or when the communication is under the control of a user in terms of timing, content and order.

The importance of interactivity was strengthened by the findings of Ghose & Dou (1998). They found websites that incorporate more interactive features are considered to be of better quality (Jee & Lee, 2002). Researchers and practitioners have found that interactivity has some main benefits for consumers and marketers. The major benefits include “facilitation of relationship marketing” (Cuneo, 1995), “creation of stronger

brand identity” (Upshaw, 1995), “greater control over information search and acquisition” (Hoffman & Novak, 1996) and “conversion of interested consumers to interactive customers” (Berthon, Pitt, & Watson, 1996) (as quoted in Jee & Lee, 2002, p. 34).

The concept of interactivity is the characteristic that distinguishes traditional media from the Internet (Coyle & Thorson, 2001; Hoffman & Novak, 1996; Pavlik, 1996). The interactivity between customers and websites has been a major subject of studies in e-commerce. However, these studies mainly examined the determinants of interactivity features of websites, such as “the structure and communication design features of websites” (Cui, Wang, & Xu, 2010, p. 37). Only a few studies on interactivity examined the relationship between social presence and the perception of interactivity in online shopping. Little is known about the influence of social interaction on customers’ perception of the interactivity of the shopping channel.

When interactivity is extended to a wider area which covers interaction between users, it is expected that even if online customers don’t get involved in direct interaction, the awareness of the presence of others can influence their shopping behaviour and how they perceive and interact with the shopping channel. Therefore it is hypothesised that increased social presence results in higher experienced interactivity with the shopping channel.

### **Hypothesis:**

- *H3.1: Increased level of social presence will result in greater perceived interactivity of an online shop*

In the interactivity literature, three items appeared to be promising in terms of examining the idea of perceived interactivity in an online situation, namely, time, control by the user, and the direction of communication (McMillan & Hwang, 2002, p. 30). However, perceived control was considered key to the notion of perceived interactivity. Cui, Wang, and Xu (2010), outlines the importance of user control in perception of interactivity. They define interactivity as “the degree to which the consumer perceives the website to be controllable, ...” (Cui, Wang, & Xu, 2010, p. 37).

Similarly Snyder-Dutch (2001) identified features, which provide high user control as key elements of interactivity. Ahren, Stromer-Galley, and Neuman (2000) and McMillan (2000) found a significant influence of multimedia functions of a website and control on interactivity. Explicit consideration of user control in defining interactivity is seen as a prominent attribute of the new media (e.g. Williams, Rice, & Rogers, 1988; Fortin, 1997; Bezjian-Avery, Calder, & Iacobocci, 1998).

Websites are interactive in nature and therefore they provide users with a framework to control the interaction (Hoffman & Novak, 1996). According to the definition proposed by Heeter (1989), 'user control' is "the degree to which users can add information to the system that a mass undifferentiated audience can access". (as quoted in Mahmoud & Auter, 2009, p. 18). The perceived control, as Van, Krooshoop, Verhoeven, and Pruyn (2012) described in the context of online shopping, is "the degree to which the environment facilitates goal achievement" (p. 1127). According to Wu (2006) "a consumer's perceived control over the interaction process reflects his or her ability or confidence in performing related activities" (p. 92).

Heeter (1989) argues that there is a link between user control and the simplicity of adding information and the minimal efforts users require to accomplish a task on the website. Ajzen (1988) defined 'perceived behavioural control' as "the perceived ease or difficulty of performing a behaviour and it is assumed to reflect past experience as well as anticipated obstacles" (p. 132). Bandura (1977) argues that behavioural control is users' perception of self-adequacy in an interaction. In other words, the increased perceived behavioural control instils confidence in users while performing multiple tasks such as site navigation, accessing content and taking part in an interaction with one or multiple users (Wu, 2006).

In this study, the effect of distributed user control between subjects on perceived interactivity, involvement and engagement is investigated. As discussed previously, perceived control was found central to the concept of perceived interactivity. Therefore, it is hypothesised that increased user control is positively related to higher experienced interactivity with the shopping channel. Also it is hypothesised that increased user control and interactivity results in higher experienced involvement and engagement (see Figure 3-4).

### Hypothesis:

- **H3.2:** Increased level of user control and usability associated with the shopping channel will result in greater perceived interactivity
- **H3.3:** Increased level of perceived interactivity positively relates to customers' behaviour including search and purchase decision behaviour
- **H3.4:** Increased level of perceived interactivity positively relates to perceived engagement and perceived involvement

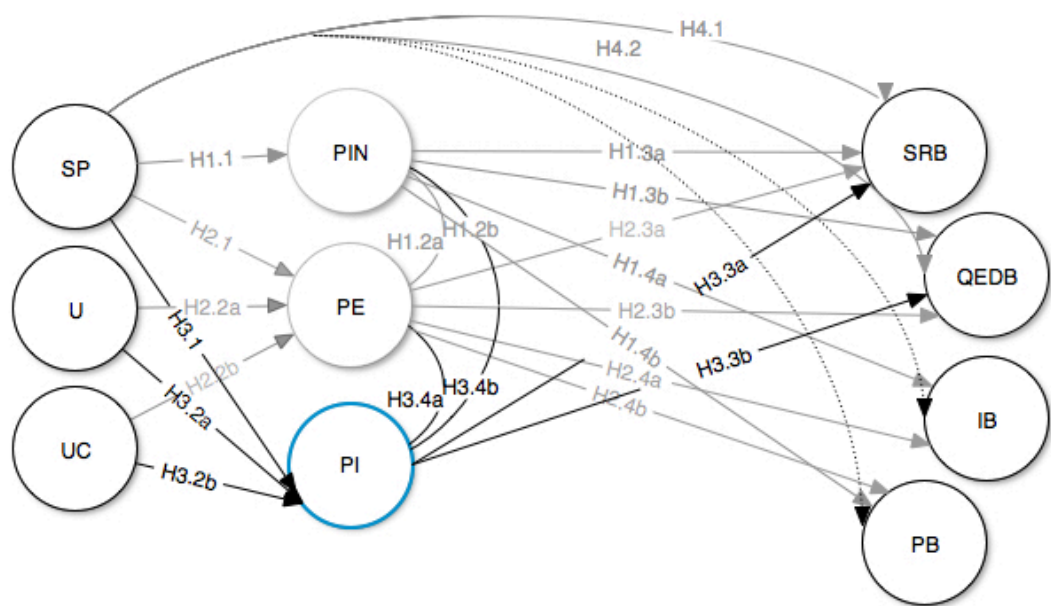
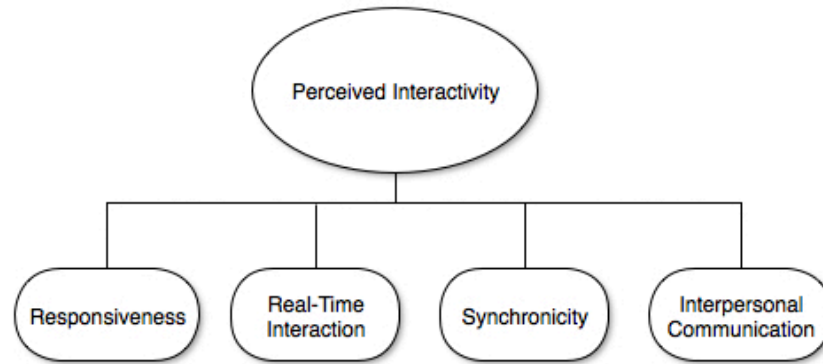


FIGURE 3-4 RESEARCH MODEL – PERCEIVED INTERACTIVITY (PI)

#### 3.1.3.1 The key components of perceived interactivity

Perceived interactivity, as it is used in this research, refers to “the degree to which the consumer perceives the website to be controllable, responsive, and synchronic” (Cui, Wang, & Xu, 2010, p. 37). The varying dimensionality of perceived interactivity is reviewed in this section to identify the primary components, including ‘responsiveness,’ ‘real-time interactions,’ ‘synchronicity’ and ‘interpersonal communication’ (see Figure 3-5). From the identified constructs, a new set of subjective measurements is developed to assess the level of perceived interactivity in chapter 4 ‘design of experiment’.



**FIGURE 3-5 KEY COMPONENTS OF PERCEIVED INTERACTIVITY**

Several studies surveyed key components that make up and influence interactivity. Dholakia, Zhao, Dholakia, and Fortin (2000) proposed six dimensions of interactivity, namely: responsiveness, personalisation, playfulness, real time interaction, connectedness, and user control. Downes and McMillan (2000) qualitatively examined interactivity to come up with six aspects including flexibility of timing, level of responsiveness, level of control, sense of place, perceived purpose of communication and direction of communication. Similarly, Coyle and Thorson (2001) studied interactivity from a functional perspective and determined three dimensions as speed, user control and mapping.

Hanssen, Jankowski and Etienne (1996) outlined three components including responsiveness, equality and functional communicative environment to define interactivity. Straubhaar and Larose (1996) use the word “interactivity” to mean situations in which “real-time feedback is collected” (p. 12). Lombard and Ahren, Stromer-Galley and Neuman, (2000) suggested features, which facilitate two-way communication. Novak, Hoffman, and Yung (2000) observed that the required interaction time is the key component. Aoki (2000) categorised interaction time into synchronous and asynchronous. She further argued that the instruments required to measure interactivity include “... the immediacy of responses, and the degree of personalization or customization” (p. 5).

Williams, Rice and Rogers (1988) found that perceptions of online interactivity are affected by the speed of communication and who is able to process messages. According to Crawford (1990), ‘interactivity’ refers to the connection between

messages and responses. Similarly, this aspect of interactivity was emphasised by Rafaeli and Sudweeks (1997). They described interactivity as the degree to which messages in the same sequence show a relationship to each other, in particular, how successful subsequent messages were in recalling the relatedness of earlier messages. Similarly, Deighton (1996) stressed the ability to relate to a particular person and the ease of collecting and remembering responses in order to be able to engage in a ‘conversation’ with that person.

Wu (2000) underlined perceived responsiveness, perceived control and perceived personalisation as dimensions of interactivity. This study was taken as a foundation by Sohn and Lee (2005) in identifying responsiveness, control and interaction efficacy as three compound variables of interactivity. Wu (2000) used a scale consisting of nine items reflecting multiple dimensions (perceived responsiveness, control and personalisation) of perceived interactivity.

Although several key components of perceived interactivity were identified in the literature survey, the four primary components were further studied in this research, including responsiveness, real time interaction, interpersonal communication and synchronicity (see Figure 3-5). They are central to the concept of perceived interactivity. They are instrumental in assessing how perceived interactivity is influenced by sense of presence and social features. Cui et al (2010) suggested perceived responsiveness “reflects the direction of the communication; and perceived synchronicity includes both feedback and timeliness” (p. 37). The significance of synchronicity has been long established in interactivity literature (Dholakia, Zhao, Dholakia, & Fortin, 2000; Ha & James, 1998; Liu, 2003; McMillan & Hwang, 2002).

**1. Responsiveness:** Perception of responsiveness refers to how fast and relevant an interactive system responds to users’ input. Consumers can measure responsiveness from either direct or indirect communication. They can do so by responding to an email in a direct form of communication, or by changes in the environment resulting from certain actions (Dholakia, Zhao, Dholakia, & Fortin, 2000). Users’ perception of responsiveness is affected by three entities when it comes to an interaction with a website. These entities are: other online users, the website itself and site navigation. Consumers expect the website to respond within a certain time period. How fast a web

site responds to users' input affects users' perception of responsiveness (Wu & Wu, 2006).

**2. Real time interactions:** Real time interaction is the key in defining interactivity, as proposed by Steuer (1992), and it refers to fast response time or speedy communication. Fortin and Dholakia (2005), however, argued that not every interactive interaction has to take place in real time. In his view, interactive interaction can happen “either in real time (as in video teleconferencing) or on a store-and-forward basis (as with electronic mail)” (p. 388). Websites provide the feature of instant messaging in order to enhance users' perception of interactivity. It takes into account that perception of interactivity increases when users receive quicker responses (Dholakia, Zhao, Dholakia, & Fortin, 2000).

**3. Synchronicity:** Synchronicity refers to the speed of delivery and process of messages in web-based applications. “Faster the response, greater the perception of interactivity” (Dholakia, Zhao, Dholakia, & Fortin, 2000, p. 7). Perceived interactivity increases when a faster response is generated by a system; this is because users feel less inhibited. Communication on mobile devices makes immediate response a possibility. Synchronised conversations are possible because people tend to leave their mobile devices switched on, no matter when and where a conversation is carried out (Gao, Rau, & Gavriel, 2009).

**4. Interpersonal communication:** Interpersonal communication was believed to be a critical part of an interactive system in interactivity literature (DeFleur & Ball-Rokeach, 1989; Durlak, 1987; Heeter, 1989; Williams, Rice, & Rogers, 1988), and it refers to the extent the mediated interaction is similar to unmediated interpersonal communication. Heeter (1989) suggests that interactivity of interaction increases when mediated communication is comparable to interpersonal communication between two or more users. A website can improve the sense of interactivity of users by integrating specific attributes which strengthen interpersonal communication.

### **3.1.3.2 Factors affecting customers' perception of interactivity**

The study on interactivity by Jee & Lee (2002) looked into the way in which personal factors affect customers' perception of a website interactivity. Employing a framework



of consumer search behaviour, personal factors are grouped into two categories, which include general factors as well as those specific to the Internet. Three general factors were identified, namely, need for cognition (NFC), expertise about the product, and product involvement. The three web specific elements were: skills, challenges, and the experience of purchasing online. These factors and their relationship with perceived interactivity is presented in the figure below (Figure 3-6). NFC proved to be an important indicator of perceived interactivity of a website. Skills were also a predictor, although of marginal significance.

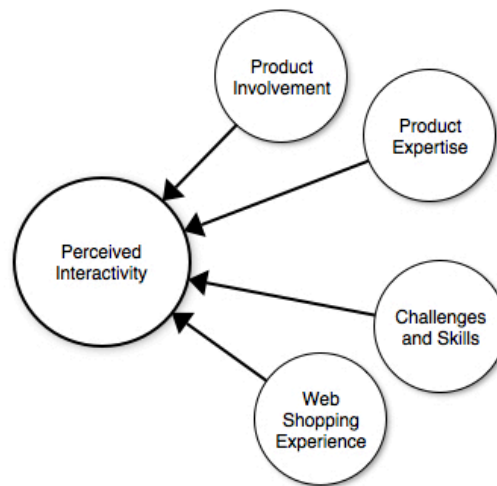


FIGURE 3-6 FACTORS AFFECTING PERCEIVED INTERACTIVITY

**1. Product involvement:** According to interactivity literature, consumers conduct fewer searches when product involvement is low and, conversely, conduct excessive searches when product involvement is high (Engel & Blackwell, 1982; Hawkins, Best, & Coney, 1986). Yoo & Stout (2001) observed that when product involvement is high, consumers have higher expectations of interacting with a website. This means under conditions of high product involvement, customers are more likely to be engaged in a more extensive search and interaction with a website then results in greater perceived interactivity.

**2. Product expertise:** The influence of product expertise on the extent of information searched differs from product involvement and NFC. The higher the level of product expertise, the lower the search effort, it was found, with less involvement in search activity as well as use of interactive functions in a website (Alba & Hutchinson, 1987; Bettman, 1986; Chi, Glaser, & Rees, 1982; Gardial & Biehal, 1987; Maheswaran & Sternthal, 1990). This is due to the fact that expert customers require less pre-purchase

information (Bettman, 1979). Shoppers new to the experience rely on data in their long-term memory to inform their decisions about purchases (Collins & Loftus, 1975), while experts use one ‘integrated rule’ which comes from previous shopping experience (Newell, 1973). In addition, novice customers are more likely to be engaged in interactive features of a website to diminish the possibility of errors in making purchase decisions (Anderson, 1982; Jee & Lee, 2002).

**3. Challenges and skills:** Novak, Hoffman, & Yung (2000) defined challenges as the opportunity for online consumers to use their skills and take action while navigating through a website. Although it was found that challenges and skills are not dependent variables (Ghani & Deshpande, 1994), many studies found a correlation between satisfactory online consumer experiences and a high degree of skills and challenges (Csikszentmihalyi, 1997; Hoffman & Novak, 1996). It has also been found that such factors will produce more interest and feelings of control by consumers (Ellis, Voelkl, & Morris, 1994; Massimini & Carli, 1988), which could contribute to an improved experience online (Ghani, Supnick, & Rooney, 1991). Novak, Hoffman, & Yung (2000) noted that the rewarding experience inspires online consumers to explore more and engage more in an interaction with a website. Wu (2000) found that a consumer’s degree of expertise as regards the Internet was positively related to their view of the interactivity of a website.

**4. Web Shopping Experience:** Internet skills related positively to the period of time a user spends using the Internet (Novak, Hoffman, & Yung, 2000). They further observed savvy Internet users are more likely to perform task-oriented activities online such as research, search for product information, and shopping. There is, however higher likelihood that experienced Internet users get less involved in website navigation and the use of interactive functions. This is because online users become experienced with the use of the Internet and e-commerce, and so they adopt an effective, more simplified method of conducting their online activities. They may limit the use of website functions to those necessary to accomplish an online task. This correlates with other studies that found that as users gain more experience, their searches for information via the Internet change from being extensive to being more simplified (Howard & Sheth, 1969).

### **3.2 Increased level of social presence improves customers' shopping behaviour**

Information search and purchase decision together are at the heart of consumer behaviour models, which have long been established. Engel, Kollat, and Blackwell (1973) proposed a five stages framework to better understand customers' shopping behaviour. These five stages include 1) problem recognition, 2) information search, 3) evaluation of alternatives, 4) purchase decision and 5) post purchase behaviour. In the customer resource life cycle (CRLF) of Ives and Learmonth (1984), pre purchase, during purchase, and post purchase are the core phases in which pre purchase and during purchase correspond to information search and purchase decision respectively. Information search, purchase decision and intention to buy were selected as three primary elements of customers' shopping behaviour to investigate in this research.

#### **3.2.1 Customers' search behaviour**

Consumers' search behaviour is a relatively important topic in e-commerce, which is widely investigated. However, its scope is confined to purchase context. Bloch, Sherell, and Ridgway (1986) conducted an exploratory study on 'on-going search behaviour,' which they define as a search which takes place separately from the process of making the purchase. Such search behaviours are carried out independently of the needs of specific purchases and decision making (Bloch, Sherell, & Ridgway, 1986, p. 120). They found a positive connection between on-going search behaviour and product involvement. They outline the significance of "recreational or hedonic motives for on-going search as opposed to practical, and informational motives" (Bloch, Sherell, & Ridgway, 1986, p. 119).

There are some factors associated with customers search behaviour, such as NFC, informational cost, product involvement and product expertise. NFC (Need For Cognition) refers to customers' tendency toward involvement in rigorous cognitive activities (Cacioppo & Petty, 1982). Different people differ in their NFC levels, and greater NFC is thought to be associated with making a better purchase decision. Different search mechanisms of different people can be used to comprehend the link between quality of purchase decision and higher NFC. Mantel and Kardes (1999) proposed that purchase decisions of customers with low NFC are dependent on

products' reviews and comparisons; however, customers with higher NFC make decisions thoughtfully and do an extensive search for details.

Similarly, Levin, Huneke, and Jasper (2000) conducted an experimental study on customers' choice-making and found a positive relationship between the level of NFC and customers' search efforts to find information online. In addition, they found that low NFC consumers employ alternatives-oriented search strategies as opposed to consumers with high NFC, who tend to adopt attribute-oriented strategies. They concluded that the level of NFC makes a difference in customers' search behaviour. It is more likely for consumers with higher NFC to be engaged in extensive searches and be exposed to interactive features of the website more than customers with lower NFC.

Two other factors related to consumer search behaviour were identified by Sundaram and Taylor (1998), including the informational cost associated with searches and the advantages involved, both non-economic and economic (Yang, 2004). According to Beatty and Smith (1987), the consumer's need to explore product information and his/her abilities of processing product information can vary depending on his/her level of product involvement. Consumers with a high level of involvement pay more attention and conduct extensive searches (Celsi & Olson, 1988). Zaichkowsky (1985) also found that product involvement is related to consumer information search behaviour.

According to Hoffman and Novak (1996), the involvement level of consumers imposes a significant impact on their search behaviour and their experiences. According to Celsi and Olson (1988), a consumer's level of involvement can be categorised into two: permanent and situational involvement. Both permanent and situational involvement impacts the consumer's motivation to acquire product-related information. The notion of involvement related to the search behaviour of consumers was highlighted in the research put forward by McQuarrie and Munson (1987) and Zaichkowsky (1985). According to Zaichkowsky (1985), high product involvement enables customers to find the right product as they gather appropriate information about the product through multiple sources. Overall high product involvement helps with making consumers' shopping experience satisfactory (Kroeber-Riel, 1979; Demangeot & Broderick, 2007).

The influence of product expertise on the extent of information searched differs from product involvement and NFC. A high level of expertise about a product was found to result in less time and effort spent in searching as well as use of interactive functions in a website (Jee & Lee, 2002). This is because customers with expertise don't need as much information to assist them with a purchase (Bettman, 1979). Customers without such expertise make use of 'domain independent rules' stored in their long-term memory to help them with their decisions as to what to buy (Collins & Loftus, 1975), while experts use one 'integrated rule' which comes from previous shopping experience (Newell, 1973). In addition, novice customers are more likely to be engaged in interactive features of a website to diminish the possibility of errors in making purchase decisions (Anderson, 1982; Jee & Lee, 2002).

### **3.2.2 Customers' purchase decision**

How people make purchase decisions online differs from offline shopping. The main difference in purchase behaviour of online and offline shopping is people's gathering of information from the people they are associated with, which has a profound effect on their purchase decisions, something that everyone does without noticing that they are doing it. The typical purchase behaviour starts with collecting information from a shopkeeper or friend or family members when we need to buy an item we are unfamiliar with. Our networks of friends and family thus form a natural part of our offline shopping experiences (Guo, Wang, & Leskovec, 2011).

Social interaction involved in traditional shopping positively influences customers' social motivation, evaluation of products and decision-making. The result of an investigation by Mangleburg, Doney and Bristol (2004) revealed that adults are interested in sharing their shopping experience with friends because they could assist with the evaluation of products and collection of required information, which then results in higher confidence in their purchase decision.

The theory of consumer socialization, as Cowart and Goldsmith (2007) explain, refers to "the process by which young people acquire skills, knowledge and attitudes relevant to their effective functioning as consumers in the marketplace" (as quoted in Ward, 1974, p. 2). It suggests that the social interaction of online shoppers can potentially

bring about extensive changes to the way in which they carry out searches for product information, consider the options and make their decisions.

Social structures and social agents are important factors involved in customer socialization. The social structure, as defined by Kamaruddin and Mokhlis (2003) is “the antecedent variables that refer to the social environment within which a person’s learning takes place” (p. 148). A social agent can be any one of our peers or parents, but also various media, including television, and school-based education.

Kamaruddin and Mokhlis (2003) proposed a theoretical research model of adolescents’ customer socialization across offline shopping methods to examine the impact of social agents and social structural factors on the way adolescents make their decisions. Their findings indicate that the effect of such factors may depend on the demographic and social characteristics of adolescents. Their peers proved to be the prime agents of consumer socialization. A further finding was that female adolescents tended to take part in family purchase decisions and talk about shopping with their peers more than male counterparts.

Uncertainty is an important issue that customers associate with while they make a purchase decision in both traditional and online shopping environments. Perceived uncertainty is defined by Dash and Saji (2008) as “the nature and amount of uncertainty perceived by an online customer in contemplating a particular purchase decision” (p. 37). They suggested that shopping with a friend reduces the perception of uncertainty because a friend or a purchase pal could provide the required information and increase confidence in the buyer’s decision.

Current e-vendors have built unique interactive features into online shopping environments. One of the attractive and desirable features for many online customers is a recommendation tool, which has been designed and rapidly improved to assist shoppers with their shopping decision. The availability of such tools has changed the manner in which people look for information about products and make purchases via the Internet.

However, making a decision to purchase a product online is a complex process, and customers’ personal involvement and required assistance associated with a purchase

decision differs, depending on the complexity of that decision. Typical routine shopping tasks, such as purchasing a newspaper, are effortless tasks. They present the routine problem-solving behaviour of consumers because they are familiar and confident with the shopping process. In this situation, personal involvement is low. However, extensive problem-solving situations which involve the purchase of costly items, such as a car or a house, are characterised by high personal involvement. Lastly, there is limited problem-solving, which is positioned on a scale above routine problem solving and below extensive problem solving, with fewer alternatives and less personal involvement (Butler & Peppard, 1998).

Decision aid tools, to an extent, were successful in helping shoppers. However, still more can be done to simplify the process of searching for all alternatives, evaluation of alternatives and making a purchase decision. Online customers tend to work with a two-stage process to make decisions and carry out a purchase. At the first stage, consumers usually perform the initial screening of a large set of available choices to set aside those that they wish to consider further. This first stage produces a subset of the best alternatives. At the second stage, they evaluate the selection of alternatives in more depth, performing the comparisons process across the selected products, based on the characteristics of the products and their preferences, before making a final purchase decision.

Current decision aid tools provide valuable support to online customers to perform the task of purchasing a product in a two-stage process, particularly by providing a list of alternatives based on customers' interests and their shopping history. However, the majority of these tools fail in supporting customers at the evaluation process; they are heavily dependent on the shopping history data of the online customers and they lack interactivity features. Also, they cannot provide the personalised recommendations and information that customers can receive from a friend or relative. As Guo, Wang, and Leskovec (2011) suggest from a basic behavioural psychology perspective, "consumers value and trust their friends' purchasing decisions more than anonymous opinions" (p. 157).

The design of socially interactive tools that shoppers can use when they are first considering the products that are available, in order to ease the process of detailed

comparisons, may have a strong positive effect on the quality and the effectiveness of their decisions to buy a particular product. They would be enabled to arrive at better decisions and need to put in less effort. It was hypothesised in this research that increased levels of social presence and social interaction in online shopping will reduce consumers' search efforts for product information, increase and refine the pool of product possibilities and improve the outcome of their shopping activity (see Figure 3-7).

#### Hypothesis:

- **H4.1:** *The increased level of social presence and the social interaction between consumers will reduce consumers' search effort for product information and have positive impact on the initial browsing of available products*
- **H4.2:** *The increased level of social presence and the social interaction between consumers will increase the size and quality of consideration and will have positive impact on quality and effectiveness of purchase decision*

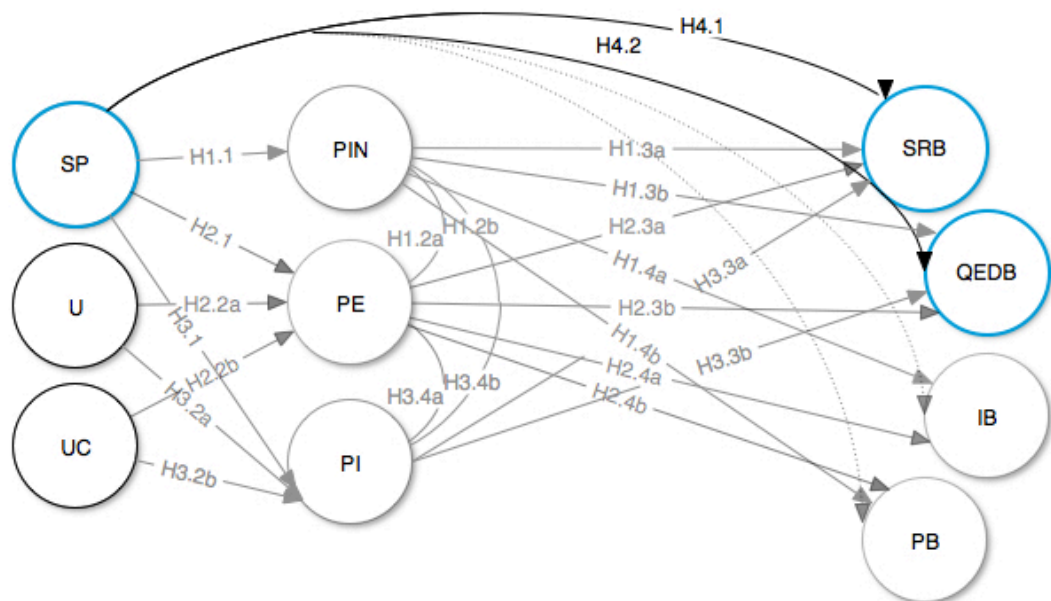


FIGURE 3-7 RESEARCH MODEL – THE QUALITY AND EFFECTIVENESS OF PURCHASE DECISION (QEDB)



### **3.2.2.1 Factors affecting the effectiveness of purchase decision**

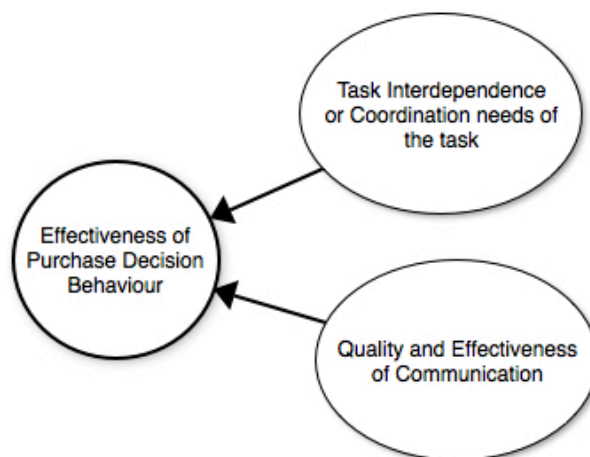
The study by Alge, Wiethoff and Klien (2003) indicates that the link between the effectiveness of communication and the relevant decision is affected by 'task interdependence'. Task interdependence is defined by Gibson (1999) and Wageman (1995) as "the extent to which team members are dependent upon each other to get tasks accomplished" (as quoted in Alge, Wiethoff, & Klien, 2003, p. 29). Task interdependence is thus linked with its collaboration aspects (Daft & Lengel, 1984). When task interdependence is high, individuals of a group must coordinate to successfully accomplish the task. However, on the contrary, the excess of communication and social cues in low interdependence conditions can negatively affect group performance (McGrath & Hollingshead, 1994).

Bell and Kozlowski (2002) argued that the outcome of a group task and the effectiveness of communication might be related to temporal qualities, communication medium and task type. According to media richness theories, the effectiveness of communication depends on task interdependence and the degree to which a mediated communication technology can facilitate coordination (Daft & Lengel, 1984). Research on social presence supports this, and suggests that if social cues conveyed by media match the social needs of the group task, then group performance will improve (Christie, 1985). Conversely, decreased social presence transmitted by a medium will result in poor group performance. This is due to the fact that in a low presence environment it is more likely that information or particular responses will be delayed or ignored (Lowry, Roberts, Romano Jr, Cheney, & Hightower, 2006).

Theories of media selection also suggest that there is a relationship between communication and the effectiveness of team decision-making. However, there is but limited research on what effect media has on decision-making effectiveness, and the conclusions are often vague (Dennis & Kinney, 1998; Dennis, Kinney, & Hung, 1999; Straus & McGrath, 1994). Despite the diverse support for the media task hypotheses, one of its principal hypotheses proved to be valid: "communication effectiveness may positively relate to decision-making effectiveness on high coordination tasks, but may be unrelated to decision-making effectiveness on low coordination tasks" (Alge, Wiethoff, & Klien, 2003, p. 29).

Alge, Wiethoff and Klien (2003) proposed that synchronous mediated-communication technologies, which convey rich information, could enable a group of people involved in a mediated conversation to perform as effectively as when they have a face-to-face conversation. The effectiveness of communication is associated with the quality of interaction and the exchange of information. The sharing of information is specifically important, since solving a complex problem or performing a complex task requires exchange of information between individuals in a group.

These findings imply that if the design of experimental environments in this study facilitates the exchange of information and supports rich interaction between group members, this will positively affect the effectiveness of communication and decision making. This means that the quality and effectiveness of communication should be measured and observed as a control variable during the experiment. In addition, they emphasise the importance of the design of an experimental task and its possible effect on purchase decision behaviour. They indicate that the task design must be achieved in a way that requires subjects in a group to coordinate to accomplish the experimental task, since in low interdependence conditions, social interaction can negatively affect decision-making and group performance. The identified variables associated with customers' purchase decision behaviour are presented in the figure below (Figure 3-8).



**FIGURE 3-8 FACTORS AFFECTING THE EFFECTIVENESS OF PURCHASE DECISION**

### 3.2.3 Customers' intention to buy and perceived benefit

One of the major concerns of Internet marketers is the intention of consumers to revisit their website (Demangeot & Broderick, 2007). It has been proposed by the theory of planned behaviour (TPB) that behaviour can rationally be calculated through behavioural intentions (Ajzen, 1991). There is an indication in TPB that behavioural intention is the most important factor in predicting behaviour because intention is mostly the motivating force behind anything a person does. According to Ajzen (1991), behavioural intentions “are motivational factors that capture how hard people are willing to try to perform a behaviour” (p. 181). TPB is considered to be among the most important theories that attempts to predict and explain human behaviour (Sheppard, Hartwick, & Warshaw, 1988). It is intended to provide explanations for most behaviours over a range of circumstances (Ajzen, 1991). TBP is thus applicable to the study of online customers' behaviour.

The Theory of Planned Behaviour is related to the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980). TRA proposes that the more positive the attitude of a person about a particular behaviour, the more likely they are to participate in that behaviour (Cyr, Hassanein, Head, & Ivanov, 2007), and the greater the subjective norm, the stronger the person's intention for engagement will be (Stephen & Toubia, 2009). The stronger the intention of the individual to engage in a behaviour, the more likely the individual will be to perform it.

Following the TPB theory, Sheppard, Hartwick and Warshaw (1988) examined the connection between intentions, as well as search and purchase behaviour of online customers. Search and purchase behaviour was found to correlate ( $r=.53$ ) with intention. In addition, the theory of ‘implementation intentions’ developed by Gollwitzer (1999) can be used to link purchase and search behaviour with behavioural intentions. The implementation intentions are “self-regulatory strategies that aim to drive goal-oriented behaviours” (Pavlou & Fygenson, 2006, p. 188). Sheeran and Orbell (1999) explained controversy as a goal-oriented behaviour that inevitably triggers a set of goal-enabling intentions which then make a behaviour a reality.

Intention to purchase a product is followed by intention to seek information about the product. The intended (goal) behaviour in this case is to purchase a certain product and implementation intention is to seek information, which is triggered by purchase intention (Pavlou & Fygenson, 2006). For example, if a student's intention is to purchase a book from Amazon, the student is expected to go to the Amazon website to collect information about the book such as reviews, alternatives, price, etc. Salisbury et al (2001) found the positive relationship between purchase intention and intention to search. It happens in a temporal manner that "consumers first form the intention to purchase a product to fulfil a particular need, and they then form the implementation intentions to facilitate fulfilling the need" (Pavlou & Fygenson, 2006, p. 188).

In the literature review related to TAM (Technology Acceptance Model), the relationship between perceived benefit and intention to buy was also studied and results showed that perceived benefit affects intention to use new services in a positive way (Ryu, Kim, & Lee, 2009) and buy products (Wang, Dacko, & Gad, 2008). Numerous researchers explored the effect of perceived benefit on consumers' behaviours and specifically intention to buy.

Lee et al (2008) found positive influence of perceived benefit on consumers' attitude and consideration towards new technologies (Lee, 2009; Wang, Dacko, & Gad, 2008). Online purchase behaviour of consumers was also found to be positively correlated with perceived benefits of online shopping (Kim, Park, & Sundar, 2013). Perceived convenience of shopping on e-vendor websites was one of the major factors that impacted the consumers' purchase decision. The effort and time saved on e-vendor websites is a major convenience factor experienced by online customers (Ranganathan & Ganapathy, 2002). Consumers make more frequent purchases when their online shopping experience is convenient and enjoyable (Doolin, Dillon, Thompson, & Corner, 2005).

How intention to buy can be affected by customers' experience with the shopping channel is investigated in this study. It is hypothesised that there is a positive correlation between experienced involvement, engagement and interactivity with the purchase intent. It is hypothesised that engaged customers are affectively involved and motivated

to revisit an online shop which then leads to intention to seek information and intention to purchase (see Figure 3-9).

### Hypotheses:

- **H1.4:** Increased level of shopping involvement with the shopping channel will result in increased future intentions and perceived benefit
- **H2.4:** Increased level of engagement with the shopping channel will result in increased future intentions and perceived benefit

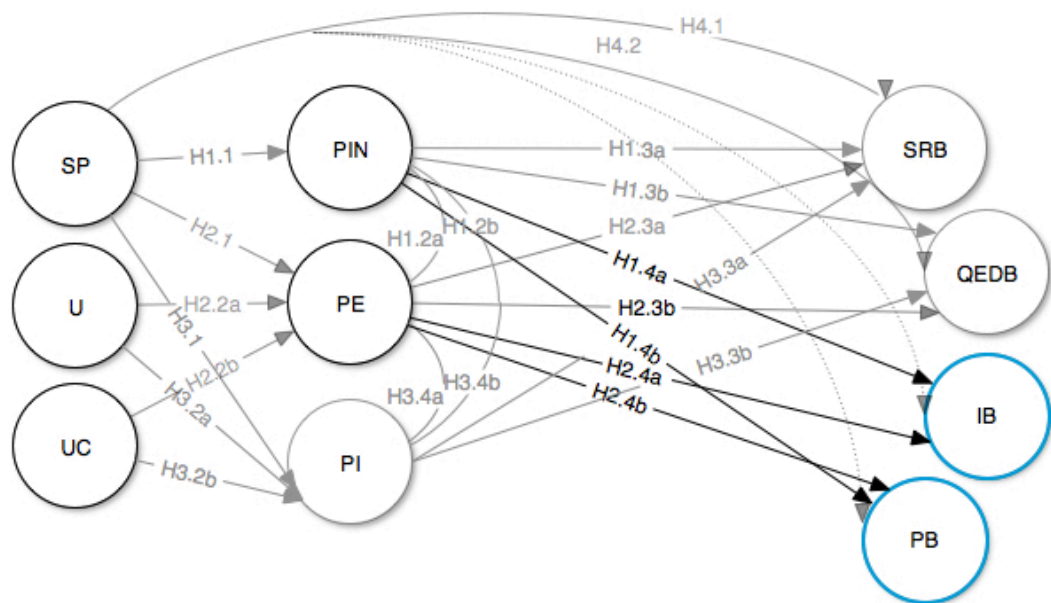


FIGURE 3-9 RESEARCH MODEL - INTENTION TO BUY (IB) AND PERCEIVED BENEFIT (PB)

#### 3.2.3.1 Factors affecting intention to buy

The purchase intention of consumers over the Internet is affected by various factors in addition to usability. (Konradt, Wandke, Balazs, & Christophersen, 2003). The main factor, which concerns the relationship between an online buyer and a seller, is 'trust'. Shop size and range of products are two other factors that influence consumers' intention to buy. Several studies have outlined the importance of consumers' perception of product ranges and size of shop in anticipating the intention to buy (Konradt, Wandke, Balazs, & Christophersen, 2003). However, in the design of the experiment in this study, users can visit and browse as many websites as they want; the website itself is not tested. So shop size and range of products can be excluded from the control variables.

System response time is another factor which influences the intention to buy (Dellaert & Kahn, 1999; Rehman, 2000). The amount of time a system takes in responding to users' input is called 'system response time'. When an online shop is delayed in responding to its consumers input, it could result in customers feeling frustrated, which could then lead them to abandon the website (Rehman, 2000). In their experimental study, Dellaert and Kahn (1999) found that waiting time had a negative impact on customers' attitudes towards the e-vendor website. It was discussed previously in this chapter that system response time or 'responsiveness' is categorised under interactivity variables, so it can be excluded from the control variables.

Individual elements are also observed to influence customers' behaviour and their perception of a system (Constantinides, 2004). The effects of different personal factors, demographic features, and psychological, cultural and socio-economic attributes have been widely acknowledged by researchers and practitioners; besides, these factors lie beyond the control and power of marketers (Harrell & Frazier, 1999; Czinkota, et al., 2000; Czinkota & Kotabe, 2001; Dibb, Simkin, Pride, & Ferrell, 2001; Jobber, 2001; Boyd, Walker, Mullins, & Larreche, 2002; Solomon & Stuart, 2003).

### **3.3 Chapter summary**

The research model and the hypotheses that were developed, as associated with social presence in online shopping experiences, were presented in this chapter. The proposed hypotheses and the research model were developed after conducting the literature survey. The two factors of usability and user control were found to be relevant to this research, and were added as two independent variables to the design of the experiment. It was found that usability and user control are two major factors that could have a great effect on user engagement and experienced interactivity. How these factors influence customers' shopping experiences and behaviour when experienced social presence is low and high was found relevant to this research.

It was hypothesised that an increased level of social presence improves online shopping experiences and users' shopping behaviour. In order to investigate the effect of social presence on online shopping, an exploratory study was conducted to identify the primary factors which construct online shopping experiences and shopping behaviour. Seven variables were identified: the three variables of perceived involvement,

engagement and interactivity were categorised as customers' shopping experiences, and the four variables of search behaviour, purchase decision behaviour, intention to buy and perceived benefit were categorised as customers' shopping behaviour.

In order to test the proposed hypotheses, an appropriate set of measurements was required for all the variables investigated in this research. The key constructs of social presence were reviewed in chapter 2. In this chapter, the primary components of perceived involvement, engagement and interactivity were identified as being relevant to this study. These components were then used in chapter 4 'design of experiment' to develop a novel quantitative measurement survey to assess the level of the corresponding variables.

In addition, from the literature survey, the main variables which have an effect on customers' shopping experiences and behaviour (but excluded from the design of the experiment (e.g. product involvement)) were identified and categorised under control variables. These variables are summarised in the next chapter, subsection 4.1.5.1, 'control variables'.

The next chapter presents the experimental design decision, based on the selected variables and the proposed hypotheses discussed in this chapter. The design of the experiment is followed by the design of the survey questionnaire and measurement items. How selected components of each variable were transformed and developed into measurement items is discussed in the next chapter.

## CHAPTER FOUR

### 4 Design of experiment

In order to investigate the proposed hypotheses, presented in the previous chapter, a fractional factorial design of three interventions (SP, U, UC) was planned. The design of experiment involved: 1) experiment methodology, 2) sampling methodology and sample size, 3) design of experimental conditions, 4) design of experimental task, and 5) a structured quantitative questionnaire of 149 items. The 149 subjective measurements in the form of pre and post experiment questionnaires were designed and developed in this study. The experiment involved 73 groups of two participants who performed a group experimental task in a computer laboratory.

The experiment methodology, FFD (fractional factorial design), is presented in the next section. The sampling methodology and sample size are described in section 4.2. The design of four experimental conditions and the experimental task are explained in section 4.3 and section 4.4. The last section 4.5 presents design of a survey questionnaire and measurements.

#### 4.1 Experiment methodology: a fractional factorial design (FFD)

The fractional factorial design of three interventions was designed to investigate the main effect of three independent variables and the interaction between them. The choice of an experimental design was based on 1) the two key objectives of experiment and 2) number of selected variables to be investigated as well as 3) the level of variables (e.g. two levels of low and high). The factors that contributed into the design decision are explained and discussed in the following sub sections.

##### 4.1.1 Objectives of experiment and number of factors

The first step in designing an experiment is to well define the primary objectives. The key objectives according to the research model and research questions, developed in this study, are:



1. **Screening objective:** Selecting the critical factors affecting the response, the main effects, and investigating the effect size of factors on the response, for example:
  - a. What is the effect size of social presence on customers' intention to buy?
  - b. Which factor has the main effect on intention to buy?
2. **Regression model objectives:** Quantifying the dependence of response variables and obtain the parameter estimates <sup>4</sup>, for example:
  - a. If increased social presence (X1) → higher engagement (Y2)?
  - b. If increased usability (X2) → higher engagement (Y2)?

Also the selection of variables was based on the research model and the hypotheses developed in this research, presented in chapters 2 and chapter 3. Three independent (treatment) variables<sup>5</sup> and seven dependent<sup>6</sup> (response) variables were identified in this study (see Figure 4-1).

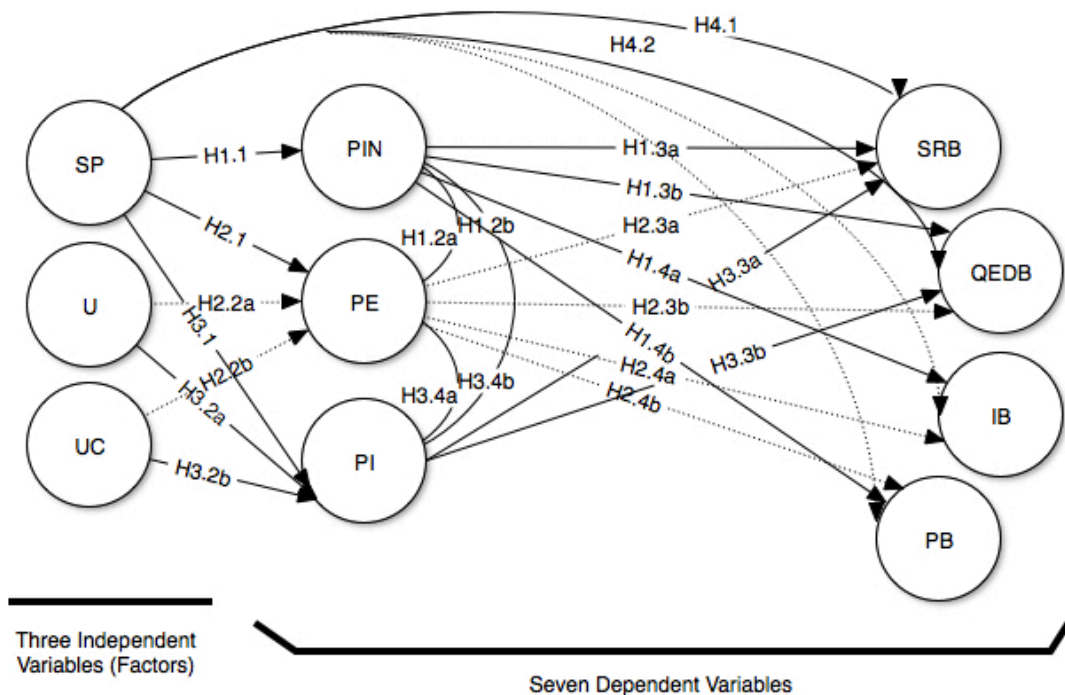


FIGURE 4-1 RESEARCH MODEL – DEPENDENT AND INDEPENDENT VARIABLES

<sup>4</sup> Read about 'select an experimental design' and setting objectives on '[engineering statistic handbook](#)'.

<sup>5</sup> The variable that is manipulated, or changed, is known as the [independent variable](#). It is also called 'input' or 'factor' or 'treatment variable'. It is indicated by 'X'.

<sup>6</sup> The variable that is measured is called the dependent variable. The dependent variable is either a behavior or a [response](#). It is also called 'output' or 'response'. It is indicated by 'Y'.

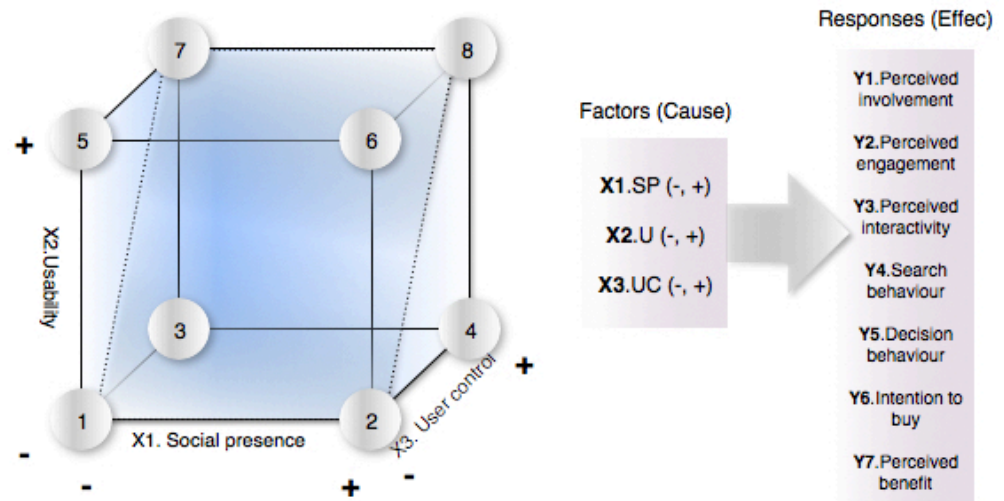


FIGURE 4-2 NUMBER OF FACTORS AND FACTORIAL DESIGN

Figure 4-2 presents the selected variables including factors and responses. The number of selected factors plays a key role in designing an experiment. This number has to be feasible between 2-5, because when number of factors goes high the number of required experimental runs<sup>7</sup>  $n=2^{(\text{number of factors})}$  goes high as well. In order to keep the experimental runs low, the number of factors was decided to be a maximum of three. Table 4-1 presents the recommended choice of an experimental design based on the objectives and the number of factors to be investigated.

	Objectives		
	Comparative objective	Screening objective	Response surface objective
1	Factor completely randomized design		
2-4	Randomised block design	<b>Full or fractional factorial</b>	Central composite or Box-Behnken
5 or more	Randomised block design	Fractional factorial or Plackett-Burman	Screen first to reduce number of factors.

TABLE 4-1 THE CHOICE OF AN EXPERIMENTAL DESIGN ([ENGINEERING STATISTIC HANDBOOK](#))

<sup>7</sup> Number of experimental conditions equals to  $n=2^{(\text{number of factors})}$ , when factors have two levels of low and high.

The factors studied in this research have two levels of low and high. The two level design is the most common experimental design, because it is simple and economical, also it provides the required screening results with high statistical power. The number of experimental runs depends on the design of experiment, number of factors and the level of factors. In factorial design the number of experimental runs is calculated as below. For example for 3 factors with two levels of low and high,  $2^3=8$  experimental runs is required for 4 factors  $2^4=16$  and so on.

$$\text{Number of experimental runs} = \text{Factor levels}^{(\text{number of factors})}$$

#### 4.1.2 Experimental design decision

Before making a design decision four experimental design options were considered and compared, including complete factorial, individual experiments, and fractional factorial. Making design decision depends on a strategic balance between research objectives and resources. According to Collins, Dziak and Li (2009) considerations in making design decisions include:

1. Whether research questions are framed as main effects or simple effects
2. Whether and which effects are aliased (confounded)<sup>8</sup> in a particular design
3. The number of experimental conditions that must be implemented in a particular design
4. The number of experimental subjects the design requires to maintain the desired level of statistical power
5. The costs associated with implementing experimental conditions and obtaining experimental subjects

Complete and fractional factorial designs are generally more economical than conducting individual experiments or ‘randomised control design’ (Collins, Dziak, & Li, 2009). A randomised control design is usually considered in cases where there is one primary factor to be investigated. Because it requires a control and a treatment group for

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<sup>8</sup> Confounding is used as a general term to indicate that the value of a main effect comes from both the main effect itself and also contamination or bias from higher order interactions. See a [glossary of DOE terminology](#).

each factor, this means for two or more factors the number of experimental runs and required sample size can be very high. For example, if there are 3 levels of the primary factor with each level to be run 2 times, then there are 6 factorial possible run sequences (or 6 ways to order the experimental trials).<sup>9</sup>

Also when the randomised control design is applied to multicomponent interventions (for example multicomponent of social presence), a challenge that comes with it is to identify and build the strong combination of components that contribute enough toward intervention effectiveness to justify the required time, money and other resources. This indicates that design of RCT (randomised control trial) requires determining factors, which have strong/detectable effect as well as components that are likely to contribute to that effect.

In response to these challenges, a FFD design was considered and designed as an effective and economical choice which fits well with the research objectives. With a fractional factorial experimental design it was possible to change more than one single variable at a time. This minimised the number of required experimental runs and sample size. Also meaningful results and conclusions about how factors affect a response could be achieved as efficiently as possible.

#### **4.1.3 A subset of 4 runs and design resolution**

A fractional factorial design involves a carefully chosen subset, or fraction, of the experimental conditions in a complete factorial design (Collins, Dziak, & Li, 2009). The complete factorial design in this study involves three factors, each of which has two levels (low and high), which create a total of eight experimental conditions  $2^3=8$ . Now a fractional factorial design is a subset of experimental conditions from the complete three-factor factorial design and it involves  $2^{3-1}=4$  experimental conditions. This fractional factorial design is a  $2^{-1}=1/2$  fraction of the complete factorial.

How to select a subset of 4 runs from a  $2^3=8$  run design? To make effective use of fractional factorial designs, it is essential that the effects of primary factors are main effects and interactions between factors are small in size. The effective strategy is to

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<sup>9</sup> Read about completely randomized designs on '[engineering statistic handbook](#)'.

select a design that aliases the effects of primary factors with the small interaction effect. This means if the assumptions of small interaction effects are correct then the estimates of the effects of primary factors are not very different from what they would have been in a much more expensive complete factorial experiment (Collins, Dziak, & Li, 2009).

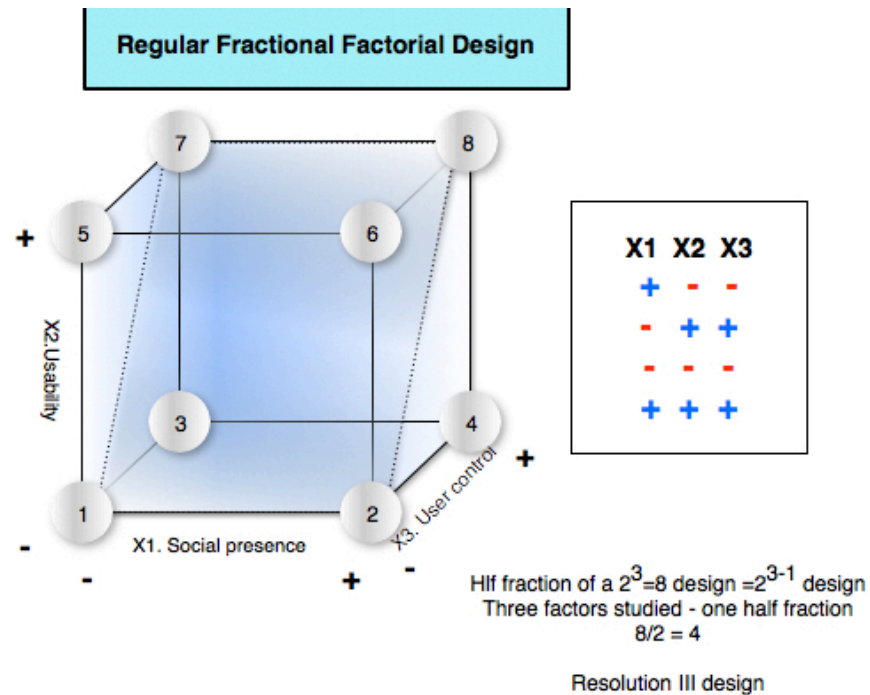


FIGURE 4-3 FRACTIONAL FACTORIAL EXPERIMENTAL DESIGN OF THREE FACTORS

Table 4-2 shows a subset of 4 ‘**balanced**’ runs from a 2 powered by 3, 8 experimental runs, which is selected from the complete three-factor factorial design. A fractional factorial design with the highest ‘**resolution of III**’<sup>10</sup> was selected, because the higher the resolution of the design, the less severe the degree of confounding. In resolution III designs, no main effects are aliased with any other main effects, but main effects are aliased with two factor interactions (it was assumed that the interaction effects are very small). As Table 4-2 shows, each level of each factor appears in the design exactly twice; this means that the design of experiment is **balanced**.

<sup>10</sup> Resolution of III is the highest resolution. In general designs with a resolution less than III are never used because in these designs some of the main effects are aliased with each other. Read about design resolution [Psychol Methods](#)

Experimental run	SP / U/ UC	Included
1	+ - -	<b>Included</b>
2	- + -	Not included
3	- - +	Not included
4	+ + -	Not included
5	+ - +	Not included
6	- + +	<b>Included</b>
7	+ + +	<b>Included</b>
8	- - -	<b>Included</b>

TABLE 4-2 A FRACTIONAL FACTORIAL EXPERIMENTAL DESIGN OF THREE INTERVENTIONS (SP, U AND UC)

#### 4.1.4 Between Subject Design

The initial decision on DOE (Design of Experiment) was to implement ‘within subject design’ to keep the sample size and cost low. With within subject design the same group of subjects can attend more than one experimental condition or subjects can be tested under all conditions (Hall, 1998). A within subject design is also called ‘a repeated measure design’. Conversely in between subject design each group of subjects is tested under only one condition.

There are two primary benefits of the within subjects design: the achieved statistical power and reduction in error variance associated with subject differences (Hall, 1998). This is because each subject’s behaviour under one condition is compared to that subject’s behaviour under the other condition. This means individual differences are controlled and kept constant in all conditions which then results in simpler detection of effects and higher statistical power. Also within subjects design is known as a more efficient design in their use of subjects and time (Lane). For example, a between-subjects design with four experimental conditions and 35 subjects per condition requires 140 subjects. However, the same experiment conducted as a within subjects design requires only 35 subjects.

However, without a control group (in FFD, fractional factorial design, there is no control group), there are a number of potential threats to the internal validity of within subject design, such as carryover effects. The carryover effect happens when having been tested under one condition affects how subjects behave in other conditions (Hall, 1998). The carry over effects happen when subjects' behaviour or task performance improves over time because of practice (practice effects) or it gets worse because subjects get tired (fatigue effects). It could also happen in situations when subjects can guess the tested hypothesis (catching on effects), so they behave in a way they think the interviewer want them to<sup>11</sup>. The problem with carryover effects is that they can become confounding variables.

Since by using between-subject design the carryover effects could be avoided and groups of two people could simply be randomised and assigned to four experimental conditions, the final decision was to conduct between subject design. So each group of subjects could be tested under one experimental conditions. The experimental runs of between subject design were **randomised** in order to avoid influence by uncontrolled variables.

#### **4.1.5 Number of replication and noise reduction**

The more times experimental conditions are replicated, the more accurately the estimate of response can be detected (Anderson & Kraber, 2004). Replication increases the chance of detecting a statistically significant effect while reducing the effect of uncontrollable variations or noises. To determine how many runs is required, associated with the design of experiment (FFD), to achieve a statistically significant effects two primary factors should be taken into consideration:

- The rough estimate of how big or small is the effect of factors
- Estimate the noise or the effect of control variables. This can be determined from background study or the pilot best

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<sup>11</sup> Read more about carryover effect on Design of experiment.

In this study in order to achieve a 90-percent probability of detecting the desired effects of between 0.5-0.55, the number of required runs for the two-level factorial experiment was calculated at 35. Concurrently to reduce the noise as much as possible the control variables<sup>12</sup> were identified carefully from literature survey and the pilot test. By reducing the noise the signal-to-noise ratio<sup>13</sup> would go high, which then reduces the number of required runs, thus detecting the same statistical effect (Anderson & Kraber, 2004). It was decided not to add further replicates due to resource constraints, but diminishing error variability. The identified control variables are presented in the following section.

#### **4.1.5.1 Control variables**

Eight control variables were identified from the pilot test on a sample size of nine people and also from literature survey. The key control variables identified in this study include:

1. Group size or number of subjects in a group
2. Subjects' relationship (friends and relatives or stranger)
3. Subjects' product involvement
4. Subjects' product expertise
5. Subjects' affiliation needs
6. Experimental task
7. Experiment time
8. Previous online shopping experience

#### **1. Control variables identified during the pilot test**

It was found that the number of subjects who participated in the experiment had a direct effect on the level of experienced involvement and engagement with the shopping channel. The observed engagement level was higher when three subjects took part in the experiment compared to two subjects. Number of subjects taking part in a group experiment was identified as a control variable that had to remain constant in all experimental conditions.

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<sup>12</sup> [Control variables](#) are quantities that should remain constant during experiment. They can prevent the effect of an identifiable error variable from the result of experiment by holding this variable constant in all experimental conditions. They should be surveyed as carefully as dependent variables.

<sup>13</sup> Read about signal to noise ration [quality digest](#).



Only limited research has considered the effects of group size on group communication specifically using CMC (Computer Mediated Communication). Lowry et al. (2006) studied the relationship between social presence and group size. They examined how communication is affected by various degrees of social presence and the size of a group. Their findings suggest that a smaller group establishes and maintains a higher quality of communication. They witnessed greater richness, openness, accuracy and appropriateness of communication in groups of three as opposed to groups of six. Likewise Nielsen and Molich (1990) found that a small group size boosts the productivity of group performance and dramatically reduces the number of errors occurring. They argued that a group size of six should be established as a maximum group size for experiments with short timeframes.

Relevant studies of CMC examined how group size can affect, for example, a user's engagement in communication and group activities, and they found that individuals as part of a larger group struggle to develop involvement. They feel their contributions are unrecognised, so they become less engaged in group activities (Latane & Wolf, 1981). Similarly, individuals feel less responsible for the outcomes when the size of a group increases (Latane & Wolf, 1981). In addition, the group size is negatively related to the number of ideas shared in a group (Steiner, 1972). Burgoon et al. (2002) found that when individuals take part in smaller group discussions they have a higher influence on the decision and they can get involved in more thoughtful and precise conversations. These findings suggest that employing a smaller group is more beneficial in order to support high quality communication and effective experimental task performance.

Engel and Blackwell (1982) and Hawkins, Best, and Coney (1984) examined the relationship between levels of product involvement and the online users' search behaviour. They suggest that under low product involvement conditions, consumers usually engage in minimal searches. Under high product involvement conditions, however, consumers tend to search extensively. The result of the pilot test supported this. Initially two experimental tasks were designed for two product categories, including task one: a group holiday, and task 2: a gift for a friend. The results of the pilot test indicate the impact of product involvement on users' engagement with the shopping channel and the extent of the information search. For example, male

participants showed less engagement and minimal search effort for the second task: a gift for a friend; however, they showed higher engagement when they booked a group holiday. This observation from the pilot test led to the redesign of the experimental task to keep the product constant in all treatment conditions. Also, the selected product had to be gender-neutral to minimise the effect of users' demographics.

It was also found during the pilot test that the time subjects spent completing the experimental task affected the outcome of the experiment. During the pilot test, subjects were allowed to spend as much time as they needed to accomplish the task. In high presence conditions, the increased time spent on the task led to higher engagement, whereas in low presence conditions it led to frustration, fatigue and less engagement. In order to minimise the effect of experiment time, it was kept constant to a maximum of half an hour in all experimental conditions. However, since the acknowledgement of the time limit itself could have had an influence on subjects' task performance, subjects were unaware of the time limit of 30 minutes.

## **2. Control variables identified from literature survey:**

Other control variables were identified from the background study, for example, a study on social agents (shopping with friends and relatives or strangers) suggests that all elements involved in communication between co-shoppers could be affected by whether customers know the person who is interacting with them through a communication tool. Not knowing who they interact with might negatively affect the shopping process, depending on people's level of affiliation needs.

A number of researchers (Alba & Hutchinson, 1987; Bettman, 1986; Chi, Glaser, & Rees, 1982; Gardial & Biehal, 1987; Maheswaran & Sternthal, 1990) examined the effect of the level of product expertise on product involvement. A high level of expertise about a product was found to result in less time and effort spent in searching as well as use of interactive functions in a website (Jee & Lee, 2002). This is because customers with expertise don't need as much information to assist them with a purchase (Bettman, 1979). Customers without such expertise make use of 'domain independent rules' stored in their long-term memory to help them with their decisions as to what to buy (Collins & Loftus, 1975), while experts use one 'integrated rule' which comes from

previous shopping experience (Newell, 1973). In addition, novice customers are more likely to be engaged in interactive features of a website to diminish the possibility of errors in making purchase decisions (Anderson, 1982; Jee & Lee, 2002).

Research has noted that a high degree of skills and the presence of challenges result in a satisfying online consumer experience (Csikszentmihalyi, 1997; Hoffman & Novak, 1996). Novak, Hoffman, and Yung (2000) discovered that web-based skills depend on the length of time that a consumer has been using the Internet. To keep the level of expertise constant in all conditions, only participants that had previous experience on online shopping and were active Internet users were invited to take part in the study. Also, the selected product in the experimental task had to be simple enough and not require a high level of expertise.

The study by Van et al (2012) on the shopping experience of people on retail websites investigated the influence of retail density on a shopper's experience and amount of expenditure as a function of affiliation needs (Van, Krooshoop, Verhoeven, & Pruyn, 2012). Their results show that the effect of retail density on the shopping experience varies, depending on the consumer. Some people choose to go shopping when there are likely to be many other people about because they enjoy the interactions with people. Others prefer to shop on their own. The shopping experience of customers with less need for affiliation could be negatively affected by retail density or social interaction. This is because people with low affiliation needs do not welcome the presence of others but instead feel burdened, seeing their presence as a constraint. In order to observe the effect of affiliation needs as a control variable on the outcome of the experiment, the prompt measurements of affiliation needs were added to the pre-test questionnaire (see appendix A Section 5).

## **4.2 Pilot test**

The experiment involved small pilot groups of four (a total of nine people testing four experimental conditions) who performed a group shopping task for one treatment condition. The results of the pilot groups were used to validate the design of the questionnaires, the experimental methodology, the effect size of each treatment condition and the sample size.

### 4.3 Participants sampling

The population for this research study includes staff and students of the University of Sussex. Simple random sampling<sup>14</sup> was selected as a sampling methodology in this study. This technique reduces the likelihood of bias and sampling error, also it is simple to implement and ensures the high degree of representatives. The volunteers were eligible to partake in the study if they had had previous online shopping experience and if they could take part in a group of two with a friend or a relative. The challenging part of the sampling was to determine the required sample size in order to detect the significant effects of factors with an observed power of over 90 percent. How sample size was calculated in this study is explained in subsection 4, which follows.

#### 4.3.1 Population

The population for this research study includes staff and students of the University of Sussex. 146 (or 73 Groups of two) paid volunteers (94 females, 52 males within the age range of 18-40) were participated in the experimental study. Majority of participants were undergraduate and postgraduate students from University of Sussex. The volunteers were eligible to partake in the study if they had previous online shopping experience. Participants were invited to participate in a group with one social contact, e.g. a friend or a relative. Participants were naive as to the purpose of the experiments.

#### 4.3.2 Criteria

The volunteers were eligible to partake in the study if they had had previous online shopping experience and if they could take part in a group of two with a friend or a relative. These two criteria were selected as control variables, as explained in the previous ‘control variables’ section. The subjects selected for this experimental study were randomly assigned to one of four experimental conditions. Participants were naive as to the purpose of the experiment.

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<sup>14</sup> [Simple random sampling](#) is a sampling technique where subjects are selected entirely by chance and every individual of a larger population has as an equal chance of being included in the sample or each individual is equally likely to be selected at any stage of sampling process.

### 4.3.3 Sampling methodology

Simple random sampling was used in this study. In simple random sampling, every individual in the target population has an equal chance of being part of the sample. This means that selection is made without aim, reason, or pattern. The great benefit of employing random sampling is it ensures that a random selected sample is unbiased and it is representative of a larger population, which is essential in drawing conclusions from the results of an experimental study. The subjects selected for this experimental study were randomly assigned to one of four experimental conditions.

### 4.3.4 Sample size

There are four important factors affecting the sample size, namely alpha level<sup>15</sup>, power<sup>16</sup>, effect size<sup>17</sup> and a one-tailed hypothesis<sup>18</sup> (Suresh & Chandrashekara, 2012), see Table 4-3. The calculation of an appropriate sample size relies on the choice of these factors in most designs. Each of these factors influences the sample size independently, but it is important to combine all these factors in order to arrive at an appropriate sample size. It is also important to keep in mind that the study design has an impact on the sample size.

Based on the FFD design in this study, there was a total of four balanced experimental conditions, and for each condition (for each run), it was estimated to have between 27 to 34 people (or 17 groups of two people). Depending on the effect size, this number could slightly increase or decrease, as the estimated effect size can play a key role to decrease or increase the required sample. Also, power proportionately increases as the sample size for the study increases.

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<sup>15</sup> The alpha level or significance level is the probability of detecting a significant difference when the treatments are equally effective (Suresh & Chandrashekara, 2012). The alpha level used in determining the sample size in most academic research studies is either 0.05 or 0.01 (Fleiss, 2003).

<sup>16</sup> The power is the probability of detecting a statistically significant difference. The ideal power for any study is considered to be 80 percent or more (Suresh & Chandrashekara, 2012).

<sup>17</sup> The effect size or minimum detectable difference is the expected difference between two independent samples.

<sup>18</sup> A [one-tailed hypothesis](#) is a directional hypothesis. A [two-tailed hypothesis](#) is one in which the direction of results is not predicated and the possibility of relationship needs to be tested in both directions, for example, testing whether social presence has a positive or negative effect on engagement.

Factors affecting the sample size

Factor	Magnitude	Impact on Identification of Effect	Required Sample Size
<i>P</i> value or alpha - level	Small	Stringent criterion and difficult to achieve significant difference	Large
	Large	Relaxed criterion. Significance is easier to attain	Small
Power	Small	Identification unlikely	Small
	Large	Identification more probable	Large
Effect	Small	Difficult to identify	Small
	Large	Easy to identify	Small
Alternative Hypothesis	One-tailed	Easy to identify	Small
	Two-tailed	More general criterion	Large

TABLE 4-3 FACTORS AFFECTING THE SAMPLE SIZE (SURESH &amp; CHANDRASHEKARA, 2012)

A study design with a one-tailed hypothesis requires 20 percent fewer subjects as compared to two-tailed studies (Suresh & Chandrashekara, 2012). Also, since randomisation reduces the confounding factors, randomised studies need 20 percent fewer subjects as opposed to non-randomised. In addition, in order to make adjustments of other factors, including withdrawals and missing data, an additional 10 - 20 percent of subjects is usually required (Suresh & Chandrashekara, 2012).

After running the pilot test, it was estimated to have a sample size of 146 (or 36 users for each run). This sample size was decided based on the power of 0.95, alpha of 0.05 and the effect size (*d*) between the ranges of 0.5 to 0.55 (one-tailed *t*-test).

#### 4.4 Design of experimental conditions

This experiment required participants to interact in four experimental conditions which exhibit opposing degrees of social presence, usability and user control. The four experimental conditions were the combination of SP low and high (SP - +) and user control and usability low and high (UC and U - +). The two treatment conditions of 1 and 4 are called 'high presence TC,' and the two treatment conditions of 2 and 3 are called 'low presence TC'. In order to achieve the difference in social presence, usability and user control, each condition exhibited different properties and perspectives according to the factors affecting social presence described previously in chapter 2, section 2.3.

#### **4.4.1 Design low and high level of social presence**

The level of social presence which participants can experience is closely related to the social cues that the communication medium can convey. The communication and coordination technologies used in treatment conditions as well as social and shared elements have to be carefully selected to create high and low levels of social presence. Available interface technologies which could be integrated within an online shop and fulfil a sense of social presence through interactions (synchronised or asynchronised) between participants were email, text chat, message board, and audio and video conference calls. In the next two sections, the use of shared communication and navigation tools in the design of the four treatment conditions is described.

##### **4.4.1.1 Shared communication medium**

People experience different levels of communication in mediated settings, since the communication between individuals is mediated by the media interface, and the richness of such media has a strong impact on the level of social presence and communicative realism. One of the communication tools which is widely being used in a virtual environment is text-based CMC. Most of the non-verbal cues involved in face-to-face communication simply do not exist in text-based CMC. Although text-based conversation is not comparable with the level of interaction we have in a traditional face-to-face communication, it still could be used to develop a sense of social presence within an online shopping environment. In fact, asynchronous text-based CMC such as email can be used as a communication tool, which supports social interaction and participation among online users at a very low level since the interaction mediated by email is not immediate and social cues transferred through email is minimal. Email and text chat was selected as a main form of communication for the low presence conditions of two and three.

According to the theory of social presence discussed previously in chapter 2, being with a friend or a relative in an online shop plays an important role in the promotion of socially meaningful interaction. A communication medium such as a video call, which affords a high level of social cues, including voice, facial expression and eye contact, will result in a higher level of social presence. Therefore, the communication medium which has the higher perceived social presence during a shopping experience will have

a better fit with the shopping objective of socialising and will result in higher levels of satisfaction with the overall shopping process. Video call was selected as the main medium for interaction between co-shoppers for the two high presence conditions of one and four.

#### **4.4.1.2 Shared navigation**

According to the co-presence theories discussed previously in chapter 2, when online users have the same understanding of the information about the context they are located in, they experience a higher level of social and co-presence. When online co-shoppers share the same shopping session and view the same products, this reduces uncertainty regarding what information is salient, which then results in shared understanding and common ground. A shared navigation medium can convey a high sense of co-presence and build common ground between online users. It allows them to navigate and view the same page synchronous with their remotely located partners. It also improves the effectiveness of communication, since the message transferring between two collaborators has the same meaning for both sender and receiver. In addition, when participants have a similar interpretation of information, this can ease the process of the search and purchase decision.

Implementing the socially rich communication medium in online shops is vital to strengthen the experienced sociality and engagement with the shopping channel, however, it is not adequate. Co-browsing is a critical element to enhance the level of social and co-presence experienced in an online shop. When co-navigation is integrated in an online shop, it allows two or more co-shoppers to share a synchronised shopping session and view the same page.

Despite the popularity and use of co-browsing in different collaborative virtual environments, including online learning environments and video gaming, it has not yet been used in an online shopping environment. Shared browsing enables real-time interaction for participants: users can click, type and navigate together. Most importantly, shared browsing offers the same level of distributed control over the shared session. This enables all participants to actively collaborate and perform a shared task, which then results in higher satisfaction experienced by co-shoppers. However, with all the development of the recent technology of co-browsing, there are still issues with



usability, accessibility and scalability. The latest technology of co-navigation was used to design the high presence conditions of one and four. The criterion to compare and decide which co-browsing tool should be used in the experimental design is presented in the next section.

#### *4.4.1.2.1 Co-browsing and Screen Sharing*

Co-browsing is one of the synchronous collaboration technologies which enables online users to co-navigate the web with others at-a-distance. Co-browsing is similar to screen sharing in terms of sharing the same web page with collaborators, but it is different in terms of how it works. Co-browsing tools simply make all participants use a common browser, and send each URL selected by the ‘host’ to all other collaborators connected to the session. Screen sharing is another set of collaboration tools that allow online users to live stream their screen to others connected online wherever they may be. Such tools, similar to co-browsing tools, allow multiple users to connect to a shared session and see a real-time navigation of other individuals’ computer screens, and also the option to use the mouse and keyboard to indicate what is on their own screen. The following are key features, as main comparative criteria to compare and decide which co-browsing tool should be used in the experimental design:

1. Co-browsing: Allows participants to browse between URLs and web pages simultaneously with their remotely located partner
2. Co-scrolling: Participants can scroll web pages in real time on the end user screen
3. Co-filling: Allows participants to fill in a web form together
4. Session control: Allows participants to take control of the co-browsing session
5. Shared pointing tool: Enables participants to present the mouse cursor to their remotely located partner in a synchronous way
6. Text chat: Participants can communicate in real time inside the co-browsing session
7. Max participants number: This is the maximum amount of participants who can be invited to take part in a co-browsing session

Co-scrolling: As the name implies, co-scrolling is the most advanced feature of a co-browsing session, enabling collaborators to scroll web pages simultaneously with all

session attendees. When one user scrolls a web page, it simultaneously scrolls on all collaborators' screens.

**Co-filling:** The co-filling feature enables collaborators to fill out online interactive documents and forms, or check out information with others in a synchronised fashion. However, only one person at a time can fill in the fields of an online form live and have the input appear on all participants' browser. Participants connected to the session can independently fill in their forms in the personal sections.

**Session control:** The control feature enables the host of a shared session to hand over control of the co-browsing session to any one of the attendees of the session. This means that in each co-browsing session only one person at a time can have full control over the session, but this control can be given to any other collaborator during the session.

**Shared pointing tool:** A shared pointing tool enables collaborators to present the mouse cursor to participants in a synchronous way over the web page being presented. This feature allows participants to present a light pointer, which moves across the web page, being presented on all participants' browsers.

The synchronised remote browser is an example of tools which facilitate coordination between online shoppers. There are several SWS (Synchronised Web Surfing) applications, having different levels of compatibility with other online applications. Some could be easily integrated into video conferencing applications. Also, the number of people that the SWS-based applications can support is different: some support only two and some more than two people. Depending on the technology being used in SWS applications, some require the software installation in users' web browsers and some use a Java applet, which does not require any installation. These SWS enabled applications make online communications more flexible and intelligent, which can be applied in social shopping. With all the features previously named as co-browsing tools for the main collaborative means, Google Hangouts and GTM (Go To Meeting) were selected as the main co-navigation tools to simulate the social shopping environment. They were used in the design of the two high presence conditions of one and four.

According to Manninen (2003), the quality of interaction in a communication situation varies according to the number of channels (e.g. visual, audio, tactile), their dynamics (e.g. the range of message intensity), and the range and degree of complexity of the features that are available. To achieve high rich interaction between participants, communication and co-navigation tools were combined with additional elements which facilitate the share of information, e.g. sharing URLs. Also tools that support equal distribution of control over the shared session between users were selected. The combined communication and co-navigation was designed differently in the two treatment conditions of one and four.

#### **4.4.2 Design low and high level of usability and user control**

Today's communication and collaboration tools are advanced in terms of usability and accessibility. Two selected collaboration tools (Google Hangouts and GTM) used in this experimental study to simulate the treatment conditions of 2 and 4 were easy to use. To be able to simulate the treatment conditions of 2 and 3 with a low level of usability and user control, it was decided to fake usability and control issues. The usability and control issues were created by:

- Taking control of the keyboard and mouse, or taking control over the shared session from one user and assigning it to his/her shopping partner every five minutes
- By using GTM the experiment administrator or host was able to switch control between the two users who participated in the experiment
- By using GTM, the experiment administrator or host was able to mute the voices of the two users who participated in the experiment, every ten minutes
- The shared session was slow to response and navigate, which caused the shared platform to be perceived as difficult to use
- In condition 3, G-mail was selected as the only medium mediating interaction between users. Sent and received messages had to be on a single chain of emails. G-mail suffers from a lack of immediate response and ease of use.

Participants were naïve to fake usability and control issues they experienced during the course of the experiment. The aim was that participants would have assumed that usability problems came from the tool itself and perceived it as difficult to use.

#### **4.5 Design of experimental task that promotes social interaction**

The level of collaboration and coordination involved in an online shopping experience depends on the coordination needs of the shopping task. Simply implementing communication and collaboration tools within an online shop is not adequate for promoting social interaction among online users. The experimental task had to create a coordination need, which then promotes interaction between participants. Also, the selected product in an experimental task had to be gender-neutral, which minimises the effect of users' demographics. In addition, it had to be simple enough and not require a high level of expertise.

According to Paredes and Martins (2012), understanding the social nature of interaction and designing an environment that promotes that interaction in every online store necessitates an interface between social need and technical deliverables. Paredes and Martins (2012) describe social interaction as “the acts, actions and practices mutually oriented between two or more people”. The conceptual core of social interaction in the virtual environment is ‘shared goals’ and ‘participation of shared communities’. For this reason, the shopping task was carefully designed around a shared goal, which requires collaboration and communication between participants to accomplish the shopping task.

The experimental task was designed in a way to promote two forms of actions taking place in an experimental environment. These two forms of actions included goal-oriented and communicative. The objective of designing goal-oriented actions was to promote collaboration and communication between participants. The goal-oriented actions happen when users' actions are being affected by the actions of their remotely connected partner involved in the experiment. This happens when users' participation and collaboration is mandatory to accomplish a task. Communicative actions relate to the general agreement of planned actions through rational discussion (Paredes & Martins, 2012). The communicative action was promoted through the experimental task, so participants arrived at a common agreement and coordinated their planned actions

accordingly; for example, they broke down the experimental task based on their preferences and expertise.

The need for social presence and human warmth differs across various types of products or services. When studying the effect of social presence, it is important to select the right product category. For example, a study by Hassanein and Head (2005) found that a greater degree of social presence generated by socially rich descriptions and images has a positive effect on shoppers' intentions to purchase clothing. However, an increased level of social presence on sites selling products such as headphones did not have the same positive effect. This suggests that the type of product is relevant to social requirements.

As discussed in this chapter, the product category was identified as a control variable that had to remain constant in all treatment conditions. Also, it had to motivate involvement with the experimental task. Under low conditions of product involvement, consumers tended to engage less and carry out few searches. But with conditions of high product involvement, consumers search more extensively.

As previously mentioned, a high degree of product expertise may reduce the amount of time a user searches for information, possibly because users look for information prior to purchase less than is expected (Bettman 1979). The product selected in this experimental task had to be simple enough and not require a high level of expertise. Moreover, since observation was adopted in this study, the experimental task had to be long enough to collect enough data.

For all the reasons discussed above, 'booking a group holiday' was selected as an experimental task. A group holiday plan had to be realistic, and involve discussion around location (where to go), the time of the holiday (when to go), duration (how long to stay), budget (how much to spend) and expenses (how much it would cost). The experimental task was broken into smaller tasks: search for destination; accommodation, activities, attractions and transportation. However, search for flights was excluded from the task after conducting the pilot test, as it extends the length of the experiment to over 1.5 hours. Participants were given the freedom to explore and browse as many websites as they wanted. However, a few websites were recommended

to participants to start their search, such as ‘booking.com,’ ‘tripadvisor,’ ‘google hotel finder,’ and ‘hostelworld’.

#### **4.6 Design of survey questionnaires**

In this study all variables including factors and responses were measured **quantitatively** with a Likert scale of 1-5. The measurement items used to measure different constructs in this study were borrowed from previously established studies and were modified in the light of preliminary quantitative questionnaires to capture unique features for the context of this study. A five-point Likert-type scale was adopted for consistency in measuring the variables (from not at all (1), very little (2), more or less (3), very much (4), greatly (5)). A total of 149 items questionnaire were generated. Each of the scale item used, and the sources from where they were adopted are presented in appendix A Section 5 (social and collaborative shopping questionnaire).

The items were pilot tested with 9 subjects, and were then tested with 146 subjects from the same population, students and staff of University of Sussex. The validity and reliability of the proposed scale was examined. Total items of 8 scales were removed from 149 questionnaire items after running data analysis due to low correlation scores.

Two questionnaires, a pre-questionnaire (administered before the users starting the experiment) and a post questionnaire (administered after the users completed the experiment) were administered. The pre-questionnaire was used to gather information about the general demographics and characteristics of the participants (age, gender, previous online shopping experience with affiliation needs and shopping orientation information) and the post-questionnaire was used for the participants to report level of social and co-presence as well as usability, user control, involvement, engagement, intention to buy and perceived benefit on a Likert scale of 1–5 (see appendix A Section 5).

#### **4.6.1 Design of pre-test questionnaire**

The design of the pre test questionnaire includes two units: structured and open-ended. The structured unit includes 13 questions and was designed to collect demographic information (including age, gender, income level and education level), as well as Internet usage and shopping tendencies (see appendix A Section 5). The Internet usage section measures users' level of comfort and expertise with using the Internet and purchasing from online shops. The shopping tendency section measure users' affiliation needs. For example, users were asked whether they prefer to buy online alone, or with friends and family, and whether their shopping partner has any influence on their purchase decisions.

The open-ended section with 9 questions includes the two sections of PT1 and PT2 (see appendix A Section 5). The key purpose of designing the section PT1 was to get a better understanding of the reasons users share shopping experiences with friends or family members. We also aimed to collect information about how online users currently buy online with remotely located shopping partners. How they combine different tools such as email, Facebook, and Skype to conduct a shared shopping experience and the difficulties associated with these tools. Users were asked if they shared their shopping experience with someone else before and if they did what collaboration or communication tools they used.

An impotent part of the experiment is to study users' search and purchase decision behaviour when they share their experience with a friend or a family member. It was hypothesized that co-shoppers might have influence on each other's purchase decisions. In order to test this, users were asked to think about the experimental task and answer four questions in section PT2 regarding their final decision on where to go and how long to stay without discussing with their shopping partners. The final decision was then recorded as part of an observation. It was tested whether the result was similar or different to the answers given to PT2 of the pre-test questionnaire.

#### 4.6.2 Design of post-test questionnaire

A subjective self report post-questionnaire of 127 items was designed to measure variables studied in this research. The measurement items constructed for the post-test questionnaire were either borrowed from previous studies, or developed in the light of a preliminary quantitative questionnaire to capture unique features for the context of this study. The developed questionnaire is generated from the content of theoretical framework and transferred into questions. Every scale item used in this experiment, and the sources from where they were adopted, are presented in appendix A Section 5 (social and collaborative shopping questionnaire). How scales were adopted and developed to precisely measure dependent and independent variables examined in this study is presented in the following section.

#### 4.7 Developing measurements of independent variables (SP, U, UC)

Figure 4-4 presents the selected variables and the research model. The selection of variables was based on the research question and the hypotheses developed in this research, as presented in chapter 2 and chapter 3. Three independent and seven dependent variables were identified in this study and are presented in the figure below.

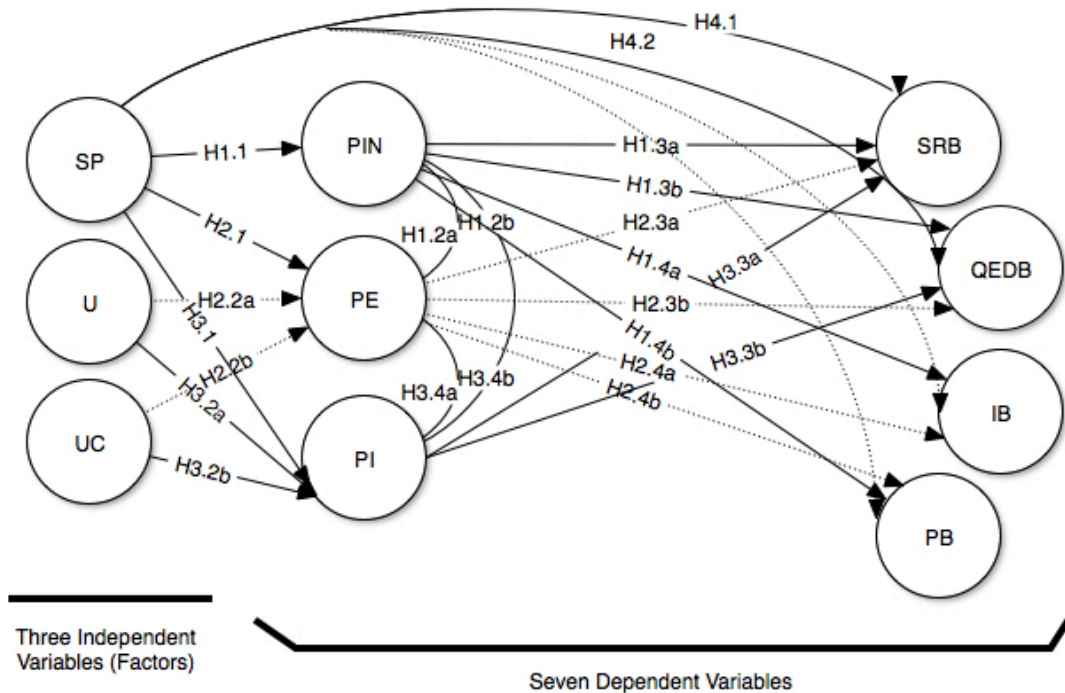


FIGURE 4-4 SELECTED VARIABLES AND RESEARCH MODEL



In order to investigate the hypotheses and the effects of factors, a set of quantitative measurements was developed for all dependent and independent variables. The measurement items were either borrowed, or developed as a quantitative questionnaire. In the following subsections, it is discussed how measurement items were selected and developed for social presence, usability and user control.

Developing subjective measurements of social presence was one of the key contributions of this research. Previously in chapter 2, the top five constructs of social presence were surveyed; in this chapter they are further explored in order to develop subjective measurements.

#### **4.7.1 Perceived social presence (SP)**

Previous studies on social presence implemented various methods of measuring presence, including a survey questionnaire, observation and task performance. IJsselsteijn et al. (2000) define two general approaches to measuring presence: subjective and objective (IJsselsteijn, de Ridder, Freeman, & Avons, 2000). Similarly, Slater et al. (1998) argue that there are two manifestations of presence: subjective and behavioural presence (Slater, Steed, McCarthy, & Maringelli, 1998). Subjective presence in an online environment refers to how an individual responds to a question about ‘being there’. Behavioural presence refers to “observable, unplanned and non-conscious bodily responses” (Slater, Steed, McCarthy, & Maringelli, 1998). Task performance measures if a user performs a task in the experimental environment as efficiently and in the same manner as in the real world.

It is agreed that presence is a subjective experience, and an effective way of measuring it is by carrying out research in the form of questionnaires or interviews that use subjective assessment methodologies. In fact, the majority of experiments studying ‘presence’ adopt questionnaires as the key instrument to measure subjective presence (Bradley, Walker, & McGrath, 1996; Benford, Bowers, Fahlen, Greenhalgh, & Snowdon, 1995; Benford, Bowers, Fahlen, & Greenhalgh, 1994; Clarence, Ellis, & Rein, 1991). Although subjective measures appear to be more valid (Prothero, Parker, Furness, & Wells, 1995) less expensive and easy to perform, due to the potential ‘instability’ of subjective measures (Freeman, Avons, Pearson, & IJsselsteijn, 1999),

researchers have turned to objective measures. Such measures, in contrast, concentrate on behavioural or physiological responses that are formed automatically and without much conscious thought (Siriaraya & Ang, 2012). IJsselsteijn et al. (2000), however, posited that the most beneficial method of measuring presence is to integrate both types of measures (IJsselsteijn, de Ridder, Freeman, & Avons, 2000).

Studies of interactions of the face-to-face kind tend to use behavioural measures or observation (Coker & Burgoon, 1987) to quantify unified variables, including engagement, involvement, immediacy and the degree of intimacy. This method measures users' behaviour as they react to different stimuli in the experimental environment. A number of verbal or nonverbal cues, e.g. tone of voice or facial expression, are good indications of the sense of presence. The use of these behavioural measures for social presence is straightforward: if participants are undertaking a particular social behaviour, it is because they are aware of the presence of others. The behavioural measures of social presence can be constructed by the absence or presence of behavioural indicators (such as eye gazing, smiling, etc.), their frequency, and some variable properties of the behaviours (Biocca, Harms, & Burgoon, 2003).

Mediated social presence is viewed as a complex concept that has to be measured on a continuous scale. Pioneers in interpersonal communication research argue that social presence can't be conceptualised in black and white. This approach restricts the concept of social presence to the naive here - not here, which is not how a person perceives the existence of others in unmediated interaction. It disregards the varying dimensions of social presence and doesn't account for different shades of psychological models of others (Biocca, Harms, & Burgoon, 2003). The following questions developed by ... measure social presence on a scale range of 0 to 1. It measures whether a sense of presence exists or does not exist.

*Agree/or Disagree, in the experimental environment....*

- *There is always a sense of human contact*
- *There is always a sense of sociability*
- *There is always a sense of human warmth*
- *There is a sense of personalness*
- *There is a sense of human sensitivity*

- *There is always a sense of friendliness*
- *There is always a feeling of belongingness*
- *There is always a possibility of social networking*

The above measurements developed by Gefen and Straub (2003) were adopted in the post test questionnaire as SP2. It was then tested which presence questionnaire developed in previous research (SP2) and in this study (SP1) is more valid, reliable and precise measurements of social presence.

#### 4.7.1.1 Sub-scales of social presence

Five constructs of social presence were identified in this research including: co-presence, mutual awareness, mutual understanding, intimacy and immediacy. These five constructs are surveyed in chapter 2. Subjective measurements are then developed in this chapter to assess experienced social presence (see Table 4-4). Some of the subjective measurements: (CP3, CP5-CP11) were utilised from previous studies of online shopping (Nowak & Biocca, 2003; Slater, Sadagic, Usoh, & Schroeder, 2000; Casanueva J. S. Blake E. H., 2001; Nowak, K., 2001; Weiner & Mehrabian, 1968; Mehrabian, 1967; Mehrabian 1971; Andersen, Andersen, & Jensen, 1979; Heeter 1992; Biocca, Harms, & Burgoon, 2003; Vilhjálmsón, 2003), however the majority of the subjective measurements: (CP1, CP2, CP4, CP12-CP14, IM1-IM4, SSP1-SSP5, MU1-MU5) defined in this thesis are **newly** developed measurements generated by consideration of a new theoretical framework that allowed the transposition of the subjective measurements into new survey questionnaires.

Consolidated social presence constructs and measurement items.

Construct	Definition	Items
(Sallnas, Rasmussen, & Sjostrom, 2000, p. 462) Nowak & Biocca (2003) (Palmer, 1995) (Biocca, Harms, & Burgoon, 2003)	Social presence refers to the feeling of being socially present with another person at a remote location. The extent to which communication and social interaction in the virtual world seem similar to a face-to-face interaction.	<b>CP3:</b> <i>Please rate how closely your sense of being together with other people in a real world-shopping settings resembles your sense of being with them in the experimental social-environment, you just experienced?</i> <b>CP7:</b> <i>To what extent did you have a sense of your shopping-partner being with you in the online shop?</i> <b>CP10:</b> <i>To what extent was this like a face-to-face conversation with a real</i>

		<p>person?</p> <p><b>CP11:</b> <i>To what extent can you imagine yourself being with your shopping-partner in the similar virtual-social environment?</i></p>
<p>Goffman (1963) (Bulu, 2012, p. 155) (Ciolek, 1982; Biocca &amp; Nowak, 1999; Biocca &amp; Nowak, 2001; Nowak, 2000) (de Greef &amp; IJsselsteijn, 2000; Cho &amp; Proctor, 2001)</p>	<p>A sense of being together in a virtual environment where individuals become “accessible, available, and subject to one another”.</p> <p>Having a sense of feeling of other individuals, namely perceiving others and having a sense of feeling that others were actively perceiving us and being part of a group.</p> <p>Full conditions of co-presence, however, are found in less variable circumstances: persons must sense that they are close enough to be perceived in whatever they are doing, including their experiencing of others, and close enough to be perceived in this sensing of being perceived. The sense of ‘being together’.</p>	<p><b>CP2:</b> <i>To what extent did you have a sense of “being together” in the online shop? OR “being with your friends/relatives in the online shop?</i></p> <p><b>CP4:</b> <i>To what extent did you have a sense that you were perceived present by your friends/relatives?</i></p>
<p>(Mason, 1994) (Casanueva &amp; Blake, 2001)</p>	<p>Colocation is a component of co-presence and it is defined as “the feeling that the people with whom one is collaborating are in same room.</p>	<p><b>CP5:</b> <i>To what extent did you have a sense of ‘being there’ in the online shop, you just experienced?</i></p> <p><b>CP6:</b> <i>To what extent did you have a sense that you were in the same place as your friends/relatives? OR</i></p> <p><b>CP7:</b> <i>To what extent did you have a sense that your shopping partners were in the same place as you?</i></p>
<p>(Bulu, 2012, p. 155) (Casanueva &amp; Blake, 2001) (Goffman, 1963; Slater, Sadagic, Usoh, Schoeder, 2000).</p>	<p>Co-presence as a sense of Group/Community: co-presence consisted of two dimensions: having a sense of feeling of other individuals, and ‘being part of a group’.</p> <p>Co-presence addresses more psychological interaction of the individuals.</p>	<p><b>CP8:</b> <i>To what extent did you have a sense of the emergence of a group/community?</i></p> <p><b>CP9:</b> <i>To what extent did you have a sense of being ‘part of the group’?</i></p>
<p>Heeter (1992, p. 263) Gunawardena (1995, p. 9) (McLeod, Baron, Marti, &amp; Yoon, 1997, p. 708) Nowak (2001, p. 4)</p>	<p>Co-presence as Apparent existence, feedback: the extent to which other beings in the world appear to exist and react to the user.</p> <p>The degree to which a person is perceived as a ‘real person’ in mediated communication.</p> <p>The degree of tangibility and proximity of other people that one perceives in a communication situation.</p> <p>If a person perceives that they have connected with another mind, they may also feel as if they were able to fulfil their communication goals.</p>	<p><b>CP12:</b> <i>To what extent did you feel you were able to assess your friends/relatives’ reaction to what you said?</i></p> <p><b>CP13:</b> <i>How tangible did you feel your closeness was to your friend/relative?</i></p> <p><b>CP14:</b> <i>To what extent you were able to communicate your needs to your friend/relative?</i></p>
<p>(Weiner &amp; Mehrabian, 1968)</p>	<p>Immediacy as a construct of social presence refers to “the degree of</p>	<p><b>IM1:</b> <i>To what extent did you have a sense of interpersonal</i></p>

(Andersen, Andersen, & Jensen, 1979, p. 153) Mehrabian, (1971a) (Exline & Winter, 1965) Goffman (1963)	psychological closeness that exists between communicators and the objects of their communication. Increase in the number and/or intensity of immediacy behaviours produces interpersonal closeness and reduces psychological distance between communicators. Immediate behaviours are those communication behaviours that reduce distance between people.	<i>closeness with your friends/relatives?</i> <b>IM2:</b> <i>To what extent did you have a sense of distance between you and your friends/relatives?</i> <b>IM3:</b> <i>To what extent did you feel that interaction with your friends/relatives was immediate?</i> <b>IM4:</b> <i>To what extent did you feel that interaction with your friends/relatives was friendly and warm?</i>
(Biocca 1997)  (Biocca, Harms, & Burgoon, 2003, p. 464)(Palmer, 1995, p.284)	The degree to which a user feels access to the intelligence, intentions, and sensory impressions of another. The minimum level of presence of another intelligence felt by users happens when users experience form, behaviour, or sensory indicators. Physical distance over which one person can experience another with the naked senses-thereby finding that the other is within range. Immediacy, intimacy and involvement, are typically used to describe behaviours, it is not difficult to imagine that they also describe a cognitive state in which individuals feel more or less directly 'present' in the interaction	<b>SSP1:</b> <i>To what extent did you feel you were able to identify your friends/relatives?</i> <b>SSP2:</b> <i>To what extent did you feel you were able to share information with your friends/relatives?</i> <b>SSP3:</b> <i>To what extent did you feel you were able to express agreements/beliefs with your friends/relatives?</i> <b>SSP4:</b> <i>To what extent did you feel the feedbacks/responses you received from friends/relatives was immediate/timely?</i>
(Biocca, Harms, & Burgoon, 2003) Heeter (1992)	Awareness of user/observer and the mediated other. Awareness of the existence of the other is accompanied by the other's reaction to the self or user.	<b>CPI:</b> <i>To what extent did you have a sense of awareness of presence of your friends/relatives in the online shop?</i>
Nowak (2000) (Savicki & Kelley, 2000, p. 817) (Biocca, Harms, & Burgoon, 2003) Vilhjálmsón (2003)	The measure of 'homophily', or perceived similarity in emotions and attitudes, to measure social presence. the ability to make one's self known under conditions of low media richness.	<b>MU1:</b> <i>How well did you feel you were able to understand what your friends/relatives was saying?</i> <b>MU2:</b> <i>How well did you feel you were able to express yourself with your friends/relatives?</i> <b>MU3:</b> <i>How well did you feel your friends/relatives understood what you meant to communicate?</i> <b>MU4:</b> <i>How well did you feel you were able to understand your friends/relatives' feelings/emotions toward the online shop?</i> <b>MU5:</b> <i>How well did you feel you and your friends/relatives share similar feelings/emotions toward the online shop?</i>

TABLE 4-4 CONSOLIDATED SOCIAL PRESENCE CONSTRUCTS AND MEASUREMENT ITEMS

## 1. First construct of social presence: perceived co-presence

Questions measuring social presence were based on two criteria: the feeling of being in a shared space with another person (co-presence) “Social presence refers to the feeling of being socially present with another person at a remote location” (Sallnas, Rassmusgohn, & Sjostrom, 2000, p. 462) and the extent to which communication and social interaction in the virtual world seem similar to a face-to-face interaction (social presence).

The use of indicators that ask the respondent to assess the ‘experience’ rather than the ‘medium’ is more typical of presence measures. The equivalent approach for a presence measure would be to ask, “How realistic is this medium? as opposed to, “How realistic was the experience?” When it comes to measuring subjective social presence (i.e. the awareness of the presence of others) one can use a similar set of attributes as for personal presence. The following measurement items are based on the work of Nowak and Biocca (2003), and Slater, Sadagic, Usoh, and Schroeder (2000).

*measurement items (CP3, CP7, CP10, CP11): [During the experiment....]*

- **CP3:** *Please rate how closely your sense of being together with other people in a real world-shopping settings resembles your sense of being with them in the experimental social-environment, you just experienced?*
- **CP7:** *To what extent did you have a sense of your shopping-partner being with you in the online shop?*
- **CP10:** *To what extent was this like a face-to-face conversation with a real person?*
- **CP11:** *To what extent can you imagine yourself being with your shopping-partner in the similar virtual-social environment?*

The term ‘co-presence’ was originated by Goffman (1963) and was defined as: a sense of being together in a virtual environment where individuals become “accessible, available, and subject to one another” (p. 22), namely, co-presence consisted of two dimensions: “having a sense of feeling of other individuals, namely perceiving others and having a sense of feeling that others were actively perceiving us and being part of a group” (Bulu, 2012, p. 155).

Ciolek (1982) states that “full conditions of co-presence, however, are found in less variable circumstances: persons must sense that they are close enough to be perceived in whatever they are doing, including their experiencing of others, and close enough to be perceived in this sensing of being perceived” (Ciolek, 1982; Biocca & Nowak, 1999; Biocca & Nowak, 2001; Nowak, 2000). Researchers further conceptualised co-presence as a sense of being together and focused on more “psychological connection of minds” (Nowak, 2001) and “the sense of being together” (de Greef & IJsselsteijn, 2000; Cho & Proctor, 2001). The questions below generated from discussed definition of co-presence and transferred into:

***measurement items (CP2, CP4): [During the experiment....]***

- **CP2:** *To what extent did you have a sense of “being together” in the online shop? OR “being with your friends/relatives in the online shop?”*
- **CP4:** *To what extent did you have a sense that you were perceived present by your friends/relatives?*

***4.7.1.1.1 Sub scales of co-presence***

Similar to social presence, co-presence has varying dimensions. The top three components of co-presence were identified as ‘colocation’, ‘sense of group/community’ and ‘apparent existence/feedback’. These constructs were used to develop measurement items to assess co-presence as a component of social presence.

***I. Co-presence: Colocation***

Colocation is a component of co-presence and it is defined as “the feeling that the people with whom one is collaborating are in same room” (Mason, 1994).

***measurement items (CP5, CP6, CP7): [During the experiment....]***

- **CP5:** *To what extent did you have a sense of ‘being there’ in the online shop, you just experienced? (Casanueva & Blake, 2001)*
- **CP6:** *To what extent did you have a sense that you were in the same place as your friends/relatives? OR CP7: To what extend did you have a sense that your shopping partners were in the same place as you? (Casanueva & Blake, 2001)*

## *II. Co-presence: Sense of Group/Community*

“...Namely, co-presence consisted of two dimensions: having a sense of feeling of other individuals, and being part of a group” (Bulu, 2012, p. 155). Co-presence is distinguished from social presence in that while social presence relates to the quality of the medium and users’ perception of the medium, “co-presence addresses more psychological interaction of the individuals” (Bulu, 2012, p. 155).

### *measurement items (CP8, CP9): [During the experiment....]*

- **CP8:** *To what extent did you have a sense of the emergence of a group/community?* (Casanueva & Blake, 2001)
- **CP9:** *To what extent did you have a sense of being ‘part of the group’?* (Casanueva & Blake, 2001)

## *III. Co-presence: Apparent existence, feedback*

Co-presence is also defined by Heeter (1992) as “the extent to which other beings in the world appear to exist and react to the user” (p. 263). Gunawardena (1995) defined co-presence as “the degree to which a person is perceived as a ‘real person’ in mediated communication”. McLeod et al. (1997) defined it as “the degree of tangibility and proximity of other people that one perceives in a communication situation” (McLeod, Baron, Marti, & Yoon, 1997, p. 708).

Nowak (2001) argues that “if a person perceives that they have connected with another mind, they may also feel as if they were able to fulfil their communication goals” (p. 4). A medium that does not leave people with this sense of connection with or access to another mind may be less able to fulfil communication goals.

### *measurement items (CP12, CP13, CP14): [During the experiment....]*

- **CP12:** *To what extent did you feel you were able to assess your friends/relatives’ reaction to what you said?*
- **CP13:** *How tangible did you feel your closeness was to your friend/relative?*
- **CP14:** *To what extent were you able to communicate your needs to your friend/relative?*



## **2. Second construct of social presence: immediacy**

Immediacy, like most other nonverbal constructs, can be measured by employing subjective measurements, observation or behavioural measurements. Subjective measurements asked respondents to answer a set of questions which measures whether they perceive the other user involved in the experiment as immediate or non-immediate. In addition, as part of the subjective measurements, a list of non-verbal immediacy behaviours can be prepared which asks respondents to what degree they perceived a person to carry out each of these behaviours. The overall level of immediacy felt by participants in such an experiment would be taken from the total of their responses (Andersen, Andersen, & Jensen, 1979).

Theories of immediacy and intimacy related to this study are discussed in chapter 2, section 2.3, 'The Varying Dimensionality of Social Presence'. A set of measurement items was developed from the content of immediacy and intimacy theories to assess perceived social presence (SP).

According to Weiner and Mehrabian (1968), 'immediacy' refers to "the degree of psychological closeness that exists between communicators and the objects of their communication" (as quoted in Conaway, Easton, & Schmidt, 2005, p. 25). "Increase in the number and/or intensity of immediacy behaviours produces interpersonal closeness and reduces psychological distance between communicators" (Andersen, Andersen, & Jensen, 1979, p. 153). Mehrabian (1967) defines 'immediacy' as "directness and intensity of interaction between two entities" (p. 325) or "psychological distance" between interactants" (Weiner & Mehrabian, 1968).

Andersen et al (1979) suggest that "immediacy behaviours are approach behaviours which increase sensory stimulation and produce Interpersonal closeness" and which also "communicate availability or attentiveness" (p. 153). They further describe such behaviours as those that bring people closer. Goffman (1963) sees immediacy behaviours as involving greater overall sensory incentive, and Mehrabian (1971a) views them as "typically multi-channelled". Immediacy behaviours can have the effect of lessening the psychological distance felt by participants. The more immediate a medium is, the easier it is for people to overcome psychological distance and feel close to others

(Andersen, Andersen, & Jensen, 1979). The simplest types of questions that can be used to measure subjective immediacy are of the form:

*measurement items (IM1, IM2, IM3, IM4): [During the experiment...]*

- **IM1:** *To what extent did you have a sense of interpersonal closeness with your friends/relatives?*
- **IM2:** *To what extent did you have a sense of distance between you and your friends/relatives?*
- **IM3:** *To what extent did you feel that interaction with your friends/relatives was immediate?*
- **IM4:** *To what extent did you feel that interaction with your friends/relatives was friendly and warm?*

### **3. Third construct of social presence: intimacy**

Intimacy, according to Argyle and Dean (1965), is a function of “proximity, eye-contact, smiling, and personal topics of conversation etc” (p. 95). Biocca (1997) argues that the amount of social presence experienced by users is “the degree to which a user feels access to the intelligence, intentions, and sensory impressions of another” (p. 22). He explains the minimum level of presence of another intelligence felt by users happens when users experience form, behaviour, or sensory indicators. The simplest types of questions that can be used to measure subjective intimacy and personal presence are of the form:

*measurement items (SSP1, SSP2, SSP3, SSP4): [During the experiment...]*

- **SSP1:** *To what extent did you feel you were able to identify your friends/relatives?*
- **SSP2:** *To what extent did you feel you were able to share information with your friends/relatives?*
- **SSP3:** *To what extent did you feel you were able to express agreements/beliefs with your friends/relatives?*
- **SSP4:** *To what extent did you feel the feedbacks/responses you received from friends/relatives was immediate/timely?*

#### 4. Forth construct of social presence: mutual awareness and understanding

Theories of mutual awareness and mutual understanding related to social presence are discussed in chapter 2, section 2.3. A set of measurement items was developed from the content of mutual awareness and mutual understanding theories to assess perceived social presence (SP).

The definition of co-presence is expanded into a broader version, which simply suggests “mutual awareness with the phrase being together” (de Greef & IJsselsteijn, 2000; Ho, Basdogan, Slater, Durlach, & Srinivasan, 1998). This happened when sensory properties of others were taken into account, especially awareness of user/observer and the mediated other (Biocca, Harms, & Burgoon, 2003). In Heeter’s (1992) definition, “awareness of the existence of the other is accompanied by the other’s reaction to the self or user” (as quoted in Shen & Khalifa, 2008, p. 726). In this definition, the “reaction of the other to the user validates that they are there and aware,...” (Biocca, Harms, & Burgoon, 2003, p. 463). The simplest types of questions that can be used to measure subjective mutual awareness are of the form:

*measurement items (CP1): [During the experiment...]*

- **CP1:** *To what extent did you have a sense of awareness of presence of your friends/relatives in the online shop?* **mutual understanding**

This aspect of social presence has been further emphasized by Nowak (2000) who “used the measure of ‘homophily’, or perceived similarity in emotions and attitudes, to measure social presence” (as quoted in Biocca, Harms, & Burgoon, 2003, p. 464). Despite the problem associated with this approach that social presence can be felt even in the absence of any similarity in views, it is relevant to note that it is possible to reach at least some degree of mutual understanding irrespective of the limitations posed by the medium (Biocca, Harms, & Burgoon, 2003). For Savicki & Kelley (2000), the definition of social presence emphasizes “the ability to make one’s self known under conditions of low media richness” (p. 817).

**measurement items (MU1, MU2, MU3, MU4, MU5): [During the experiment....]**

- **MU1:** *How well did you feel you were able to understand what your friends/relatives was saying?*
- **MU2:** *How well did you feel you were able to express yourself with your friends/relatives?*
- **MU3:** *How well did you feel your friends/relatives understood what you meant to communicate?*
- **MU4:** *How well did you feel you were able to understand your friends/relatives' feelings/emotions toward the online shop?*
- **MU5:** *How well did you feel you and your friends/relatives share similar feelings/emotions toward the online shop?*

#### **4.7.2 Usability (U)**

Similar to social presence, both subjective and objective methods can be employed to measure usability. A common method to measure this factor is to carry out a scenario base usability assessment, where participants, using the system of interest, provide their response to a set of usability assessment scenarios, which are tasks that present real problems to be solved, such as how to write and send an email (Whiteside, Bennett, & Holzblatt, 1988).

For a scenario-based methodology, either subjective or objective measures are used to assess usability. Objective measures in this case include the time it takes to complete a scenario, rate of completion, and the amount of time used for recovering from errors (Whiteside, Bennett, & Holzblatt, 1988). The subjective measure is a Likert scale questionnaire where participants comment on a system's ease of use, interface appeal, and so on (Alty, 1992).

According to Lewis (1995), most assessments with regard to usability gather subjective as well as objective data. However, choosing the appropriate measurements depends on what is being evaluated. If the main aim is an increase in productivity, objective measures are valid, but if it is to improve the appeal for the user, then subjective

measures are the focus. Of importance is an understanding of the psychometric properties of the assessment (Lewis, 1995, p. 58).

The IBM research materials are designed explicitly for usability assessment based on scenarios (Lewis, 1995). IBM created a subjective after-scenario questionnaire (ASQ) which consists of three questions about participants' satisfaction with system usability once they have completed each scenario, measuring the three most important characteristics with regard to system usability: how easy a task is to accomplish, time spent on the task, and usefulness of supporting information (messages, online help, and documentation) (Lewis, 1995).

The Post-Study System Usability Questionnaire (PSSUQ) is a subjective assessment of system usability. It is a short questionnaire of a 19-item instrument, its duration is approximately ten minutes, subsequent to a usability study. The PSSUQ assesses the satisfaction of participants as regards the usability of a system (Lewis, 1995). The PSSUQ is relevant to this study and it is adopted as part of a post-test questionnaire to assess users' perception of usability of the simulated online shop in four treatment conditions.

Psychometric evaluation of ASQ and PSSUQ presented adequate approximation of sensitivity, reliability and validity (Lewis, 1995), despite the fact the ASQ is an after-scenario questionnaire, intended for use in a scenario-based usability testing situation, and PSSUQ is intended to evaluate the general level of users' satisfaction with a system. The consistency of the two questionnaires makes their application wider and the generalisation of results possible. Due to their satisfactory psychometric attributes, they give usability researchers the self-assurance to do measurements in a standardised way using the questionnaires, whether it is a field research involving CSUQ (Computer System Usability Questionnaire) or a usability test/study involving PSSUQ or ASQ.

Of late, different quantitative scales have been created for usability including; SUS (System Usability Scale), a work of the Digital Equipment Co. Ltd. In 1986 for introducing usability engineering; a scale by Lin, Choong, and Salvendy (1997). The SUS was selected as a secondary assessment and it is added to the post-test questionnaire. The reliability and validity of the two questionnaires PSSUQ and SUS,

was then tested, and users' responses to SUS were removed from the data analysis due to the low validity score.

#### Consolidated usability measurement items

Construct	Items
<b><i>During the experiment...</i></b>	
IBM(Lewis, 1995) (Lewis, 2002)	<b>PSSUQ1:</b> <i>To what extent did you feel satisfied with how easy it was to use this system?</i>
	<b>PSSUQ2:</b> <i>To what extent did you feel it was simple to use this system?</i>
	<b>PSSUQ3:</b> <i>To what extent did you feel you could effectively complete the shopping task using this system?</i>
	<b>PSSUQ4:</b> <i>To what extent did you feel you were able to complete the shopping task quickly using this system?</i>
	<b>PSSUQ5:</b> <i>To what extent did you feel you were able to efficiently complete the shopping tasks using this system?</i>
	<b>PSSUQ6:</b> <i>To what extent did you feel comfortable using this system?</i>
	<b>PSSUQ7:</b> <i>To what extent did you feel it was easy to learn to use this system?</i>
	<b>PSSUQ8:</b> <i>To what extent did you believe you could become productive quickly using this system?</i>
	<b>PSSUQ9:</b> <i>To what extent did you feel whenever you made a mistake using the system, you could recover easily and quickly?</i>
	<b>PSSUQ10:</b> <i>To what extent did you feel the system interface was pleasant?</i>
	<b>PSSUQ11:</b> <i>To what extent did you like using the system interface?</i>
	<b>PSSUQ12:</b> <i>To what extent did you feel this system has all the functions and capabilities you expect it to have?</i>
	<b>PSSUQ13:</b> <i>To what extent did you feel you were satisfied with this system</i>

TABLE 4-5 USABILITY MEASUREMENT ITEMS

#### 4.7.3 User control (UC)

The components which build interactivity have been discussed in chapter 3. The primary element of interactivity is user control over the timing, content, and order of communications. User control means the degree of control the user has over the interaction experience (Gao, Rau, & Gavriel, 2009). It is associated with minimising the effort required for a task, the amount of effort a user needs to expend, as put forward by Heeter (1989), and includes control by the receiver in addition to control by the sender of messages (Fortin, 1997).

According to a study by Rozendaal, Braat, and Wensveen (2010) of user control, the level of interactivity and social presence experienced by users in the interaction environment is closely related to immediacy of control and mode of control (or anticipation of events). The immediacy of control implies that “a high delay between a

user's actions and the associated consequences decreases the sense of presence" (Casanueva, 2001, p. 30). The more control a participant has in interacting with the virtual environment, the higher the sense of presence. The anticipation of events or mode of control indicates that participants will probably "experience a greater sense of presence in an environment if they are able to anticipate or predict what will happen next" (Witmer & Singer, 1998). It suggests presence can increase if the interaction techniques are natural or well known to the participants (Rozendaal, Braat, & Wensveen, 2010).

According to Hoffman & Novak (1996), an interactive online environment should allow the consumer some control. The perception of behavioural control is seen to be of higher importance than actual control as regards its effect on intentions and actions (Ajzen, 1988). Consumers' perception of behavioural control is related to a feeling of self-efficacy (Bandura, 1977) and is defined by Ajzen (1988) as "the perceived ease or difficulty of performing the behaviour and . . . is assumed to reflect past experience as well as anticipated obstacles" (p. 132). A person's perceived control over the interaction in VE is related to his/her ability and confidence in carrying out mental or physical tasks while online, such as site navigation, access to content and the sequence of interaction (Wu & Wu, 2006). The simplest types of questions that can be used to measure user control are of the form:

Consolidated user control measurement items	
Construct	Items
<i><b>During the experiment...</b></i>	
<b>**New Items</b>	<b>UC1:</b> <i>To what extent did you feel you were able to follow the conversation between you and your friends/relatives?</i>
Vilhjálmsson (2003)	<b>UC2:</b> <i>To what extent did you feel you had control over the conversation?</i>
<b>**New Items</b>	<b>UC3:</b> <i>To what extent did you feel you could predict your friends/relatives' reaction to what you said/or shared?</i>
	<b>UC4:</b> <i>To what extent did you feel confident performing the shopping task?</i>
	<b>UC5:</b> <i>Please rate how easy you were able to navigate and find information through this system?</i>
	<b>UC6:</b> <i>To what extent did you feel you had control over navigating an online shop?</i>

TABLE 4-6 USER CONTROL MEASUREMENT ITEMS

#### 4.8 Developing measurements of dependent variables

Figure 4-5 presents the selected variables and the research model. Seven dependent variables were identified in this study and are presented in Figure 4-5. In the following sub sections it is discussed how measurement items were selected and developed for dependent variables including perceived involvement, engagement, interactivity and online users' shopping behaviour.

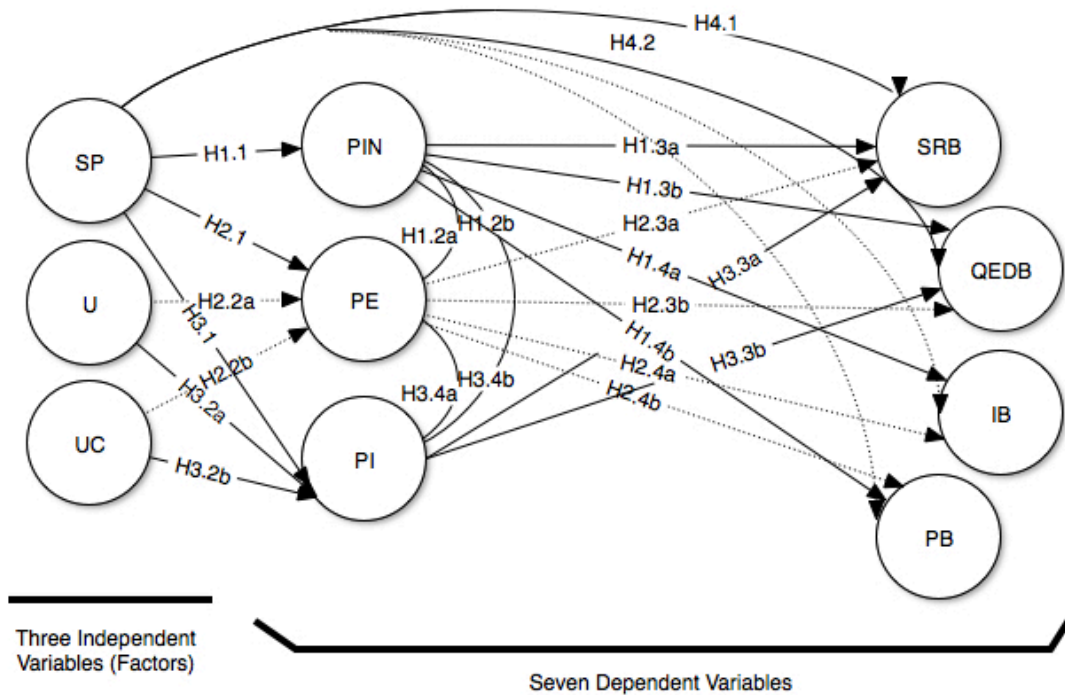


FIGURE 4-5 RESEARCH MODEL AND DEPENDENT VARIABLES

Some of the subjective measurements: (PIN1-PIN8, PE1-PE10, SRB1-SRB3 and SRB6, QEDB1-QEDB5, IB3 and IB6-IB7, PB1-PB3, PB6-PB8) were utilised from previous studies of online shopping (Casanueva & Blake, 2001; O'Brien & Toms, 2009; Lin, 2007; Pavlou & Fygenson, 2006; Haubl, 2000; Taylor, 1995; Limayem, 2000; Gefen, 2003; Kim, 2008; Green, 2011; Jarvenpaa, 2000; Swaminathan, 1999; Davis, 1989; Moore, 1991), however some subjective measurements: (RS1-RS3, IC1, SRB4-SRB5, QEDB6-QEDB8, IB1-IB2, IB4-IB5, IB8-IB9) defined in this thesis are **newly** developed measurements.



#### 4.8.1 Perceived involvement (PIN)

Some definitions extend “social presence slightly beyond the notion of awareness to suggest the importance of an element sometimes labelled psychological involvement” (Biocca, Harms, & Burgoon, 2003, p. 463). The two components of perceived involvement found in literature surveys are ‘focused attention’ and ‘felt involvement’. The appropriate set of measurements was borrowed from a study by Casanueva and Blake (2001) and O'Brien and Toms (2009).

##### *I. Focused attention*

The following measurements were borrowed from the study by Casanueva and Blake (2001) on customers' involvement. Measurements were revised slightly relevant to this study (see Table 4-7).

##### Consolidated perceived involvement measurement items (focused attention)

Construct	Items
<i>During the experiment...</i>	
Casanueva and Blake (2001)	<p><b>PIN1:</b> <i>To what extent did you feel you forgot about your immediate surroundings while shopping on this website?</i></p> <p><b>PIN2:</b> <i>To what extent did you feel that you were so involved in your shopping task that you ignored everything around you?</i></p> <p><b>PIN3:</b> <i>To what extent did you feel that you lost yourself in the shopping experience?</i></p> <p><b>PIN4:</b> <i>To what extent did you feel that you blocked out things around you when you were shopping on this website?</i></p>

TABLE 4-7 PERCEIVED INVOLVEMENT MEASUREMENT ITEMS 1

##### *II. Felt Involvement*

The following measurements are borrowed from study by O'Brien and Toms (2009) on development and evaluation of a survey to measure perceived involvement. Measurements were revised slightly relevant to this study (see Table 4-8).

##### Consolidated perceived involvement measurement items (felt involvement)

Construct	Items
<i>During the experiment...</i>	
O'Brien and Toms (2009)	<p><b>PIN5:</b> <i>To what extent did you feel that you were absorbed in your shopping experience?</i></p> <p><b>PIN6:</b> <i>To what extent did you feel you were interested in your shopping experience?</i></p> <p><b>PIN7:</b> <i>To what extent did you feel involved in the shopping experience?</i></p> <p><b>PIN8:</b> <i>To what extent did you feel that the shopping experience was fun?</i></p>

TABLE 4-8 PERCEIVED INVOLVEMENT MEASUREMENT ITEMS 2

#### **4.8.2 Perceived engagement (PE)**

Although social presence is, of itself, an extraordinary concept, the emphasis on interactive behaviour has resulted in its redefinition, to now include aspects of behaviour such as eye contact, nonverbal mirroring, and the taking of turns. This addresses the need to include within the definition of social presence, a behavioural component. For Palmer (1995), the definition of social presence includes “effectively (negotiating) a relationship through an interdependent, multi-channel exchange of behaviours” (p. 291).

According to Nowak (2001), the essential components to form and maintain interpersonal relationships within VE (virtual environment) is providing users with “a sense that they have shared an experience, had access to another mind, or experienced a face engagement” (p. 5). This allows them to have “a focused connection, which is necessary for meaningful interactions” (p. 5).

Nowak (2001) emphasised that this construct carries an impending restriction, with its measurement that may misperceive people’s perception of the use of media. It is imperative to improve the set of objective and/or subjective measurements that accurately assess “the extent to which people feel a sense of the other mind” (Nowak, 2001, p. 8). The usual way of determining whether people do, in fact, feel connected to another mind, aside from whether or not they thought this would be possible, is to simply ask the individuals involved “whether or not they felt they made a connection with another person, or whether they felt engaged in the conversation” (Nowak, 2001, p. 8).

The following measurements were borrowed from Heather, O’Brien and Toms (2009) on the development and evaluation of a survey to measure user engagement. Measurements were revised slightly, in order to be relevant to this study (see Table 4-9).

## Consolidated perceived engagement measurement items

Construct	Items
<i><b>During the experiment...</b></i>	
O'Brien and Toms (2009)	<b>PE1:</b> <i>To what extent did you feel that the shared shopping experience was attractive?</i>
	<b>PE2:</b> <i>To what extent did you feel that the shared shopping experience was aesthetically appealing?</i>
	<b>PE3:</b> <i>To what extent did you feel interested in the shopping experience?</i>
	<b>PE4:</b> <i>To what extent did you feel that you continued shopping in the shared environment out of curiosity?</i>
	<b>PE5:</b> <i>To what extent the content of the shared shopping environment incited your curiosity?</i>
	<b>PE6:</b> <i>To what extent was your shopping experience satisfactory?</i>
	<b>PE7:</b> <i>To what extent did you feel the shopping experience was worthwhile?</i>
	<b>PE8:</b> <i>To what extent do you consider your shopping experience a success?</i>
	<b>PE9:</b> <i>To what extent do you feel your shopping experience was rewarding?</i>
	<b>PE10:</b> <i>To what extent did you feel that the shopping experience did not work out the way you had planned?</i>

TABLE 4-9 PERCEIVED ENGAGEMENT MEASUREMENT ITEMS

**4.8.3 Perceived interactivity (PI)**

Steuer (1992) defines interactivity as “the extent to which users can modify the form and content of a mediated environment in real-time” (p. 84). According to Williams, Rice and Rogers (1988) interactivity is “the degree to which participants in a communication process have control over, and can exchange roles in, their mutual discourse” (p. 10). Rafaeli and Sudweeks (1997) outline interactivity from the perspective of interpersonal communication, as “the extent to which messages in a sequence relate to each other and especially the extent to which later message recount the relatedness of earlier message”.

Ha and James (1998) defined interactivity as “the extent to which the communicator and the audience respond to each other’s communication need” (as quoted in Dholakia, Zhao, Dholakia, & Fortin, 2000, p. 461). Perceived interactivity has been defined by Cui, Wang, and Xu, 2010 as “the degree to which the consumer perceives the website to be controllable, responsive, and synchronic” (p. 37).

Fortin (1997) highlights the role of a communication system in experienced interactivity. He describes interactivity as the extent to which one or more users are able to communicate within a communication system, either in a store-and-forward manner

or in real time, where the timing, content and sequence is all under the control of the user ( as quoted in Dholakia, Zhao, Dholakia, & Fortin, 2000).

#### 4.8.3.1 Sub-scales of perceived interactivity

The various components of interactivity were reviewed in chapter 3. The primary identified components are responsiveness, real-time interaction, synchronicity and interpersonal communication. These components are further explored in the following subsections, and they are transformed into measurement items to assess interactivity. All interactivity measurements are **new items** developed in this study (RS1-RS3 and IC1). They were generated by the consideration of a new theoretical framework that allowed the transposition of the subjective measurements into new survey questionnaires, (see Table 4-10).

Consolidated interactivity constructs and measurement items		
Construct	Definition	Items
Crawford (1990, p.105) (Rafaeli & Sudweeks, 1997)	Website interactivity refers to the relatedness of a response to earlier messages. The extent to which messages in a sequence relate to each other, and especially the extent to which later message recount the relatedness of earlier message.	<b>RS3:</b> <i>To what extent did you feel there was continuity between messages you receive from your friends/relatives?</i>
(Dholakia, Zhao, Dholakia, & Fortin, 2000, p. 7) Steuer (1992, p. 84)	The speed with which communication takes place, particularly response time. The extent to which users can modify the form and content of a mediated environment in real-time	<b>RS1:</b> <i>Please rate how immediate or fast was the response/reactions you received from your friends/relatives?</i>
(Dholakia, Zhao, Dholakia, & Fortin, 2000; Ha & James, 1998; Liu, 2003; McMillan & Hwang, 2002)	The speed that a system can afford to exchange messages between communicators	<b>RS2:</b> <i>Please rate how immediate or fast you were able to follow and understand the messages, which were exchanged between you and your friends/relatives?</i>
(DeFleur & Ball-Rokeach, 1989; Durlak, 1987; Heeter, 1989; Williams, Rice, & Rogers, 1988) (Gao, Rau, & Salvendy, 2009, p. 485) (Heeter, 1989)	The degree to which a media affords and enables interpersonal communication. The more the technologically mediated communication resembles interpersonal communication, the more interactive the communication is.	<b>IC1:</b> <i>Please rate how closely did you feel the interaction you experienced with your friends/relatives in the online shop resembles your sense of having interpersonal communication with them in real world-shopping settings?</i>

TABLE 4-10 PERCEIVED INTERACTIVITY CONSTRUCTS AND MEASUREMENT ITEMS

### **1. First construct of interactivity: responsiveness**

A consumer's perceived responsiveness refers to "how he or she perceives an interactive system responds to his or her input" (Wu & Wu, 2006, p. 92). Crawford (1990, p.105) notes that interactivity in an online situation refers to the relatedness between a response and messages that were sent earlier. This is a vital feature of the study by Rafaeli and Sudweeks (1997), who described interactivity as it relates to interpersonal communication, as "the extent to which messages in a sequence relate to each other, and especially the extent to which later message recount the relatedness of earlier message".

*measurement item (RS3): [During the experiment...]*

- **RS3:** *To what extent did you feel there was continuity between messages you receive from your friends/relatives?*

### **2. Second construct of interactivity: real-time interactions**

Real-time interaction refers to "the speed with which communication takes place, particularly response time" (Dholakia, Zhao, Dholakia, & Fortin, 2000, p. 7). This is an important characteristic of Steuer's (1992) description of interactivity as the degree to which users have control in real-time over the content and form of an environment which is mediated (p. 84). The faster the response, the greater the perception of interactivity.

*measurement item (RS1): [During the experiment...]*

- **RS1:** *Please rate how immediate or fast was the response/reactions you received from your friends/relatives?*

### **3. Third construct of interactivity: synchronicity**

Synchronicity has for a long time been recognised as a key aspect of interactivity (Dholakia, Zhao, Dholakia, & Fortin, 2000; Ha & James, 1998; Liu, 2003; McMillan & Hwang, 2002). Synchronicity is associated with the speed that a system can afford to exchange messages between communicators. The faster that responses can be exchanged between two users, the less inhibited these communicators are, and the more their perception of the interactivity of the environment is enhanced (Gao, Rau, & Gavriel, 2009).

***measurement item (RS2): [During the experiment...]***

- **RS2:** *Please rate how immediate or fast you were able to follow and understand the messages, which were exchanged between you and your friends/relatives?*

**4. Forth construct of interactivity: interpersonal communication**

Interpersonal communication has had a longstanding position in studies about interactivity as the standard or the best form of interactive communication (DeFleur & Ball-Rokeach, 1989; Durlak, 1987; Heeter, 1989; Williams, Rice, & Rogers, 1988). Interactivity here is seen as the degree to which a media enables interpersonal communication. “The more the technologically mediated communication resembles interpersonal communication, the more interactive the communication is” (Gao, Rau, & Salvendy, 2009, p. 485).

***measurement item (IC1): [During the experiment...]***

- **IC1:** *Please rate how closely did you feel the interaction you experienced with your friends/relatives in the online shop resembles your sense of having interpersonal communication with them in real world-shopping settings?*

**4.8.4 Search Behaviour (SRB)**

In the research conducted by Yang (2004), the search behaviour of the consumers was measured by quantity, size and intensity of search. Other scholars pointed to various difficulties experienced in measuring online users’ search behaviour (Lee & Hogarth, 2000). There is a high demand for addressing the measurement aspect of search behaviour. The scales for measuring subjective search behaviour were borrowed from previous studies and some were developed as new items (see Table 4-11).

## Consolidated search behaviour measurement items

Construct	Items
[In your online shopping experience with a friend/relative, do you agree or disagree that...]	
(Lin, 2007; Pavlou & Fygenson, 2006)	<b>SRB1:</b> <i>I feel using this system decreases my search effort – as part of perceived usefulness of getting information</i> <b>SRB6:</b> <i>I feel this system simplifies the comparison among selected products. – as part of perceived ease of getting information</i>
(Lin, 2007; Haubl, 2000)	<b>SRB2:</b> <i>I feel using this system increase the size of product consideration.</i> <b>SRB3:</b> <i>I feel this system enables me to explore more online shops and available products.</i>
<b>**New Items</b>	<b>SRB4:</b> <i>I feel this system assists me in the initial search for available products.</i> <b>SRB5:</b> <i>I learnt about new online shops through this system.</i>

TABLE 4-11 SEARCH BEHAVIOUR MEASUREMENT ITEMS

## 4.8.5 Quality and effectiveness of decision behaviour (QEDB)

The scales for measuring subjective purchase-decision were taken and adapted from previous studies and some were developed as new items (see Table 4-12).

## Consolidated purchase decision measurement items

Construct	Items
[In your online shopping experience with a friend/relative, do you agree or disagree that...]	
(Lin, 2007; Pavlou & Fygenson, 2006)	<b>QEDB2:</b> <i>I am satisfied with the effectiveness of the final purchase decision. – as part of perceived purchasing usefulness.</i> <b>QEDB3:</b> <i>I am confident with my final purchase decision. – as part of purchasing self-efficacy.</i> <b>QEDB5:</b> <i>I feel using this system increase the effectiveness of my purchase decision. – as part of perceived purchasing usefulness</i>
Haubl (2000)	<b>QEDB1:</b> <i>I am satisfied with the quality of the final purchase decision.</i> <b>QEDB4:</b> <i>I feel using this system increases the quality of my purchase decision.</i>
<b>**New Items</b>	<b>QEDB6:</b> <i>I feel my friend/relative can have influence on my purchase decision.</i> <b>QEDB7:</b> <i>I feel the influence of my friend's/relative's recommendation on my purchase decision is positive.</i> <b>QEDB8:</b> <i>I feel my friend/relative can increase my confidence in making purchase decision.</i>

TABLE 4-12 PURCHASE DECISION MEASUREMENT ITEMS

## 4.8.6 Intention to buy (IB)

'Willingness to buy' was the scale used to select the items in order to quantify the intention to buy. The scales for measuring intention to buy were adapted from previous studies and some were developed as new items (see Table 4-13).

## Consolidated intention to buy measurement items

Construct	Items
(Taylor, 1995; Limayem, 2000; Gefen, 2003; Kim, 2008)	<b>IB3:</b> <i>I intend to use this system to buy from online shops with my friends/relatives in the near future.</i>
(Green, 2011; Kim, 2008; Gefen, 2000; Jarvenpaa, 2000)	<b>IB7:</b> <i>I think I am likely to purchase more by using this system.</i>
(Lin, 2007; Kim, 2008; Jarvenpaa, 2000)	<b>IB6:</b> <i>I intend to recommend this system to my friends/relatives.</i>
<b>**New Items</b>	<b>IB1:</b> <i>I would like to buy from online shops recommended by my friends/relatives through this system.</i> <b>IB2:</b> <i>I would use my credit card to buy from online shops recommended by my friend/relative through this system.</i> <b>IB4:</b> <i>I am likely to use this system very often to buy from online shops with my friends/relatives in future.</i> <b>IB5:</b> <i>I think using this system can encourage me to shop online more often with my friends/relatives.</i> <b>IB8:</b> <i>I think I am likely to make an unplanned purchase by using this system.</i> <b>IB9:</b> <i>I think I am likely to spend more on online shop by using this system.</i>

TABLE 4-13 INTENTION TO BUY MEASUREMENT ITEMS

## 4.8.7 Perceived benefit (PB)

The perceived benefit scale was administrated to the subjects to evaluate the extent of satisfaction. The scale was adapted by the questionnaire of user interaction satisfaction and some were developed as new items (see Table 4-14).

## Consolidated perceived benefit measurement items

Construct	Items
(Zhang , Lu, Shi, Tang , & Zhao, 2012)	<b>PB1:</b> <i>I think using this system is convenient.</i>
(Kim, 2012) (Kim, Ferrin, & Raoc, 2008)	<b>PB2:</b> <i>I can save money by using this system.</i>
(Zhang , Lu, Shi, Tang , & Zhao, 2012)	<b>PB3:</b> <i>I can save time by using this system.</i>
	<b>PB7:</b> <i>Using this system enables me to make purchase decision within the shortest time frame.</i>
	<b>PB8:</b> <i>Using this system enables me to find product information within shortest time frame.</i>
(Kim, Ferrin, & Raoc, 2008)	<b>PB6:</b> <i>Using this system increases my productivity at online shopping.</i>
(Zhang , Lu, Shi, Tang , & Zhao, 2012)	<b>PB4:</b> <i>Using this system enables me to accomplish a shopping task more quickly.</i>
(Pappasa, 2015)	<b>PB5:</b> <i>Using this system enables me to accomplish a shopping task more effectively.</i>

TABLE4-14 PERCEIVED BENEFIT MEASUREMENT ITEMS



#### 4.9 Chapter summary

This chapter presents the design of the experiment. The design of the experiment involved the choice of an experimental methodology, sampling and sample size, design of experimental conditions and experimental tasks, as well as design of structured quantitative measurements. The choice of experimental methodology, a fractional factorial design, was based on 1) the objectives of the experiment, including screening and regression model objectives; 2) the number of selected variables, based on the research model and hypotheses developed in this research. Three independent and seven dependent variables were selected (see the research model Figure 4-5), with two levels of low and high for each variable. Four experimental design options were considered; however, an FFD design (a fractional factorial design) was considered as an effective and economical choice which fits well with the research objectives.

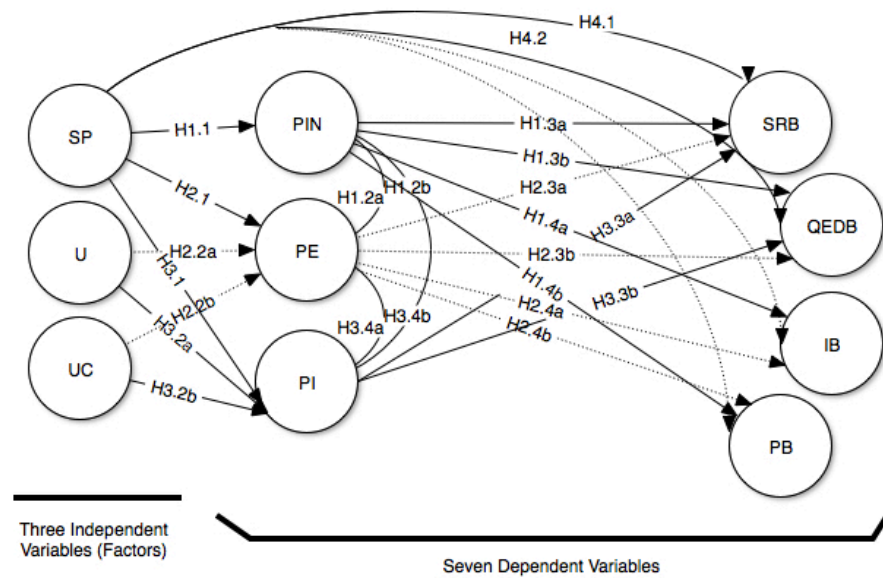


FIGURE 4-6 RESEARCH MODEL, DEPENDENT AND INDEPENDENT VARIABLES

A subset of 4 balanced runs  $2^{3-1}=4$  from  $2^3=8$  (full factorial) experimental runs was selected with the resolution III. Also, a between subject design was selected to avoid the carryover effects of within subject design and to be able to randomise a group of subjects to four experimental conditions. In order to keep the number of replication and confounding variables (noise) down, eight control variables were identified from the pilot test and literature review. The control variables were kept constant in all

experimental conditions. This maximised the probability of identifying statistically significant effects of three factors examined in this study.

The population for this research study includes staff and students of the University of Sussex. A simple random sampling technique was selected, as it reduces the likelihood of bias and sampling error. The volunteers were eligible to partake in the study if they had previous online shopping experience and if they could take part in a group of two with a friend or a relative. The sample size was determined in order to detect the significant effects of factors with an observed power of over 90 percent. The pilot test showed a sample size of 146 (or 36 users for each run) as optimum. This sample size was decided based on the power of 0.95, alpha of 0.05 and the effect size (d) between the ranges of 0.5 to 0.55 (one-tailed t-test).

Design of experimental conditions includes design of low and high levels of social presence, usability and user control. The design involved integration of available interface technologies to simulate the experimental conditions. Each condition exhibited different use of communication and navigation mediums. The experimental task was designed in order to create coordination needs that promote social interactions between subjects. This means subjects had to collaborate and communicate to be able to accomplish the shopping task. Also, the selected product in an experimental task had to be gender-neutral, which minimises the effect of users' demographics. In addition, it had to be simple enough and not require a high level of expertise. 'Booking a group holiday' was selected as an experimental task. A holiday plan had to be realistic, and involve discussion around location (where to go), the time of the holiday (when to go), duration (how long to stay), budget (how much to spend) and expenses (how much it would cost).

Design of a survey questionnaire involved design of pre and post test questionnaires. In this study all variables including factors and responses were measured **quantitatively** with a Likert scale of 1-5 for consistency (from not at all (1), very little (2), more or less (3), very much (4), greatly (5)). A total of 149 items questionnaire were designed. Measurements were either borrowed from previously established studies or developed as new items. The majority of the subjective measurements of social presence, user control and perceived interactivity are **newly** developed measurements in this study,

generated by consideration of a new theoretical framework that allowed the transposition of the subjective measurements into new survey questionnaires.

## CHAPTER FIVE

### 5 Experimental procedure

This chapter presents the experimental procedure. Chapter 4 discussed that the experimental design involves the following four experimental conditions:

- *TC1 [Social Presence (high), Usability & User Control (low)]*
- *TC2 [Social Presence (low), Usability & User Control (high)]*
- *TC3 [Social Presence (low), Usability & User Control (low)]*
- *TC4 [Social Presence (high), Usability & User Control (high)]*

This chapter presents the manner in which the above experimental conditions were simulated using multiple platforms and software. The screen-capture of each condition is also provided. In addition, this chapter explains how subjects were recruited and randomly assigned to four experimental conditions, as well as how the experimental task and conditions were conducted.

#### 5.1 Execute experimental task

The experiment discussed in Chapter 4 was focused on an online shopping session (the experiment) where participants completed a pre and post-test questionnaire of 149-items. Each experiment took about 90 minutes and, on completion, each participant was paid £7 for his or her time. There was also a prize draw with a chance to win an iPad Air (32 GB, WiFi worth £479). Their participation was voluntary, and they were free to withdraw at any time without giving a reason. All experiments took place in the Computer Graphics Centre in the Informatics Department at the University of Sussex.

Participants were recruited by emails, which were circulated to various departments at the University of Sussex on three separate occasions (see appendix A). Flyers and leaflets were designed and distributed across the University library, lecture rooms and corridors. Students and staff who showed interest then received an email containing details of the experiment. They were asked to bring a social contact, e.g. a friend or a relative, who had previous experience of online shopping. They were given a timetable to choose the appropriate date and time to take part in the experiment. Once they

confirmed the suitable time slot, they were booked and received a confirmation email regarding their booking time and instruction for cancelations, as well as guidance on how to access the lab. After booking, a random number between 1 and 4 was assigned to each two-participant group (as discussed in Chapter 4, a group of subjects was randomly assigned a number from one to four, which correlated to the experimental conditions). The random number was generated using an online tool called ‘random.org’<sup>19</sup>.

Two different rooms, within the same laboratory, were prepared for conducting the experiment since participants had to be placed in two separate rooms. Each room was equipped with a 27-inch iMac, with a built in webcam, which was connected to a second Apple monitor with a headset, a mouse and a keyboard. The second monitor was attached since all activities (including website navigation, screen sharing and video or text chat) had to be recorded as part of the observation. This meant the software used in the simulated environment could not be minimized. For this reason, two monitors were used: one for search and another for communication and collaboration between participants. Participants were not allowed to move, minimize or maximize applications, nor could they open a program or a new window on the iMacs. Two other iMacs were placed in the lab for the purpose of conducting pre and post-test questionnaires. Participants were asked to use headphones to block out extraneous noises in the treatment conditions of experiment one and four (subjects had video chat in ‘high presence’ conditions in these experiments) in order to reduce distractions.

As each participant arrived in the laboratory, and before starting the experiments, participants were asked to read the information sheet and sign the consent form (see appendix A). The information sheet included a brief introduction about the purpose and procedure of the study. It declared the approval of the research by the science and technology cross-schools research ethics committee (C-REC). It acknowledged the length of the experiment and questionnaire. It also confirmed the payment of £7 and the possibility of winning the iPad Air after the participant successfully completed the experiment. The consent form had participants acknowledge that the social shopping experiment would be screen captured.

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<sup>19</sup> [random.org](http://random.org) generates random numbers, it is available online.

Next, each participant was introduced to the experimental task and experimental platform prepared on the two iMacs. This involved learning how to use the designed platform (e.g. the use of two monitors, one for search and the other for communication with their remotely located partner) and how to perform the shopping task. In order to ensure that each participant had fully understood the task, the researcher verbally explained the task to a group of participants and answered any questions they had.

The experiment began with pre-test questionnaire when participants confirmed they understood the task, had no further questions and were ready to start. The pre-test questionnaire was administered by the researcher and was automated by Survey Monkey. This was conducted on two iMacs located in the laboratory room. Once participants completed the pre-experiment questionnaire, one of the two participants was taken to a different room.

In conditions one and four, the experimental task was initiated once participants confirmed their headphones and microphone were functioning (high presence conditions SP (+), U&UC (+,-)), and they were ready. The shopping task was to book a group holiday in which they and their shopping partner should collaborate to make a final purchase decision, or otherwise, without collaboration of all group members, the task would not be completed. Booking a group holiday involved discussion around location (where to go), the timing of the holiday (when to go), duration (how long to stay), budget (how much to spend) and expenses (how much it will cost). Participants were asked to discuss and develop ideas of how they would plan their holiday. The task was designed to provide participants with a certain degree of freedom to explore different websites and interact with their shopping partner through the provided communication and navigation channels. The shopping experiment was completed when participants agreed upon a final decision. No booking had to be made at the end of the task, the group had to agree to a plan for a group holiday in order to end the task.

The task was limited to a 30-minute timeframe, however participants were made unaware of the time limit, since this could influence their task performance. Once the time limit was reached, the participants were instructed to stop. After completing the experiment, the post-experiment questionnaire of 149-items was completed in the same laboratory room. The researcher administered the post-test questionnaire and the

participants' questions were answered when, and if, needed. Similar to the pre-test questionnaire, the post-test questionnaire was automated by Survey Monkey and was run on iMacs. Participants were asked to read the statement (below) before answering the post-test questionnaire:

'Please answer the questionnaire to the best of your ability, it is very important to answer the questionnaire very carefully. The interviewer can recognize questionnaires that are randomly filled. Such questionnaires will bias the experiment and will have to be removed from the analysis, leading us to recruit more candidates than is necessary. Such questionnaires will be withdrawn from the iPad Air prize draw'.

Participants were advised not to leave the room if any technical problems occurred during the experiment, and instead to communicate the issues with the researcher through a provided text chat window. During the experiment, the researcher could observe all the iMac activities performed by the subjects, so all possible issues could be resolved with minimal disruption to the experiment. For example, if users accidentally closed one of applications or required assistance they could communicate with researcher through the text chat provided.

## **5.2 Execute experimental conditions**

Four different experimental conditions were created, with two degrees (low or high) of social presence, usability and user control. The control variables, identified from the literature survey and the pilot test (see detail of control variables in chapter 4), were kept equal in all conditions. For example, the number of subjects in each group, the experimental task, and the time spent on the task, were found to have effects on the outcome of the experiments, so they were kept constant in each experimental run.

For experimental conditions with high and low social presence (SP), Google Hangouts<sup>20</sup> was used in the high SP and text chat/email for the low SP. Part of the experimental task was to search and find a list of favourite items and share them with the shopping

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<sup>20</sup> Google Hangouts is a communication platform, which allows up to 10 users at a time to perform a group video chat. It also allows one to share documents, images and You Tube videos, and it includes instant messaging and SMS. Google Hangout is accessible through Gmail, Google+ website and mobile apps on Android devices.

partner. This required sharing data, images and videos, the Google Hangouts screen-sharing tool was used in the high SP conditions, while copy and pasting the URL into text chat/email was used in the low SP conditions.

To strengthen a high sense of social presence for the high presence conditions of experiments one and four, Google Hangouts (video and screen sharing) and Go-To-Meeting<sup>21</sup> (GTM) were used. The experimental conditions of two and three were deliberately designed to disrupt and decrease the sense of social presence felt by having the participants use text communication platforms such as email and Google shopping shortlist<sup>22</sup> (text platform).

To test the impact of user control and usability, the experimental conditions of two and four (high usability and user control conditions) were created with an increased degree of control and usability. The high level of control over the shopping session was distributed equally between the two users. The conditions of experiments one and three (low usability and user control conditions) were created with low and unequally distributed control between the two users, and a further decreased level of usability.

### **5.2.1 Experimental condition 3: SP(-) UC(-) U(-)**

In experimental condition three all independent variables of social presence, usability and user control were set to low. This condition was simulated in order to 1) investigate the impact of the decreased levels of usability, user control and social presence on perceived involvement, engagement and interactivity, and 2) examine which independent variables have the main effect on online customers' shopping experiences and shopping behaviour, especially the intention to buy.

In order to create this experimental condition, all three variables, including social presence, usability and user control, were carefully adjusted in the experimental environment. As previously mentioned, Gmail suffers from a lack of usability and user

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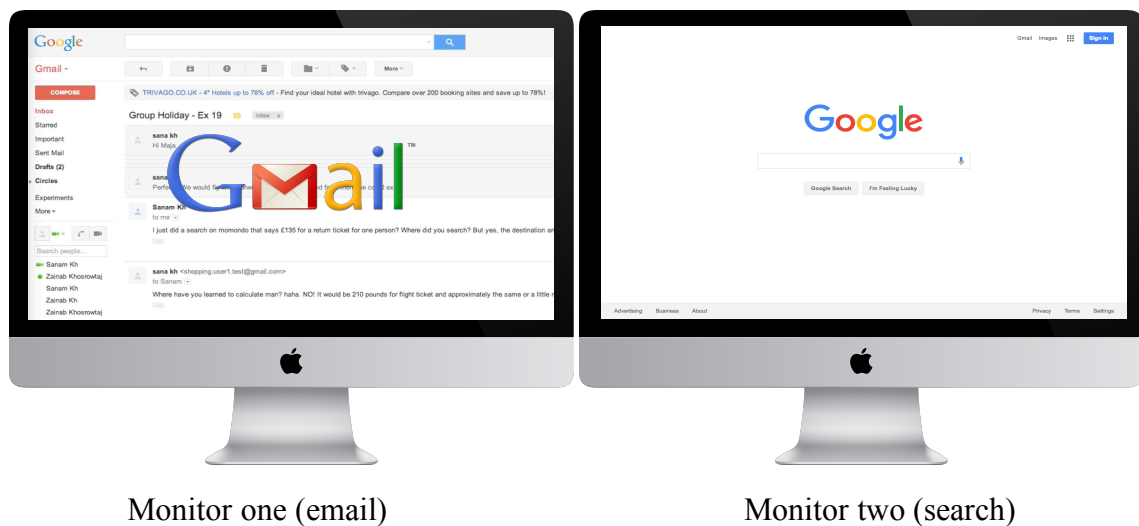
<sup>21</sup> Go To Meeting is a web-based communication and collaboration service developed by Citrix systems. It is a video conferencing software that allows users to hold an online meeting and share their desktop in real time.

<sup>22</sup> Google shopping shortlist is a text based online platform that is used as a shared basket. Users can shortlist products they browse on multiple websites by copy and pasting the URL into Google shopping shortlist. The shortlisted products can be shared and accessed by other users.

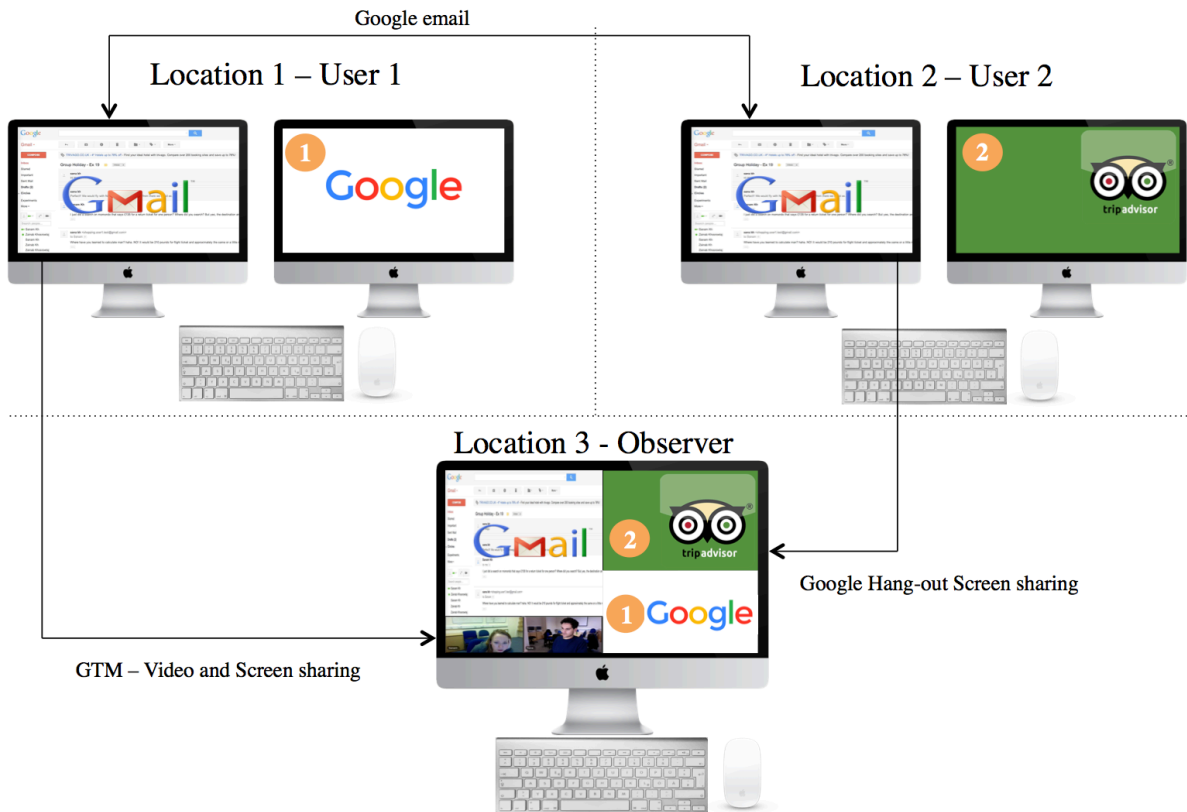


control and, as a mediated communication channel, it offers the lowest level of social presence (mainly due to response delay). Subjects were instructed to send and receive messages in a chain of emails. They were not allowed to create a new message in Gmail. They could share items by copy and pasting a URL and sending it through email.

The experiments were run using two monitors: one monitor was reserved for conducting the search and one monitor was used for communication through Gmail. Subjects were instructed to perform their search and share items through a chain of emails exchanged between them. All discussion had to happen in an email composed by the researcher. The audio, video and screen sharing capabilities were switched off in this condition and subjects were asked not to use any other forms of communication. Two Gmail addresses were created for user 1 and user 2, so participants did not require login details or need to use their personal emails (See Figures 5-1 and 5-2).



**FIGURE 5-1 EXPERIMENTAL CONDITION THREE – MONITOR 1 (EMAIL) AND MONITOR 2 (SEARCH)**



**FIGURE 5-2 EXPERIMENTAL CONDITION THREE : SP(-) UC(-) U(-)**

Subjects were instructed to send and receive messages by email. They could share items by copy and pasting a URL and sending it through email. The audio, video and screen sharing capabilities were switched off in this condition.

The researcher was able to observe emails exchanged between the two participants in the experiment and the items they shared. Further, all search activities occurring on user 1 and user 2's monitors, as well as their faces, were observed and recorded using Google Hangouts screen sharing and GTM (See Figure 5-3).

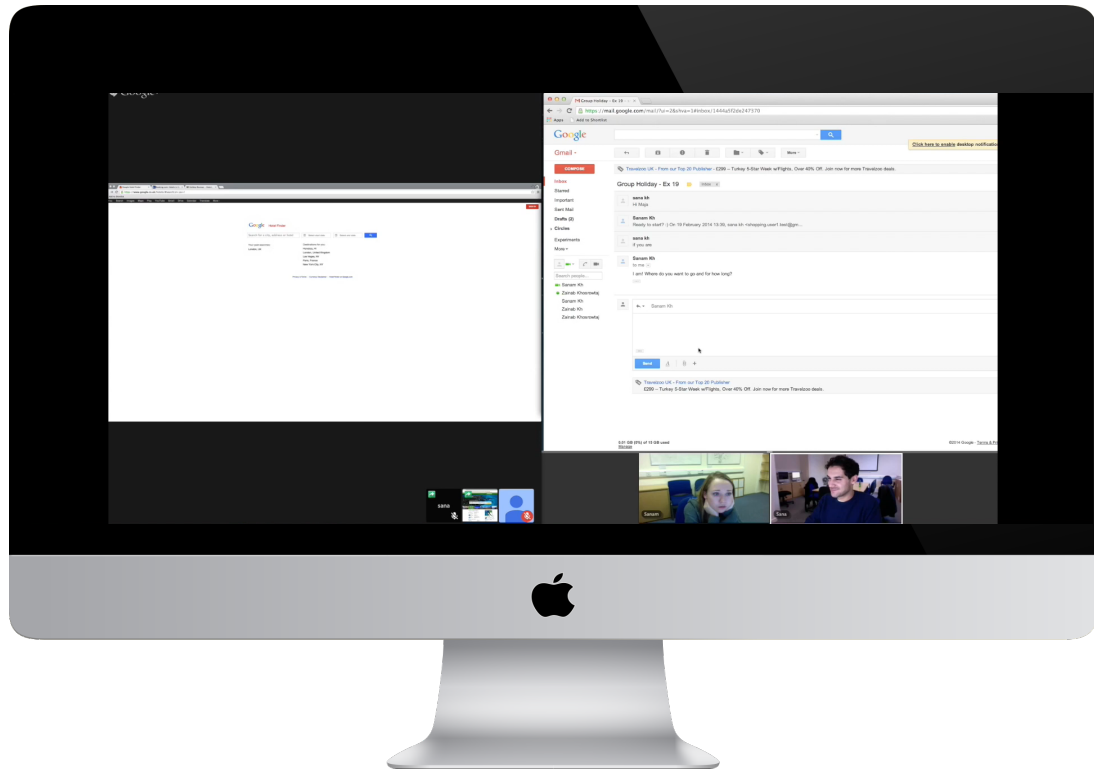


FIGURE 5-3 THE INTERVIEWER'S SCREEN - EXPERIMENTAL CONDITION THREE: SP(-) UC(-) U(-)

### 5.2.2 Experimental condition 2: SP(-) UC(+) U(+)

In experimental condition two, usability and user control had to be set high, while social presence had to be low. This condition was simulated in order to 1) investigate the impact of the increased level of usability and user control on experienced involvement, engagement and interactivity when social presence was low, and 2) examine which independent variables have the main effect on online customers' experiences and their shopping behaviour.

In order to simulate this experimental condition, two variables of usability and user control were carefully adjusted in the experimental environment. A suitable platform, which offers high level of usability, user control and conveyed low level of presence, was Google shopping shortlist (text-based platform). Google shopping shortlist is a text based online platform that is used as a shared basket. Users can shortlist products they browse on multiple websites by copy and pasting the URL into Google shopping shortlist. The shortlisted products can be shared and accessed by other users. Users can leave comments and communicate through a text chat box. Google shopping shortlist

does not notify users when a new item is added, users have to refresh the page to see new items (which can cause delay).

The experiments were run using two monitors: one monitor was used for conducting the search and the other monitor was used for the Google shopping shortlist (GSS). Users were instructed to perform their search and add their favourite items to the shared basket. All conversations between subjects had to happen in the text chat box provided by GSS. All audio and video capabilities were switched off in this condition, and subjects were asked not to use other forms of communication. Two Gmail addresses were created for user 1 and user 2, so participants did not require login details or need to use their personal emails (see figures 5-4 and 5-5)



Monitor one (G-shared basket and text chat)

Monitor two (search)

**FIGURE 5-4 EXPERIMENTAL CONDITION TWO – MONITOR 1 (G-SHARED BASKET) AND MONITOR 2 (SEARCH)**

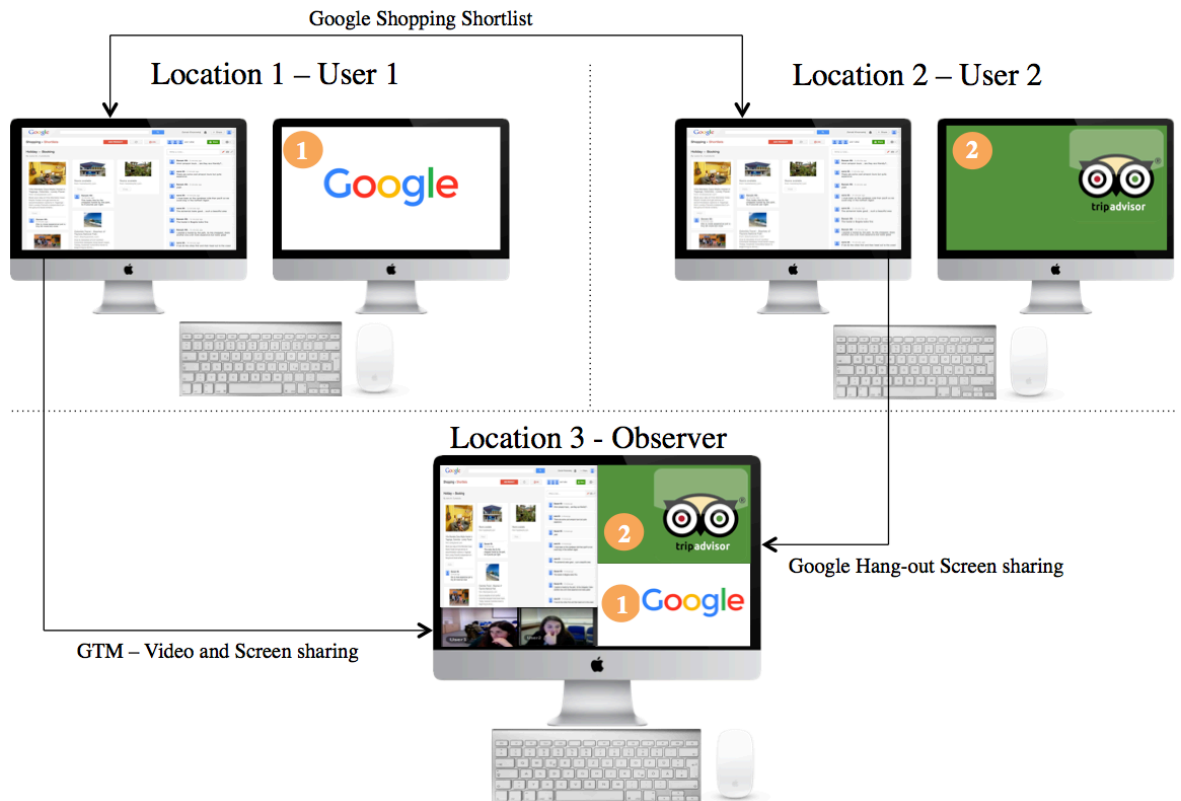


FIGURE 5-5 EXPERIMENTAL CONDITION TWO : SP(-) UC(+) U(+)

Users joined a shared shopping shortlist to share items and communicate with their shopping partner. Audio, video and screen sharing capabilities were switched off. Users could only have text conversation.

The researcher joined the shared Google shopping shortlist in each experimental run. The researcher could observe text conversions between subjects and the items they shared. Further, all search activities that occurred on user 1 and user 2 monitors, as well as the subjects' faces, were observed and recorded using Google Hangouts screen sharing and GTM (see Figure 5-6).



FIGURE 5-6 THE INTERVIEWER'S SCREEN - EXPERIMENTAL CONDITION TWO: SP(-) UC(+) U(+)

### 5.2.3 Experimental condition 1: SP(+) UC(-) U(-)

In experimental condition one, social presence had to be set high, while user control and usability had to be low. This condition was simulated in order to 1) investigate the impact of an increased level of social presence on experienced involvement, engagement and interactivity when usability and user control are low, and 2) examine which independent variables have the main effect on an online customers' experience and their shopping behaviour.

The high level of social and co-presence were carefully adjusted in the experimental environment with integration of suitable platforms, which support video conferencing and screen sharing. Google Hangouts and GTM (Go To Meeting) were the most suitable platforms, which support video chat, text chat and co-browsing. GTM was a better option because, by using GTM, fake usability and control issues could simply be simulated.

GTM was selected to help simulate the condition of experiment one. The shopping session was shared between the two users participating in the experiment. At any particular time, only one user had control over the session, keyboard and mouse. With GTM, users could browse multiple pages within one shared platform and could simultaneously have a video conversation (see Figure 5-2), however only the interviewer, as the host of the shared session, had full control. With GTM, multiple users can join a shared session, including the interviewer, however, the interviewer's video was off and microphone was mute.

In order to create a low level of usability and control in experimental condition one, the control over the keyboard and mouse was switched from user 1 to user 2 in two minute intervals (the researcher had administrator control over the session and could switch controls between users). Also, audio chat was muted every 5 minutes. In addition, browsing the shared session was slow with a purposeful delay in mouse movement response or keyboard typing. This caused frustration for users. Participants were not aware of the usability problems occurring during experiments. However, it was acknowledged that only one person at a time had the control over the shared session and users were supposed to check who had the control. Subjects were uninformed as to how often the controls would switch between users (see Figures 5-7 and 5-8)

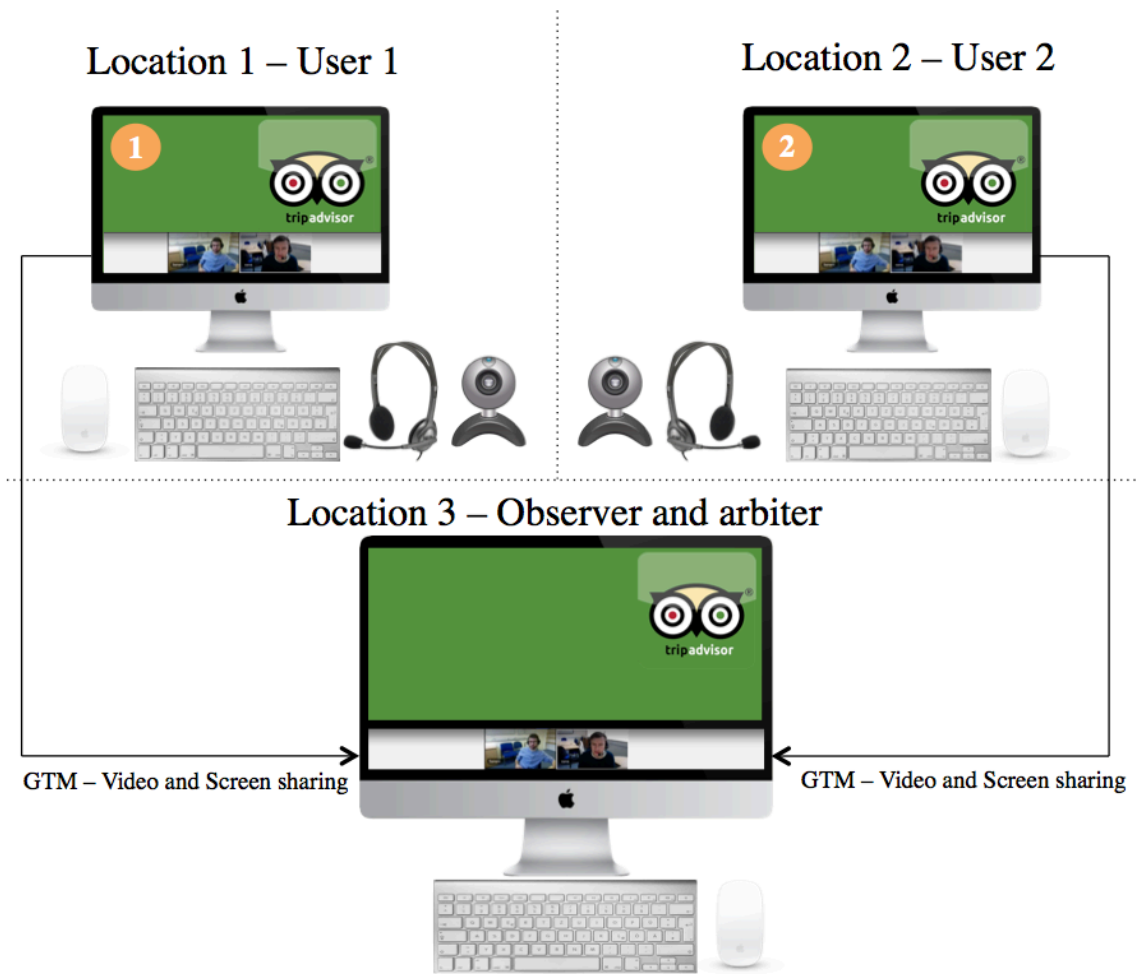


FIGURE 5-7 EXPERIMENTAL CONDITION ONE : SP(+) UC(-) U(-)

The experiment occurred in the shared session and was recorded using GTM. The Sunflower Sound<sup>23</sup> was used to record audio conversations in experimental condition one.

<sup>23</sup> [Sunflower Sound](#) is an open source extension for Mac OS, designed to create a virtual audio output device that can also act as an input.





Monitor one (search, screen sharing and video call)

**FIGURE 5-8 THE INTERVIEWER'S SCREEN - EXPERIMENTAL CONDITION ONE : SP(+) UC(-) U(-)**

Users could browse multiple pages within a shared session and had video conversation.

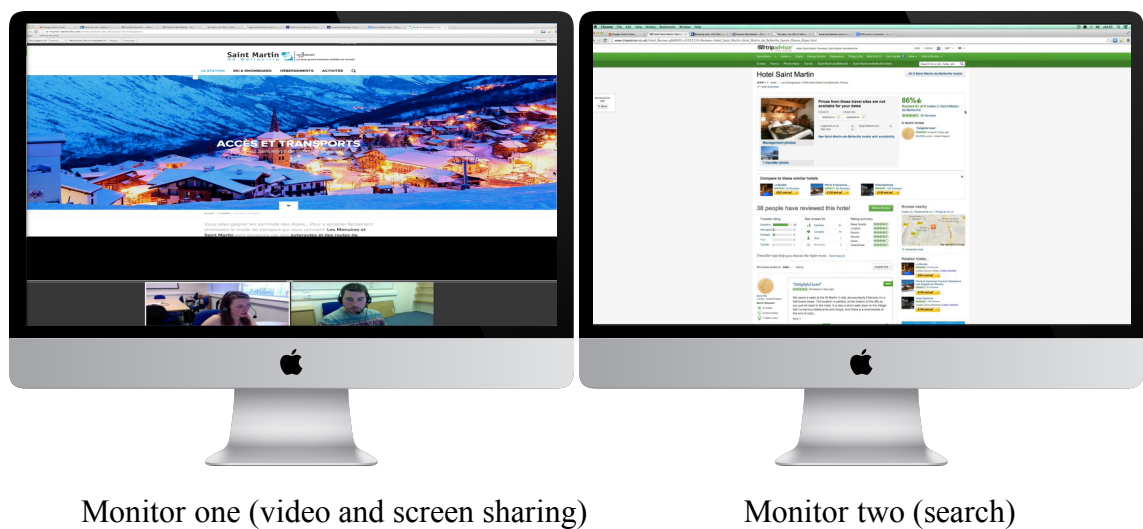
#### **5.2.4 Experimental condition 4: SP(+) UC(+) U(+)**

In experimental condition four all three variables of social presence, usability and user control were set to high. This condition was simulated in order to 1) investigate the impact of the increased level of SP, U and UC on perceived involvement, engagement and interactivity, and 2) examine which independent variables had the main effect on an online customer's shopping experiences and shopping behaviour, specifically, their intention to buy.

The increased levels of all independent variables were carefully adjusted in an experimental environment. The selected platforms, which simulated the experimental environment, had to be advanced in terms of usability and user control. They also had to convey a high level of social presence. The combined use of Google Hangouts and GTM (Got To Meeting) was a suitable option. The two applications are easy to use and support full control over a shared session (screen sharing session) or video conversation.

Google Hangouts allows users to exchange control of their machine. This includes control over a mouse and a keyboard. GTM was used to support video conversations and Google Hangouts was used for screen sharing.

The experiments were conducted using two monitors: one monitor was used for conducting the search and one monitor was used for screen sharing. Users could observe the search activities of their remotely located partner through Google Hangouts. Conversations between subjects occurred through GTM video chat. Users were provided with the Google Hangouts text chat in order to share information, e.g. URLs (see Figures 5-9 and 5-10).



**FIGURE 5-9 EXPERIMENTAL CONDITION FOUR – MONITOR 1 (VIDEO AND SCREEN SHARING) AND MONITOR 2 (SEARCH)**

Users could observe the search activities of their remotely located partner through Google Hangouts. Users had video chat and they were provided with the text chat implemented in G-Hangouts to share information, e.g. URLs.

The researcher joined Google Hangouts and GTM in all experimental runs. The video conversations between subjects were observed and recorded. All search activities occurring on user 1 and user 2's monitors, as well as their faces, were observed and recorded using the Google Hangouts screen sharing and GTM (see Figure 5-11).

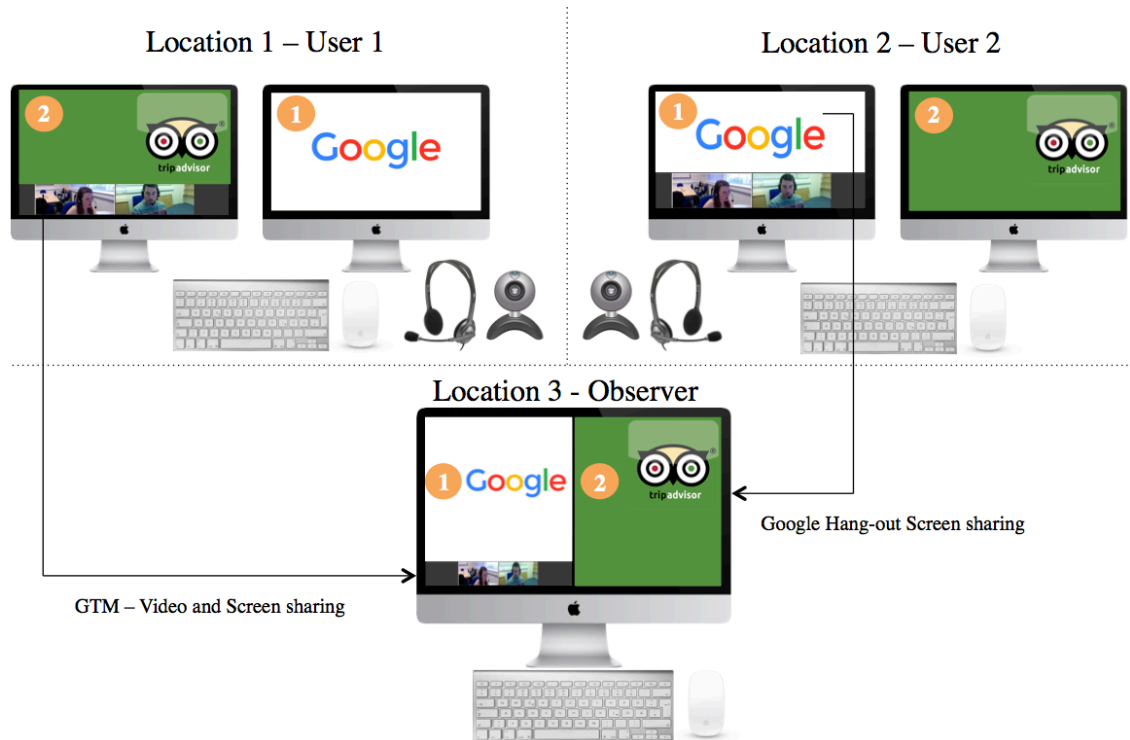


FIGURE 5-10 EXPERIMENTAL CONDITION FOUR : SP(+) UC(+) U(+)



FIGURE 5-11 THE INTERVIEWER'S SCREEN - EXPERIMENTAL CONDITION FOUR: SP(+) UC(+) U(+)

### **5.3 Chapter summary**

This chapter explains that subjects were recruited and randomly assigned to four experimental conditions, as well as the procedures for the experimental tasks and conditions. Four different experimental conditions were created, with two degrees (low or high) of social presence, usability and user control. The control variables were kept equal in all conditions. For example, the number of subjects in each group, the experimental task, and the time spent on the task, were found to have effects on the outcome of the experiments, so they were kept constant in each experimental run.

Experiments one and four involved high levels of social presence. To strengthen a high sense of social presence, Google Hangouts (video and screen sharing) and Go-To-Meeting (GTM) were used. In experimental condition one, social presence had to be set high, while user control and usability had to be low. This condition was simulated in order to investigate the impact of an increased level of social presence on the experience of involvement, engagement and interactivity when usability and user control are low, and to examine which independent variables have the main effect on an online customers' experience and shopping behaviour. In experimental condition four, all three variables of social presence, usability and user control were set to high.

Experiments two and three involved low levels of social presence. The experimental conditions were deliberately designed to disrupt and decrease the sense of social presence felt by having the participants use text communication platforms such as email and Google shopping shortlist. In experimental condition two, usability and user control had to be set high, while social presence had to be low. This condition was simulated in order to investigate the impact of the increased level of usability and user control on the experience of involvement, engagement and interactivity when social presence was low, and to examine which independent variables have the main effect on online customers' experiences and shopping behaviour. In experimental condition three, all independent variables of social presence, usability and user control were set to low. The researcher joined all experimental runs as an observer.

## CHAPTER SIX

### 6 Data analysis and results

This chapter presents findings and discusses the result of data analysis. It begins with the description of the sample and data preparation. It continues with the hypothesis test and results of observation.

Participants' demographic is presented in the next section 6.1. Data preparation and result of reliability and validity of scales are presented from sections 6.2 to 6.6. The section 6.7 hypothesis test and findings, reports on the results of ANOVA and (linear and multiple) regression analysis. This section is structured around independent variables and it includes the result of observation. This chapter concludes with the summary of findings in section 6.8.

#### 6.1 Participants' demographic

Total respondent 146 Sussex student, 93 of respondents were female (64.5%) and 51 were male (35.4%). 70% of participants were in the age range of 18-23, 16.6% in the age range of 24-29 and 11.8% over 30 years old. Majority of respondents, about 61.8% had no income, 20.13% had income between £8-15k and only 9% had income over £16k (see Table 6-1). 80% of respondents preferred to buy alone when they shop **online** and 63% prefer to buy with friends or relatives when they shop **offline**. However, when they were asked: *'have you ever, in any of your online shopping experiences, felt that you like or need to share your shopping experience with your friends or family members?'* About 69.18% of them responded, 'Yes'. Among the participants who responded 'Yes' to the above question, 87.23% required a second opinion to reduce 'uncertainty' and about 34.04% felt it would be more fun if they shop online with friends or relatives and 10 of them responded they like to share their experience and thoughts when they shop online.

Characteristic	Frequency	Percent
Gender		
Male	51	35.4%
Female	93	64.5%
Total	144	100%
Age		
-17	2	1.38%
18-23	101	70.1%
24-29	24	16.6%
30-35	13	9.02%
36-41	3	2.08%
42-47	1	0.69%
Total	144	100%
Annual income (£)		
No income	89	61.8%
-£8k	29	20.13%
£8-15k	13	9.02%
£16-23k	4	2.77%
£24-31k	7	4.86%
£32-39k	1	0.69%
£40k+	1	0.69%
Total	144	100%
Education level		
Diploma	26	18.05%
Bachelor	80	55.55%
Master	28	19.44%
MPhil	1	0.69%
DPhil	9	6.25%
Total	144	100%

TABLE 6-1 DEMOGRAPHIC CHARACTERISTICS OF SAMPLE

## 6.2 Data preparation

After primary data was collected, it was checked and prepared for statistical analysis. First, data was transferred to an Excel file and the quality of the collected data was carefully assessed. From a sample size of 146, two subjects were removed from the data set since they were found to be biased (e.g. one of the two subjects answered ‘greatly’ to 90% of the questions). The data set then was built with careful consideration for data organisation and variable coding (from 1 to 5). Depending on measurements, some data was reverse coded from 5 to 1. For inconsistencies or missing data, the post-editing statistical was conducted to improve the accuracy of the subsequent analysis. Prior to more advanced analysis, data was tested through charts and descriptive statistics. Also, new variables (e.g. the mean of social presence) were calculated using ‘compute

variables' in SPSS<sup>24</sup>. In addition, independent variables were binned at 2 and 4 levels using 'visual binning' in SPSS. Data pitfalls like missing and anomalous values (outliers) that might affect further data processing were identified. Data preparation was followed with a test of distributed normality and the detection of outliers. Also, to ensure the appropriateness of the research instrument, it was tested for content validity, reliability and construct validity.

### **6.3 Test of distributed normality**

Distributed normality of data of each variable was examined by the 'Shapiro Wilk' test. The result indicates the normal distribution of data of every individual variable tested in this study.

### **6.4 Detect outliers**

To detect the outliers, the labelling outlier methodology<sup>25</sup> and the  $g$  equal to 2.2 (Hoaglin et al 1987) was used to determine lower and upper limit. Only one outlier was detected and removed from data set.

### **6.5 Content validity**

To ensure content validity, the questionnaire was pilot tested by having a board of professionals review it, after which essential alterations were made to develop both the content and clarity of the questionnaire. Then, a sample of respondents separate from those included in the pilot test was asked to check the questionnaire. These and all pilot test respondents were excluded from the main sample used for reliability testing, construct validation, and hypothesis testing.

### **6.6 Test of reliability and validity of scales**

The assessment of the measurement model includes the estimation of internal consistency for reliability, and tests of convergent and discriminant validity for construct validity. Cronbach's alpha was used to evaluate the internal consistency

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<sup>24</sup> IBM SPSS statistics is the most popular software package used for statistical analysis. It is used to perform data entry and analysis and to create tables and graphs.

<sup>25</sup> [Labelling outlier methodology](#) is a valid method of detecting outliers. It is based on multiplying the interquartile range (IQR) by a factor of 2.2 as a multiplier.

reliability associated with scores derived from a scale. Internal consistency reliability exceeded 0.8 for all scales (Cronbach's alpha of between 0.8 to 0.9) used in this study and thus was highly acceptable. The Cronbach reliability coefficients of all variables were higher than the minimum cut-off score of 0.60 (Nunnally, 1978), 0.65 (Lee & Kim, 1999), or 0.70 (Nunnally & Bernstein, 1994). Table 6-2 shows the descriptive statistics for the constructs, and the reliability (Cronbach's alpha) of the scales.

8 items were removed from 127 items in the post-test questionnaire due to low correlation scores. The Cronbach's alpha increased to .904 when items 'IB8' and 'IB9' were removed from 'Intention to Buy' scales. From usability scales (PSSUQ) one item, 'PSSUQ9,' was removed to reach a higher Cronbach's alpha of .936. From perceived engagement and perceived involvement scales, two items: 'BE10' and 'PIN8,' were removed and Cronbach's alpha increased to .876 and .895 respectively. From user control and search behaviour scales, 'UC5' and 'SRB1,' as well as 'SRB5' were removed to achieve a higher Cronbach's alpha of .852 and .823 respectively. (Refer to appendix B to see the result of the reliability test)

Construct	Mean	S.D.	N of Items	Alpha
Co-presence	3.382	.658	14	.912
Immediacy	3.248	.758	4	.778
Mutual Understanding	3.590	.739	5	.865
Social Presence	3.423	.647	23	.920
Usability	3.505	1.077	12	.936
User Control	3.573	.581	6	.720
Perceived Interactivity	3.486	.923	9	.852
Perceived Involvement	3.623	.746	7	.895
Perceived Engagement	3.563	.658	9	.876
Search Behaviour	3.661	.830	4	.823
Purchase Decision	3.693	.798	8	.909
Intention to Buy	3.137	.914	7	.921
Perceived Benefit	3.277	1.030	7	.943

TABLE 6-2 DESCRIPTIVE STATISTICS AND RELIABILITY INDICES FOR CONSTRUCTS

## 6.7 Hypothesis test and findings

Prior to conducting SPSS analysis, the assumptions of normality was evaluated and determined to be satisfied as the four groups distributions were associated with skew and kurtosis less than 2.0 and 9.0 respectively. Furthermore, the assumptions of homogeneity of variances was tested and satisfied based on Levene's F test (see appendix C).



### 6.7.1 Level of social presence in four treatment conditions

Level of Social and co-presence in four treatment conditions was tested by independent t-test. The mean difference is significant at the level of  $p < 0.05$ . The means plot below (Figure 6-1) presents the level of social and co-presence in four treatment conditions. Chapter 4 discussed that the experimental design involves the following four experimental conditions:

- *TC1 (Social Presence (high), Usability & User Control (low))*
- *TC2 (Social Presence (low), Usability & User Control (high))*
- *TC3 (Social Presence (low), Usability & User Control (low))*
- *TC4 (Social Presence (high), Usability & User Control (high))*

The mean difference between treatment conditions 1 and 4 is not statistically significant, as the level of social and co-presence was set high in the two treatment conditions. However, the mean difference in the two conditions of low and high social presence is statistically significant SP ( $t(142) = -5.89, p = .000 < 0.05$ ) and CP ( $t(142) = -5.33, p = .000 < 0.05$ ). This confirms that the design of the two levels (low and high) of social presence in low and high presence conditions was successful. (Refer to the result of ‘Post Hoc Test. Multiple Comparisons’ and independent t-test in appendix C Section1).

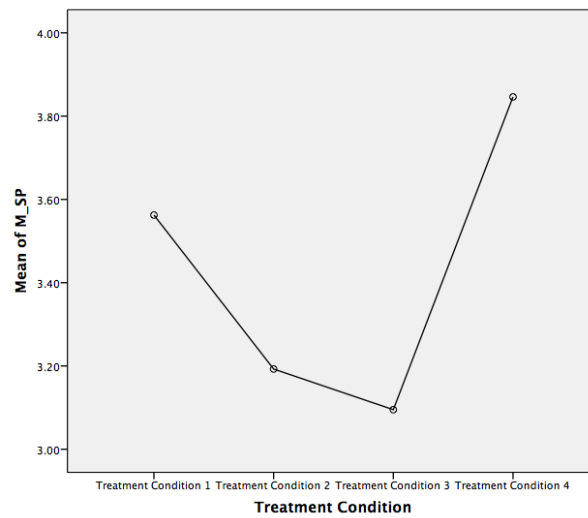
- *Treatment condition 1 and 4, SP and CP were set high*
- *Treatment condition 2 and 3, SP and CP were set low*

Group statistics Mean_SP				
Social Presence (two levels)	N	Mean	(SD)	Standard error
Low	72	3.144	(.587)	.069
High	72	3.704	(.553)	.065

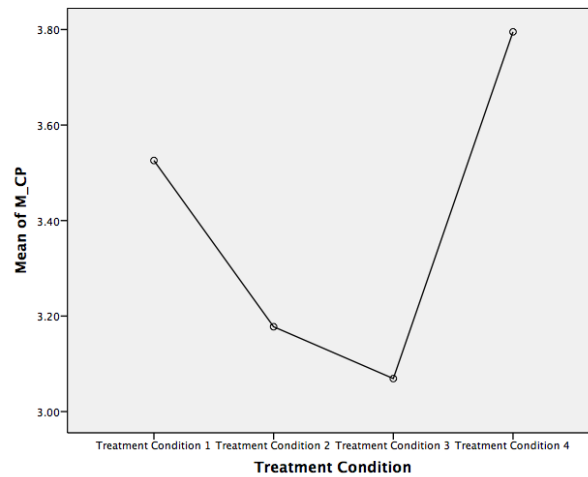
TABLE 6-3 MEANS OF SOCIAL PRESENCE IN LOW AND HIGH PRESENCE CONDITIONS

Group statistics M_CP				
Social Presence (two levels)	N	Mean	(SD)	Standard error
Low	72	3.123	(.612)	.072
High	72	3.660	(.596)	.070

TABLE 6-4 MEANS OF CO-PRESENCE IN LOW AND HIGH PRESENCE CONDITIONS



**FIGURE 6-1 MEANS OF SOCIAL PRESENCE IN FOUR TREATMENT CONDITIONS**



**FIGURE 6-2 MEANS OF CO-PRESENCE IN FOUR TREATMENT CONDITIONS**

Independent *t*-test and ANOVA test was followed by Univariate analysis to test the mean difference of social and co-presence in four treatment conditions per gender (see Figures 6-3 and 6-4). It was found that the level of experienced social and co-presence for females were numerically higher as opposed to male participants in all treatment conditions; it was significantly higher in condition 4.

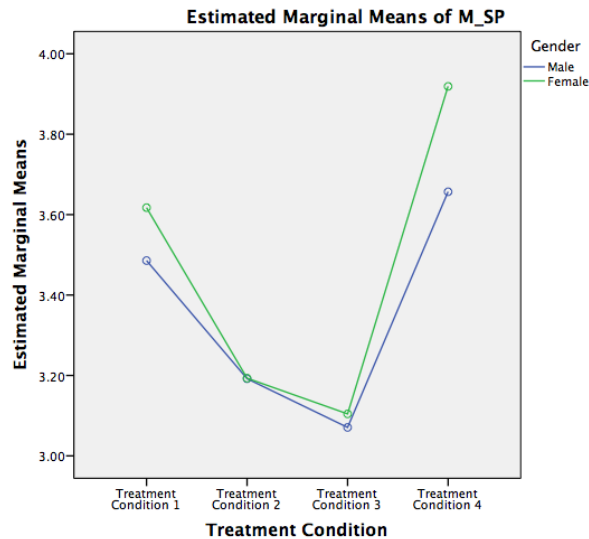


FIGURE 6-3 PROFILE PLOTS OF SOCIAL PRESENCE IN FOUR TREATMENT CONDITIONS PER GENDER

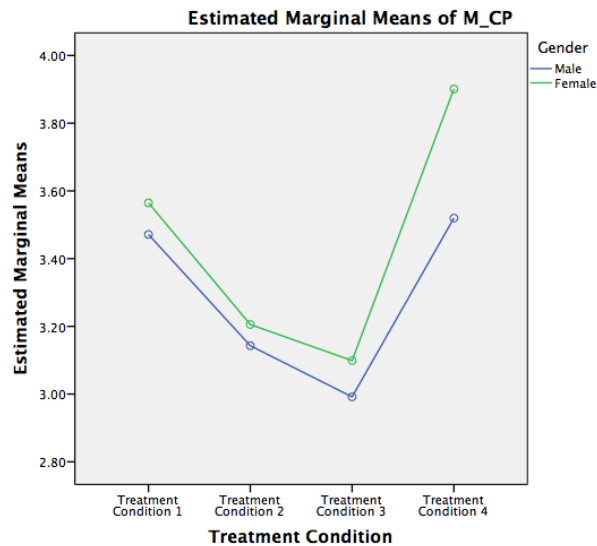


FIGURE 6-4 PROFILE PLOTS OF CO-PRESENCE IN FOUR TREATMENT CONDITIONS PER GENDER

### 6.7.2 Level of usability in four treatment conditions

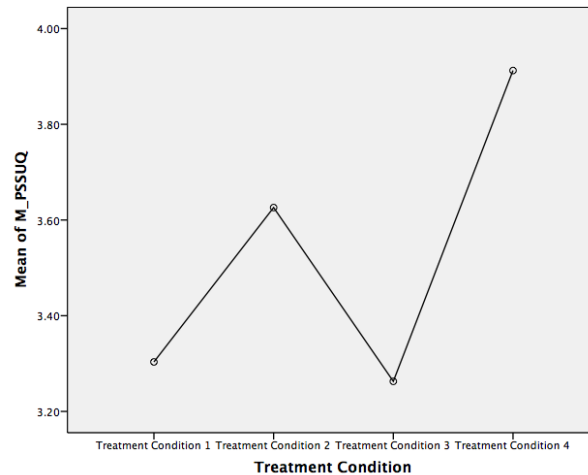
Level of usability in 4 different treatment conditions was tested with independent t-test. The mean difference is significant at the level of  $p < 0.05$ . The means plot below (Figure 6-5) presents the level of usability in four different treatment conditions. The mean difference of usability in low and high conditions is significant with PSSUQ ( $t(142) = -4.20, p = .000 < 0.05$ ). This confirms that the design of the two levels of usability in low and high usability conditions was successful. (Refer to the result of 'Post Hoc Test. Multiple Comparisons' and independent t-test in appendix C Section 2).

*Treatment condition 2 and 4, Usability were set high*

- *Treatment condition 1 and 3, Usability were set low*

Group statistics M_PSSUQ				
Usability (two levels)	N	Mean	(SD)	Standard error
Low	72	3.283	(.721)	.085
High	72	3.769	(.663)	.078

**TABLE 6-5 MEANS OF USABILITY IN LOW AND HIGH USABILITY CONDITIONS**



**FIGURE 6-5 MEANS OF USABILITY IN FOUR TREATMENT CONDITIONS**

Independent *t*-test and ANOVA test was followed by Univariate analysis to test the mean difference of usability in four treatment conditions per gender (see Figure 6-6). Univariate test indicates female and male participants experienced usability differently. Female participants experienced the lowest level of usability in condition 3 and the highest level of usability in condition 4. However, male participants experienced higher level of usability in all conditions as opposed to females, except condition 1. For male participants the experienced usability in conditions 2 and 3 were numerically similar and the mean difference of usability for males was only statistically significant between condition 1 and condition 4.

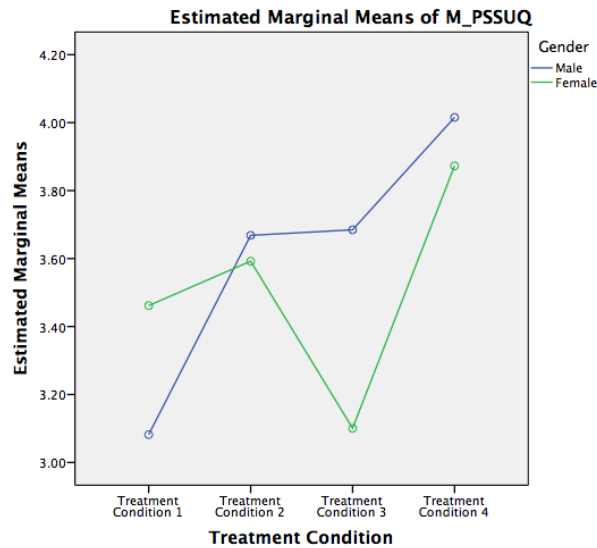


FIGURE 6-6 PROFILE PLOTS OF USABILITY IN FOUR TREATMENT CONDITIONS PER GENDER

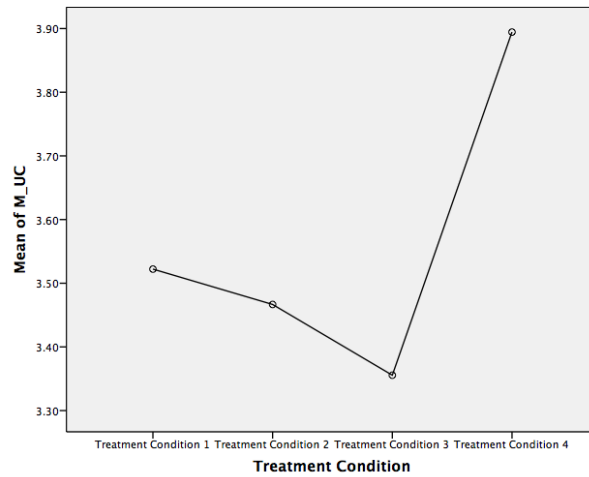
### 6.7.3 Level of user control in four treatment conditions

Level of user control in four treatment conditions was tested with independent t-test. The mean difference of user control in low and high conditions is statistically significant UC ( $t(142) = -2.43, p = 0.016 < 0.05$ ). This confirms that the design of the two levels of user control in low and high user control conditions was successful. The mean difference of user control in conditions 3 and 4 found to be statistically significant, however the mean difference between conditions 1 and 2 also 3 and 2 is not statistically significant (see Figure 6-7). (Refer to the result of 'Post Hoc Test. Multiple Comparisons' and independent t-test in appendix C Section 3).

- *Treatment condition 2 and 4, User Control were set high*
- *Treatment condition 1 and 3, User Control were set low*

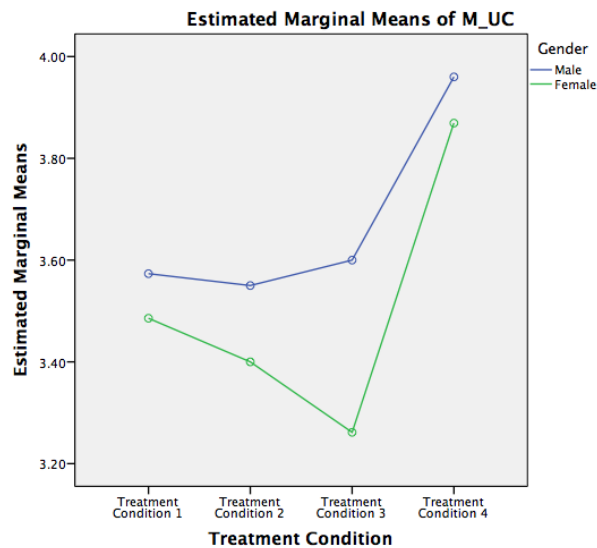
Group statistics M_UC				
User Control (two levels)	N	Mean	(SD)	Standard error
Low	72	3.439	(.586)	.069
High	72	3.680	(.605)	.071

TABLE 6-6 MEANS OF USER CONTROL IN LOW AND HIGH USER CONTROL CONDITIONS



**FIGURE 6-7 MEANS OF USER CONTROL IN FOUR TREATMENT CONDITIONS**

Independent *t*-test and ANOVA test was followed by Univariate analysis to test the mean difference of user control in four treatment conditions per gender (see Figure 6-8). The experienced user control was higher for male participants as opposed to females. Although the experienced user control was lowest for females in condition 3, it was lowest for males in condition 2.



**FIGURE 6-8 PROFILE PLOTS OF USER CONTROL IN FOUR TREATMENT CONDITIONS PER GENDER**

### 6.7.4 Results of correlation analysis

The correlation between dependent and independent variables of between-subject design was tested by regression analysis. The correlation coefficient, adjusted R square as well as F value and predictor B value were calculated and presented in the following sections.

Table 6-7 is the summary of Pearson correlation coefficients<sup>26</sup> for dependent and independent variables including: SP (Social Presence), UC (User Control), PSSUQ (Usability), PE (Perceived Engagement), PIN (perceived Involvement), PI (Perceived Interactivity) and online customers' shopping behaviour including SRB (Search Behaviour), QEDB (Quality and Effectiveness of Decision Behaviour), IB (Intention to Buy) and PB (Perceived Benefit).

<i>Correlation matrices</i>										
	PIN	PE	PI	SP	PSSUQ	UC	SRB	QEDB	IB	PB
<i>PIN</i>	1.000									
<i>PE</i>	.658	1.000								
<i>PI</i>	.430	.542	1.000							
<i>SP</i>	.423	.524	.737	1.000						
<i>PSSUQ</i>	.501	.724	.645	.588	1.000					
<i>UC</i>	.411	.509	.914	.644	.650	1.000				
<i>SRB</i>	.374	.504	.198	.195	.522	.205	1.000			
<i>QEDB</i>	.462	.703	.541	.584	.732	.516	.566	1.000		
<i>IB</i>	.415	.695	.403	.413	.660	.363	.644	.697	1.000	
<i>PB</i>	.446	.628	.480	.458	.764	.479	.588	.691	.723	1.000
<i>Mean</i>	3.623	3.563	3.486	3.423	3.505	3.573	3.661	3.693	3.137	3.277
<i>SD</i>	.746	.658	.923	.647	1.077	.581	.830	.798	.914	1.030

All significant at the  $p < .001$  level

TABLE 6-7 PEARSON CORRELATION TABLE

### 1. Three independent variables

The result of regression test illustrates positive correlation between three independent variables of SP (social presence), PSSUQ (usability) and UC (user control). Usability and user control has the highest correlation ( $r = .650$ ) followed by user control and social presence ( $r = .644$ ). See Figure 6-9.

<sup>26</sup> [Pearson correlation coefficient](#) is a measure of the linear correlation between two variables X and Y, giving a value between +1 and -1. where +1>0 is positive correlation, 0 is no correlation and -1<0 is negative correlation.

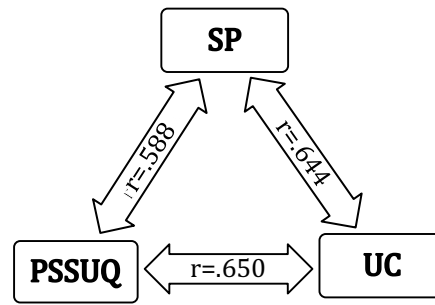


FIGURE 6-9 CORRELATION BETWEEN THREE INDEPENDENT VARIABLES OF SP, PSSUQ AND UC

## 2. Perceived involvement

The following hypotheses are associated with perceived involvement. It is tested whether 3 independent variables (SP, PSSUQ and UC) have positive correlation with perceived involvement. Also, it is tested whether increased level of perceived involvement has any positive impact on users' shopping behaviour, including search and purchase-decision behaviour as well as intention to buy.

- *H1.1: Increased level of social presence will result in higher level of involvement with the shopping channel*
- *H1.2: Increased level of shopping involvement positively relates to perceived engagement and perceived interactivity*
- *H1.3: Increased level of shopping involvement positively relates to customers' search and purchase decision behaviour*
- *H1.4: Increased level of shopping involvement with the shopping channel will result in increased future intentions and perceived benefit*

The adjusted R square, F value and predictor B value were calculated and presented in Table 6-8.

Construct	F Value	Mean	S.D.	R Square	Predictor B
Perceived Involvement	-	3.623	.746	-	-
Social Presence	31.01	3.423	.647	.173	.487
Usability	47.69	3.505	1.077	.246	.499
User Control	28.911	3.573	.581	.163	.494
Perceived Interactivity	32.287	3.486	.923	.180	.381
Perceived Engagement	108.14	3.563	.658	.428	.596
Search Behaviour	23.126	3.661	.830	.134	.426
Purchase Decision	38.58	3.693	.798	.208	.508
Intention to Buy	29.59	3.137	.914	.167	.526
Perceived Benefit	35.250	3.277	1.030	.193	.631

All significant at the  $p < .001$  level

TABLE 6-8 ADJUSTED R SQUARE, F VALUE AND PREDICTOR B VALUE (PERCEIVED INVOLVEMENT)



### Independent variables and perceived involvement

It was hypothesized that '*H1.1: increased level of social presence will result in higher level of involvement with the shopping channel*'.

The result of regression analysis supports the hypothesis and illustrates positive correlation between perceived involvement and three independent variables. The calculated Pearson correlation coefficient is high for social presence ( $r=.423$ ,  $r^2=.173$ ,  $F(1,142)=31.01$ ,  $p=.000<0.05$ ) and usability ( $r=.501$ ,  $r^2=.246$ ,  $F(1,142)=47.69$ ,  $p=.000<0.05$ ). However, it is low for user control ( $r=.411$ ,  $r^2=.163$ ,  $F(1,142)=28.91$  and  $p=.000<0.05$ ). See appendix C Section 4.

### Perceived involvement, engagement and interactivity

It was hypothesized that '*H1.2: increased level of shopping involvement positively relates to perceived engagement and perceived interactivity*'.

The result of regression analysis supports the hypothesis and illustrates positive correlation between perceived involvement, engagement and interactivity. See Figure 6-10. Perceived involvement has the highest correlation with PE ( $r=.658$   $>0.5$ ) followed by perceived interactivity ( $r=.430$ ). See the results of linear regression in appendix C Section 5.

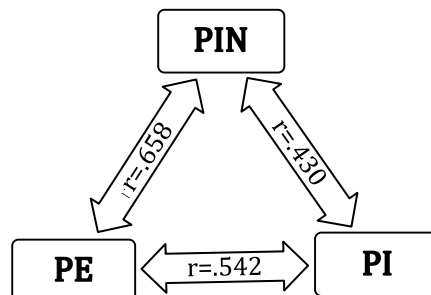


FIGURE 6-10 CORRELATION BETWEEN THREE DEPENDENT VARIABLES OF PIN, PI AND PE

### Perceived involvement and users' shopping behaviour

It was hypothesized that '*H1.3: increased level of shopping involvement positively relates to customers' search and purchase decision behaviour*.' and '*H1.4: Increased level of shopping involvement with the shopping channel will result in increased future intentions and perceived benefit*'.

The result of regression analysis supports the hypotheses and indicates positive correlation between perceived involvement and online customers' behaviour. The Pearson correlation coefficient is higher for correlation between purchase decision behaviour and perceived involvement ( $r=.462$ ) with adjusted  $R$  square of .208. The  $r$  value is low for search behaviour ( $r=.374$ ) with adjusted  $R$  square of .134. and it is moderate for intention to buy ( $r=.415$ ) and perceived benefit with adjusted  $R$  square of .167 and .193 respectively.

The result of factorial ANOVA indicates high  $F$  value of  $F(1,142)=38.58$  with the unstandardized coefficients  $B$   $.346 < B = .508 < .669$  at the significant level of  $p=.000 < 0.05$  for purchase decision behaviour. The unstandardized coefficients  $B$  for intention to buy is  $.335 < B = .526 < .718$  at the significant level of  $p=.000 < 0.05$ . See appendix C Section 6.

### 3. Perceived engagement

The following hypotheses are associated with perceived engagement. It is tested whether 3 independent variables (SP, PSSUQ and UC) have positive correlation with perceived engagement. Also, it is tested whether increased level of perceived engagement has any positive impact on online users' behaviour, including search and purchase decision as well as intention to buy and perceived benefit.

- *H2.1: Increased level of social presence will result in greater users' engagement with the shopping channel*
- *H2.2: Increased level of user control and usability associated with the shopping channel will result in higher users' engagement*
- *H2.3: Increased level of engagement with the shopping channel positively relates to customers' behaviour including search and purchase decision behaviour*
- *H2.4: Increased level of engagement with the shopping channel will result in increased future intentions and perceived benefit*

The adjusted  $R$  square,  $F$  value and predictor  $B$  value were calculated and presented in the table below (Table 6-9).

Construct	F Value	Mean	S.D.	R Square	Predictor B
Perceived Engagement	-	3.623	.746	-	-
Social Presence	53.623	3.423	.647	.269	.546
Usability	156.64	3.505	1.077	.521	.654
User Control	49.7	3.573	.581	.254	.555
Perceived Interactivity	59.049	3.486	.923	.289	.530
Search Behaviour	48.24	3.661	.830	.248	.633
Purchase Decision	139.09	3.693	.798	.491	.852
Intention to Buy	132.57	3.137	.914	.479	.971
Perceived Benefit	92.64	3.277	1.030	.391	.980

All significant at the  $p < .001$  level

TABLE 6-9 ADJUSTED R SQUARE, F VALUE AND PREDICTOR B VALUE (PERCEIVED ENGAGEMENT)

### Independent variables and perceived engagement

It was hypothesized that '*H2.1: Increased level of social presence will result in greater users' engagement with the shopping channel.*' and '*H2.4: Increased level of user control and usability associated with the shopping channel will result in higher users' engagement.*'

The result of regression analysis supports the hypotheses and illustrates positive correlation between perceived engagement and three independent variables. The calculated Pearson correlation coefficient is very high for usability ( $r=.724$ ,  $r^2=.521$ ,  $F(1,142)=156.64$ ,  $p=.000<0.5$ ) and social presence ( $r=.524>.5$ ,  $r^2=.269$ ,  $F(1,142)=53.623$ ) at the significant level of  $p=.000<0.05$ . It is moderate for user control ( $r=.509$   $r^2=.254$ ,  $F(1,142)=49.7$ ,  $p=.000<0.5$ ).

The multiple regression test was conducted with the two independent variables of social presence and usability. The correlation coefficient of PE and combined independent variables was calculated at  $r=.734$   $r^2=.533$ ,  $F(2,141)=82.48$ ,  $p=.000<0.5$ . This result indicates over 50% of variability in the level of experienced engagement can be accounted for the two independent variables of social presence and usability. See the results of regression linear and multiple regression analysis in appendix C Section 7.

### Perceived engagement and users' shopping behaviour

It was hypothesized that '*H2.2: Increased level of engagement with the shopping channel positively relates to customers' behaviour including search and purchase decision behaviour.*' and '*H2.3: Increased level of engagement with the shopping channel will result in increased future intentions and perceived benefit.*'

The result of regression analysis supports the hypotheses and demonstrates positive correlation between perceived engagement and users' shopping behaviour. The calculated Pearson correlation coefficient is very high for intention to buy ( $r=.695$   $r^2=.479$ ,  $F(1,142)=132.57$ ,  $p=.000<0.5$ ). This indicates approximately 50% of variability in customers' intention to buy is accounted for by level of experienced engagement with the shopping channel. The calculated predictor  $B$  value is also significantly high ( $.804<B=.971<1.138$   $p=.000<0.5$ ) for intention to buy.

The calculated Pearson correlation coefficient is also very high for purchase decision ( $r=.703$   $r^2=.491$ ,  $F(1,142)=139.09$ ,  $p=.000<0.5$ ) and perceived benefit ( $r=.628>.5$ ,  $r^2=.391$ ,  $F(1,142)=92.64$ ,  $p=.000<0.5$ ). It is moderate for search behaviour ( $r=.504$   $r^2=.248$ ,  $F(1,142)=48.24$ ,  $p=.000<0.5$ ). See the results of regression linear analysis in appendix C Section 8.

#### 4. Perceived interactivity

The following hypotheses are associated with perceived interactivity. It is tested whether 3 independent variables (SP, U and UC) have positive correlation with perceived interactivity. Also, it is tested whether increased level of perceived interactivity has any positive impact on online users' behaviour, including search and purchase decision as well as intention to buy and perceived benefit.

- *H3.1: Increased level of social presence will result in greater perceived interactivity of an online shop*
- *H3.2: Increased level of user control and usability associated with the shopping channel will result in greater perceived interactivity*
- *H3.3: Increased level of perceived interactivity positively relates to customers' behaviour including search and purchase decision behaviour*
- *H3.4: Increased level of perceived interactivity positively relates to perceived engagement and perceived involvement*

The adjusted R square, F value and predictor B value were calculated and presented in the table below (Table 6-10).

Construct	F Value	Mean	S.D.	R Square	Predictor B
Perceived Interactivity	-	3.623	.746	-	-
Social Presence	169.32	3.423	.647	.541	.751
Usability	100.93	3.505	1.077	.411	.569
User Control	717.387	3.573	.581	.834	.973
Search Behaviour	5.788*	3.661	.830	.032	.254*
Purchase Decision	58.889	3.693	.798	.288	.671
Intention to Buy	27.511	3.137	.914	.156	.576

All significant at the  $p < .05$  level

TABLE 6-10 ADJUSTED R SQUARE, F VALUE AND PREDICTOR B VALUE (PERCEIVED INTERACTIVITY)

### Independent variables and perceived interactivity

It was hypothesized that ‘H3.1: Increased level of social presence will result in greater perceived interactivity of an online shop.’ and ‘H3.2: Increased level of user control and usability associated with the shopping channel will result in greater perceived interactivity.’

The result of regression analysis supports the hypotheses and illustrates positive correlation between perceived interactivity and independent variables. The calculated Pearson correlation coefficient is very high for social presence ( $r=.737$   $r^2=.541$ ,  $F(1,142)=169.32$ ,  $p=.000<0.5$ ) and usability ( $r=.645$   $r^2=.411$ ,  $F(1,142)=100.93$ ,  $p=.000<0.5$ ). The result of multiple regression analysis with the two independent variables of social presence and usability illustrates very high Pearson correlation coefficient ( $r=.782$   $r^2=.607$ ,  $F(2,141)=111.21$ ,  $p=.000<0.5$ ). This indicates over 60% of variability in the level of experienced interactivity with the shopping channel is accounted for by level of social presence and usability. See the results of regression linear and multiple regression analysis in appendix C Section 9.

### Perceived interactivity and users’ shopping behaviour

It was hypothesized that “H3.3: Increased level of perceived interactivity positively relates to customers’ behaviour including search and purchase decision behaviour.”

The result of regression analysis supports the hypothesis and demonstrates statistically significant correlation between perceived interactivity and users’ shopping behaviour. The calculated Pearson correlation coefficient found to be high for purchase decision ( $r=.541$   $r^2=.288$ ,  $F(1,142)=58.88$ ,  $p=.000<0.5$ ) with predictor B ( $.498 < B = .671 < .844$ ) and moderate for intention to buy ( $r=.403$

$r^2=.156$ ,  $F(1,142)= 27.511$ ,  $p=.000<0.5$ ). However, it was found to be low (below 0.2) for search behaviour ( $r=.198$   $r^2=.032$ ,  $F(1,142)= 5.788$ ,  $p=.017<0.5$ ). See the results of regression linear analysis in appendix C Section 10.

### 6.7.5 Results of factorial ANOVA analysis

Prior to conducting the ANOVA test, the assumptions of normality was evaluated and determined to be satisfied as the four groups distributions (social presence and usability) were associated with skew and kurtosis less than 2.0 and 9.0 respectively. Furthermore, the assumptions of homogeneity of variances was tested and satisfied based on Levene's F test.

#### 1. Perceived involvement

The main effect of independent variables including social presence and usability on perceived involvement was tested by Univriate analysis in SPSS. The interaction between the two variables of social presence and usability was also tested by Two-Way ANOVA (see Table 6-11).

Construct	F Value	$\eta^2$	Observed power
Social Presence	17.583	.110	98.6%
Usability	19.889	.123	99.3%
User Control	11.837	.077	92.7%

Dependent variable: Perceived Involvement, All significant at the  $p<.001$  level

TABLE 6-11 RESULTS OF FACTORIAL ANOVA (INDEPENDENT VARIABLES AND PERCEIVED INVOLVEMENT)

Table 6-12 presents the estimated marginal means of perceived involvement across two levels of usability (low, high) and social presence (low, high). It can be seen that the low level of perceived involvement is associated with the numerically smallest level of social presence and usability. Also, high level of involvement is associated with the numerically highest level of social presence and usability. In order to test the effect size of independent variables on perceived involvement as well as the interaction between variables, a between groups ANOVA was performed.

Descriptive statistics dependent variable: M_PIN				
M_SP	M_PSSUQ	Mean	(SD)	N
Low	Low	3.279	(.678)	51
	High	3.712	(.684)	23
	Total	3.411	(.704)	74
High	Low	3.670	(.609)	22
	High	4.000	(.683)	48
	Total	3.896	(.674)	70
Total	Low	3.397	(.678)	73
	High	3.906	(.692)	71
	Total	3.648	(.729)	144

TABLE 6-12 MEANS OF PERCEIVED INVOLVEMENT ACROSS TWO LEVELS OF SOCIAL PRESENCE AND USABILITY

### The result of factorial ANOVA:

The independent between groups ANOVA yielded a statistically significant effect of social presence ( $F(1,142) = 17.58, p = .000 < 0.05, \eta^2 = .110$ ) and usability ( $F(1,142) = 19.88, p = .000 < 0.05, \eta^2 = .123$ ) on perceived involvement with the observed power of 99%. Thus, the null hypothesis of no difference between the means of perceived involvement was rejected (see Figure 6-11). This means the three interventions (SP, U and UC) have an effect on perceived involvement. It was found that usability has the main effect on perceived involvement. The effect size is considered large based on (Cohen, 1992) guidelines. However, the effect size of user control on perceived involvement found to be small UC ( $F(1,142) = 11.83, p = .001 < 0.05, \eta^2 = .077$ ) compared to social presence and usability with the observed power of 92%. (Refer to appendix C Section 11 to see the result of test).

The interaction between the two variables of social presence and usability was found not to be statistically significant. However, to evaluate the interaction between variables further, the statistically significant ANOVA was followed with pairwise comparison test. The mean difference of perceived involvement across two levels of social presence is numerically higher when usability is low. (Refer to appendix C Section 11 to see the result of ANOVA and pairwise comparison in detail).

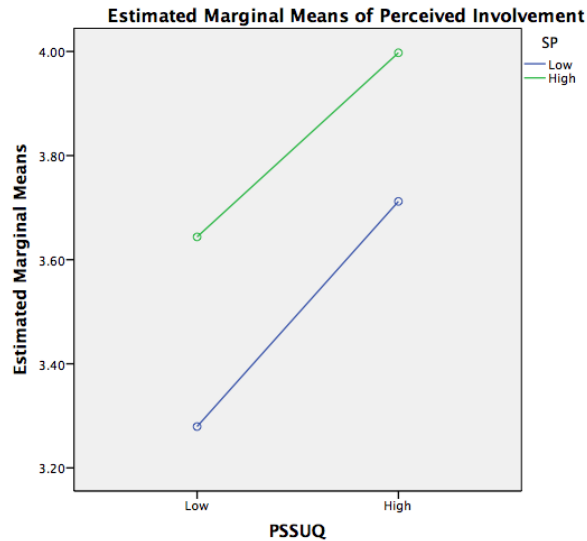


FIGURE 6-11 MEANS OF PERCEIVED INVOLVEMENT IN LOW AND HIGH PRESENCE AND USABILITY CONDITIONS

## 2. Perceived engagement

The main effect of independent variables including social presence and usability on perceived engagement was tested by Univariate analysis in SPSS to calculate the effect size. The interaction between social presence and usability was also tested by Two-Way ANOVA (see Table 6-13).

Construct	F Value	$\eta^2$	Observed power
Social Presence	30.63	.177	100%
Usability	67.77	.323	100%
User Control	21.53	.132	99.6%

Dependent variable: Perceived Engagement, All significant at the  $p < .001$  level

TABLE 6-13 RESULTS OF FACTORIAL ANOVA (INDEPENDENT VARIABLES AND PERCEIVED ENGAGEMENT)

Table 6-14 presents the estimated marginal means of perceived engagement across two levels of usability (low, high) and social presence (low, high). It can be seen that the low level of perceived engagement is associated with the numerically smallest level of social presence and usability. Also, the high level of perceived engagement is associated with the numerically highest level of social presence and usability. However, the mean difference of perceived engagement is mainly associated with the level of usability. In order to test the effect size of independent variables on perceived engagement as well as the effect of interaction between variables, a between groups ANOVA was performed.



Descriptive statistics dependent variable: M_PE				
M_SP	M_PSSUQ	Mean	(SD)	N
Low	Low	3.093	(.610)	51
	High	3.758	(.469)	23
	Total	3.300	(.646)	74
High	Low	3.449	(.451)	22
	High	4.041	(.491)	48
	Total	3.855	(.550)	70
Total	Low	3.200	(.587)	73
	High	3.949	(.499)	71
	Total	3.570	(.661)	144

TABLE 6-14 MEANS OF PERCEIVED ENGAGEMENT ACROSS TWO LEVELS OF SOCIAL PRESENCE AND USABILITY

### The result of factorial ANOVA:

The independent between groups ANOVA yielded a statistically significant effect of social presence and usability on perceived engagement ( $F(1,142) = 30.63, p = .000 < 0.05, \eta^2 = .177$ ) and ( $F(1,142) = 67.77, p = .000 < 0.05, \eta^2 = .323$ ) with the observed power of 100%. Thus, the null hypothesis of no difference between the means of perceived engagement was rejected (see Figure 6-12). This means the three interventions (SP, U and UC) have an effect on perceived engagement. The independent between groups ANOVA illustrated that usability has the main effect on perceived engagement. The effect size of usability on perceived engagement is considered large based on (Cohen, 1992) guidelines. (Refer to appendix C Section 12 to see the results of ANOVA test).

The result of ANOVA test also indicates a statistically significant effect of user control on perceived engagement ( $F(1,142) = 21.53, p = .000 < 0.05, \eta^2 = .132$ ) with the observed power of 99.6%.

The interaction between the two variables of social presence and usability was found not to be statistically significant. However, to evaluate the interaction between variables further, the statistically significant ANOVA was followed with pairwise comparison tests. The mean difference of perceived engagement across two levels of social presence is statistically significant when usability is low. (Refer to appendix C Section 12 to see the results of ANOVA and pairwise comparison analysis).

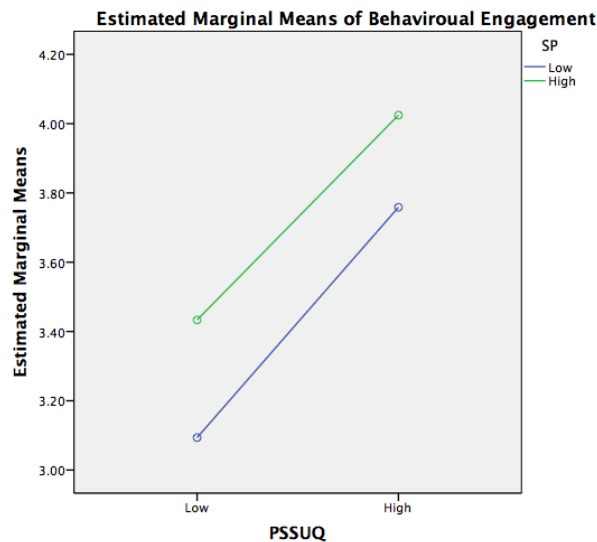


FIGURE 6-12 MEANS OF PERCEIVED ENGAGEMENT IN LOW AND HIGH PRESENCE AND USABILITY CONDITIONS

### 3. Perceived interactivity

The main effects of independent variables including social presence and usability on perceived interactivity was tested by Univariate analysis in SPSS to calculate the effect size. The interaction between social presence and usability was also tested by Two-Way ANOVA (see Table 6-15).

Construct	F Value	$\eta^2$	Observed power
Social Presence	80.03	.360	100%
Usability	51.973	.268	100%
User Control	134.219	.486	100%

Dependent variable: Perceived Interactivity, All significant at the  $p < .001$  level

TABLE 6-15 RESULT OF FACTORIAL ANOVA (INDEPENDENT VARIABLES AND PERCEIVED INTERACTIVITY)

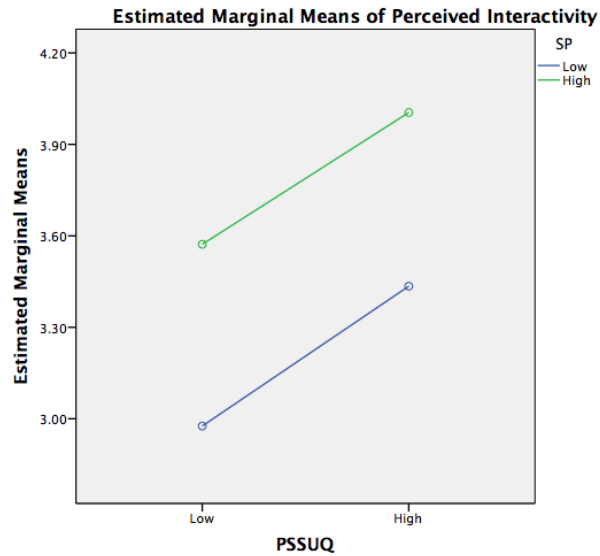
Table 6-16 presents the estimated marginal means of perceived interactivity across two levels of usability (low, high) and social presence (low, high). It can be seen that the low level of perceived interactivity is associated with the numerically smallest level of social presence and usability. Also, high level of involvement is associated with the numerically highest level of social presence and usability. However, the mean difference of perceived interactivity is mainly associated with the level of social presence. In order to test the main effect of independent variables on perceived interactivity as well as the effect of interaction between variables, a between groups ANOVA was performed.

Descriptive statistics dependent variable: M_PI				
M_SP	M_PSSUQ	Mean	(SD)	N
Low	Low	2.976	(.477)	51
	High	3.434	(.473)	23
	Total	3.118	(.519)	74
High	Low	3.606	(.432)	22
	High	4.023	(.504)	48
	Total	3.892	(.518)	70
Total	Low	3.166	(.545)	73
	High	3.832	(.564)	71
	Total	3.494	(.646)	144

TABLE 6-16 MEANS OF PERCEIVED INTERACTIVITY ACROSS TWO LEVELS OF SOCIAL PRESENCE AND USABILITY

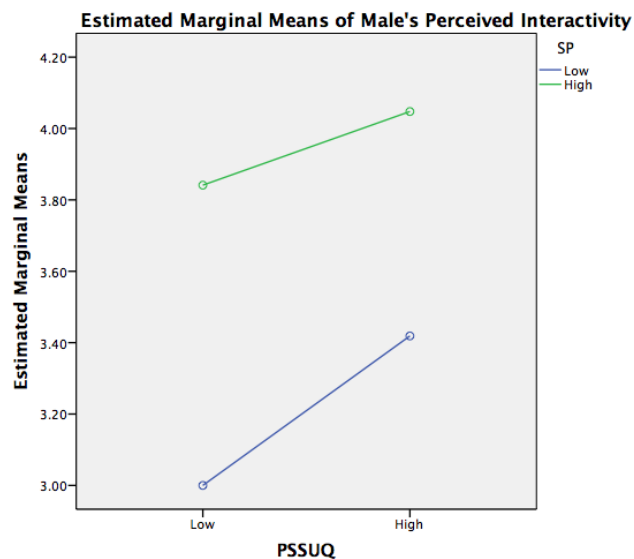
### The result of factorial ANOVA:

The independent between groups ANOVA yielded a statistically significant effect of social presence ( $F(1,142) = 80.03, p = .000 < 0.05, \eta^2 = .360$ ) and usability ( $F(1,142) = 51.973, p = .000 < 0.05, \eta^2 = .268$ ) on perceived interactivity with the observed power of 100%. Thus, the null hypothesis of no difference between the means of perceived interactivity was rejected (see Figure 6-13). This means the three interventions (SP, U and UC) have an effect on perceived interactivity. The result of independent between groups ANOVA demonstrates that *social presence has the main effect on perceived interactivity*. This effect size associated is considered large based on (Cohen, 1992) guidelines. The interaction between the two variables of social presence and usability was found not to be statistically significant. (Refer to appendix C Section 13 to see the result of ANOVA and pairwise comparison).



**FIGURE 6-13 MEANS OF PERCEIVED INTERACTIVITY IN LOW AND HIGH PRESENCE AND USABILITY CONDITIONS**

ANOVA test was repeated per gender categories (see Figure 6-14). It was found that the effect of social presence on experienced interactivity was larger for male participants ( $F(1,47) = 28, p = .000 < 0.05, \eta^2 = .373$ ) as opposed to females ( $F(1,89) = 22, p = .000 < 0.05, \eta^2 = .199$ ). Conversely the effect of usability on experienced interactivity was larger for female participants ( $F(1,89) = 18.87, p = .000 < 0.05, \eta^2 = .175$ ) compared to males ( $F(1,47) = 28, p = .029 < 0.05, \eta^2 = .097$ ).



**FIGURE 6-14 MEANS OF MALES' PERCEIVED INTERACTIVITY IN LOW AND HIGH PRESENCE AND USABILITY CONDITIONS**

#### 4. Intention to buy

The mean difference of intention to buy in four experimental conditions was tested by ANOVA and pairwise comparison analysis. Looking at the descriptive statistic table below (Table 6-17), the mean difference of intention to buy for male participants is numerically large in conditions 1 and 4 (see Figure 6-15). However, it is numerically small in all experimental conditions for females. The mean difference of male's intention to buy was further investigated by independent *t*-test. The result of independent *t*-test illustrates that the mean difference of males' intention to buy ( $t(23) = -2.304, p = 0.029 < 0.05$ ) is statistically significant in conditions 1 and 4 (see Table 6-18). (Refer to appendix C Section 14).

Gender * Treatment Condition, dependent variable: Intention To Buy					
Gender	Treatment Condition	Mean	Standard error	95% Confidence Interval	
				Lower	Upper
Male	TC1	2.667	.236	2.199	3.134
	TC2	3.214	.229	2.762	3.667
	TC3	3.357	.290	2.784	3.930
	TC4	3.414	.290	2.842	3.987
Female	TC1	3.109	.200	2.714	3.504
	TC2	3.271	.205	2.866	3.676
	TC3	3.027	.180	2.672	3.383
	TC4	3.200	.183	2.838	3.562

TABLE 6-17 MEANS OF INTENTION TO BUY IN FOUR TREATMENT CONDITIONS PER GENDER

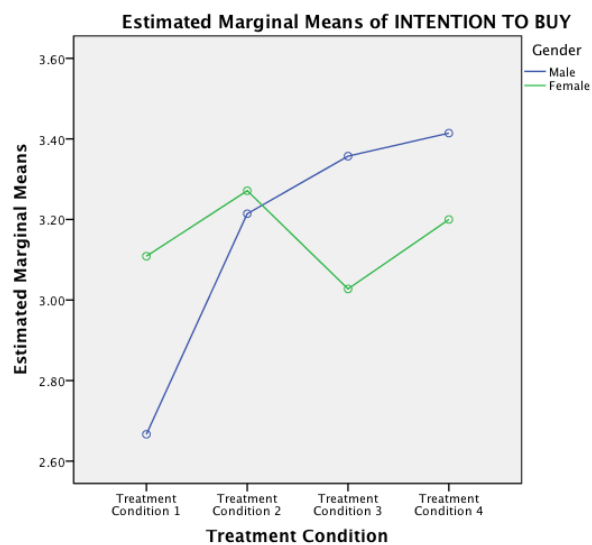


FIGURE 6-15 MEANS OF INTENTION TO BUY PER GENDER

Group statistics Male Intention To buy

Treatment Condition	N	Mean	(SD)	Standard error
TC1	15	2.666	(.820)	.211
TC4	10	3.414	(.754)	.238

TABLE 6-18 MEANS OF MALES' INTENTION TO BUY IN CONDITION 1 AND CONDITION 4

This finding led to the assumption that usability has the main effect on males' intention to buy. To test this assumption the Univariate analysis was conducted. Between the two independent variables of usability and social presence, usability was found to have the main effect (see Figure 6-16) with the large effect size of .327 ( $F(1,47) = 22.83$ ,  $p = .000 < 0.05$ ,  $\eta^2 = .327$ ) and observed power of 99%. Although the effect size of usability on males' intention to buy is large, it was found that the effect of social presence ( $F(1,47) = 5.95$ ,  $p = .018 < 0.05$ ,  $\eta^2 = .112$ ) on males' intention to buy is statistically significant. (Refer to appendix C Section 14).

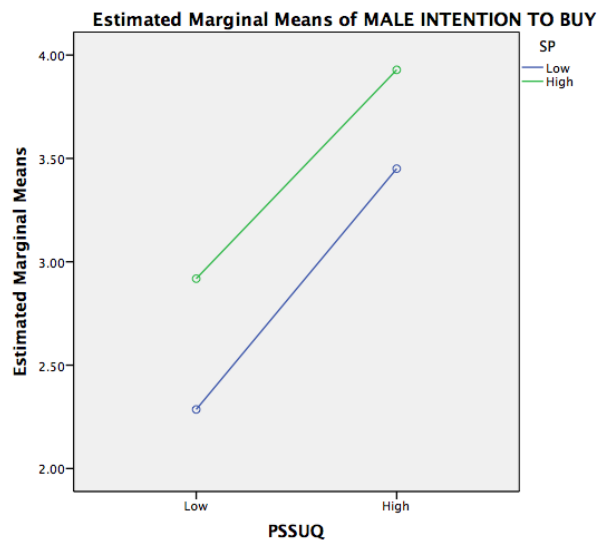


FIGURE 6-16 MEANS OF MALES' INTENTION TO BUY IN LOW AND HIGH PRESENCE AND USABILITY CONDITIONS

The main effects of independent variables including social presence and usability on intention to buy was tested by Univariate analysis in SPSS to calculate the effect size. The interaction between social presence and usability was also tested by Two-Way ANOVA (see Table 6-19).

Construct	F Value	$\eta^2$	Observed power
Social Presence	26.372	.157	99.9%
Usability	56.485	.285	100%

Dependent variable: Intention To Buy, All significant at the  $p < .001$  level

TABLE 6-19 RESULTS OF FACTORIAL ANOVA (INDEPENDENT VARIABLES AND INTENTION TO BUY)

Table 6-20 presents the estimated marginal means of intention to buy across two levels of usability (low, high) and social presence (low, high). It can be seen that the low level of intention to buy is associated with the numerically smallest level of social presence and usability. Also high level of intention to buy is associated with the numerically highest level of social presence and usability. However, the mean difference of intention to buy is mainly associated with level of usability. In order to test the main effect of independent variables on intention to buy as well as the interaction between variables, a between groups ANOVA was performed.

Descriptive statistics dependent variable: M_IB				
M_PSSUQ	M_SP	Mean	(SD)	N
Low	Low	2.521	(.730)	51
	High	3.000	(.735)	22
	Total	2.665	(.759)	73
High	Low	3.403	(.959)	23
	High	3.764	(.707)	48
	Total	3.648	(.808)	71
Total	Low	2.795	(.901)	74
	High	3.524	(.795)	70
	Total	3.149	(.924)	144

All significant at the  $p < .001$  level

TABLE 6-20 MEANS OF INTENTION TO BUY ACROSS TWO LEVELS OF SOCIAL PRESENCE AND USABILITY

### The result of factorial ANOVA:

The independent between groups ANOVA yielded a statistically significant effect of social presence ( $F(1,142) = 26.372$ ,  $p = .000 < 0.05$ ,  $\eta^2 = .157$ ) and usability ( $F(1,142) = 56.485$ ,  $p = .000 < 0.05$ ,  $\eta^2 = .285$ ) on intention to buy with the observed power of 99.9% and 100% respectively. Thus, the null hypothesis of no difference between the means of intention to buy was rejected (see Figure 6-17). *The result of ANOVA test indicates 15% of the variance in level of users' intention to buy is accounted for by level of experienced social presence.* This is significantly large effect size based on (Cohen, 1992) guidelines.

The result of independent between groups ANOVA indicated usability has the main effect on intention to buy. The interaction between the two variables of social presence and usability was found not statistically significant. However, to evaluate the interaction between variables further, the statistically significant

ANOVA was followed with pairwise comparison test. The mean difference of intention to buy across two levels of social presence is numerically high when usability is low. (Refer to appendix C Section 15 to see the result of ANOVA and pairwise comparison).

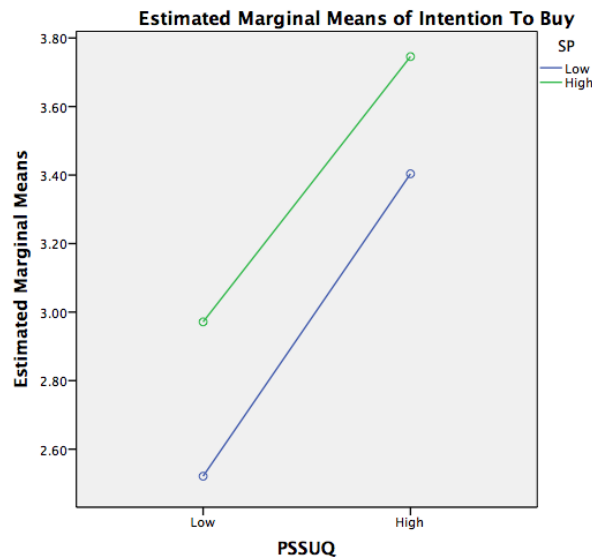


FIGURE 6-17 MEANS OF INTENTION TO BUY IN LOW AND HIGH PRESENCE AND USABILITY CONDITIONS

The independent between groups ANOVA illustrates a statistically significant effect of social presence ( $F(1,142) = 22.233, p = .000 < 0.05, \eta^2 = .135$ ) and usability ( $F(1,142) = 134.947, p = .000 < 0.05, \eta^2 = .487$ ) on perceived benefit with the observed power of 99.7%. Thus, the null hypothesis of no difference between the means of perceived benefit was rejected. ***The result of ANOVA test indicates 13% of the variance in level of perceived benefit is accounted for by level of experienced social presence.*** The effect size associated with statistically significant effects are considered large based on (Cohen, 1992) guidelines. (Refer to appendix C Section 16)

#### 6.7.6 Results of observation

The following hypotheses are associated with online customers' shopping behaviour. It is tested whether increased level of social presence positively influence how online users search for product information and whether it increases the size and quality of product considerations.



*H4.1: The increased level of social presence and the social interaction between consumers will reduce consumers' search effort for product information and have positive impact on the initial browsing of available products*

*H4.2: The increased level of social presence and the social interaction between consumers will increase the size and quality of considerations*

In order to test the above hypothesis, number of visited items, shared items and number of times users asked for help, guidance or suggestions were recorded as part of observation. ANOVA test was conducted to test the mean difference of observed items in four experimental conditions.

### **Results of ANOVA and post-hoc test:**

#### **1. Number of shared items**

A shared item is an item that is shared between users in each experimental condition through communication and collaboration tools provided for them. For example a shared item is an item shared on 'Google shopping shared list' in condition 2 or it is a link to an item shared through email in condition3.

Table 6-21 presents the means of shared items in four treatment conditions. It can be seen that the mean difference of shared items is mainly associated with experienced social presence. The mean difference is statistically significant in all experimental conditions except conditions 2 (SP (-), U&UC (+)) and 3 (SP (-), U&UC (-)). (Refer to appendix D Section 1)

- *TC1 (Social Presence (high), Usability & User Control (low))*
- *TC2 (Social Presence (low), Usability & User Control (high))*
- *TC3 (Social Presence (low), Usability & User Control (low))*
- *TC4 (Social Presence (high), Usability & User Control (high))*

Descriptive statistics number of shared items in four experimental conditions			
Group	Mean	(SD)	N (pairs)
TC1	18.29	(7.96)	14
TC2	8.78	(4.14)	18
TC3	7.33	(4.03)	18
TC4	34.72	(10.93)	18

Groups with differing subscripts are significantly different at the  $p < .05$  based on Fisher's LSD post hoc paired comparisons

**TABLE 6-21 MEANS OF SHARED ITEMS IN FOUR TREATMENT CONDITIONS**

The mean difference of shared items are statistically significant between conditions 1 and 4. This illustrates the increased level of social presence and usability will result in increased number of shared items between users.

## 2. Number of visited items

Visited items are total numbers of items visited by a group of users, who did experiment in pair, in an experimental session. Visited items include page visit and items visit (or clicks) on a page.

Table 6-22 presents the means of visited items in four treatment conditions. The means of visited items increases from condition 1 to condition 4. This is mainly associated with experienced usability in conditions 1 and 3. (Refer to appendix D Section 2)

Descriptive statistics number of visited items in four experimental conditions			
Group	Mean	(SD)	N (pairs)
TC1	14.43	(3.94)	14
TC2	19.83	(8.99)	18
TC3	20.00	(7.02)	18
TC4	30.06	(6.89)	18

Groups with differing subscripts are significantly different at the  $p < .05$  based on Fisher's LSD post hoc paired comparisons

TABLE 6-22 MEANS OF VISITED ITEMS IN FOUR TREATMENT CONDITIONS

## 3. Number of considered items

A considered item is an item that participants shared, discussed, evaluated and considered to be part of their shopping basket.

Table 6-23 presents the means of considered items in four experimental conditions. The mean difference of considered items is not numerically large between conditions 1, 2 and 3. The mean of considered items is significantly high in condition 4 and it is associated with experienced social presence and usability, however social presence has the main effect. (Refer to appendix D Section 3)

Descriptive statistics number of considered items in four experimental conditions

Group	Mean	(SD)	N (pairs)
TC1	4.07	(1.90)	14
TC2	4.50	(2.73)	18
TC3	3.17	(3.60)	18
TC4	9.44	(3.91)	18

Groups with differing subscripts are significantly different at the  $p < .05$  based on Fisher's LSD post hoc paired comparisons

TABLE 6-23 MEANS OF CONSIDERED ITEMS IN FOUR TREATMENT CONDITIONS

#### 4. The frequency of users asking for help, guidance or suggestion (FHGS)

A second opinion was one of the reasons users require to share their online shopping experience with friends or relatives (it was discussed in chapter 1 and chapter 3). It was observed during the experiment that the frequency of users asking for help, suggestions or ideas was high in conditions 4 and 1 (high presence conditions) as opposed to conditions 2 and 3 (low presence conditions).

Table 6-24 presents the frequency of FHGS in four experimental conditions. It can be seen that the mean difference of FHGS is associated with the experienced social presence. (Refer to appendix D Section 4)

Descriptive statistics frequency of help solicitations in four experimental conditions

Group	Mean	(SD)	N (pairs)
TC1	9.00	(3.76)	14
TC2	2.72	(1.93)	18
TC3	1.50	(1.65)	18
TC4	14.39	(9.17)	18

Groups with differing subscripts are significantly different at the  $p < .05$  based on Fisher's LSD post hoc paired comparisons

TABLE 6-24 MEANS OF FHGS IN FOUR TREATMENT CONDITIONS

#### Task performance in four treatment conditions

To be able to evaluate the task performance, the experimental task was broken into 1) initial discussion 2) planning and 3) final decision. The time spent at the two stages of conducted task 1 and 2 (initial discussion and planning) was recorded as part of observation. The result of ANOVA test and profile plots associated with the observed items are presented below.

## Results of ANOVA and post-hoc test:

### 1. The initial discussion time

The initial discussion time is the time users spent on discussing an initial plan for the experimental task (a group holiday). They discussed destinations, planning time, duration, accommodations, means of transportation and budget. Table 6-25 presents the means of initial discussion time in four experimental conditions. The low discussion time in conditions 1 and 4 (high presence conditions) means effective task performance, which is associated with higher experienced social presence. (Refer to appendix D Section 5)

Descriptive statistics initial discussion time (in minutes) in four experimental conditions			
Group	Mean	(SD)	N (pairs)
TC1	4.40	(4.55)	14
TC2	13.19	(8.29)	18
TC3	13.17	(7.79)	18
TC4	3.57	(4.39)	18
Groups with differing subscripts are significantly different at the $p < .05$ based on Fisher's LSD post hoc paired comparisons			

TABLE 6-25 MEANS OF INITIAL DISCUSSION TIME IN FOUR TREATMENT CONDITIONS

### 2. The planning time

Planning time was the time users spent on planning a group holiday within 30 minutes of experimental session. The planning time recorded from the time users agreed on the initial plan and they initiated the search. Table 6-26 presents the means of planning time in four experimental conditions. The mean difference of planning time is statistically significant between conditions 4 and 3, also 4 and 2. This means the mean difference of planning time is associated with the experienced social presence. (Refer to appendix D Section 6)

Descriptive statistics planning time (in minutes) in four experimental conditions			
Group	Mean	(SD)	N (pairs)
TC1 a	25.03	(5.67)	14
TC2 b	19.63	(3.62)	15
TC3 b	20.18	(5.61)	16
TC4 c	26.31	(4.35)	18
Groups with differing subscripts are significantly different at the $p < .05$ based on Fisher's LSD post hoc paired comparisons			

TABLE 6-26 MEANS OF PLANNING TIME IN FOUR TREATMENT CONDITIONS

## 6.8 Chapter summary

This chapter presented the results of data analysis. The data analysis (regression and ANOVA) was conducted to test the hypotheses and the research model developed in this thesis. Also, some assumptions were developed during observation and data analysis that were further investigated. Below is the summary of the key findings:

1. The validity and reliability of social presence scales (developed in this study) achieved the conbach'Alpha of 0.920. The conbach's alpha used to evaluate the internal consistency reliability associated with scores derived from a scale. Presence scales include four sub-scales of SP (Social Presence), CP (Co-presence), mutual understanding (MU), intimacy and immediacy (IM).
2. The correlation between dependant and independent variables of between-subject design was tested by regression analysis. The result of regression analysis supports the hypotheses developed in this thesis. It illustrates positive correlations between three interventions and dependent variables.
3. Increased level of social presence improves the online shopping experiences. It was found that increased level of social presence results in higher level of experienced involvement, engagement and interactivity with the shopping channel. Also, it was found that social presence has statistically significant effect on perceived involvement and engagement. However, social presence has a main effect on perceived interactivity.
4. Social presence has the largest effect size on perceived interactivity, followed by perceived engagement and intention to buy. The result of data analysis indicates 15% of the variance in level of users' intention to buy is accounted for by level of experienced social presence.
5. The increased level of social presence and social interaction between consumers will reduce consumers' search effort for product information and have positive impact on the initial browsing of available products.
6. Online users are able to complete a shopping task more effectively when a mediated environment supports high level of social presence and usability.

Key findings and implications associated with them are discussed in detail in the next chapter. Next chapter concludes this thesis with contributions to knowledge, limitations and future research.

## CHAPTER SEVEN

### 7 Conclusions

Online shopping is moving towards becoming more of a social and group experience, whereby users can share their shopping journeys, and experience the sort of natural interactions that happen in physical stores. Despite limited success to date, it is expected that the concept of 'social shopping' will have a great impact on e-commerce and online shopping activities in the near future. The rapid growth of e-commerce makes it imperative to enhance people's online shopping experiences by developing the facility for collaboration, social communication and the human touch.

Online shoppers, as discussed before, respect their friends' and relatives' opinions as well as third-party reviews of products before making their purchase decision. Shoppers engage in collaborative shopping, not only for the fulfilment of social interaction with others, but also for a second opinion about a product (Zhu & Benbasat, 2009). Also, shopping inherently is a social activity that people tend to do in the company of others. The evolution of web technologies will facilitate real-time, entirely shared, co-browsing online encounters. This will allow online customers to share the entire shopping experience with friends or relatives.

A decade ago, Internet connections lacked speed and reliability, but improved technology means that these days web sharing has become much more refined. Communication by means of the Internet can now be quick, straightforward, efficient and intuitive. Users can now participate in experiences as though they were in exactly the same location. Recent developments in online technologies deliver a web platform where people can easily and instantly share their entire web experience with others. It should allow communication and coordination in real time, and, more importantly, experience of the web in a completely interactive way, not just to communicate in real time, but also to participative in the same activity at the same time.

Recent advances in social media have opened up the way for a new era of development and has forever changed how people socialise and interact on the Internet. The Internet is now increasingly mobile, personalised and adaptive. It is occupied by many diverse

social networks filled with humans who are constantly connected and who either generate or consume content and information. While this higher degree of connectivity via social networks is a huge advance, it still does not serve to bring people together as much as they could be.

Social shopping can provide users with a quick and easy way to be involved in an online collaboration session with family or friends. Also, instead of a one-way interaction, online customers can be fully engaged in a truly interactive communication-collaboration session. Retailers also should join the shared-shopping networks of customers, and, by acquiring this information, they are able to offer a refined personalised shopping experience that competes favourably with what one can expect in a high street store. Social shopping not only delivers all of the components of the previous online shops, but it also provides synchronous fully shared-shopping experiences for online customers.

Simulations of social shopping environments were designed in this study. They were built by integrating the latest online collaborative and communication technologies. Through the simulated environments, users were able to share their entire shopping experience with their remotely located partners. They were able to co-navigate, instantly communicate and share information. How newly designed social environments affect users' shopping behaviour, including search, purchase decision and intention to buy, was tested in this research.

Social presence was found as a prerequisite component of social shops. This research answered the questions of 1) How social presence can be built and measured within online shops? 2) How increased level of social presence can positively influence users' shopping behaviour? 3) Whether social presence has direct or indirect impact on perceived involvement, engagement and interactivity experienced by users? The summary of findings and discussions are presented in the next Section.

## 7.1 Summary of findings and discussions

### 1. Social presence in four experimental conditions

Level of Social and co-presence in four experimental conditions was tested by independent t-test. The mean difference was found statistically significant in low and high presence conditions SP ( $t(142) = -5.89$ ,  $p = .000 < 0.05$ ) and CP ( $t(142) = -5.33$ ,  $p = .000 < 0.05$ ). This confirms that the design of the two levels (low and high) of social presence in low and high presence conditions was successful.

Summary of findings:

- It was found that the level of experienced social and co-presence for female participants were numerically higher compared to males in all experimental conditions; it was significantly higher in condition 4 (SP (+), U&UC (+)).
- It was found that female and male participants experienced usability differently, or in other words, their perception of usability of a system can be very different. Female participants experienced the lowest level of usability in condition 3 (SP (-), U&UC (-)) and highest level of usability in condition 4 (SP (+), U&UC (+)). However, male participants experienced higher level of usability in all conditions as opposed to females except condition 1 (SP (+), U&UC (-)).
- It was found that experienced user control was higher for male participants compared to females; it was significantly higher in condition 3 (SP (-), U&UC (-)). While females experienced the lowest level of user control in condition 3 (SP (-), U&UC (-)), male participants experienced the lowest level of user control in conditions 1 (SP (+), U&UC (-)).

These findings verify that men and women's perception of social presence and usability can be different. Although increased social presence have positive effect on shopping experiences for male and female shoppers, it has higher effect on females. Conversely, it was found that usability and user control have higher effects on male customers. This suggests that increased level of social presence results in satisfactory shopping experiences for both male and female customers, if usability and user control are carefully designed and adjusted within an online shop. However, it will have a greater effect on female customers.



## 2. Summary of hypothesis test

The correlation between dependant and independent variables of between-subject design was tested by (linear and multiple) regression analysis. The result of regression analysis supports the hypotheses developed in this thesis. It illustrates positive correlations between three independent and dependent variables.

Table 7-1 presents the summary of Pearson correlation coefficients<sup>27</sup> for dependent and independent variables including: SP (Social Presence), UC (User Control), PSSUQ (Usability), PE (Perceived Engagement), PIN (perceived Involvement), PI (Perceived Interactivity) and online customers' shopping behaviour including SRB (Search Behaviour), QEDB (Quality and Effectiveness of Decision Behaviour), IB (Intention to Buy) and PB (Perceived Benefit).

<i>Correlation matrices</i>										
	PIN	PE	PI	SP	PSSUQ	UC	SRB	QEDB	IB	PB
<i>PIN</i>	1.000									
<i>PE</i>	.658	1.000								
<i>PI</i>	.430	.542	1.000							
<i>SP</i>	.423	.524	.737	1.000						
<i>PSSUQ</i>	.501	.724	.645	.588	1.000					
<i>UC</i>	.411	.509	.914	.644	.650	1.000				
<i>SRB</i>	.374	.504	.198	.195	.522	.205	1.000			
<i>QEDB</i>	.462	.703	.541	.584	.732	.516	.566	1.000		
<i>IB</i>	.415	.695	.403	.413	.660	.363	.644	.697	1.000	
<i>PB</i>	.446	.628	.480	.458	.764	.479	.588	.691	.723	1.000
<i>Mean</i>	3.623	3.563	3.486	3.423	3.505	3.573	3.661	3.693	3.137	3.277
<i>SD</i>	.746	.658	.923	.647	1.077	.581	.830	.798	.914	1.030

All significant at the  $p < .001$  level

TABLE 7-1 PEARSON CORRELATION TABLE

<sup>27</sup> [Pearson correlation coefficient](#) is a measure of the linear correlation between two variables X and Y, giving a value between +1 and -1. Where +1>0 is positive correlation, 0 is no correlation and -1<0 is negative correlation.

Table 7-2 presents the summary of hypotheses developed in this study with the calculated predictor  $B^{28}$  value and T value<sup>29</sup>. The predictor  $B$  value is high for H2.1, H2.2a, H2.3b, H2.4a and H2.4b. This verifies that social presence and usability are strong predictors of user engagement, and also perceived engagement is a strong predictor variable of users' purchase decision, intention to buy and perceived benefit.

Research model results		
Hypothesis	Predictor $B$	T value
H1.1. Increased social presence→higher involvement	.487	5.56
H1.2a. Higher involvement→higher engagement	.596	10.399
H1.2b. Higher involvement→higher interactivity	.381	5.682
H1.3a. Higher involvement→search behaviour	.426	4.809
H1.3b. Higher involvement→purchase decision behaviour	.508	6.212
H1.4a. Higher involvement→higher intention to buy	.526	5.440
H1.4b. Higher involvement→higher perceived benefit	<b>.631</b>	5.937
H2.1. Increased social presence→higher engagement	<b>.546</b>	7.323
H2.2a. Increased usability→higher engagement	<b>.654</b>	12.516
H2.2b. Increased user control→higher engagement	.555	7.050
H2.3a. Higher engagement→search behaviour	.633	6.946
H2.3b. Higher engagement→purchase decision behaviour	<b>.852</b>	11.794
H2.4a. Higher engagement→higher intention to buy	<b>.971</b>	11.514
H2.4b. Higher engagement→higher perceived benefit	<b>.980</b>	9.625
H3.1. Increased social presence→higher interactivity	<b>.752</b>	13.013
H3.2a. Increased usability→ higher interactivity	.569	10.046
H3.2b. Increased user control→ higher interactivity	.973	26.784
H3.3a. Higher interactivity→search behaviour	.254	2.406
H3.3b. Higher interactivity→purchase decision behaviour	.671	7.674
H3.4a. Higher interactivity→higher intention to buy	.576	5.245
H3.4b. Higher interactivity→higher perceived benefit	<b>.765</b>	6.512

All significant at the  $p<.001$  level

TABLE 7-2 RESEARCH MODEL RESULTS

<sup>28</sup> In a linear regression model the estimated raw or unstandardized regression coefficient for a predictor variable (referred to as [B on the SPSS REGRESSION output](#)) is interpreted as the change in the predicted value of the dependent variable for a one unit increase in the predictor variable. Thus a B coefficient of 1.0 would indicate that for every unit increase in the predictor, the predicted value of the dependent variable also increases by one unit.

<sup>29</sup> The [t statistic](#) is the coefficient divided by its standard error. It is a measure of the precision with which the regression coefficient is measured.

### Summary of findings:

- Among the three dependent variables of perceived engagement, involvement and interactivity, perceived engagement is the key predictor of customers' purchase intention and perceived benefit. The predictor  $B$  value is very high for H2.4a and H2.4b, presented in Table 7-2.
- Multiple regression analysis resulted a very high correlation coefficient ( $r=.734$   $r^2=.533$ ,  $F(2,141)= 82.48$ ,  $p=.000<0.5$ ) for perceived engagement and the two independent variables of social presence and usability. This indicates over 50% of variability in the level of experienced engagement is accounted for by level of experienced social presence and usability.

This suggests that if an online shop creates an engaging shopping experience for its online customers, this engagement leads to higher tendency of customers towards revisiting the site and purchasing from it. This can perfectly link to the other finding in this research, which suggests increased level of social presence, usability and user control results in an engaging experience with an online shop.

### 3. Summary of the effect size of independent variables

**Social presence.** Table 7-3 presents the effect size of social presence on independent variables tested in this experimental study. Social presence has the largest effect size on perceived interactivity, followed by perceived engagement and intention to buy.

Construct	F Value	$\eta^2$	Observed power
Perceived Involvement	17.583	.110	98.6%
Perceived Engagement	30.63	.177	100%
Perceived Interactivity	80.03	.360	100%
Intention To Buy	26.372	.157	99.9%
Perceived Benefit	22.233	.135	99.7%

Independent variable: Social Presence, all significant at the  $p<.001$

**TABLE 7-3 THE EFFECT SIZE OF SOCIAL PRESENCE ON INDEPENDENT VARIABLES**

## Summary of findings:

- *A statistically significant effect of social presence on intention to buy ( $\eta^2=.157$ ) with the observed power of 99.9%.* This indicates 15% of the variance in the level of users' intention to buy is accounted for by level of experienced social presence in an online shop.
- Users who experienced higher level of social presence and usability they experienced significantly higher involvement with the shopping channel.
- Social presence has the main effect on perceived interactivity.
- The effect of social presence on experienced interactivity was larger for male participants ( $\eta^2=.373$ ) as opposed to females ( $\eta^2=.199$ ).

The findings suggest that increased level of social presence within an online shop, will have statistically significant effect on users' experienced involvement, engagement and interactivity (users' shopping experience) as well as users' intent to revisit and purchase from the shop.

**Usability.** Table 7-4 presents the effect size of usability on independent variables tested in this experimental study. Usability has the largest effect size on perceived benefit, followed by perceived engagement and intention to buy.

Construct	F Value	$\eta^2$	Observed power
Perceived Involvement	19.889	.123	99.3%
Perceived Engagement	67.77	.323	100%
Perceived Interactivity	51.973	.268	100%
Intention To Buy	56.485	.285	100%
Perceived Benefit	134.947	.487	99.7%

Independent variable: Usability, all significant at the  $p<.001$

TABLE 7-4 THE EFFECT SIZE OF USABILITY ON INDEPENDENT VARIABLES

## Summary of findings:

- *Usability has the main effect on males' intention to buy* with the large effect size ( $\eta^2=.327$ ).
- The effect of usability on experienced interactivity was larger for female participants ( $\eta^2=.175$ ) as opposed to males ( $\eta^2=.097$ ).
- Between the two independent variables, usability has the main effect on perceived benefit with large effect size ( $\eta^2=.328$ ) for females and ( $\eta^2=.564$ ) for males.

The findings suggest that usability is the main factor affecting users' shopping experiences and shopping behaviour with statistically significant effects. The effect size of usability on users' intention to buy was found greater than social presence. Also the effect size of usability on men was found higher than women.

**User Control.** Table 7-5 presents the effect size of user control on independent variables tested in this experimental study. User control has relatively smaller effects on independent variables, especially users' intention to buy and perceived benefit (due to very small effects, they were excluded from the table below (Table 7-5)). However, the effect size of user control on perceived interactivity and engagement is reasonably high.

Construct	F Value	$\eta^2$	Observed power
Perceived Involvement	11.837	.077	92.7%
Perceived Engagement	21.53	.132	99.6%
Perceived Interactivity	134.219	.486	100%

Independent variable: User Control, all significant at the  $p < .001$

**TABLE 7-5 THE EFFECT SIZE OF USER CONTROL ON INDEPENDENT VARIABLES**

User control has the smallest effect size on dependent variables as compared to social presence and usability. However, user control is an essential component of interactivity of an online shop. The lack of user control leads to decreased usability and interactivity experienced with the shopping channel.

## 7.2 Summary of observation results

Observation was conducted to test whether increased level of social presence has positive impact on how online users search for product information and whether it increases the size and quality of considerations. In order to test this, number of visited items, shared items, considered items and FHGS (frequency of users asking for help, guidance and suggestions) items were recorded as part of observation (see the detail in chapter 6).

**Social presence.** Table 7-6 presents the effect size of social presence on observed items tested in this experimental study. Social presence has the largest effect size on shared items, followed by FHGS items.

Construct	F Value	$\eta^2$	Observed power
Shared Items	53.447	.715	100%
Visited Items	13.954	.395	100%
Considered Items	13.805	.393	100%
FHGS Items	23.621	.525	100%

Independent variable: Social Presence, all significant at the  $p < .001$

TABLE 7-6 THE EFFECT SIZE OF SOCIAL PRESENCE ON OBSERVATION ITEMS

Summary of findings:

- The increased level of social presence and the social interaction between consumers *reduce consumers' search effort for product information and have positive impact on the initial browsing of available products.*
- The increased level of social presence and the social interaction between consumers *increase the size and quality of shared items, considered items and visited items.*
- The frequency of users asking for help, guidance or suggestions will increase when level of social presence is high and a mediated environment facilitate a high quality social interaction between users.
- Online users are able to complete a shopping task more effectively when a mediated environment supports high level of social presence and usability.

It was also found that in the low presence conditions of 2 and 3, the lack of communication led to the excess of search which in most cases were 'random browsing' instead of 'goal oriented search behaviour' (users search towards a shared goal, i.e. users split the task between themselves and search for specific information). It was observed that users who experienced low presence conditions visited similar pages and looked for the same information. However, in comparison, users who experienced high presence conditions, split the experimental task, which then led to more visited and shared items, and also effective task performance as well as completion of the experimental task within 30 minutes or less.

In addition, it was found that the effect of social presence and usability on users' search behaviour was small. How users search online is mainly associated with their level of expertise and their previous shopping experiences. However, it was observed that increased level of social presence could affect users' search strategy. This is because when users shop together they receive guidance or suggestions from their co-shopper, which directly affect how they conduct search online.

### 7.3 Contributions to knowledge

#### 1. Classification and development of subjective measurements for four dimensions of social presence identified in online shopping experiences

Social presence as a psychological and subjective presence and not physical presence was investigated in this thesis. The key components that make up social presence in an online shop were explored and identified. These four components of social presence were of interest in this study and reviewed in detail in chapter 2. They include co-presence, mutual awareness, mutual understanding, intimacy and immediacy (as one item). They were selected because they are relevant to the context of online shopping. Presence measurements were then developed based on the four identified components.

Previous studies developed subjective measurements to assess level of experienced social presence in mediated environments. The literature survey was reviewed and set of measurements was selected from previous studies of online shopping. Some of the subjective measurements: (CP3, CP5-CP11) were utilised from previous studies of online shopping (Nowak & Biocca, 2003; Slater, Sadagic, Usoh, & Schroeder, 2000; Casanueva J. S. Blake E. H., 2001; Nowak, K., 2001; Weiner & Mehrabian, 1968; Mehrabian, 1967; Mehrabian 1971; Andersen, Andersen, & Jensen, 1979; Heeter 1992; Biocca, Harms, & Burgoon, 2003; Vilhjálmsón, 2003), however the majority of the subjective measurements: (CP1, CP2, CP4, CP12-CP14, IM1-IM4, SSP1-SSP5, MU1-MU5) defined in this thesis are **newly** developed measurements generated by consideration of a new theoretical framework that allowed the transposition of the subjective measurements into new survey questionnaires.

The validity and reliability of social presence scales were tested. The conbach'Alpha of 0.920 was achieved for social presence scales used in this study. Also, the correlation between sub-scales of presence was tested using regression linear analysis. The high correlation was achieved between SP (social presence) and 5 subscales of co-presence (CP), mutual understanding (MU), mutual awareness (MA), intimacy and immediacy (IM).

## 2. A new experimental research model for investigating social and co-presence in online shopping

Review of literature guided this research to identify the six key components of online shopping. These six components are social presence, usability, user control, experienced engagement, involvement and interactivity. Social presence is the core concept that this study is constructed upon on and it received favourably great attention. The research model (See figure 7-1) and hypotheses were developed to investigate the relationship between the six components.

To evaluate and understand the alteration in online customers' behaviour, when they experience different mediated environments, customers' behaviour was split into four categories of search, purchase decision, intention to buy and perceived benefit. They are the main constructs of customers' buying cycle. To test the hypotheses a fractional factorial experiment of three interventions (social presence, usability and user control) was designed. Also the experimental environment, which simulates the four treatment conditions, was designed and implemented.

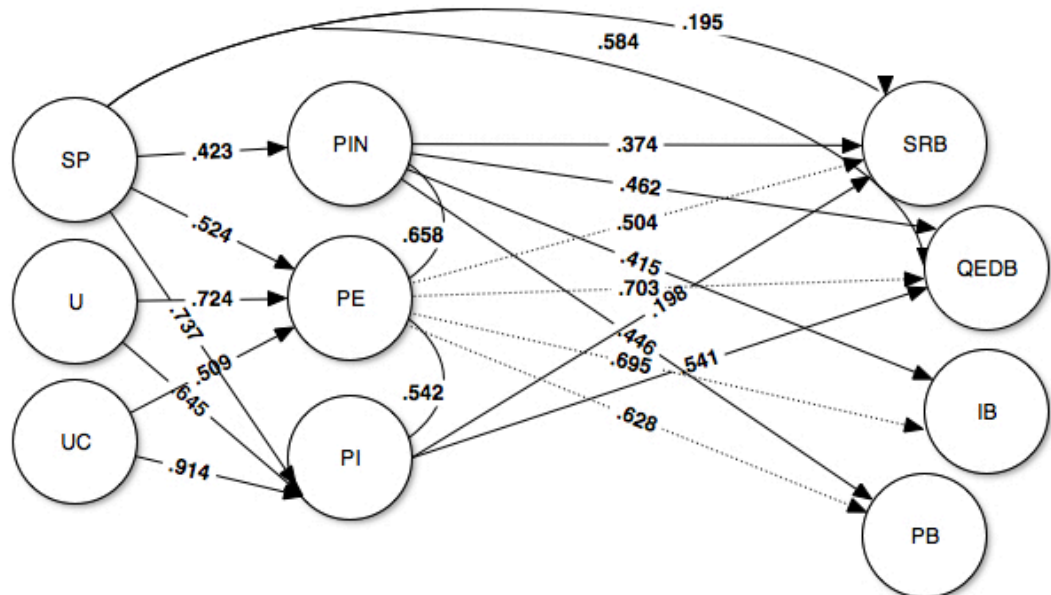


FIGURE 7-1 RESEARCH MODEL (R VALUE)



### **3. Increasing the level of social and co-presence improves the online shopping experiences**

It was found that increased level of social and co-presence in an online shop improves overall shopping experiences. More specifically it improves 1) customers' experienced engagement, involvement and interactivity with a shopping channel 2) customers' search effort and effectiveness of purchase decision 3) customers' tendency to revisit a shop and make a purchase. The results support the following hypotheses associated with the social presence:

#### **1. *'Increased level of social presence results in higher level of experienced involvement, engagement and interactivity with the shopping channel'.***

- When high level of social and co-presence is promptly built within an online shop, this can lead to highly engaged customers who experience higher interactivity and involvement with the shopping channel.
- Social presence has statistically significant effect on perceived interactivity, engagement and involvement. However, it has a larger effect on perceived interactivity. This effect size is considered large based on (Cohen, 1992) guidelines.

#### **2. *Increased level of social presence reduces consumers' search effort for product information, and also increases the effectiveness and quality of purchase decision.***

- The increased level of social presence supported with rich social interactions between online customers lead to increased number of visited and shared items.
- The frequency of users asking for help, guidance or suggestions increases when level of social presence is high and a mediated environment facilitate the rich interaction between online users.
- Increased level of social presence and rich social interaction enable online users to make purchase decision more effectively.

#### **3. *Increased level of social presence results in higher customers' intent to revisit an online shop and purchase from it.***

- The independent between groups ANOVA yielded a statistically significant effect of social presence on intention to buy ( $F(1,142) = 26.372, p = .000 < 0.05, \eta^2 = .157$ ) with the observed power of 99.9%.

- This indicates 15% of the variance in the level of users' intention to buy is accounted for by level of experienced social presence, also nearly 13% of the variance in level of perceived benefit is accounted for by level of experienced social presence.

With newly designed and developed measurements (including social presence, customers' behaviour and experiences), research model as well as experimental environments, this study can be replicated for diverse e-retailers, product categories and samples.

#### **7.4 Limitations and future research**

The main limitations experienced throughout this research include the limited number of runs for a design of a factorial experiment, as well as the number and diversity of participants taking part in the experiment. The number of runs had a direct impact on the effect size of the independent variables. The number of experimental runs had to remain low (maximum of 4 runs) since it is a critical indicator of the required number of participants to achieve a statistically significant power of  $\leq 90\%$  and effect size of above 0.5. For this reason it was crucial to keep the noises (random factors affecting the effect size) down. Control variables were identified very carefully from the pilot test as well as previous studies, and they were kept equal in all treatment conditions. Also the design of the experimental environment was done with great attention to detail. Detail of control variables and the design of each experimental run are explained in chapter 4.

A shared goal was identified from the pilot test as an independent variable which might have great influence on customers' online shopping experience. Shared goal was initially designed as part of the experiment, however, it had to be removed, as the design of the experiment exceeds the number of runs to 16 ( $2^4$ ; 2 levels of 4 independent variables). It was determined to have 35 users for each run to achieve the statistical power of  $\leq 90\%$ . This means that for an experiment with 16 runs, 560 ( $35 \times 16 = 560$ ) participants were required. The shared goal as a control variable is explained in detail in chapter 4.

Also, the diversity of participants' demographics was limited to the students and staff of the university of Sussex. The majority of the participants were students within the age

group of 18 to 35 with no or low income level. For example, it was found that experienced social presence for the age group of '18-23' was numerically higher compared to other age groups, or 'price' was the key concern for the majority of participants at the planning and purchase decision stages. Although customers' demographics had no significant impact on the results of this study, a wider age group with diverse online shopping skills and affiliation needs might result in higher or lower experienced social presence and consequently influences users' intention to buy. This study can be repeated for a younger age group who have stronger connections with social networks and are expert users of online shopping and familiar with online social elements.

The results of the analysis indicate that males and females experience social presence slightly differently. The overall level of experienced social presence by females was numerically higher than males. Also, the effect size was different for the two gender groups, for example, the effect size of social presence on perceived interactivity was higher for males as compared to females. This means that females and males have different perceptions of the variables investigated in this study. This study can be repeated while the number of females and males are kept equal in each run.

In addition, the number of group members had a direct impact on overall experienced social presence, engagement and involvement. This was found during the pilot test, when participants took part in a group of two and three. When the number of group members is high, the experienced engagement and involvement is high as well. The size of a group had to remain stable in all experimental conditions. Since group members had to be friends or relatives, it was decided to keep the group size to a maximum of two. However, the experiment can be repeated with a larger group size, and it is expected to achieve a higher level of engagement if the number of group members increases.

Moreover, the experimental study can be repeated for diverse product categories and task scenarios. A wide range of online retail sells products online, and an increased level of social presence in their online stores doesn't necessarily increase customers' engagement and intention to buy. Increased level of social presence is beneficial for products that are either complex or fun. Customers respect a second opinion for

complex products and they enjoy sharing fun products with friends and relatives. Also, depending on customers' level of product involvement and expertise, the experienced engagement and involvement with the shopping channel will be different.

The experiment had a time limit of 30 minutes. Increased or decreased time limit might affect the results of the experiment, especially task performance. The majority of groups of two users who experienced condition 4 (SP +, U&UC +) managed to complete the experimental task within half an hour. However, if users are given more time, e.g. two hours, they might be able to complete the task under all conditions. Additionally, the more time users spend on the task, the higher engagement and involvement can be achieved.

## **7.5 Final conclusion**

Customers' experience evolves every day, and it is becoming the key focus of digital marketing and e-commerce. It is more important than ever before to better understand how online customers' behaviour develops, if online shopping experience transforms from solo experience to group experience. This happens when online shops initiate the enhancement of social elements and invention of social interactions.

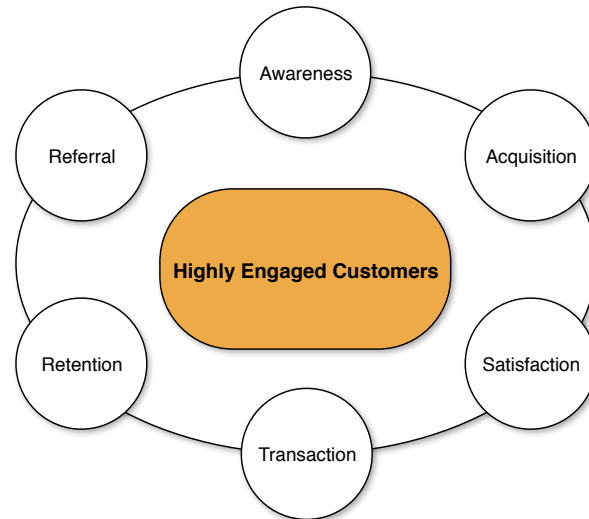
At this time it is essential for e-vendors to have a framework to initiate building a sense of presence in their online stores. It was discussed in this research that, depending on product types, complexity of products and products' fun elements, different levels of social presence is required. For example, the required level of social presence for products like travel shouldn't necessarily be as equal as complex products such as a house or a car.

Studying social cues is fundamental in building the sense of presence in a mediated environment. Online users experience different level of social presence in mediated settings, since the communication between individuals is mediated by the media interface, and the richness of such media has a strong impact on the level of social presence and communicative realism. The level of social presence which participants could experience is closely related to social cues that the communication medium can convey.

Recent development of communication and coordination technologies offers advanced levels of experienced social presence, usability and highly engaged customers. Also, the development of mobile apps and high-speed Internet connections make it more important for online shops to take advantage of available technologies to build a shared synchronous experience for online customers. How to integrate the available interface technologies within an online shop to fulfil a sense of social presence through interactions is discussed and presented in chapter 2 and chapter 4 in this thesis.

In this research it was found that increased social and co-presence in an online shop improves the shopping experience and behaviour of online customers. Increased level of social presence leads to highly engaged customers who experience higher interactivity and involvement with the shopping channel. Also, increased social presence reduces consumers' search effort for product information and it increases the effectiveness and quality of purchase decision. In addition, increased social presence results in higher tendency of customers to revisit an online shop and purchase from it.

These findings can be applied to e-commerce, digital marketing disciplines and social media studies. This research presents the key role that social presence plays in influencing experienced engagement with the shopping channel and consequently in retaining online customers. It is vital for an online retail to maintain its customers to survive. It was found that user engagement is the greatest predictor of customers' intent to revisit and purchase from an online shop. Without this engagement customers are less likely to return to the shop.



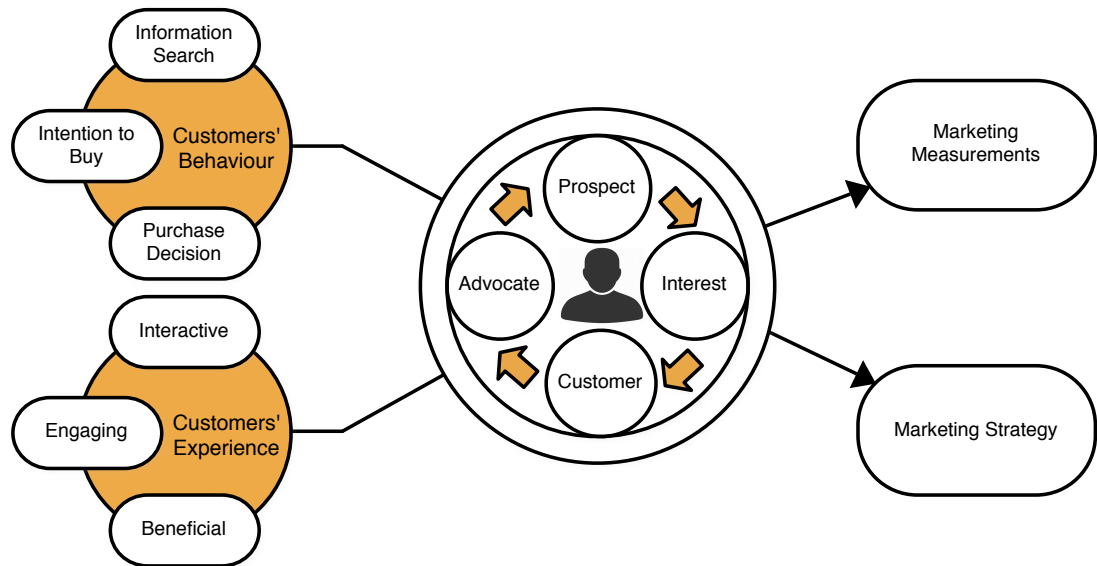
**FIGURE 7-2 SOCIAL PRESENCE WAS FOUND TO BE ONE OF THE KEY PREDICTORS OF USER ENGAGEMENT**

Engaged customers are the most profitable customers. It is through an engaging experience that e-vendors can ensure they have the ability to encourage consumers to revisit and use the services they offer online. Building an engaging experience is as important as building e-trust. One way to build this engagement is through integration of social elements and a natural social interaction similar to what customers experience offline. Social presence was found to be one of the key predictors of user engagement. This emphasises the importance of building a sense of social presence within an online shop.

It is vital for e-vendors to enhance customers' experience with the website. This research demonstrates that improving a sense of presence will enhance consumers' satisfaction and intention to buy. It reduces customers search efforts and excels the quality of purchase decisions. Making a better purchase decision, along with effective, simple and engaging shopping experience lead to highly satisfied customers that are willing to spend more time exploring an online shop and make repeat purchases. This will open a new revenue opportunity for businesses to drive more sales.

In addition, understanding online users' behaviour is vital to marketing disciplines. The findings of this research illustrate that users' behaviour change towards an online shop when their experience with the shop is shared with friends and family members. Marketing activities can benefit from sharing the shopping experience, since it can initiate a unique method of brand recognition and brand recommendations. Moreover,

marketing strategies and measurements are built upon on customers' behaviour and experiences. The latest trend in marketing, places customers in the centre of all activities. Therefore, the transformation of online customers' shopping experiences from solo to group experiences can lead to evolution and transformation of marketing strategies as well as measurements.



**FIGURE 7-3 MARKETING STRATEGIES AND MEASUREMENTS**

Furthermore, sharing the shopping experience can shape the modern behaviour of online customers. The latest evolution of social commerce offers purchase mechanism on social networks such as Facebook, Pinterest and Twitter. Social networks offer a new way of shopping and product discovery. Networking on social media sites, to an extent, contributed to building a sense of presence and evolving the way people shop online. The findings of this research verify the continuous influence of social interaction on behaviours of online customers. It is expected that with the integration of collaborative digital platforms within online shops customers become smarter and more efficient in discovering new products and making a purchase decision.

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## **10 Appendix A**

### **10.1 Participant invitation sheet**

#### **Volunteers needed to participate in a social shopping experiment**

Dear Colleagues,

I am conducting an experimental study as part of my PhD research at the University of Sussex on search and purchase decision behaviour in online shopping.

I would be very grateful if you could participate in my study, but it is essential that you participate with one social contact, e.g. a friend or a relative, and you have previous experience of online shopping.

Participation should not take more than 70 minutes and it involves an online shopping session (the experiment) and completing a 149-item questionnaire. On completion of the experiment each participant will be paid **£7** for his or her time. There is also a prize draw with a chance to win an iPad Air (32 GB, WiFi worth £479).

Your participation is voluntary, it is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw at any time and without giving a reason.

In developing the experiment and the questionnaire, we found that many participants find consideration of the issues involved interesting and engaging. We encourage you to forward this request to other people you think might be interested.

This research has been approved by the Sciences and Technology Cross-Schools Research Ethics Committee (C-REC). All data collected will be anonymised and kept strictly confidential.

All experiments will take place in the Computer Graphics Centre in the Informatics Department, which is located on the Chichester1, Room 128, University of Sussex.

If you are interested in taking part, please contact me at [zk30@sussex.ac.uk](mailto:zk30@sussex.ac.uk)

Many thanks for all assistance you can provide.

## 10.2 Participant information sheet

You are invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

I am a PhD student in the Informatics Department, University of Sussex.

I am conducting an experiment to study users' search and purchase decision behaviour when their online shopping experience is shared with friends and relatives.

You are invited to participate in this study because you had previous experience of online shopping. You were asked to bring one friend or relative, because the social shopping experiment should be conducted in groups of two.

Your participation is voluntary, it is up to you to decide whether to take part or not. If you do decide to take part you should keep this information sheet for your records and you will be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason.

Participation should take 70 minutes or less, and it involves an online shopping session (the experiment) and completing a 149-item questionnaire. On completion of the experiment you will be paid £7 for your time. There is also a prize draw with a chance to win an iPad Air (32 GB, WiFi worth £479).

All data collected in this experiment will be kept strictly confidential. All information will be anonymised and will be used only in a summary form, therefore any individual or private information will not be presented and will not be shared with a third party. The results of the research will be analyzed and used as part of my research thesis.

This research has been approved by the Sciences and Technology Cross-Schools Research Ethics Committee (C-REC).

Contact point for further information:

Researcher: [zk30@sussex.ac.uk](mailto:zk30@sussex.ac.uk)

If you have any concerns about the way in which the study has been conducted, you could contact my supervisor and the ethics committee (C-REC) who reviewed the project:

Dr Martin White, [m.white@sussex.ac.uk](mailto:m.white@sussex.ac.uk)

Ethics Committee (C-REC), [crecscitec@sussex.ac.uk](mailto:crecscitec@sussex.ac.uk)

Thank you for taking time to read the information sheet

Date:

### 10.3 Participant's social contact information sheet

You are invited to take part in a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

I am a PhD student in the Informatics Department, University of Sussex.

I am conducting an experiment to study users' search and purchase decision behaviour when their online shopping experience is shared with friends and relatives.

You are invited to participate in this study because you had previous experience of online shopping. The social shopping experiment should be conducted in groups of two.

Your participation is voluntary, it is up to you to decide whether to take part or not. If you do decide to take part you should keep this information sheet for your records and you will be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason.

Participation should take 70 minutes or less, and it involves an online shopping session (the experiment) and completing a 149-item questionnaire. On completion of the experiment you will be paid £7 for your time. There is also a prize draw with a chance to win an iPad Air (32 GB, WiFi worth £479).

All data collected in this experiment will be kept strictly confidential. All information will be anonymised and will be used only in a summary form, therefore any individual or private information will not be presented and will not be shared with a third party. The results of the research will be analyzed and used as part of my research thesis.

This research has been approved by the Sciences and Technology Cross-Schools Research Ethics Committee (C-REC).

Contact point for further information:

Researcher: *zk30@sussex.ac.uk*

If you have any concerns about the way in which the study has been conducted, you could contact my supervisor and the ethics committee (C-REC) who reviewed the project:

Dr Martin White, *m.white@sussex.ac.uk*

Ethics Committee (C-REC), *crecscitec@sussex.ac.uk*

Thank you for taking time to read the information sheet

Date:

#### 10.4 Consent form for project participants

PROJECT TITLE: Social and Collaborative Shopping

Project Approval  
Reference: MWZK1013

I agree to take part in the above University of Sussex research project. I have had the project explained to me and I have read and understood the Information Sheet, which I may keep for records. I understand that agreeing to take part means that I am willing to:

Allow the social/collaborative shopping experiment to be screen captured.  
Respond to a 149-item questionnaire.

I understand that any information I provide is confidential, and no information that I disclose will lead to the identification of any individual in the reports on the project, either by the researcher or by any other party. I consent to the screen captures being shown to other researchers and interested professional parties.

I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.

I consent to the processing of my personal information for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the Data Protection Act 1998.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

This section is for the interviewer:

I believe that \_\_\_\_\_ (name) understands the above project and gives his/her consent voluntarily.

Name: \_\_\_\_\_

Signature \_\_\_\_\_

Address: \_\_\_\_\_

Date: \_\_\_\_\_

### 10.5 Social and collaborative shopping questionnaire

This section is for the interviewer:

Questionnaire Number	
Experiment Number	
Group Number	
Participants Number	
Date and Time	
Start Time	
End Time	
Duration of the Task	Hour/minutes
Time of Pre Test Questionnaire	minutes
Time of Post Test Questionnaire	minutes

Summary of Observation: [IM and IN Behaviour] – [Search, Evaluation and Decision Behaviour]

Please carefully read the following questions and tick your answer.

Demographic	
Gender	<input type="checkbox"/> Male <input type="checkbox"/> Female
Age	<input type="checkbox"/> -17 <input type="checkbox"/> 18-23 <input type="checkbox"/> 24-29 <input type="checkbox"/> 30-35 <input type="checkbox"/> 36-41 <input type="checkbox"/> 42-47 <input type="checkbox"/> 48-53 <input type="checkbox"/> 54+
Income level	<input type="checkbox"/> No Income <input type="checkbox"/> - £8k <input type="checkbox"/> £8-15k <input type="checkbox"/> £16-23k <input type="checkbox"/> £24-31k <input type="checkbox"/> £32-39k <input type="checkbox"/> £40k+
Education level	<input type="checkbox"/> High School <input type="checkbox"/> Diploma <input type="checkbox"/> Bachelor <input type="checkbox"/> Master <input type="checkbox"/> MPhil <input type="checkbox"/> DPhil

Internet Usage and Shopping Tendency
How often do you use Internet? <input type="checkbox"/> Everyday <input type="checkbox"/> 3-5 times per week <input type="checkbox"/> Once a week <input type="checkbox"/> 3-5 times per month <input type="checkbox"/> Less than Once a month <input type="checkbox"/> Never
How do you describe your level of comfort with using Internet? <input type="checkbox"/> Not Comfortable at all <input type="checkbox"/> Slightly Comfortable <input type="checkbox"/> Somewhat Comfortable <input type="checkbox"/> Very Comfortable <input type="checkbox"/> Extremely Comfortable
How often do you purchase from online shops? <input type="checkbox"/> Everyday <input type="checkbox"/> 3-5 times per week <input type="checkbox"/> Once a week <input type="checkbox"/> 3-5 times per month <input type="checkbox"/> Less than Once a month <input type="checkbox"/> Never
How do you describe your level of comfort with purchasing from online shops? <input type="checkbox"/> Not Comfortable at all <input type="checkbox"/> Slightly Comfortable <input type="checkbox"/> Somewhat Comfortable <input type="checkbox"/> Very Comfortable <input type="checkbox"/> Extremely Comfortable
Can you specify when you buy from <u>online</u> shops, do you prefer to do it... <input type="checkbox"/> Alone <input type="checkbox"/> With friends or relatives
Can you specify when you buy from <u>offline</u> shops, do you prefer to do it... <input type="checkbox"/> Alone <input type="checkbox"/> With friends or relatives
Do you seek friends or relative' opinions on products, before making a purchase decision? <input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, depends on a product <input type="checkbox"/> Yes, for majority of Products <input type="checkbox"/> No, never
Do your friends or relatives have influence on your purchase decision? <input type="checkbox"/> Yes, always <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No, never
Do you agree or disagree...



I go shopping with my friends or family members to socialize.	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
Shopping with others is a bonding experience.	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
I enjoy socializing with others when I shop.	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>

**PT 1**

1. Have you ever, in any of your online shopping experiences, felt that you like or need to share your shopping experience with your friend(s) or your family member(s)? YES ☐ NO ☐

If your answer to the above question is **No**, please go to the section PT2, question1 on this page.

2. If **Yes**, was it because:

You required a second opinion to reduce your uncertainty. YES ☐ NO ☐

You felt it would be more fun if your friend(s) or your family member(s) could join you to browse or search and purchase product(s) from an online shop. YES ☐ NO ☐

Others, please specify:

3. Can you explain how you shared your online shopping experience with your remotely located friend(s) or family member(s)? Can you specify the communication or collaboration tools (e.g. Skype, email) you used and product (s) you purchased?

4. Have you been satisfied with the tools (e.g. Skype, email) you have used to share your online shopping experience with your remotely located friend(s) or family member(s)? Can you explain any difficulties you might have experienced?

**PT 2**

1. Before starting the given shopping task (booking a group holiday) with your friend/relative, can you think of your possible plan to book a group holiday for a few minutes and answer following questions:

Can you estimate the time you may need to spend to make the final decision on booking a group holiday?

Can you estimate minimum and maximum budget you may be willing to spend on booking a group holiday?

Can you estimate number of websites you think you may visit and number of options you may need to consider before making your final decision?

Can you think of where and when you love to go and how long you like to stay?

Please answer the questionnaire to the best of your ability, it is very important to answer the questionnaire very carefully. Questionnaires that are filled in 'randomly' can be picked up by the interviewer. Such questionnaires will bias the experiment and have to be removed from the analysis leading to us having to recruit more candidates than is necessary. Such questionnaires will be withdrawn from the iPad Air prize draw.

Please carefully read the following questions and rate your answer from 1 to 5 in the Rate box provided.

1. Not at all    2. Very Little    3. More or Less    4. Very Much    5. Greatly

SP1			Rate
During the experiment...			
23	CP1	To what extent did you have a sense of awareness of presence of your friend/relative in the online shop?	
24	CP2	To what extent did you have a sense of 'being together' in the online shop?	
25	CP3	Please rate how closely your sense of 'being together in the online shop' resembles your sense of 'being with your friend/relative' in a real world-shopping environment?	
26	CP4	To what extent did you have a sense that you were perceived as 'being present' by your friend/relative?	
27	CP5	To what extent did you have a sense of 'being there' in the online shop, you just experienced?	
28	CP6	To what extent did you have a sense that you were in the same place as your friend/relative?	
29	CP7	To what extent did you have a sense that your friend/relative were in the same place as you?	
30	CP8	To what extent did you have a sense of the emergence of a group?	
31	CP9	To what extent did you have a sense of being "part of the group"?	
32	CP10	To what extent was this like a face-to-face conversation with a real person?	
33	CP11	To what extent can you imagine yourself being with your friend/relative in the similar environment?	
34	CP12	To what extent did you feel you were able to assess your friend/relative's reaction to what you said?	
35	CP13	How tangible did you feel your closeness was to your friend/relative?	
36	CP14	To what extent were you able to communicate your needs to your friend/relative?	
37	IM1	To what extent did you have a sense of interpersonal closeness with your friend/relative?	
38	IM2	To what extent did you have a sense of distance between you and your friend/relative?	
39	IM3	To what extent did you feel that interaction with your friend/relative was immediate?	
40	IM4	To what extent did you feel that interaction with your friend/relative was friendly and warm?	

Please carefully read the following questions and rate your answer from 1 to 5 in the Rate box provided.

1. Not at all    2. Very Little    3. More or Less    4. Very Much    5. Greatly

SP1			Rate
		During the experiment...	
41	MU1	How well did you feel you were able to understand what your friend/relative were saying?	
42	MU2	How well did you feel you were able to express yourself with your friend/relative?	
43	MU3	How well did you feel your friend/relative understood what you meant to communicate?	
44	MU4	How well did you feel you were able to understand your friend/relative's feelings or emotions toward the online shop?	
45	MU5	How well did you feel you and your friend/relative share similar feelings or emotions toward the online shop?	
46	SSP1	To what extent did you feel you were able to identify your friend/relative?	
47	SSP2	To what extent did you feel you were able to share information with your friend/relative?	
48	SSP3	To what extent did you feel you were able to express agreements/beliefs with your friend/relative?	
49	SSP4	To what extent did you feel the feedbacks/responses you received from your friend/relative was immediate?	
50	SSP5	To what extent did you feel you could get to know someone that you met through this system?	

Please carefully read the following questions and tick your answer.

SP2		
In your online shopping experience with a friend/relative, do you agree or disagree that...		
51	1. There is always a sense of human contact	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
52	2. There is always a sense of sociability	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
53	3. There is always a sense of human warmth	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
54	4. There is a sense of personalness	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
55	5. There is a sense of human sensitivity	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
56	6. There is always a sense of friendliness	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
57	7. There is always a feeling of belongingness	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>
58	8. There is always a possibility of social networking	Agree <input type="checkbox"/> Disagree <input type="checkbox"/>

QRC		
In your online shopping experience with a friend/relative, do you agree or disagree that...		
59	1. The overall quality of the communication was good.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
60	2. The communication was effective.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
61	3. I found it enjoyable to talk to my friend/relative through this system.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
62	4. The outcome of the communication was satisfactory.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
In terms of your communication with your friend/relative, it can be said that....		
63	5. Responses lacked details.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
64	6. Messages were vivid (rich).	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
65	7. Forms of expression had variety.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
66	8. The amount of information was lean.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree

SUS		
In your online shopping experience with a friend/relative, do you agree or disagree that...		
	1. I think I would like to use this system frequently.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
67	2. I found this system unnecessarily complex.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
68	3. I think I would need the support of a technical person to be able to use this system.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
69	4. I found the various functions in this system were well integrated.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
70	5. I thought there was too much inconsistency in this system.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
71	6. I would imagine that most people would learn to use this system quickly.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
72	7. I found the system very awkward to use.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
73	8. I felt very confident using this system.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
74	9. I need to learn a lot about this system before I could effectively use it.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
75	10. I am satisfied with this system.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree

		Agree
76	11. I would prefer to use something other than this system.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
77	12. Given a choice, I would choose this system over others.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
78	13. Using this system was a frustrating experience.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree

Please carefully read the following questions and rate your answer from 1 to 5 in the Rate box provided.

*1. Not at all    2. Very Little    3. More or Less    4. Very Much    5. Greatly*

PSSUQ			Rate
	During the experiment...		
79	PSSUQ1	To what extent did you feel satisfied with how easy it was to use this system?	
80	PSSUQ2	To what extent did you feel it was simple to use this system?	
81	PSSUQ3	To what extent did you feel you could effectively complete the shopping task using this system?	
82	PSSUQ4	To what extent did you feel you were able to complete the shopping task quickly using this system?	
83	PSSUQ5	To what extent did you feel you were able to efficiently complete the shopping tasks using this system?	
84	PSSUQ6	To what extent did you feel comfortable using this system?	
85	PSSUQ7	To what extent did you feel It was easy to learn to use this system?	
86	PSSUQ8	To what extent did you believe you could become productive quickly using this system?	
87	PSSUQ9	To what extent did you feel whenever you made a mistake using the system, you could recover easily and quickly?	
88	PSSUQ10	To what extent did you feel the system interface was pleasant?	
89	PSSUQ11	To what extent did you like using the system interface?	
90	PSSUQ12	To what extent did you feel this system has all the functions and capabilities you expect it to have?	
91	PSSUQ13	To what extent did you feel you were satisfied with this system?	

Please carefully read the following questions and rate your answer from 1 to 5 in the Rate box provided.

*1. Not at all    2. Very Little    3. More or Less    4. Very Much    5. Greatly*

PIN			Rate
During the experiment...			
92	PIN1	To what extent did you feel you forgot about your immediate surroundings while you were doing the shopping task?	
93	PIN2	To what extent did you feel that you were so involved in the shopping task that you ignored everything around you?	
94	PIN3	To what extent did you feel that you lost yourself in the shopping experience?	
95	PIN4	To what extent did you feel that you blocked things out around you when you were doing the shopping task?	
96	PIN5	To what extent did you feel that you were absorbed in your shopping experience?	
97	PIN6	To what extent did you feel you were interested in the online shopping experience?	
98	PIN7	To what extent did you feel involved in the shopping experience?	
99	PIN8	To what extent did you feel the shopping experience was fun?	

PE			Rate
During the experiment...			
100	PE1	To what extent did you feel the shopping experience was attractive?	
101	PE2	To what extent did you feel the shopping experience was aesthetically appealing?	
102	PE3	To what extent did you feel interested in the shopping experience?	
103	PE4	To what extent did you feel that you continued shopping out of curiosity?	
104	PE5	To what extent the content of the shopping environment incited your curiosity?	
105	PE6	To what extent was your shopping experience satisfactory?	
106	PE7	To what extent did you feel the shopping experience was worthwhile?	
107	PE8	To what extent did you consider your shopping experience a success?	
108	PE9	To what extent did you feel your shopping experience was rewarding?	
109	PE10	To what extent did you feel that the shopping experience did not work out the way you had planned?	



Please carefully read the following questions and rate your answer from 1 to 5 in the Rate box provided.

1. Not at all    2. Very Little    3. More or Less    4. Very Much    5. Greatly

PI			Rate
During the experiment...			
110	UC1	To what extent did you feel you were able to follow the conversation between you and your friend/relative?	
111	UC2	To what extent did you feel you had control over the conversation?	
112	UC3	To what extent did you feel you could predict your friend/relative's reaction to what you said/or shared?	
113	UC4	To what extent did you feel confident performing the shopping task?	
114	UC5	Please rate how easy you were able to navigate and find information through this system?	
115	UC6	To what extent did you feel you had control over navigating the online shop?	
116	RS1	Please rate how immediate or fast was the response/reactions you received from your friend/relative?	
117	RS2	Please rate how immediate or fast you were able to follow and understand the messages, which were exchanged between you and your friend/relative?	
118	RS3	To what extent did you feel there was continuity between messages you receive from your friend/relative?	
119	IC1	Please rate how closely did you feel the interaction you experienced with your friend/relative through the system resembled your sense of having communication with them in real world-shopping settings?	

Please carefully read the following questions and tick your answer.

PB			
In your online shopping experience with a friend/relative, do you agree or disagree that...			
120	1. I think using this system is convenient.	Strongly Disagree	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
121	2. I can save time by using this system.	Strongly Disagree	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
122	3. Using this system enables me to accomplish a shopping task more quickly.	Strongly Disagree	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
123	4. Using this system enables me to accomplish a shopping task more effectively.	Strongly Disagree	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
124	5. Using this system increases my productivity at online shopping.	Strongly Disagree	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
125	6. Using this system enables me to make purchase decision within the shortest time frame.	Strongly Disagree	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
126	7. Using this system enables me to find product information within the shortest time frame.	Strongly Disagree	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree

IB		
127	1. I would like to buy from online shops recommended by my friends/relatives through this system.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely
128	2. I would use my credit card to buy from online shops recommended by my friend/relative through this system.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely
129	3. I intend to use this system to buy from online shops with my friends/relatives in the near future.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely
130	4. I am likely to use this system very often to buy from online shops with my friends/relatives in future.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely
131	5. I think using this system can encourage me to shop online more often with my friends/relatives.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely
132	6. I intend to recommend this system to my friends/relatives.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely
133	7. I think I am likely to purchase more online by using this system.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely
134	8. I think I am likely to make an unplanned purchase by using this system.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely
135	9. I think I am likely to spend more on online shop by using this system.	Very Unlikely 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Very Likely

SRB		
In your online shopping experience with a friend/relative, do you agree or disagree that...		
136	1. I feel using this system decreases my search effort.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
137	2. I feel using this system increases the size of product consideration.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
138	3. I feel this system enables me to explore more online shops and available products.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
139	4. I feel this system assists me in the initial search for available products.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
140	5. I learnt about new online shops through this system.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
141	6. I feel this system simplifies the comparison among selected products.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree

QEDB		
In your online shopping experience with a friend/relative, do you agree or disagree that...		
142	1. I am satisfied with the quality of the final purchase decision.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
143	2. I am satisfied with the effectiveness of the final purchase decision.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
144	3. I am confident with my final purchase decision.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
145	4. I feel using this system increases the quality of my purchase decision	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
146	5. I feel using this system increases the effectiveness of my purchase decision.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
147	6. I feel my friend/relative can have influence on my purchase decision.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
148	7. I feel the influence of my friend's/relative's recommendation on my purchase decision is positive.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree
149	8. I feel my friend/relative can increase my confidence in making purchase decision.	Strongly Disagree 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> Strongly Agree



## 10.6 The ethic committee approval certificate



University of Sussex

Sciences and Technology  
Cross-Schools Research Ethics Committee  
**CERTIFICATE OF APPROVAL**

<b>Reference Number:</b>	ER/ZK30/1 [MWZK1013]
<b>Title of Project:</b>	A randomised factorial trial measuring the effect of 'Social and Co-Presence', 'Control' and 'Usability' on Online Shopping Experiences
<b>Principal Investigator:</b>	Martin White
<b>Student:</b>	Zainab Khosrowtaj
<b>Collaborators:</b>	-
<b>Duration of Approval:</b>	12 months
<b>Expected Start Date:*</b>	10 Oct 2013
<b>Expiration of Approval:</b>	31 Dec 2014
<p><b>The proposed amendment to this project – to increase the participant reimbursement from £5 to £7 - has been given ethical approval by the Sciences and Technology Cross-Schools Research Ethics Committee (C-REC).</b></p> <p>*NB. If the <u>actual</u> project start date is delayed beyond 12 months of the <u>expected</u> start date, this Certificate of Approval will lapse and the project will need to be reviewed again to take account of changed circumstances such as legislation, sponsor requirements and University procedures.</p> <p><b>Please note and follow the requirements for approved submissions:</b></p> <p>Amendments to protocol. Any changes or amendments to approved protocols must be submitted to the C-REC for authorisation prior to implementation.</p> <p>Feedback regarding the status and conduct of approved projects Any incidents with ethical implications that occur during the implementation of the project must be reported immediately to the Chair of the C-REC.</p> <p>The principal investigator is required to provide a brief annual written statement to the committee, indicating the status and conduct of the approved project. These reports will be reviewed at the annual meeting of the committee. A statement by the Principal Investigator to the C-REC indicating the status and conduct of the approved project will be required on the following date(s):</p> <p>December 2014.</p>	
<b>Authorised Signature</b>	Richard de Visser
<b>Name of Authorised Signatory (C-REC Chair or nominated deputy)</b>	<b>Richard de Visser</b>
<b>Date</b>	11 March 2014

## **11 Appendix B. results of reliability and validity of scales**

Due to the length of appendix B, it is published online, <http://zkh30.github.io/>.

## **12 Appendix C. results of correlation and factorial ANOVA**

Due to the length of appendix C, it is published online, <http://zkh30.github.io/>.

1. Level of social presence in four treatment conditions
2. Level of usability in four treatment conditions
3. Level of user control in four treatment conditions
4. Correlation analysis: independent variables and perceived involvement
5. Correlation analysis: perceived involvement, engagement and interactivity
6. Correlation analysis: perceived involvement and users' shopping behaviour
7. Correlation analysis: independent variables and perceived engagement
8. Correlation analysis: perceived engagement and users' shopping behaviour
9. Correlation analysis: independent variables and perceived interactivity
10. Correlation analysis: perceived interactivity and users' shopping behaviour
11. The results of factorial ANOVA: perceived involvement
12. The results of factorial ANOVA: perceived engagement
13. The results of factorial ANOVA: perceived interactivity
14. Means of intention to buy in four treatment conditions
15. The results of factorial ANOVA: intention to buy
16. The results of factorial ANOVA: perceived benefit

## **13 Appendix D. results of observation**

Due to the length of appendix D, it is published online, <http://zkh30.github.io/>.

1. Univariate analysis of variance: shared items in four treatment conditions
2. Univariate analysis of variance: visited items in four treatment conditions
3. Univariate analysis of variance: considered items in four treatment conditions
4. Univariate analysis of variance: The frequency of users asking for help, guidance or suggestion (FHGS) in four treatment conditions
5. Univariate analysis of variance: initial discussion time in four treatment conditions
6. Univariate analysis of variance: planning time in four treatment conditions