Knowledge Sharing and Professional Online Communities Acceptance: An Integrated Model

being a Thesis submitted for the degree of

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by:

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"وَمَا تَوْفِيقِي إِلَّا بِاللَّهِ عَلَيْهِ تَوَكَّلْتُ وَإِلَيْهِ أُنِيبُ"

(هود: 88)

In the Name of Allah, Most Gracious, Most Merciful

“And my success (in my task) cannot come except from ALLAH. In Him I trust, and unto Him I repent”

(Hud: verse 88)

Abstract

This study aims to advance empirical research in the realm of the use of professional online communities for knowledge sharing. Use of these communities is likely to be influenced not only by social factors but also by cognitive and technological factors. Hence, drawing upon theoretical and empirical foundations and contextually relevant previous research, three theoretical frameworks were developed and applied, in which relational factors (trust), individual factors (knowledge/system self-efficacy), and technological factors (system quality and content quality) were integrated together with the Unified Theory of Acceptance and Use of Technology (UTAUT) to examine the use of professional online communities to acquire/provide knowledge among professionals. To test these theoretical models, an online web-survey was administered to 366 members of eight professional communities in Egypt.

Employing covariance-based structural equation modelling (CB-SEM), the results of this study confirmed that professional online communities have emerged as an essential channel to facilitate knowledge sharing among professionals. Performance expectancy and personal outcome expectancy were found to be the strongest determinants of professional online community use. Relational capital - trust - was found to be a significant predictor of usage behaviour. However, for members who used the community for knowledge provision, trust was found to have a stronger influence than was perceived trust on using the community for knowledge acquisition. For members who used the community for knowledge acquisition, effort expectancy and social influence revealed significant effect, in contrast to members who use the community for knowledge provision. Regarding the hypotheses common to both use behaviours, the findings demonstrated some significant differences. Content quality, for example, seemed to have a clearly stronger influence on trust than system quality in all models. Content quality showed stronger effect on trust for using professional online communities for knowledge provision than using for knowledge acquisition, while system quality was found to be a stronger predictor of trust in the use for knowledge acquisition. For effort expectancy, system quality tended to have a stronger influence than system self-efficacy in all models; however, the influence of system quality on effort expectancy tended to be more important when online communities are used for knowledge acquisition.

As for moderating effects, the influence of performance expectancy on use for knowledge acquisition and the influence of personal outcome expectancy on use for knowledge provision were found to be moderated by users' gender (stronger for men) and age (stronger for younger users), while the influence of performance expectancy on use for knowledge acquisition was found to be influenced by users' experience (stronger for less experienced users).

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Dedication

This work is dedicated to the memory of three people who passed away during my PhD journey.

To my younger brother, **Hamed Abdel-Hakim Montash**, who taught me the meaning of brotherhood, belief and patience. Truthfully, you were the best teacher.

To my uncle and father-in-law, **Saeed Ali Montash**, who taught me the meaning of persistence and determination.

To my teacher, **Professor Naiem Hafiz Abougomaa**; although you are no longer here, your words are still an endless source of motivation and inspiration.

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List of Abbreviations

ADSL	Asymmetric Digital Subscriber Line
AGFI	Adjusted goodness-of-fit index
AMOS	Analysis of Moment Structures
ASV	Average shared variance
AVE	Average variance extracted
BI	Behaviour Intention
CB-SEM	Covariance-based structural equation modelling
CFA	Confirmatory factor analysis
CFI	Comparative fit measure
CMV	Common method variance
CN	Critical N
CQ	Content quality
CR	Composite reliability
CRM	Customer relationship management
D&M IS	DeLone and McLean IS Success Model
df	Degree of freedom
DSS	Decision Support System
e-Commerce	Electronic Commerce
e-Government	Electronic Government
e-Learning	Electronic Learning
e-mail	Electronic mail
EE	Effort Expectancy
EFA	Exploratory factor analysis
EKR	Electronic Knowledge Repositories
EM	Estimation maximization
EOU	Ease of use
GFI	Goodness-of-fit index
GLS	General least square
GOF	Goodness-of-Fit
H	Hypothesis
ICT	Information and Communications Technologies
IDC	International Data Corporation
IS	Information Systems
IT	Information technology
IT	Information Technology
ITU	International telecommunication Union
KMS	Knowledge Management System
KSE	Knowledge self-efficacy
LISREL	Linear Structural Relationship Analysis
MACS	Mean and covariance structure
MCAR	Missing Completely at Random
MI	Modification indices
MICT	Ministry of Communication and Information Technology
MIS	Management Information System
ML	Maximum likelihood
MM	Motivational Model
MSV	Maximum shared variance
MUDs	Multiuser dungeons
MVA	Missing value analysis
N	Sample size
OLS	Ordinary Least Squares
PCFI	Parsimony comparative fit index
PE	Performance Expectancy
PEOU	Perceived ease of use
PLS	Partial least square
PNFI	Parsimony normal fit index
POU	Personal outcome expectancy
PU	Perceived Usefulness
RC	Relational capital
RMSEA	Root mean square error of approximation
SCT	Social Cognitive theory
SEM	Structural Equation Modelling
SI	Social Influence
SIS	State Information System
SMC	Squared multiple correlation
SMS	Short message service
SN	Subjective Norm
SNs	Social networks
SPSS	Statistical Package for Social Sciences
SQ	System Quality
SRMR	Standardised root mean square residual
SSE	System self-efficacy
TAM	Technology Acceptance Model
TLI	Tucker-Lewis index
TML	Technology-mediated learning
TPB	The Theory of Planned Behaviour
TPB	The Theory of Planned Behaviour
TR	Trust
TRA	Theory of Reasoned Action
TTF	Task-technology fit
US	United States
UKA	Use for knowledge acquisition
UKP	Use for knowledge provision
UTAUT	The Unified Theory of Acceptance and Use of Technology
VIF	Variance inflation factor
α	Cronbach's Alpha
β	Standardised coefficient
λ	Factor loading
X^2	Chi-square

Chapter One: Introduction and Research Background

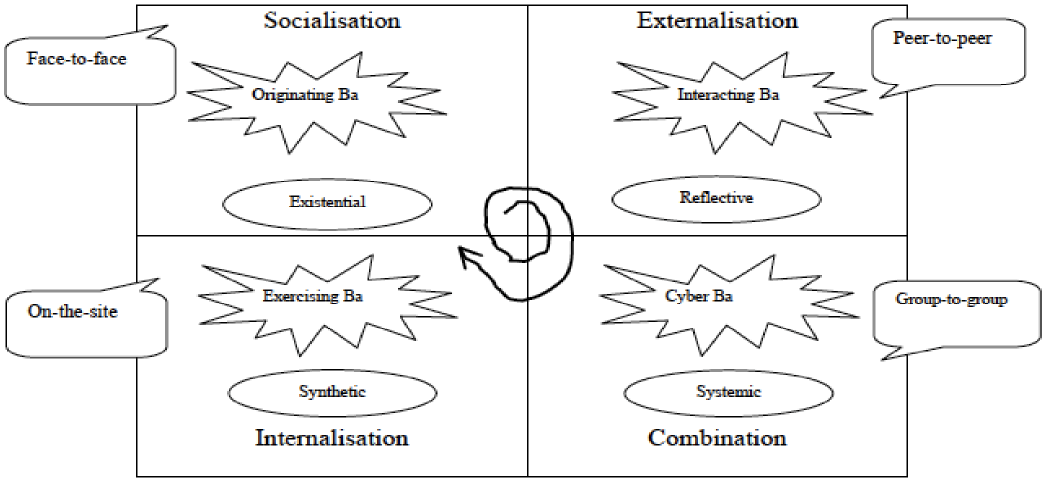
1.1. Introduction

Recently, organisational researchers have accepted knowledge to be one of an organisation's richest resources, and supporters of the resource-based view of organisations believe that knowledge is a strategic key resource that definitely leads to competitive advantage (Hooff and Ridder, 2004). In order to leverage and power their knowledge resources, many organisations now value and position the management of organisational knowledge as a substantial and integral business function (Grover and Davenport, 2001). In addition to its effect on the competitive advantage (Nonaka and Takeuchi, 1995b), knowledge has been found to be a key source of better work performance (e.g. Huang, 2009, Kang et al., 2008), effectiveness (e.g. McNeish and Mann, 2010), and innovation (e.g. Lin, 2007, Vaccaro et al., 2010, Yamin and Otto, 2004).

Knowledge management has been defined by Scarbrough et al. (1999) as *"any process or practice of creating, acquiring, capturing, sharing, and using knowledge, wherever it resides, to enhance learning and performance in organisations"* (p.1). The objective of knowledge management is to pinpoint and leverage the collective knowledge in an organisation to help it compete and survive (Choo et al., 1998). Bollinger and Smith (2001) asserted that the core competencies of an organisation depend on the experience and skills of its employees. Therefore, organisations have to capitalise on and make use of the knowledge of their employees in a systematic manner in order to derive the optimum benefits of these competencies. One of the popular approaches to creating collective organisational knowledge is to motivate individuals to share their skills, experiences, and know-how which reside within them (tacit knowledge) with the rest of the organisation. In other words, the collective organisational knowledge occurs when organisations are able to transform tacit knowledge into explicit knowledge.

Nonaka (1994) and Von Krogh et al. (2000) introduced four possible modes of knowledge conversion between tacit and explicit knowledge. These modes are: tacit to tacit, tacit to explicit, explicit to explicit, and explicit to tacit. They define these modes respectively as Socialisation, "tacit to tacit" (where tacit knowledge is shared through informal interaction), Externalisation, "tacit to explicit" (where "the sequential role of metaphor" plays an important role), Combination, "explicit to explicit" (the process of converting explicit knowledge into more complex and systematic sets of explicit knowledge", and Internalisation, "explicit to tacit" (where people learn from each other by doing, action and practice).

According to Nonaka and Toyama (2003), knowledge can be considered as context-specific and usually needs a physical place to exist. Therefore, the concept of "*Ba*" or "place" was first introduced by Nonaka and Konno (Spring 1998). This concept is identified as the "shared context in which knowledge is shared, created and utilised" (Nonaka et al., 2000: 14). "*Ba"* can be "physical (e.g. office), visual (e.g. email), mental (e.g. shared experience) or any combination of them" (Nonaka and Konno, Spring 1998). They assert also that "*Ba*" serves as a foundation for knowledge creation, which is considered as a "self-transcendental process" or a spiralling process of interaction between explicit and tacit knowledge. This process comprises four spiral steps (see Figure 1.1):



Source: Nonaka and Konno (1998: 46)

Figure 1.1: The Four Characteristics of Ba

As can be seen from Figure 1.1, there are four different types of "*Ba*", which can be described as follows:

- Socialisation, which depends on face to face meetings, "physical proximity" and the time people spend together, involves the sharing of tacit knowledge between those people. This process is supported by what is called "Originating Ba"; the "space" where individuals can share their feelings and experiences.
- Externalisation requires some means whereby tacit knowledge can be explained in an understandable form to others and "Interacting Ba" may support this. This means

a careful selection of team members and groups with the right mixture of specific knowledge and abilities.

- Combination or the conversion of explicit knowledge to more complex sets of explicit knowledge is interested in the systemization of knowledge and communication, which in practice focuses on the collecting, integrating, editing, and dissemination of explicit knowledge. This is the space of "Cyber Ba", where information technologies can play an essential role in interaction and creating a virtual world, especially in collaborative environments which utilise information technologies.
- Finally, internalisation is responsible for converting explicit knowledge to organisational tacit knowledge, and "Exercising Ba" supports this through training with senior mentors/colleagues, teaching, and learning by continuous self-refinement.

Although "*ba*" reflects the common place or space where new knowledge is created, it involves and embraces in its four types the concept of knowledge exchange (Nonaka and Toyama, 2003: 3). Some researchers seem to consider knowledge sharing as an organisational innovation, since it can help in generating new ideas and developing new business opportunities by utilising the "socialisation" and learning process (Darroch and Rod, 2002). Moreover, knowledge sharing is considered crucial because of its role of promoting best practices that can be applied by the organisation as it reduces redundant learning efforts (Lu et al., 2006).

However, most organisations might not have all the required knowledge in their possession within their organisational boundaries, and thus need to connect to an outside source at either the organisational or individual level. Moreover, organisational members might incline to hoard and not willing to provide valuable knowledge due to the fear of losing superiority or power obtained from the ownership of that knowledge (Chiu et al., 2006). In this regard, Riege (2005) states that "*in the old school of thinking where profitability was reflected by an organisation's output, knowledge hoarding rather than sharing was believed to benefit career advancement*" (p.24). Competing for the same resources might be another major obstacle to sharing knowledge between organisational members. Hara and Hew (2007: 255), in their qualitative study, concluded that, besides five other factors, the existence of a "non-competitive environment" is one of the major factors that helped professional nurses to share their unique knowledge in the online community. They argue that to share knowledge people need to talk about their experiences. However, holding regular face-to-face interactions might be costly and time consuming, which may affect the effectiveness of those interactions. They strongly recommend using new technologies such as the Internet that support online communities as a "*viable alternative to live conversation and knowledge sharing*" (p. 236).

Ideas, new information, and experiences, which are required for dealing with a wide range of problems, might not be available within an organisation; instead, these ideas and experiences can be obtained freely by the organisation's members through external network connections (Bouty, 2000). One of the available options to make such connection to external sources of knowledge, especially at the individual level, is by participating and being involved in knowledge communities (Wasko and Faraj, 2005, Ala-Mutka et al., 2009, Zhang, 2013). Snyder and Wenger (2003) in supporting this asserted that today's organisations face numerous challenges that require increasing capabilities for innovation and learning, which are impeded by current organisational structures. Moreover, they insist that many organisations are not able and do not have the required knowledge to solve problems which are described as complex to standardise or predict and which require more agile, boundary-spanning, and knowledge-based structures such as communities of practice. They suggested that knowledge communities that exceed formal boundaries might enable practitioners who are facing common problems and challenges to learn from each other, to find out common synergies across organisations and to develop new knowledge. Alavi and Leidner (2001) considered that the most important process of knowledge management, at the individual and organisational levels, is to transfer knowledge to where it can be utilised. Thus, these types of knowledge communities could be invaluable for such transfer.

Professional online communities can be defined as "*online networks in which individuals with common interests, goals or practices interact to share information and knowledge, and engage in social interactions*" (Kim et al., 2011b: 2). They have been used widely by many different professions for knowledge sharing. Now professionals can share their ideas and experiences, find quick answers, give access to other individuals with the same interests, solve job related problems, and perform complicated tasks *"through collaboration with both known and unknown colleagues"* (Yu et al., 2009: 12). Recently, Ala-Mutka et al. (2009), in their study to examine why IT professionals join online communities, have found that 75% of an IT professional community reported that their participation in these communities helps them perform a better job, while 68% reported that their participation helped their professional development. Despite the wide expansion and the increasing importance of online communities, however, the literature reveals clearly the existence of a research gap, as the previous research has not explored the patterns of motivators and how members' beliefs influence their use of this type of community.

1.2. Problem definition and research background

Information and knowledge exchange represents the main reason for member participation in online communities, especially in the context of professional communities, where the key objectives of participation might be to collect and to contribute information and knowledge related to the community's interests (Gupta and Kim, 2004). Seeking and asking for information is the main reason mentioned by online community members when asked about the reasons and motivations for joining an online community (Wellman and Gulia, 1999). Ridings and Gefen (2004), in their exploratory study, reported that information exchange with other members was the main reason for participation. This conclusion was confirmed by the reported findings of other studies that emphasised that the majority of people join online communities mainly for exchange, discussion and debates around areas and topics of interests (Koh et al., 2007, Moore and Serva, 2007).

Recently, most organisations have realised that sustainable development can be an appropriate aim to be achieved. However, this aim highlights the concept of learning organisations, which motivate their members to continually learn and help to innovate and generate new ideas and thinking. According to Shehata (2000), organisations keep learning not only from their own experience, but also from others' experiences. Regarding the assertion by Alavi and Leidner (2001) that the most important aspect of knowledge management is to transfer knowledge and best practices where they can be utilised, professional online communities might be valuable for such transfer.

A review of online community literature indicates that there are three schools of thought. *The first one focuses on "online community design"*. According to this view of an online community, there are social-technical factors, which are considered essential for knowledge exchange and relationship building that should be included in the design of a community in order to promote and enhance the outcomes of the community. Dholakia et al. (2004) reported that an online community's structural design may significantly enhance and elevate members' participation. Electronic commerce and electronic government (e-Government) researchers, for example, have emphasised that web-site design is a crucial factor that can affect intention to use and usage adoption (e.g. Barnes and Vidgen, 2012, Cabrera et al., 2006, McGill and Klobas, 2005). Moreover, Ma and Agarwal (2007) found that online community whose designs remind members of the value of their contributions obtain significantly more members' contributions.

The second stream is concerned with online communities' success and sustainability factors. Previous studies have focused on the search for models and/or methods that help in better understanding the factors that determine the success of online communities and how to maximise them (Gupta and Kim, 2004, Zheng et al., 2013). Moreover, this research shows diversity of variables and predictors that can determine the success of this type of community. For instance, Williams and Cothrel (2000) suggest that there are three main factors for creating and sustaining online communities, which include member development, management and community relations.

Many researchers have asserted the importance of social relations, especially trust, for any online community to prosper and survive. When members trust one another, for example, they will be more likely to join in and promote the community (Chang et al., 2013, Chiu et al., 2006). Hsu et al. (2007) contend that building mutual trust in an online community may first require founding and establishing "economy-based trust", followed by "information-based trust" and then "identification-based trust". The authors advocate that managers should also help and motivate members to switch from economy-based trust to information-based trust. If economy-based trust is dominant, then new members might act in accordance to the potential rewards and costs incurred by their behaviour. Thus, economy-based trust tempts members to join. Moreover, developing information-based trust might decrease risk and uncertainty.

Members' visit frequency is another measure of an online community member's loyalty and participation sustainability. Prior research has reported that members' satisfaction showed a positive effect on variables that can manifest loyalty such as patronage (e.g. Gustavsson, 2005, De Valck et al., 2007). Additionally, member satisfaction might increase affect toward and involvement in a community, which could motivate the member to visit it more often (De Valck et al., 2007).

Moreover, information system researchers highlight the importance of interactivity, usability and sociability as measures of online communities' success. According to Preece (2001), usability defines the nature of the interaction between people and technology, while sociability defines the nature of embedded social interaction inside the community. The determinants of usability are more concerned with technology design, technology reliability, and how users interact with the technology. However, the determinants of sociability revolve around how members interact with each other and to what extent they trust each other. Thus, some measures can be used as determinants of sociability such as the degree to which members are involved and participate (Preece, 2001).

The final stream of research focuses on the members' behaviour towards contributing their knowledge. Recently, from a social-psychological perspective, a growing body of research has strongly emphasised some concerns regarding using online communities for knowledge sharing (Lin and Huang, 2010). It suggests that sharing knowledge with others may cause the contributor to lose the value of obtaining knowledge to others; moreover, all may obtain benefits except the contributor (Lin, 2008). Therefore, it might be irrational for an individual to spend time, make effort, and donate his or her knowledge to others, when *"they can easily free-ride on the effort of others"* (Wasko and Faraj, 2005: 38). However, if all members of an online community choose to free-ride, this community will no longer survive. Thus, several researchers recently have tried to answer the question; why does an individual spend his/her valuable time and effort contributing knowledge to others in online communities?

A study of "electronic networks of practice", (Wasko and Faraj, 2005: 38), based on the Social Capital Theory, reported that reputation, altruism, expertise and tenure in the field, and community interests were found to be critical predictors of knowledge contribution. In this regard, Chiu et al. (2006), additionally, affirmed the significant impact of some aspects of social capital and "community-related outcome expectations" on the quantity and quality of knowledge contributed. Ma and Agarwal (2007) noted that contribution behaviour in any online community is mainly influenced by accurate communication and two other types of benefits; the extrinsic benefits, and intrinsic benefits. According to Ma and Agarwal, both types of benefits are derived from the verification of identity.

Based on the above discussion and the foregoing literature of knowledge sharing in professional online communities, there are a number of gaps and limitations in the existing knowledge.

Firstly, professional online communities are a type of communication channel intended to facilitate the interaction among community members. In general, knowledge management systems are developed based on three groups of technologies (Turban et al., 2005); a) communication technologies that help users to contact each other and to have access to the required knowledge; b) collaboration technologies that facilitate group work; c) database management systems that work as a repository for storage and retrieval of knowledge. Therefore, from the technical view, online communities are a "form of the Internet based information system" (Lin and Lee, 2006: 480). Moreover, previous research has demonstrated that the online technical attributes influence members' participation (e.g. Preece, 2001, Kuo and Young, 2008) and loyalty (Lin, 2008) in online communities. However, although a limited number of empirical studies have investigated knowledge sharing within online communities based on social-psychological perspectives (e.g. Chiu et al., 2006, Wasko and Faraj, 2005), to the best of the author's knowledge, no previous study has attempted to integrate the possible determinants that motivate members of a professional community to use this type of community for knowledge sharing (see the rationale for integration in Section 1.5). The literature reveals clearly that work combining the different potential factors that could explain using professional online communities for knowledge sharing is extremely limited. Consequently, very little is known about a) which factors provide the main contribution in explaining this behaviour; b) what mediating mechanism is involved; and c) and whether the proposed cognitive, social, and technical factors have differing or similar implications for online knowledge sharing behaviour (Olivera et al., 2008).

Secondly, social capital theory has been utilised by a few researchers to understand knowledge sharing behaviour (Chiu et al., 2006, Wasko and Faraj, 2005). In addition, there is a stream of research in management information systems that tries to draw the relationship between information success factors that can explain online members' behaviours (Phang et al., 2009). However, to date and to the researcher's knowledge, no previous study has studied the causal association between any of the technological online aspects and social relations in the contexts of professional online communities. Huysman and Wulf (2006) emphasise that examining the relationship between the technological aspects of technology and social relations is "*still largely an open question*" (p. 47).

Thirdly, sharing knowledge and information can enhance individuals' learning from each other's know-how and accumulated experience (Nonaka and Takeuchi, 1995b). In the organisational setting, members of an organisation, especially members whose professional experience and knowledge are diverse, develop new knowledge by communicating and exchanging their valuable information and knowledge. Thus, and according to Kang et al. (2008), "*individual information and knowledge, which tends to be dissimilar and fragmented, has become a more effective source of information for organisational performance as they are shared among members of an organisation*" (p.1549). Moreover, they argue that many studies in organisational settings have explained what makes knowledge sharing successful, but very few have examined the influence of knowledge sharing on employee work performance. Indeed, the literature indicates that no one empirical study has examined the relationship between using professional online communities for knowledge sharing – acquisition - and a member's work performance.

Fourthly, the intention to contribute knowledge would be meaningless if the intention of knowledge requests was absent (Ridings and Gefen, 2004). Knowledge sharing can be defined as an active process between two parties: knowledge provider and knowledge collector. Hooff and Ridder (2004) state that *"both processes have a different nature, and can be expected to be influenced by different factors"* (p.118). However, the literature shows that studies which have approached knowledge sharing did not examine knowledge sharing as a process (See Appendix B). Quigley et al. (2007) emphasised that very little is known about how the different "*motivational factors identified with knowledge providing and knowledge receiving work in conjunction with each other because the motivational mechanisms across these domains are rarely studied together*" (p.72). Therefore, they suggested the need to develop a coherent, integrated, theoretical framework to show how the motivational factors can explain knowledge sharing (acquisition/provision) and how this knowledge is utilised in ways that benefit performance. However, in the professional online community setting, previous empirical studies mainly focused on members' loyalty (Lin, 2008, Lin and Lee, 2006), continuance intentions (Chen, 2007), and the quality and quantity of contribution (Chiu et al., 2006, Wasko and Faraj, 2005).

Finally, in knowledge sharing behaviour especially, one of the main limitations of previous research is to focus on developed economies in either Western countries or East Asian countries (See Appendices A and B). Wang and Noe (2010) emphasise that "*the majority of studies that have examined non-Western cultural influences on knowledge sharing have been conducted in Chinese cultures and more studies on how cultural differences affect knowledge sharing in emerging economies in countries in Africa, the Middle East, and South America are needed*" (p.126). Furthermore, previous research suggests that information technology in the developing countries might be under-utilised and, as a result, might not provide a significant contribution to improving and supporting individual and organisational performance (Anandarajan et al., 2000). Yang et al. (2009) see that technology adoption in the developing countries might show a different interaction pattern because they may take advantage of their late adoption, and clearly "*this difference is worth investigating*" (p. 196). Empirically, McCoy et al. (2007) reported that technology acceptance "*did not hold across all cultural groups" and it "may not apply to all people with all cultural orientations"* (p.87). In this regard and because of this debate, Hofstede et al. (2010) see that modern information and communication technologies are more likely to show different patterns in collectivistic, masculine, and uncertainty avoidance societies, where people incline to use direct ways to relate to their social environment. Regardless, the review of the previous literature reveals that the majority of the empirical evidences of technology use were drawn from studies conducted in the USA and Western developed countries and very few studies were conducted in developing countries.

Having detailed the various gaps and limitations in the existing research, this study intends to fill the gaps in current knowledge in the following ways:

Firstly, this study will be guided by the unified theory of acceptance and use of technology UTAUT theory (Venkatesh and Bala, 2008, Venkatesh et al., 2003, Venkatesh et al., 2012), the Social Cognitive Theory SCT (Bandura, 1997, Bandura, 1978, Bandura, 1989, Bandura, 1994), The Information Success model (DeLone and McLean, 1992), and the Theory of Relational Capital (Nahapiet and Ghoshal, 1998, Prusak and Cohen, 2001). In general, and according to Straub (2009), TAM and UTAUT are two models developed specifically for investigating technology use and adoption in the organisational settings. Although these two theories are able to explain behavioural intention and usage behaviour, the UTAUT model is still new and untested. In this regard, Barnes and Vidgen (2012) state that, "*the explanatory and predictive* *power of UTAUT has yet to be fully demonstrated*". Hence, additional research is needed to understand how the UTAUT may be applied in settings outside of the organisational and cultural contexts, such as professional online communities and non-Western culture. Furthermore and from a knowledge sharing behaviour standpoint, Kankanhalli et al. (2005) advocate that other perspectives such as the technology acceptance models may "*help to better account for ease of use and usefulness*" of online communities use. Benbasat and Barki (2007) agree with Kankanhalli et al. by recommending the extension of acceptance models to "*different IT contexts in order to reach a more comprehensive understanding of what influences adoption and acceptance, ... and to provide more useful recommendations for practice*" (p.216).

The Social Cognitive Theory, on the other hand, is a "*widely accepted, empirically validated model of individual behaviour*" (Compeau and Higgins, 1995a: 190). It proposes that environmental influences such as social pressures or unique situational characteristics, cognitive and other individual factors including personality as well as demographic characteristics, and behaviour are reciprocally determined (Compeau and Higgins, 1995a). In more details and according to this theory, individuals have the tendency to make decisions about the environment in which they want to exist, in addition to being influenced by those environments. When individuals participate in online communities, they actually interact with each other in a dynamic context (Hansen et al., 2005); therefore, members' participation is considered as a dynamic interpersonal relationship building process in which members seek achieving a sequence of social psychological needs (Chow and Chan, 2008). How individuals are connected in social relations could "*determine to what extent and in what way they can draw upon and contribute knowledge*" (van den Hooff and Huysman, 2009: 2). Hence, Social Capital Theory will be more relevant to understand and obtain more details of interpersonal needs regarding using professional online communities for knowledge sharing.

Secondly, drawing on a rigorous theoretical foundation, empirical support, and contextually relevant studies, this research aims to combine four streams of research in order to understand and explain factors that can determine professional online communities use for knowledge sharing (provision and acquisition). Whitaker and Parker (1999) have suggested four major categories for the stimulation of online agricultural communities: technology, motivation, task, and system factors. According to Whittaker and Parker, technology and system factors refer to general computer and communication factors (such as consistent and compatible software), which are very important in the context of online communities. Motivation factors refer to the perceived benefits of being a community member, while task factors relate to perceived appropriateness of fit of the technology to the main task of the community. However, later in this chapter (Section 1.5.) the rationale for using an integrative view will be discussed in more detail.

Thirdly, this research aims to investigate the different antecedents of using professional online communities for knowledge sharing, not only the contribution behaviour. From the knowledge-sharing standpoint, usage behaviour to search for and acquire knowledge should be examined equally to individual behaviour to provide it (Chen et al., 2010). From an online community's perspective, in order to guarantee an effective knowledge interaction activity and to manage these communities productively, balanced attention to both usage behaviours (collecting and providing) is necessary, and there is a need for an understanding of both of them regarding their antecedents. Furthermore, this comprehensive view will permit examination of how the different beliefs and their antecedents affect use of professional online communities to contribute knowledge and to obtain knowledge.

Finally, although the literature shows limitations in the investigation of using online communities for knowledge sharing, all previous studies were conducted in Western and Far Eastern countries (see Appendices A and B). Generally speaking, Johns (2006), in his influential work, states that, "*To take the most straightforward external validity example, relationships theorised or found in Western cultures might not hold up in non-Western cultures such that the validity of Western theories is said to be culturally biased*" (p.400). Consequently, it might be difficult to generalise the findings of these studies to other unique cultures such as the Islamic Middle East or North African culture. Al-Busaidi et al. (2010), for example, argue that knowledge is viewed as power and as being private in the Arabian culture, therefore, sharing it represents a loss of competitive advantage. Thus, to overcome this limitation, this research will be conducted in Egypt, which is classed as a developing country that has substantial differences in terms of politics, economics, culture, and social development compared to the Western and Asian cultures (Hassan, 2010). Egypt, as one of the Middle East Arabian countries, tends to be relatively high in collectivism according to the individualism index, high in power distance, high in uncertainty avoidance, and male oriented according to the masculinity/femininity index (Ting-Toomey, 2012, Gnanlet and Yayla-Kullu, 2013, Swaidan, 2012).

These characteristics provide a different context that should be considered in the process of studying professional online communities' usage for knowledge sharing. Moreover, conducting this study in Egypt will make a contribution to the literature in the area, and be useful for academics seeking to construct a theory that has applicability to the range of contexts in the globalised setting. Briefly, using technology acceptance as a main perspective to examine knowledge sharing in professional online communities and its determinants in a non-Western and non-East Asian country, to overcome the gap between developing and developed countries is worth investigation. Consequently, adopting UTAUT with three motivational theories to examine knowledge sharing behaviour in professional online communities in Egypt, as a developing Islamic country, is one of the purposes of this research.

1.3. Research context

Since the Arab Spring, it is more obvious now that information and communications technologies (ICT) have brought about significant changes in the political, economic, cultural, and social systems in this strategic area (Khan, 2012, Mansour, 2012, Ramzy et al., 2011, Seo and Thorson, 2012). Although the success of the Egyptian revolution in 2011 should be credited only to the Egyptians, the role of ICT cannot be denied. The terms "The Internet revolution", "the social media revolution", and "the Egyptian revolution Web 2.0" all reflect the critical role that ICT played in the success of the Egyptian revolution. Moreover, they reflect the importance of technologies in Egyptians' lives (Aouragh and Alexander, 2011).

The Internet world statistics (2011) reported that Egypt is ranked as the first African country (in terms of percentage of total population) in using the Internet and social networks (SN). Egypt has been ranked as one of the highest countries (14) that invested in the ICT sector between 2007 and 2010 (ITU, 2012)[1]. During this period, the capital expenditure increased at a rate of 16% annually (ITU, 2012). Successive Egyptian governments have taken positive steps to increase Internet usage, especially to change the dial-up connection to Asymmetric Digital Subscriber Line (ADSL) connectivity and fibre optic broadband. About 24 million Egyptians were connected to the Internet at home using an ADSL connection in 2008, compared to 21 million in 2007 (Ramzy et al., 2011). According to a Ministry of Communication and Information Technology (MCIT) report (April 2012), there are about 31 million Internet users in Egypt (39.5%

[1]http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2012/MIS2012_without_Annex_4.pdf

of total population) with an annual growth rate of 19.6%[2]. Moreover, the national bandwidth increased by 52.6% in 2011 (SIS, 2012). These percentages may be highly significant if we consider the illiteracy rate (27%) (UNESCO, 2010)[3].

The expression "digital divide" has been used to describe the difference between individuals who have access to the required resources to use new ICT (e.g. the Internet) and individuals who do not have the required resources and accordingly cannot access the technology (Fiser, 2005). This term, furthermore, can depict the discrepancy between people who have the required skills, knowledge and abilities to use new ICTs and people who do not. However, the physical ICT (e.g. number of computers, bandwidth, number of telephone lines… etc.) and prices that users can afford to access ICT are two important factors to define the digital divide. In this regard, the following table presents the Egyptian physical ICT or access indicators as presented by ITU (2011).

Table 1.1: Egyptian ICT development index

Fixed-lines subscriptions per 100 citizens		Mobile-lines subscriptions per 100 citizens		International Internet bandwidth per every user		% Households with computer		% Households with internet	
2008	2010	2008	2010	2008	2010	2008	2010	2008	2010
15.1	11.9	52.7	87.1	1'920	6'591	27.0	34.0	19.9	31.2

Source: International Telecommunication Union (ITU 2011), http://www.itu.int/ITU-D/ict/facts/2011/material/ICTFactsFigures2011.pdf

The above table shows a decrease in fixed-line subscriptions. This decline can be attributed to the spread of "local line sharing ADSL" where neighbours and local inhabitants can share one ADSL network. However, all other indicators show significant and increasing development in the Egyptian information and communication technology infrastructure. This increase is supported by very low and competitive communication prices.

In two studies that aimed to explore the digital divide and the Arabian culture, Wheeler (2004; Cited in Wheeler (2009)) concluded that the Arabian states are more active information societies than general statistics gathered in Western countries indicate. She employed availability and affordability of information and communication technology as two main determinants that can be used as measures of

[2] http://www.mcit.gov.eg/Upcont/Documents/Publications_282012000_Eng%20Flyer-June%202012-3.pdf
[3] http://www.uis.unesco.org/Library/Documents/world-development-indicators-education-en.pdf

access to key technologies. The following table summarises the survey results regarding Egypt.

Table 1.2: Information technology and everyday life in Egypt

- "Getting a mobile phone: Tourist SIM card 2 months, 70LE. 30 Min. to find a store-not well advertised, but all the locals knew where to go. - Getting a dial up Internet account: 10 seconds. (After discovering the free dial up Internet phone numbers 0777 numbers; charged as a local phone call-but no access fee). - Satellite TV: @ 30$ a month for 3 months; 30 minutes for full installation. - Internet café: 5 minute walk; 13 cents an hour. - Credit cards only accepted in shops/hotels/restaurants that cater to westerners. - Newspapers have frequent coverage of IT/Internet related issues in both English and Arabic. State rhetoric is more focused on poverty reduction and unemployment and increasing basic subsidies (2004 cabinet; but former minister of ICT appointed Prime Minister!) - Drawbacks: Connectivity concentrated in the cities; poverty and overpopulation; crumbling infrastructure; ADSL available in the Capital but still @50$ a month. Costs supposedly falling; authoritarianism; inequality; illiteracy as high as 50%; cultural issues; English language capability limited; educational system needs a major overhaul".

Source: Wheeler (2004: 5)

The results of both surveys strongly supported that access to the Internet and using information and communication technologies is reasonable and more efficient in Egypt than it is in Western countries, where it can take longer time to get access and it costs double or even triple compared to the Arabian countries.

Wheeler concluded that "*the ease and affordability of access to information technology and the Internet in Egypt suggest that more empirical data on emerging information societies in the region are a must if we are to more accurately assess technology driven change*" (p. 5).

1.4. The purpose of the research and the research questions

The main aim of this study is to investigate the factors that increase or reduce the inclination of professionals to use online communities to share knowledge (acquisition and provision). Three conceptual models will be developed through social cognitive theory, relational capital theory, information system success theory and the unified theory of acceptance and use of technology. More specifically, the main objectives of this research is to:

1- Explore the determinants of the use of professional online communities for knowledge sharing among professionals.

2- Extend the UTAUT Model to explain professional online communities' usage for knowledge acquisition/provision.
3- Examine the role of trust, online system self-efficacy, and the online system characteristics in explaining professional online communities' usage for knowledge acquisition/provision, and examine whether these factors integrated with the UTAUT Model can discriminate between usage for knowledge provision and usage for acquisition.

Based on these objectives and the adopted theoretical framework, the following research questions emerge:

Question 1: What influence does performance expectancy have on using the community for knowledge acquisition among professional online community members?

Question 2: What influence does personal outcome expectancy have on using the community for knowledge provision among professional online community members?

Question 3: What influence does effort expectancy have on using the community for knowledge acquisition/providing among professional online community members?

Question 4: What influence does social influence have on using the community for knowledge provision and use for knowledge acquisition among professional online community members?

Question 5: What influence does relational capital – Trust - have on use of the community for knowledge provision and use for knowledge acquisition among professional online community members?

Question 6: What influence does system self-efficacy have on performance expectancy, personal outcome expectancy, and effort expectancy among professional online community members?

Question 7: What influence does knowledge self-efficacy have on personal outcome expectancy of knowledge provision among professional online community members?

Question 8: What influence does the system quality have on performance expectancy, personal outcome expectancy, and the relational capital among professional online community members?

Question 9: What influence does the content quality have on performance expectancy, personal outcome expectancy, and the relational capital among professional online community members?

In order to answer these questions, a number of hypotheses will be generated after reviewing the related literature.

1.5. Why the integrative view?

Recently, the literature on technology acceptance and knowledge sharing supports the assumption that the integration of the psychological and environmental factors may be critical for understanding the factors that motivate professionals to use online communities for knowledge sharing (e.g. Chan et al., 2010, Cheng et al., 2008, Hara and Hew, 2007, Schaupp et al., 2010, Venkatesh et al., 2012, Wixom and Todd, 2005). In his seminal work in *MIS Quarterly*, Kock (2009) concluded that integration of models is required to help researchers better understand the factors that may influence technology adoption and use. In their study to investigate e-Government services use, Schaupp et al. (2010) recommended that a broader and more comprehensive understanding of technology acceptance can be obtained by integrating models from different research streams. From a knowledge sharing point of view, Quigley et al. (2007) emphasised that *"no single theoretical perspective can provide explanation of the knowledge sharing and transfer process"*. Experimentally, and drawn upon the integration of incentive, goal-setting-social cognitive, and social motivation theories, they reported that the three theories together better predicted knowledge sharing rather than by examining their influence separately. Hara and Hew (2007), in a qualitative study aimed at understanding knowledge sharing behaviour between nurses in an online community of health-care professionals, found that the six factors that have been found to be critical to sustain knowledge sharing can be grouped into three categories: social environment, individual needs, and technological features.

Adopting an integrative perspective to explain the use of online communities for knowledge sharing in professional online communities is one of several main contributions in this study. Table 1.3 illustrates the different research perspectives to approaching online communities in the social sciences.

Table 1.3: Online community research perspectives

Theoretical perspective	Aim	Constructs	References
Individuals' beliefs and psychology	Studying the different motivators that might stimulate individuals' intention towards participating in virtual communities, mainly by using intention models (e.g. the Theory of Planned Behaviour and the Theory of Reasoned Action)	- Intrinsic and extrinsic benefits. - Emotional benefits. - Community-related behaviour (sense of community) - Community cohesion and unity.	(Bock et al., 2005, Exter et al., 2009); (Yin, 2010);
Sociology	Studying and understanding the influence of social structure, social relations, and the community' cognitive aspects on the social processes and outcomes among the community members.	- Community structure - Social ties - Social capital (network and trust)	(Chiu et al., 2006); (Wasko and Faraj, 2000, Wasko and Faraj, 2005)
Information systems	This perspective emphasises interactivity, usability and sociability or the elements involved in social interactions among members.	- Ease of use and usability - Usefulness - The intention to use the system	(Hsu and Lu, 2004) (Phang et al., 2009); (Preece, 2001); (Ridings et al., 2002);
Economic	This perspective highlights the economic value of online communities because of the quality and quantity of knowledge and information produced.		(Balasubramanian and Mahajan, 2001)

As discussed above, knowledge sharing in online communities occurs at the individual, the social and the technical levels. For an individual member, knowledge sharing is contacting and interacting with other members to pursue their help and their knowledge in getting something done better, more quickly and/or more efficiently. For another member, knowledge sharing is responding to other members or providing his/her knowledge. People might provide their knowledge for intrinsic and/or extrinsic reasons. From the social and the technical perspectives, knowledge online communities are social entities in which members interact and communicate together using information technologies (Huysman and Wulf, 2006). Knowledge management literature has recently emphasised the significant role of interactive knowledge management technologies in bringing and implanting the human side into the knowledge management equation (e.g. Hew, 2009, Mathwick et al., 2008, Choi et al., 2010). Moreover, knowledge management literature highlights some technological issues such as the design standards and the technological features that might promote sociability and encourage users to interact with each other. Therefore, an integrative model is significantly needed because it is more likely to help to examine different antecedents and enablers that might explain professional online communities' usage behaviour for knowledge sharing. In more detail, the integrative perspective will be adopted for three reasons:

Firstly, online communities are web-based applications that operate through computer software and as the online community members are the main actors in the knowledge sharing process, it is expected that members' use behaviour will be influenced by individual cognition, social relations, and the technical aspects that constitute the environment. As mentioned above, Quigley et al. (2007) emphasised that no single perspective can explain the behaviour of knowledge sharing. Wixom and Todd (2005) noted that two main streams of research have evolved in information technology: behavioural beliefs (e.g. technology acceptance models) and object-based beliefs (e.g. information success models). They emphasised that both streams offer valuable contributions to our understanding of information technology, although each tells only part of the story. The authors strongly supported integrating the two research streams to provide complete understanding of how system characteristics can explain system usage. Thus, the current question that researchers have been trying to answer, "Why should individuals use online communities for knowledge sharing?" would be answered by integrating the beliefs/cognitive factors and contextual factors together.

Secondly, as discussed above and as will be discussed later, the majority of the previous research focuses on one level of analysis (e.g. Chan et al., 2010, Chiu et al., 2006, Wasko and Faraj, 2005). However, as has been mentioned, knowledge sharing occurs at the individual, the social and the technical levels. Therefore, using one level of analysis to examine what motivates professionals to use online communities to share their knowledge might overlook more significant multilevel relationships, such as the impact of the online system characteristics on members' relations and the expected outcomes or perceived usefulness. In this regard, Benbasat and Barki (2007: 216) suggested that "*TAM has fulfilled its original purpose and that it is time researchers moved outside its limited confines*". They strongly recommend that revisiting other theories and redirecting their focus toward exploring the antecedents of the technology adoption and acceptance beliefs (usefulness and ease of use) would be beneficial to theory and practice.

Finally, integration of theories, besides establishing a richer nomological network (Venkatesh et al., 2012), provides the possibility of improving the research results and increases the explanatory power of the research model (Kuo and Young, 2008, Wixom and Todd, 2005). Therefore, besides providing the appropriate conceptual structures for understanding the use of professional online communities for knowledge sharing, it can enhance the predictive power of the factors that influence and explain usage and adoption.

1.6. Importance of the study

In terms of implications, the current research offers an empirical examination of the use of online professional communities for knowledge sharing (providing and acquisition) from an individual, social and technical perspective. Because of the young age of online community technologies and their applications for knowledge dissemination (see Chapter Two), theories of individual behaviour, information systems, and interpersonal relationships provide empirically validated results that can form a ground for further investigation of professional online communities. Quigley and his colleagues argue that prior research that has explored the predictor factors that can help understanding the process of knowledge sharing between contributors and seekers has suffered from the absence of an integrated framework (Quigley et al., 2007). Moreover, understanding of how usage activities for both knowledge provision and acquisition can be simultaneously motivated is still lacking (He and Wei, 2009). Straub (2009) notes that one of the main limitations of technology usage and adoption models is the absence of other important factors that should be identified. Thus, the need to develop a model that explores different potential motivations through different theoretical lenses will help in better understanding usage behaviour in such communities, as well as contributing to the continuous development and success of this type of knowledge community.

External validity of theories is considered a significant contribution. (Johns, 2006) explained that external validity can be achieved by investigating theories in new settings. He identified new settings as setting multiplied by treatment interactions (e.g. involving location or occupation) (p.400). So far, most of the previous studies on technology use have generally focused on organisational settings and mandatory technology. Although studying organisational use of technology is important, technology has broken through into everyday life not only in organisational settings. In this regard, Straub (2009) stated that, *"by studying technology use behaviour and intentions in a mandatory environment, the model is not truly measuring technology acceptance because the individuals ultimately do not have a choice as to whether to accept a technology"* (p.641). He urged future research on technology acceptance and adoption in a voluntary context.

Finally, professional communities, which are considered as knowledge-based communities, "*need to increase the quality and quantity of new knowledge more rapidly to satisfy the expanding requirements of their members*" (Lin et al., 2009: 930). The effective usability of new communication technologies will promote and enhance rapid learning and high productivity so that the community can be successful. Accordingly, this study tries to assist the executives of online communities or organisations, particularly in Egypt, to answer some questions and concerns that may emerge for knowledge management in these communities. Furthermore, this study tries to help the developers of professional online communities in establishing the appropriate community so that the community members can interact and share their knowledge easily and more effectively.

1.7. Structure of the study

This study consists of eight chapters. Chapter One presents the research background, the objectives and research questions, explains the purpose and significance of the study and offers the structure of the whole thesis.

Chapter Two deals with the concept of knowledge management, knowledge sharing and issues related to knowledge sharing. Information derived from the literature regarding knowledge management and sharing in online communities will also be presented, together with an examination of those factors identified in the literature that influence knowledge sharing in these communities while Chapter Three explains the development of the theoretical models and hypotheses, based on the literature review.

Chapter Four discusses the research philosophy, research methods, strategy and methods selected for this study, and the sampling procedures, and ends with the statistical techniques employed. Chapter Five shows how the research instrument was developed and tested, discussing in detail the results of pre-test interviews and a large-scale pilot study.

Chapter Six presents the quantitative results using descriptive analysis, and the appropriate statistical techniques for testing hypotheses.

Chapter Seven discusses the findings while Chapter Eight presents the conclusions of this research, the research recommendations, the limitations of the research and suggestions for further research.

Chapter Two: Knowledge sharing and online communities

2.1. Introduction

This chapter presents an overview of the previous research. The concept of knowledge management and knowledge sharing will be presented. Consequently, this chapter will discuss also the different factors that might promote and motivate people to share their knowledge. Finally, the definition of virtual communities, and their development will be discussed.

2.2. Knowledge management

Knowledge management is a main practice used in organisations working to attach knowledge as a resource for sustained competitive advantage (Kankanhalli et al., 2005). At the general level, knowledge management can be defined as a number of processes that control the creation, dissemination, and utilisation of knowledge. According to Turban et al. (2002), the most common knowledge management practices may include the following:

- The process of sharing knowledge and best practices.
- Implanting a culture that facilitates knowledge sharing.
- Promoting and reusing best practices.
- Producing and processing knowledge as a valuable product.
- Driving knowledge for innovation.
- Leveraging intellectual aspects.

There is no one accepted definition of knowledge management due to the various backgrounds and disciplines from which the knowledge management researchers have come. These different backgrounds have brought many perspectives on the definition of knowledge management. However, Table 2.1 shows a number of definitions that reflect different perspectives of knowledge management.

Table 2.1: Knowledge management definitions

Reference	Knowledge management	Perspective
Grey (1996)	"a collaborative and integrated approach to the creation, capture, organisation, access and use of an enterprise's intellectual capital"	Integration (information systems and human resources
Davenport and Prusak (1998)	"Knowledge management draws from existing resources that your organisation may already have in place – good information systems management, organisational change management, and human resources management practice".	Integration (information systems and human resources)
Swan et al. (1999)	"Any process or practice of creating, acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and performance in organizations"	Human resources process
Skyrme (1999)	"the explicit and systematic management of vital knowledge and its associated process of creating, gathering, organising, diffusion, use and exploitation, in pursuit of organisational objectives"	Human resources process
Mertins et al., (2000)	"all methods, instruments and tools that in a holistic approach contribute to the promotion of core knowledge process"	Information systems
Uit Beijerse (2000)	"the achievement of the organisation's goals by making the factor knowledge productive"	Strategy
Newell et al., (2002)	"improving the ways in which firms facing highly turbulent environment can mobilize their knowledge base (or leverage their knowledge "assets") in order to ensure continuous innovation"	Strategy
Plessis (2007: 21)	"an umbrella term for a variety of interlocking terms, such as knowledge creation, knowledge valuation and metrics, knowledge mapping and indexing, knowledge transport, storage and distribution and knowledge sharing".	Integrated

Source: Jashapara and Tai (2011)

As seen in Table 2.1, researchers have approached knowledge management through four different perspectives: strategy, human resources, information systems and integrated approach. Alavi and Leidner (2001) discussed that the selected perspective on knowledge management should concentrate essentially on: (a) creating and handling knowledge stocks only if knowledge is seen as an object or it is associated with information access, (b) knowledge flow and the knowledge processes of creation, transferring, and dissemination if knowledge is considered as a process, (c) building core competences, building intellectual capital and understanding the strategic value of know-how if knowledge is viewed as capability. Moreover, they argue that, based on the selected perspective of knowledge, the chosen strategy for managing knowledge is decided, and more importantly the prospective role of information technologies, which support knowledge management efforts, should change in parallel. Table 2.2 summarises the different perspectives as stated by Alavi and Linder with implications for knowledge management and knowledge management systems.

Table 2.2: Knowledge perspectives and implications

Perspectives	Definition	Implications for knowledge Management	Implications for knowledge management systems
Knowledge, data, and information	Data is a fact and/or raw number. Information is processed and interpreted data. Knowledge is personalised information	KM focuses on exposing individuals to potentially useful information and facilitating assimilation of information.	KMS will not appear radically different from existing IS, but will be extended toward helping in user assimilation of information.
State of mind	Knowledge is the state of knowing and understanding.	KM involves enhancing individuals' learning and understanding through provision of information.	Role of IT is to provide access to sources of knowledge rather than knowledge itself.
Object	Knowledge is an object to be stored and manipulated.	Key KM issue is building and managing knowledge stocks.	Role of IT involves gathering, storing, and transferring knowledge.
Process	Knowledge is a process of applying expertise.	KM focus is on knowledge flows and the process of creation, sharing, and distributing knowledge.	Role of IT is to provide link among sources of knowledge to create wider breadth and depth of knowledge flows.
Access to information	Knowledge is a condition of access to information.	KM focus is organized access to and retrieval of content.	Role of IT is to provide effective search and retrieval mechanisms for locating relevant information.
Capability	Knowledge is the potential to influence action.	KM is about building core competencies and understanding strategic know-how.	Role of IT is to enhance intellectual capital by supporting development of individual and organisational competencies.

Source: (Alavi and Leidner, 2001: 111)

Wiig (1993) emphasises the importance of "Three Pillars of Knowledge Management" for effective management of knowledge: studying the knowledge and its adequacy; looking for the embedded usefulness of knowledge; and finally, actively managing knowledge processes. In this regard, Nonaka and Takeuchi (1995a) stated that knowledge management, in its most simple meaning, is "knowledge creation". They reported that successful companies in Japan have been distinguished by their abilities to create organisational knowledge. Briefly, they have defined knowledge management as "*creating new knowledge, disseminating it throughout the organisation, and embody it in products, services, and systems*" (p.3).

In summary, and according to Alajmi (2011), defining what knowledge management is requires shedding light on four dimensions or pillars that reflect the principal features of knowledge management initiatives.

The first key dimension revolves around knowing what other people or an individual know and where knowledge exists. Therefore, this dimension concerns the different types of knowledge that should be recognised and understood in order to leverage knowledge to benefit communities. As mentioned earlier, knowledge can be grouped into tacit and explicit. In this regard, identifying and understanding these two different categories of knowledge definitely will lead to designing or finding best ways to recognise "who knows what". Ichijo et al. (2007) consider that "tacit knowledge" is the most disputable type of knowledge. They attribute this to the difficulty of articulating it in formal language. However, "explicit knowledge", according to Ichijo et al. (2007), can be expressed and articulated in words and numbers. Moreover, explicit knowledge can be easily shared and distributed in different forms.

The second dimension is the ability to have access to what people know (tacit and explicit) and where knowledge exists. Based on the International Data Corporation (IDC, 2007), about 4.5% of knowledge might be lost or purposefully hidden. They attribute this loss to employee turnover, poor information resources management, and hoarding. Furthermore, they argue that employees consume approximately 25% of their work time looking for information and then they may spend 25% to analyse the obtained information. As will be discussed later, previous research provides clear evidence that online community networks might be an effective gateway for accelerating the processes of obtaining and developing new knowledge. In this regard, Granovetter (1983) emphasises that "weak ties" between individuals accelerate and intensify the transformation of information and knowledge by serving as a bridge between members.

The third pillar is the individuals' willingness and inclination to share their knowledge, to engage in problem solving and to participate in decision-making. The decision to share knowledge might not be an easy decision; moreover, people cannot be forced to do so. Individuals may not be inclined to share or provide their unique knowledge if they conceive it as a valuable and important resource. Moreover, they should have the ability to overcome the interrelated circumstantial situations that may control and affect knowledge sharing behaviour (Bock et al., 2005, Lin, 2007b).

The final dimension is the supporting culture that encourages mutual learning and innovation. The ability to create such a culture depends on many factors such as effective reward systems, management support, organisational structure, technological facilities, and mutual trust (Al-Alawi et al., 2007). Sveiby and Simons (2002) found that there are two main obstacles that might impede knowledge sharing; the *''internal culture of resistance to sharing'' and ''a culture of hoarding knowledge''* (p.421). They also explained that the previous literature clearly shows how the two important factors, collaboration and trust, can be incorporated into the organisational culture for successful knowledge management practices. Moreover, they emphasise that for developing a sharing culture, organisations must focus on ‘‘*the values, beliefs and assumptions that influence the behaviours and the willingness to share knowledge*” (p.421).

Based on the above discussion, it can be noticed that knowledge management is a broad concept that might be seen as a group of components involving different and integral activities. This concept is extended to include theories, models, processes and information and communication technologies that support the processes of protecting, developing, transferring and utilising knowledge.

However, among these components of the knowledge management concepts, knowledge sharing has been devoted a major attention from researchers because it is a corner stone in knowledge management efforts. Wang and Noe (2010) argue that many organisations have been focusing on the issue of knowledge sharing because of their perceptions of the growing importance of knowledge to their organisations.

2.3. Knowledge sharing

There is no all-round definition of the concept of knowledge sharing, as scholars have approached it from different perspectives. Alavi and Leidner (1999) stated that many researchers studied knowledge sharing, knowledge transfer, and knowledge flow as exchangeable terms. However, they argued that knowledge sharing is much preferred to other terms and can be defined as *“the process of disseminating knowledge throughout the organisation”* (p.110). Lee (2001) defines knowledge sharing as “*the activities of transferring or disseminating knowledge from one person, group or organisation to other*” (p.323). However, Lin et al. (2007) see that the term “knowledge transfer” is mostly used when knowledge is exchanged between organisations. Differently, as stated by Bock et al. (2005), “knowledge sharing” is generally appropriate when knowledge and information are exchanged between employees or individuals within an organisation.

The literature has defined knowledge sharing as a type of social process that demands the involvement of two or more people. Based on this view, Davenport and Prusak (1998b) have defined knowledge sharing as a “*process that involves exchange of knowledge between individuals and groups*” (p.5). They pointed out that knowledge sharing has two main associated activities; absorption or acquisition which takes place when new knowledge is obtained; and the dissemination activity which takes place when knowledge is shared with others. Gibbert and Krause (2002) refer to knowledge sharing as "*the willingness of individuals in an organisation to share with others the knowledge they have acquired or created*" (p.90). This process takes place when one party gives the other party some knowledge (explicit or tacit) that he/she has. Hooff and Ridder (2004) have defined knowledge sharing as a "*process where individuals mutually exchange their (implicit and explicit) knowledge and jointly create new knowledge*" (p.118). Hooff and Ridder's definition suggests that knowledge sharing is a process consisting of two distinct behaviours (knowledge donation and knowledge collection). Connelly and Kelloway (2003) have defined knowledge sharing as a "*set of behaviours that involve the exchange of information or assistance to others*" (p.294). They also added that knowledge sharing differs from information sharing. They argue that knowledge sharing carries a meaning of reciprocity, while information sharing revolves around the availability of information to the employees without direction or even request.

Knowledge sharing may exist either through formal or informal contexts. The informal communication channels embody the spread of knowledge informally through, for example, impromptu meetings, informal workshops, or "coffee break conversations" (Alavi and Leidner, 2001: 120). Holtham and Courtney (2001) discussed that informal knowledge sharing promotes socialisation among colleagues, especially in smaller organisations. Regarding formal knowledge sharing contexts, Kwok and Gao (2005/2006) emphasise that this type of knowledge sharing is more likely to include workshops, trainings, or formal classes, and these formal knowledge sharing opportunities are usually intended to ensure distribution of a body of knowledge.

There are different viewpoints about knowledge sharing behaviour and whether it is a natural or unnatural behaviour. Davenport and Prusak (1998b: 189) explained that "*sharing knowledge is often unnatural*" and individuals in most cases do not tend to provide their tacit knowledge, because they perceive it as a power. On the other hand, some researchers think that knowledge sharing is a natural behaviour but depends on the surrounding culture. For example, Skyrme (2002) argues that knowledge exchange is a natural tendency, and might be natural in some organisations, and might be unnatural in other organisations. However, he discusses that sharing behaviour might be influenced by the belief that "Knowledge is power". Nevertheless, he commented that perceiving knowledge as a power is not the main obstacle to sharing knowledge.

Reflecting on the above discussion and definitions, a working definition has been developed for this research. Knowledge sharing can be defined as "*the process of* *voluntarily providing and acquiring knowledge that is needed through formal and informal online communities via information systems technologies*".

The following section discusses, based on an extensive literature review, the different factors that have been found to affect knowledge sharing.

2.4. Factors affecting knowledge sharing

Knowledge sharing literature has proposed that the culture of knowledge sharing can be effectively promoted not only by the direct incorporation of knowledge in organisations' business strategy, but also by changing attitudes and behaviours towards knowledge sharing (Lee and Choi, 2003). However, McDermott and O'Dell (2001) stated that many knowledge management efforts are unsuccessful due to the difficulty of changing people's minds and non-supportive beliefs. Knowledge is valuable and it can be expected that individuals may not tend to share their unique knowledge unless they expect some preferable benefits in return (Wu et al., 2009). Hence, previous studies suggest that motivations (intrinsic and extrinsic) are a powerful tool to promote knowledge sharing among individuals and, at the same time, to overcome barriers that hinder it (Cruz et al., 2009). Bock et al. (2005) contend that motivational factors of knowledge sharing and contribution reflect three levels of driving force. These levels are individual benefits (self-interest and individual gains), group benefits (reciprocal relationships with others), and organisational benefits (the organisational gains and commitment respectively). In general, the factors that may motivate individuals to provide their knowledge can be classified into two broad categories: individual factors and contextual factors. The following sub-sections discuss these factors in more details. (For further information about knowledge sharing previous studies, see Appendix A)

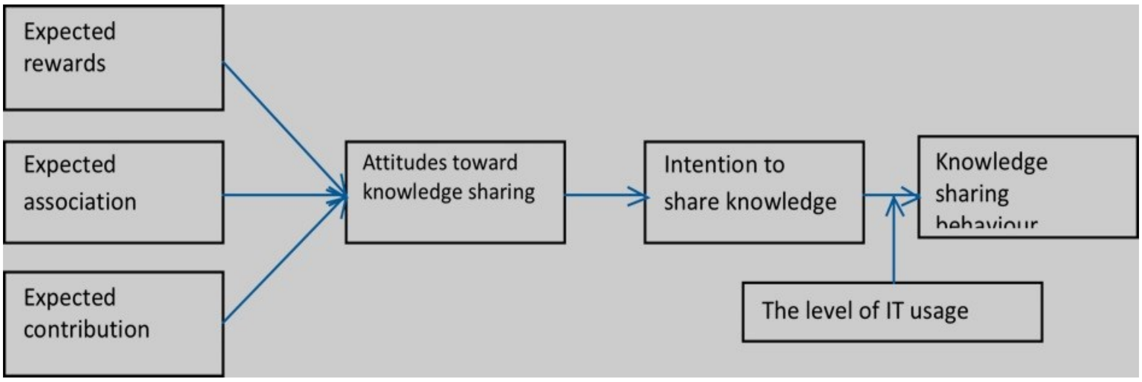
2.4.1 Individual factors

The motivational and individual factors can be identified in individual attitudes, perceived benefits and costs, and individual characteristics.

2.4.1.1. Individual attitudes

Attitude has been studied as a key factor for knowledge sharing intention and actual knowledge sharing behaviours. Study of attitude and its relationship with knowledge sharing is deeply supported by the theory of reasoned action (TRA) and the technology acceptance model (TAM), which explain how individuals' behaviour is determined by their beliefs and attitudes (Venkatesh et al., 2003). Fishbein and Ajzen (1975) suggested that an individual's attitude toward a specific behaviour refers to the result of an evaluation of the positive and negative feelings or consequences of performing target behaviour. In general, the literature indicates that individuals' positive attitudes toward sharing knowledge should be associated with a high level of knowledge sharing.

Bock and Kim (2002), in their study to advance our knowledge of the factors that affect an individual' knowledge sharing behaviour in the organisational context, reported a significant relationship between individual expectations of the outcomes of knowledge sharing, represented in expected rewards, expected contribution, expected association, and the attitude toward knowledge sharing. In turn, there was a significant relationship between this attitude and the behavioural intention to share knowledge. (See Figure 2.1)



Source: Bock and Kim (2002: 16)

Figure 2.1: Examining attitudes towards knowledge sharing

Similarly, Ryu et al. (2003) developed and validated a theoretical model to explain the relationship between hospital physicians' attitudes and their intention to share. The results of structural equation modelling (SEM) revealed that the attitudes of physicians had direct affect on the behavioural intentions to share knowledge with other colleagues. Moreover, the results showed that the influence of subjective norms on physicians' intention to share is significantly mediated by their attitude.

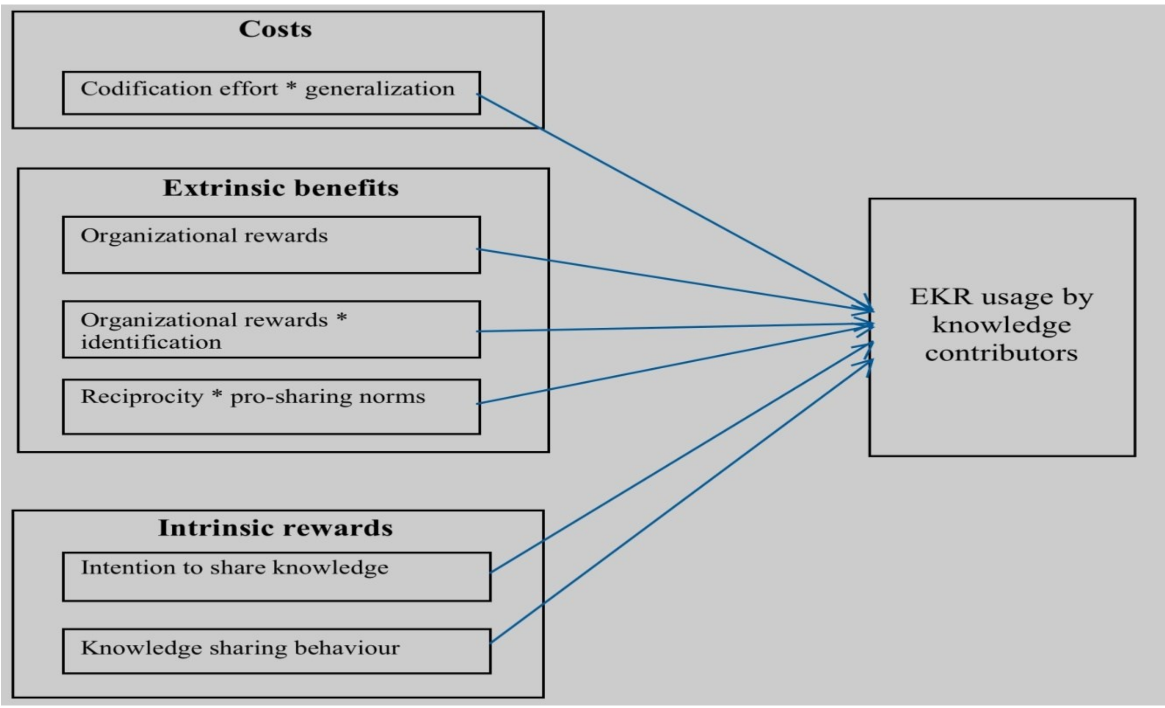
Kuo and Young (2008) examined four competing models (one model drawn from TRA and three models drawn from the theory of planned behaviour TPB) for studying knowledge sharing behaviours. The findings revealed that although the coefficients of determination (R^2) in all four models demonstrated that attitude towards knowledge sharing, in addition to subjective norm, controllability and self-efficacy, showed significant explanations of variance in knowledge sharing intention, interestingly, they demonstrated a significant association between sharing intention and sharing behaviour over all four models.

Regarding how individuals' attitudes to learning, sharing and storing influence organisational knowledge sharing, Yang (2010) study with data collected from 499 respondents working in an international tourist hotel in Taiwan, found that employees' attitudes to sharing and to learning significantly influence organisational knowledge sharing.

2.4.1.2. Benefits and outcomes

Knowledge sharing is a social process between two or more individuals. Social exchange theory explains individuals' behaviours in social exchange situations. According to this theory, individuals evaluate the expected benefits with the costs and base their action decisions on the expectation that the action will lead to rewards such as respect, reputation, and tangible incentives (Blau, 1964). Social exchange theory is different from the economic exchange theory in that it proposes that obligations between individuals are not clearly specified and are non-monetary (Kankanhalli et al., 2005). This theory has been adopted in many studies to explain and understand why people are motivated to share their knowledge with others. Choi et al. (2008) stated that "*in order to share knowledge, individuals must perceive that sharing it would be worth the effort to others and that some new value will be created, with expectation of receiving some of this value for themselves* " (p.39). Consistent with this theory, research proposes that expected and/or perceived benefits are positively associated with knowledge sharing, while perceived costs have a negative influence on knowledge sharing.

In their study, Kankanhalli et al. (2005) have demonstrated that the perceived benefits and costs play an important role in motivating individuals to participate in electronic knowledge repositories (EKR). They reported that extrinsic benefits (organisational rewards, organisational reward identification, and reciprocity) and intrinsic benefits (knowledge self-efficacy, and enjoyment in helping others) have a positive effect on knowledge sharing (Figure 2.2). However, according to Kankanhalli et al, the positive effect of organisational rewards and reciprocity is contingent on pro-sharing norms. On the other hand, they found that codification effort is negatively related to electronic knowledge repositories under conditions of weak generalised trust.



Source: Kankanhalli et al. (2005: 132)

Figure 2.2: Contributing knowledge to EKR

Using theories of collective action, and employing archival, survey, network and content analysis data to investigate the usage of a legal association electronic network for knowledge sharing, Wasko and Faraj (2005) aimed to study why some members in a network (computer-mediated discussion forum in which individuals exchange knowledge with each other) provide and donate their unique knowledge to other members, *"primarily strangers when the contributor does not have any immediate benefits and free-riders are able to acquire the same knowledge as everyone else*". They found that enjoying helping others did not have significant effect on knowledge contribution. However, they found that reputation, the benefit gained from active participation in the electronic network, has a positive effect on knowledge contribution. Interestingly, they found that network members contribute and share their knowledge regardless of the expected outcomes of reciprocity or the degree of their commitment to the network.

Cress et al. (2007) developed two models for fostering knowledge contribution to a shared database. They tested whether creating awareness about the usefulness of one's knowledge to others could contribute positively to better knowledge contributions or not. They found that communicating the usefulness of one's knowledge in retrospect has a positive effect on individuals' future sharing behaviour.

Studying knowledge sharing participation in an online community of practice, Lin (2007a) found that the level of sharing is related to increased internal satisfaction, perceived obligation to reciprocate the knowledge gains from the forum, enhanced professional reputation, and helping advance the community. Based on an empirical study of examining the differences in sharing knowledge interpersonally and via databases, Bordia et al. (2006) reported a positive influence of the perceived benefits (career and reputation) on knowledge sharing only for technology-aided sharing but not in a face-to-face context. They explained this result by suggesting that the benefits of sharing knowledge in a database context may be more explicit and more formalized.

Hew and Hara (2007b), in their qualitative study on three online professional communities with the objective of examining the perceived costs that might inhibit knowledge sharing, found that the lack of time, as a cost, and unfamiliarity with the subject are the two most frequently cited reasons for not sharing knowledge.

2.4.1.3. Individual characteristics

Literature indicates that the relationship between personality or individual characteristics and knowledge sharing have not been clearly documented (Chen et al., 2010, Huang, 2009). Enjoyment in helping others was found to have an effect on knowledge sharing (Kankanhalli et al., 2005, Lin, 2007b, Wasko and Faraj, 2005). Enjoyment in helping others, as mentioned before, derives from the concept of altruism, which exists when individuals obtain intrinsic enjoyment from helping others without expecting anything in return (Kankanhalli et al., 2005: 122). In an interesting study, Hwang (2008) investigated individuals’ social/self-identities and affective commitment as important identity factors for perceived enjoyment in sharing knowledge and knowledge sharing attitude in the technology-mediated learning (TML) environment. In a survey of undergraduate business students in the northern region of the US, they found that enjoyment in helping others has an effect on intention to share knowledge (R^2 = 0.51).

In their study to examine the influence of openness to experience, Cabrera et al. (2006) found a significant relationship between the openness to experience and knowledge exchange. They concluded that high level of openness to experience leads to a high level of curiosity, which, in return motivates individuals to seek peoples' ideas and knowledge. In this regard, Jarvenpaa and Staples (2000) found that the level of ability and comfort when employees use communication technology influences their usage of collaborative electronic-media for information sharing. Constant et al. (1994) reported a significant relationship between the level of education, work experience, and employees' attitude to share their experience and knowledge. In another study, they reported positive relationship between the level of expertise and sharing useful knowledge (Constant et al., 1996).

Several studies revealed that people who are confident in their skills and abilities to contribute useful knowledge showed significant intentions to share their knowledge (Cabrera et al., 2006, Lin, 2007a). Bordia et al. (2006) revealed that individuals are less likely to share knowledge when they are apprehensive. Interestingly, they found that evaluation apprehension, a ''*person's active anxiety-toned concern that he or she may be evaluated negatively*'' (Rosenberg, 1969: 281), is higher when sharing happens through collective database-related technologies. They explained that the database context prompted higher levels of evaluation apprehension due to the characteristics and number of individuals who have access to the knowledge and the permanency of the record. Furthermore, they asserted that if organisations want to encourage knowledge sharing through a database context, they have to find ways of reducing individuals' evaluation apprehension.

2.4.2 Contextual factors

As discussed earlier, knowledge can be considered as context-specific and usually needs a physical place to exist. Therefore, knowledge sharing, which is affected by individual factors as mentioned above, is also influenced by a number of contextual forces. Lu et al. (2006) claimed that context has a crucial role in knowledge sharing for two reasons. First, the context creates opportunities for individuals to interact with each other while providing different degrees and natures of interpersonal relationships. Second, the context in which knowledge is shared and transferred might provide the required resources to support or inhibit the completion of this process. The following sections describe the role that different contextual factors play in leveraging or reducing knowledge sharing behaviours.

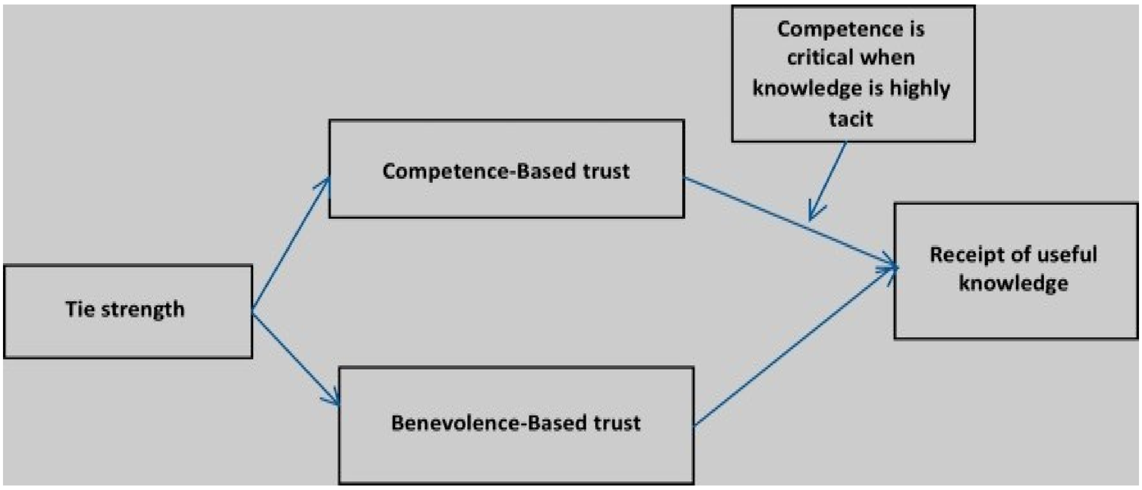
2.4.2.1. Social relations

Social exchange theory has been used to examine how social factors relate to knowledge sharing, and how it works as a motivator of knowledge sharing. Examining social factors is important because knowledge sharing involves providing knowledge to another person or people. Many researchers believe that when social relationships exist, people are more willing to provide useful knowledge, more willing to listen and accept each other's knowledge (Wu et al., 2007).

The social relationships between individuals are an important aspect of interpersonal knowledge exchange; individuals tend to share knowledge within close-knit networks and seek knowledge more frequently from individuals who are close to them (Robertson et al. 1996). However, Robert et al. (2008) asserts that people tend to share their knowledge when they perceive that the process of sharing will enhance their identity, social status and reputation within their social and/or the professional network. They emphasise also that in an organisational setting, social capital occurs when people work together over time and communicate with each other through a variety of communication media.

In a study of behaviours which affect knowledge sharing, Scarbrough (2003) identified four behaviours that should be encouraged. The first behaviour is called "knowledge web", which works as a social network responsible for connecting people by their knowledge and this can be improved using communities of practice to facilitate sharing. The second behaviour is called "knowledge ladder", which implies that sharing is required to maintain or improve status and this is facilitated by creating an environment where knowledge sharing is valued. Next comes the "knowledge torch", which focuses on the importance of leadership and role models. Finally, there is the "knowledge fortress", where knowledge is seen as a source of protection or power, a view which can be diminished or at least mitigated by building trust across departments with cross-functional teams. Likewise, using a qualitative interview in 20 organisations, Abrams et al. (2003) identified ten managerial behaviours and practices, "trust builders", that stimulate interpersonal trust that leads to knowledge sharing behaviour. These behaviours are divided into four dimensions: trustworthy behaviours, organisational factors, relational factors, and individual factors. They asserted that the effectiveness of these "trust builders" is highly affected by the characteristics of the organisation. However, they suggested that this set of ten behaviours and practices is not general for all organisations, but every organisation has to choose the right set of trust builders to focus on.

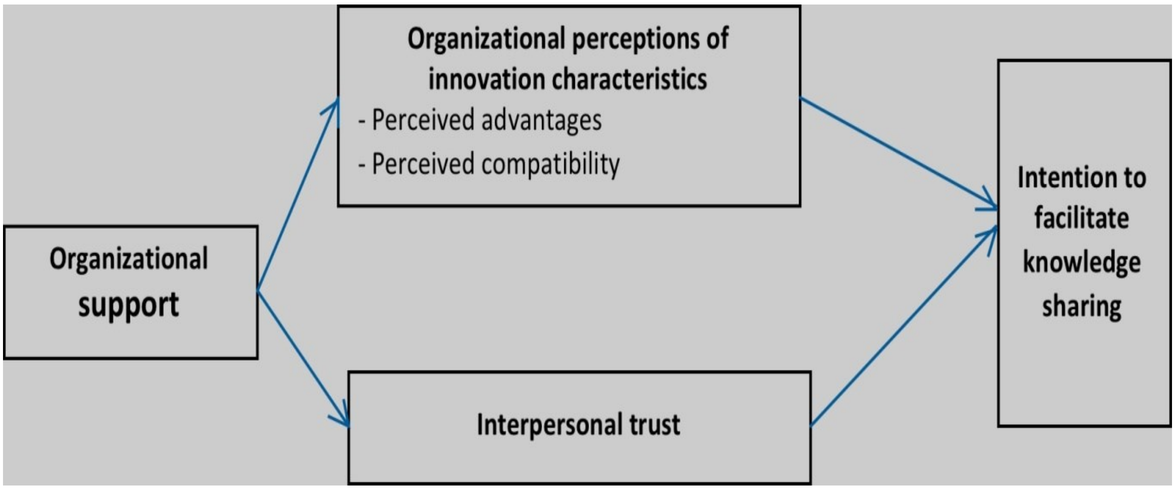
Trust has not been only used as exogenous predictor of knowledge sharing, but has also been used as a mediator. For example, Levin and Cross (2004) conducted a survey with all individuals in three divisions: one in an American pharmaceutical company, one in a British bank, and one in a Canadian oil and gas company, to examine the relationship between tie strength and receipt of useful knowledge. They found that stronger ties had a positive and statistically significant overall effect on receipt of useful knowledge. Moreover, they were able to prove that the relationship between strong ties and providing useful knowledge was mediated by trust (benevolence-based trust and competence-based trust). (see Figure 2.3).



Source: Levin and Cross (2004: 1481)

Figure 2.3: The mediating role of trust

In a survey study conducted by Lin (2006) in Taiwan on 154 senior executives, to examine the relationship between interpersonal trust and intention to facilitate knowledge sharing, she found that interpersonal trust explained the highest influence on the intention to facilitate knowledge sharing (Figure 2.4). Moreover, the author strongly advised managers to pay more attention to establishing a social interaction culture to improve employee beliefs concerning mutual trust in organisations, which in turn can impact on the intention to facilitate knowledge sharing.



Source: Lin (2006: 28)

Figure 2.4: Trust and the intention to facilitate knowledge sharing

Bakker et al. (2006) studied the role of trust in knowledge sharing, and investigated whether or not trust explains knowledge sharing relationships. They examined three dimensions of trustworthiness: capability, integrity, and benevolence and their effects on knowledge sharing. In general, they did not find statistically significant relationships between trust dimensions and knowledge sharing. The authors explained this result by suggesting that trust by itself does not explain the extent to which members of new product development teams share knowledge. Interestingly, they found that individuals were inclined not to share complete know-how with members who are perceived to be very capable. Alternatively, they were inclined to share more and complete knowledge when they believe that other team members are honest, fair and follow the same principles they have. Furthermore, they found that the trustee's beliefs – benevolence - towards the trustor did not show a significant influence on knowledge sharing.

Wu et al. (2007) conducted a study to understand the factors that can foster knowledge sharing and learning intensity at the team level from the perspective of social capital. Using sales teams from the e-travel industry, they found that affect-based trust was a significant determinant of knowledge sharing and learning intensity. However, task uncertainty and social interaction, which refers to "*activities that team leaders and companies design and implement to promote knowledge sharing and learning intensity*" (Wu et al., 2007: 333), was found to have significant influence on learning intensity.

In a study aimed to examine the effect of justice, cooperativeness and ties on tacit knowledge sharing through trust in co-workers and organisational commitment in Taiwan by surveying 212 part-time students, Lin (2007b) found that interpersonal ties showed significant influence on sharing tacit knowledge through trust in co-workers.

Specifically, Lin examined two different kinds of ties; instrumental and expressive. Instrumental ties arise in the performance of work and are responsible for facilitating the transfer of physical, informational, or financial resources to team members. Expressive ties are responsible for offering friendship and social support. Lin found that instrumental ties explained 0.29 ($p < 0.01$) of trust in co-workers, and expressive ties explained 0.14 ($p < 0.05$). In turn, trust in co-workers explained 0.20 ($p < 0.01$) of tacit knowledge sharing.

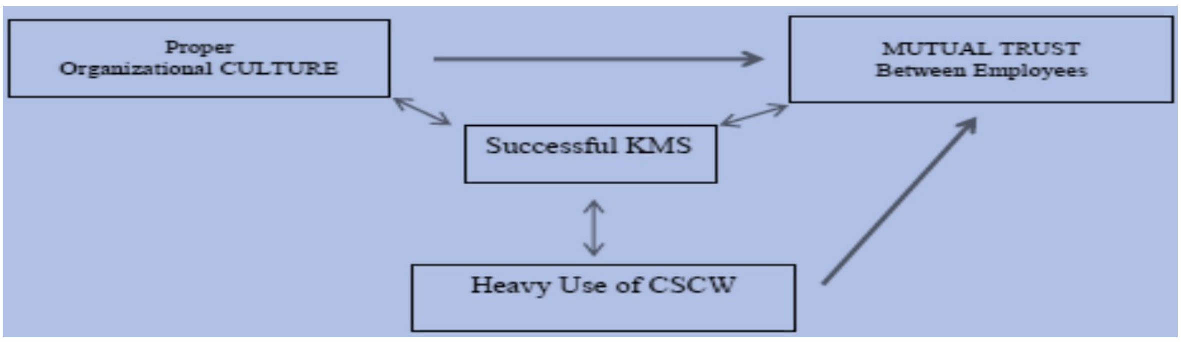
Although the above studies support a significant relationship between trust and knowledge sharing, Søndergaard et al. (2007) stressed that trust can be a double-edged sword. Wang and Noe (2010: 121) argued that "*unjustified trust may cause a potential user to refrain from questioning the usefulness of the knowledge and its context for application, leading to misapplication or misuse of the knowledge*".

2.4.2.2. Information technology

Knowledge management literature has emphasised the importance of information and communication technology infrastructure and application in linking organisational information with knowledge integration (Davenport and Prusak, 1998a). Alavi and Leidner (2001) believe that IT increases knowledge transfer through extending an individual's reach beyond formal lines of communication. IT can do more than just storing and retrieving data. By creating access to knowledge and eliminating all temporal and/or spatial obstacles between knowledge workers, information and communication technology can enhance knowledge sharing levels (Hendriks, 1999). McDermott (2000) discussed that communities play a key role in promoting knowledge sharing, in addition to the capabilities of information systems that fuel the desire for knowledge sharing. He emphasises that IT is only one of four challenges faced in building efficient knowledge sharing communities. These challenges are the technical challenge of making information available; the social challenge of building diverse and thinking communities; the managerial challenge of creating a culture and environment that encourage knowledge sharing; and the personal challenge of being open to ideas and being prepared to share them.

Regardless of the consensus about IT importance, literature shows mixed results about IT availability and knowledge sharing elevation. In their comparative study between public and private sector in South Korea, Kim and Lee (2006) found that individuals' usage of IT applications was an important factor in employee knowledge sharing. They suggested that public and private sectors should invest in IT applications and knowledge sharing systems. This investment can help executives and managers in enhancing employee perceptions of supportive interest in their knowledge sharing skills. They also found that the degree of ease of IT application usage had a significant influence on employees' capabilities of knowledge sharing. They suggest that increasing the level of user-friendliness of IT tools by participation in the design process and training programmes can improve knowledge sharing. Similarly, Lee et al. (2006), in a study of 356 sample units in South Korea, indicted that IT service quality is one of three managerial drivers that have positive effect on knowledge sharing level and knowledge quality through maturity of the organisational climate for knowledge sharing. Examining whether IT utilisation has different effects on explicit and implicit knowledge or not, Lu et al. (2006) demonstrated that IT utilisation showed a strong influence on the sharing of explicit rather than tacit knowledge. They suggested also that promoting the sharing of tacit knowledge requires innovative strategies that combine and integrate IT-based and face-to face channels. Consequently, they agreed that IT alone is insufficient for successful knowledge management. In a similar vein, Tohidinia and Mosakhani (2010) reported that the level of information and communication technology (ICT) usage is a main determinant of both knowledge collection and donation.

Using a survey of 29 construction companies in USA, Issa and Haddad (2008) demonstrated that IT played an important role in assisting and motivating employees in sharing knowledge. They also found that those companies did not face difficulties using IT because good knowledge management was one of their top priorities and because of the large size of those companies. (See Figure 2.5)



Source: Issa and Haddad (2008: 187)

Figure 2.5: Information technology and knowledge sharing in construction

Some strategists believe that new technologies are the best way to promote knowledge sharing because they provide many advantages for organisations and employees. For example, IT may be suitable for shy or very busy employees and individuals who prefer to avoid face-to-face communication or interaction, especially with people whom they do not know well (Fahey and Prusak, 1998). Also, it can be accessed at the individual's convenience, which facilitates interaction between many people in different places at an appropriate time. However, Connelly and Kelloway (2003), in their study examining the predictors of Canadian employees' perceptions of knowledge sharing cultures, found that the presence of knowledge sharing technologies in an organisation did not predict a positive knowledge sharing culture. They suggested various explanations for this result. One possibility was that their study may have employed an inadequate measure of the presence of technology. They suggested that the measure had to take into account employees' training, degree of use, or attitudes toward the used technology. They also noted that technology did not impact significantly on knowledge sharing culture, nor was it an inhibitor. That is, the employees interpreted the presence of technology as a symbol of management's support for knowledge sharing.

2.4.2.3. Organisational culture and climate

Organisational culture is a complex concept that has been studied widely. Up to date there is no commonly agreed definition in the management literature for organisational culture (Issa and Haddad, 2008). Constant et al. (1994) stated that organisational culture plays an important role in information sharing. They divided organisations into two groups: organisations that discourage information sharing because of the fear of industrial espionage or distracting employees' attention from their own work or of causing role conflict: and organisations that encourage information sharing by promoting a culture of good citizenship and voluntary help. A small volume of research has explored the association between organisational culture and knowledge sharing behaviour. In their qualitative study of 50 different companies, DeLong and Fahey (2000) classified four ways in which culture influences individuals' behaviours toward knowledge creation, sharing and use. These ways are; *"a) culture shapes assumptions about which knowledge is important; b) culture mediates the relationships between levels of knowledge; c) culture creates a context for social interaction; d) culture shapes creation and adoption of new knowledge".*

In a Canadian thesis, Gruber (2000) employed in-depth interviews with 29 individuals to examine the culture of knowledge sharing in the R&D department of a high-tech firm. He found that there is a number of organisational culture factors which influence the culture of knowledge sharing: openness, availability of communication channels, management support and a reward system linked to knowledge sharing behaviour. Moreover, he found that a reward system linked to knowledge sharing represents the key element of a culture that supports knowledge sharing. Using survey questionnaires for data collection from 996 employees, McKinnon et al. (2003) studied organisational culture in Taiwan's manufacturing companies. They found a significant positive relationship between the organisational culture dimensions (innovation, respect for people and stability) and organisational commitment, job satisfaction and information sharing. Moreover, they found that organisational commitment, job satisfaction and information sharing were high when a closer fit existed between individuals' preferred and perceived organisational culture.

A number of cultural dimensions, which are likely to affect knowledge sharing, have been identified. For example, Civi (2000) suggested that training is the most important way to start seeding an organisational culture which seeks a more open, collaborative environment. Furthermore, Park et al. (2004) explored the causal relationship between organisational culture and knowledge management technology in a survey of 26 US organisations selected from different industries. They found a significant positive relationship between using knowledge management technology and cultural attributes. However, trust, as one of these culture attributes, showed a strong positive relationship with other cultural attributes (sharing information freely, developing friends at work and working closely with others). Al-Alawi et al. (2007) studied the relationship between organisational culture and knowledge sharing. Data were collected from several public and private companies in the Kingdom of Bahrain. Semi-structured interviews were used as a supporting tool to emphasise the basic data collected through surveys. They found that specific dimensions of organisational culture (trust, communication, information systems, rewards and organisation structure) significantly influenced knowledge sharing in the studied organisations.

Creating and developing a knowledge sharing culture is considered a key issue when an organisation builds a knowledge management programme. Without an appropriate atmosphere, all efforts to build a knowledge sharing culture are useless (Reid, 2003). In addition, the lack of a culture of communication and exploring new ideas could be a major obstacle to knowledge sharing. In a six case study, communication climate was found to be a key variable, since the constructive communication climate was found to positively predict knowledge contribution, knowledge seeking and affective commitment (Hooff and Weenen, 2004). In their study examining the predictors of knowledge sharing behaviour in the Iranian oil industry, Tohidinia and Mosakhani (2010) reported that organisational climate had a positive influence on subjective norms, which in turn positively determined people's intention to share knowledge.

2.4.2.4. Rewards and incentives

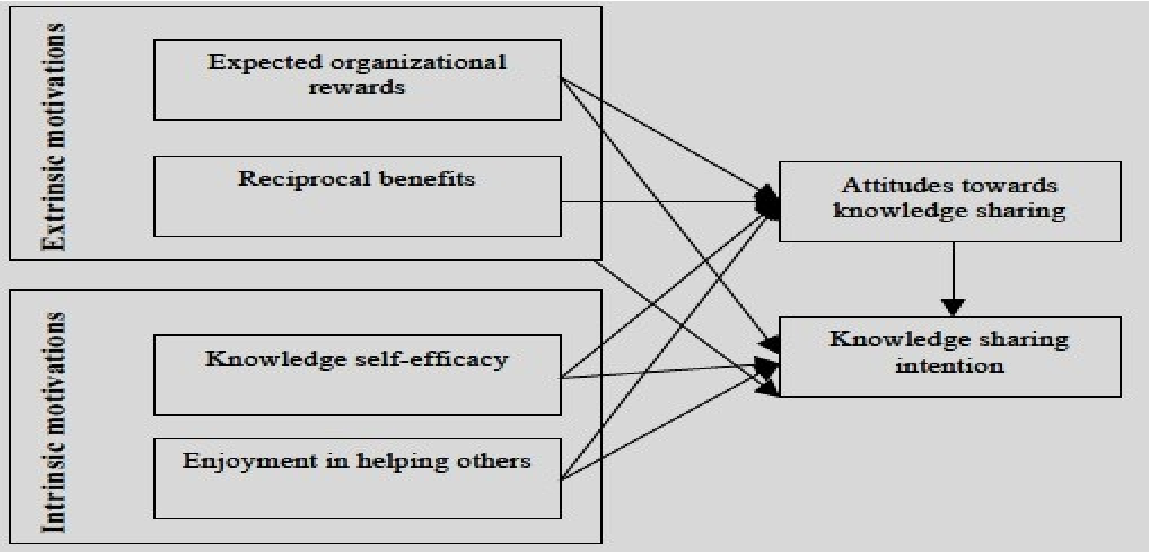
Incentives, which include, for example, recognition and rewards, have been found as extrinsic motivators to promote knowledge sharing and help other motivators for building a supportive culture (Nelson et al., 2006).

The literature shows mixed results about the influence of incentives on individuals' knowledge-sharing. Kankanhalli et al. (2005), for example, found that organisational rewards, promotion, bonus and salary were positively related to the frequency of knowledge contribution made to knowledge management systems, particularly when individuals identify with the organisation. Similarly, Cabrera et al. (2006) found that individuals who perceive high levels of incentives to contribute and obtain knowledge reported that the content of knowledge management systems is useful. Based on a convenience sample of 322 participants from South Korea, Kim and Lee (2006) reported that a performance-based pay system was the major contributor to knowledge sharing among the other significant variables (social networks, IT application usage and end-user focus).

To answer the question, "*Do incentives perceived as sufficient motivate more proprietary knowledge sharing than incentives perceived as insufficient regardless of incentive type (monetary or nonmonetary*?" Wolfe and Loraas (2008) conducted two laboratory experiments using a sample of MBA students. They found that, regardless of the type of incentive, it must be perceived as satisfactory and adequate to stimulate full knowledge sharing. Moreover, they suggested that the non-monetary incentives employed in the study were not perceived as satisfactory when sample units self-determined incentive sufficiency.

On the other hand, another perspective advocates that the only reason to participate in sharing activities is the intrinsic rewards derived from work itself. Constant et al. (1994) found that technical information providers within a multinational organisation's computer network did not know the other party "seekers" at all, and they were not motivated by nay intangible incentives or rewards for their sharing behaviour. Based on the Economic Exchange Theory, which posits that expected rewards will positively influence behaviour, Bock and Kim (2002), interestingly, found that attitude toward knowledge sharing was negatively influenced by expected extrinsic rewards. They suggested that extrinsic rewards may well hinder rather than promote the development of favourable attitudes toward knowledge sharing. The underlying reason, as they mentioned, is that an emphasis on financial rewards to individuals may affect negatively recipients' social relationships with co-workers and/or create an image of poor citizenship behaviour perceived by co-workers as the cause of this negative reaction. In another study that aimed to analyse social-psychological forces as the antecedents of intention toward knowledge sharing, Bock et al. (2005) revealed that knowledge sharing was negatively predicted by anticipated extrinsic rewards. These interesting findings were attributed to the design of the study and/or the specific extrinsic reward mechanisms applied by the sampled organisations. Kwok and Gao (2005/2006) also found that extrinsic motivations (external rewards or punishments) did not positively influence an individual's attitude towards knowledge sharing. However, they found that absorptive capacity (the ability to use knowledge) and channel richness had a pro-social impact on attitudes toward knowledge sharing.

Based on a survey of 172 employees from 50 large organisations in Taiwan, Lin (2007a), in a study that aimed to test the influence of some intrinsic and extrinsic motivators on employee knowledge sharing behaviour (See Figure 2.6), found that the expected organisational rewards did not significantly explain individuals' attitudes and intentions towards knowledge sharing. She explained these findings by noting that the majority of sample units were executives who may not value organisational rewards. Other motivators were suggested to stimulate individuals to share their knowledge, such as encouraging the belief that sharing knowledge with other colleagues was an obligation. She also explained that knowledge sharing mainly occurs in informal interactions, which means that making rewards contingent on knowledge sharing behaviour is a difficult thing.



Source: Lin (2007a: 138)

Figure 2.6: Extrinsic and intrinsic motivations and knowledge sharing

Similarly, Tohidinia and Mosakhani (2010) did not find a significant relationship between organisational rewards and the attitude towards knowledge sharing. They attributed this result to several reasons. They suggested that an effective reward system has to be encouraging and goal oriented. Additionally, they advocated that a reward system needs to be perceived as contingent or performance based to be effective. Moreover, they thought that non-monetary rewards such as social recognition can be more meaningful to employees than pecuniary rewards.

However, relating organisational rewards and incentives with knowledge sharing is not challenge free. For example, Osterloh and Bruno (2000) stated that, as it is very difficult to identify tacit knowledge at the individual level, it is also very difficult to reward or punish employees for sharing or hoarding their tacit knowledge. They also added that if knowledge sharing rewards are linked to the business unit's performance or through the organisation overall, then the unit's members may not have any incentive to abandon their individual competitive knowledge.

2.5. Online communities

The different definitions of the word "community" indicate some difficulties and confusion in defining the term (Bhattacharyya, 2004). The word community has usually been used to refer to geographical proximity and face-to-face relationships. Therefore, a standard definition of community is "*a constructed arena where multiple people with shared interests interact with each other*" (Zou and Park, 2011: 5). Hamman (1999) defined "community" as (1) a group of individuals (2) who share social interactions (3) with some structural relations with each other (4) and share an area for at least some of the time. A community can be characterised by either sharing of the same interests (community of interests) or geographical closeness (e.g., neighbourhood) and by the relational interaction or social ties that draw people together (Heller, 1989). Bhattacharyya (2004) defines community as *"any social configuration that possesses shared identity and norms"* (p.12).

Supported by the huge advancements of communication technology, besides the progress of infrastructure establishment, computers and information technology play a crucial role of making interpersonal and social networking more attractive and powerful through removing and reducing the effect of the geographical and temporal constraints that hinder the traditional face-to-face interaction (Kang et al., 2006). With the emergence and development of the Internet and the growing importance of interactive communication technologies, people began to interact with each other via these technologies. As a result, the concept of community has grown to encompass online communities (Lin et al., 2007).

Prior to discussing the concept of online communities in general and the concept of professional online community in particular, we should first compare this type of community with the traditional or physical communities to reveal the key differences. Online communities have the same three components as the traditional communities: people as members, social interaction and a sense of belonging. However, Zou and Park (2011) describe the following noticeable changes and differences: "*Media is becoming an arbiter, not just a creator, of community; communities can be entirely dependent upon technology for their survival; the identities of community members are more ambiguous; communication is becoming less direct, requiring more proactive interaction among members of a community; and passive or anonymous participation is becoming standard*".

According to Ridings et al. (2002), in comparison with online communities, traditional communities tend to depend on a typical sense of location and the relationships among their members are generally bound to regional and physical proximity. Unlike traditional communities, online communities can work across and beyond space, time and physical organisational boundaries. Zou and Park (2011) argue that online communities differ from traditional communities in the sense that they neither share geographical space nor are self-sufficient (p.108). However, they identified five other criteria which might be fulfilled: the ability to engage in collective action, shared rituals and social regulation, patterned interaction among members, identification, and a sense of belonging and self-awareness of being a community. The following table summarises the difference between traditional communities and online communities.

Table 2.3: Traditional communities vs. online communities

Traditional (physical) communities	Online (virtual) communities
• Depend on sense of location	• Sense of location is not relevant
• Face-to-face communications and influenced by strong ties relationships	• Mostly depend on written communications and influenced by weak-ties relationships.
• Relationships built on regional proximity	• Regional proximity is not important for building relationships
• Homogeneous in social and individual characteristics; but more heterogeneous attitudes.	• Heterogeneous in social and individual characteristics; but more homogeneous attitudes.
• Require logistical and social costs	• Logistical and social costs are low
• Require physical presence	• Most participants are invisible
• Relatively small number of members	• Relatively large number of members

Source: Prepared by the researcher

As for online community definition, it has been defined based on different perspectives. From a social perspective, Ridings et al. (2002) state that online communities can be defined as *"groups of people with common interests and practices that communicate regularly and for some duration in an organized way over the Internet through a common location or mechanism"* (p.273). Chiu et al. (2006: 1873) refer to online communities as "*networks in which people with common interests, goals, or practices interact to exchange information and knowledge, and engage in social interactions*". Some researchers elaborated the concept of online communities based on a socio-technical perspective. Chua and Balkunje (2013), for example, after conducting content analysis on more than 1800 messages from six different online communities, divided online communities into two distinct types: support communities and technical communities. Support communities are more interested in members' relationships, emotions, and informational provision through expressions of consideration, advice and feedback for better decision-making. On the other hand, technical online communities are similar to interest communities where users *"are bound together by common interests to share insights and solutions to problems"* (p.67). Regarding knowledge dynamics, Amin and Roberts (October 2006) identified four overlapping distinctive types of knowledge communities: expert or creative communities, task/craft based communities, professional communities and virtual communities. They argue that the first three types are completely different, based on the type of knowledge they deal with.

Moreover, they asserted that virtual communities overlap with the other three communities, but use information and communication technologies (ICT) to facilitate the process of exchanging and sharing knowledge.

Technologists see online communities based on the software or the platform used to facilitate communication among the community members such as listservers (members communicate through emails), and bulletin board or newsgroups (members communicate or interact asynchronously based on Web 2.0 platforms). These software technologies support the communication within the community, and help in creating the boundaries of the community (see the next section for more details about the different online software platforms). Drawing upon this view, Preece (2000) defines an online community as a *"computer-mediated service which is related to a shared purpose, such as an interest, need, information exchange, or service that provides a reason for the community"* (p.10). Balasubramanian and Mahajan (2001) approached online communities from an economic perspective. Therefore, they define this type of community in a neutral way as any entity that shows all of the following characteristics (p.108): 1) Formed by a group of people who have shared interests; who 2) maximise their utility rationally; and 3) interact and communicate with each other without physical proximity; 4) this interaction is conducted in a social-exchange process that embraces mutual and beneficial production and consumption; with 5) shared objectives.

From a holistic view, Lee et al. (2003) identified four characteristics which define online communities, regardless of the discrepancies or inconsistencies that occur among a number of online community definitions: (1) they are built on a computer-mediated space called cyberspace; (2) activities are done by using computer-based information technology; (3) communication and interaction are the main focus, and the content and/or topics are driven by the community's participants; (4) the online community relationship evolves through and ends in communicating among members. De Souza and Preece (2004) refer to an online community as "*a group of people, who come together for a purpose online, and who are governed by norms and policies*" (p.580). They claimed that their broad definition offers a balanced view of online communities in terms of both social and technical factors (sociability and usability). They further added that this definition applies to a variety of online communities that may differ in structure and practice.

With respect to the concept of professional online community, Wenger (1998) stated that professional online communities can be viewed as an extension of the community of practice. He argued that a "community of practice" is a group of individuals who have a common competency or responsibility within the firm. It connects professionals across organisational boundaries and facilitates the flow of information and transfer of knowledge. Although communities of practice can be formal mechanisms started by management to promote communication and information exchange, they typically are informal groups that form spontaneously. Communities of practice have been identified as effective loci for the creation and sharing of knowledge in organisations (Cox, 2005, Lave and Wenger, 1998). Katzy and Ma (2002) discussed that the main difference between a community of practice and professional online community, although they may have the same meaning, is that the first one concerns individuals located inside a specific large organisation, whereas professional communities' members are usually represented by independent professionals or workers like doctors, lawyers, and craftsmen who are self-employed or working for small companies or within small teams. In this regard, Cabrera et al. (2006: 246) argued that a community of practice allows employees in an organisation to exchange experiences, work methods, improvement ideas and market hints by posting documents onto a database that is accessible to all members of a group.

Moreover, as discussed by Ardichvili (2008: 542), the common attribute between community of practice and professional community is that they are "*not working toward achieving specific performance goals*", unlike virtual teams, which are usually "created to achieve specific performance goals". However, Katzy and Ma (2002) depended on the cost transaction theory to conceptualise the professional online community as a form of organisation that falls between market and hierarchical firm. They divided professional communities into three groups (p.4):

1) "Intra-firm professional communities" or "communities of practice", which aim to improve the process of knowledge and information sharing among the organisation's employees to support the culture of creativity and innovation. They argued that this type of community is very important for creating core-competence and to affirm knowledge as a vital strategic resource. In this regard,

2) "Inter-firm professional communities", which aim to "improve and strengthen the relationships with customers and partners". They argued that this type of community is vital for facing the current dynamic environment.

3) "Public professional communities", the main focus of this study, aims to bring all qualified professional (employed by companies or individual professionals)

> who are interested in specific topics together to share their experiences, information and knowledge. They emphasised that this type of community, where professionals interact, is of great value for members' development, resolving problems, performing tasks, and improving individual capability, without the problem and expense of relocating members.

Reflecting on the above discussion and definitions, this study adapts Chen (2007) and Yin (2010) definitions of professional online community. In this regard, professional online communities can be defined as *"cyberspaces supported by computer-based information technology, centered upon communication and interaction of participants to serve employees, professionals, and scholars, among others who are related to and/or interested in a specific field of knowledge".*

The next two sub-sections discuss in some detail the different platforms and tools that are used to facilitate members' communication and interactions in online communities, and the benefits that such communities produce for their members.

2.5.1. Online communication tools

Generally speaking, all kinds of online communities must have a certain type of infrastructure/software to exist. As discussed by Ridings (2005), all online communities have a "common location" that is not tangible like the location of traditional communities. However, he defined this common location by the mechanism used to provide social space for the community's members to interact with each other. As mentioned earlier, an online community can be described by the software used. There is a range of different types of online communication tools and platforms. Lewis and Allan (2005) suggested that online communication tools can be divided into two main types of technologies that facilitate connection and interaction between community members (p.36). The first type of online communities technology is called *"asynchronous tools".* This type of online community enables members to communicate with each other at a suitable time because it does not depend upon users being connected at the same time. In this type of community technology, a member who seeks other members' knowledge posts his/her message (question/enquiry). This message is held by the system. Other members can read this message and respond to it at their convenience. On the other hand, the second type is called "*synchronous tools*". Unlike the asynchronous tools, these tools enable members to communicate and interact only when they use the same system at the same time which means immediate and live communication. Real-timer, text-based chats, and chat rooms are examples of these technologies (see Table 2.5).

In this respect and based on the common location noted above, Ridings (2005) defines four basic online community tools: listservs, bulletin boards or message boards, conferencing systems, and multiuser dungeons (MUDs). These technology tools can run under several types of communications such as one-to-one email, one-to-many email, electronic newsletters, private messages, and video conferencing. Furthermore, Wang (2010) considered that computer-mediated communities constitute a "*multi-layered communicative space*" (p.43), which means that community members could participate in several conversations throughout different communication channels simultaneously.

The following table lists and summarises the different platforms and tools of information technologies used for communication and knowledge sharing. Description and advantages/disadvantages of each tool are presented in some details.

Table 2.4: Online communities' technologies tools

Technology	Type of communication	Description/Application	Advantages	Disadvantages
Mailing list/listserv	1 to 1, 1 to many	- Asynchronous - Available 24/7 - May be moderated administration or un-moderated. - Broadcast only (push technology) -The list might be hosted by a company or might individually purchased and supported - Listservers deliver messages in two forms - either they trickle through as they are sent or a moderator collects them into a digest - Visitors must register	- Easy to use/ appropriate for newbies - does not require special equipment except email capability - appropriate for sending announcements and newsletters - appropriate for broadcasting messages and group discussions - members may take time to reflect, write and edit items and posts posted to the list - Registration is required – may help to create a feeling of belongings	- Visitors have to register – so it might discourage participation - Lists with too many postings may be overwhelming to other members - Everything posted or wrote to the list reaches each member - Context for responses and enquiries' answers have to be provided by including all parts of previous messages - If a digest is sent it can be difficult to respond to a particular message because messages are not threaded or ordered.
UseNet News newsgroup	1 to many	- Asynchronous 24/7 - Collection of discussions on various topics hosted on the Internet, cross posting between UseNet News groups is common and spamming is frequent - Users have to go to UseNet to read messages (pull technology) Open communities, no registration required to post -Usually non moderated	- Open communities, no registration required to post – may encourage wider participation - No special equipment beyond Internet access - A large number of newsgroups exist on the Internet with a wide range of topics - It is easy to find an existing group to match your interests - Participants may take time to reflect, compose and edit items posted to the list	- Open communities, no registration required to post – may create a sense of anonymity that can lead to inappropriate messages and hostile postings (flaming) - Spamming is frequent - Need sufficient expertise to run - The volume of messages in some groups may be overwhelming
Message Boards/bulletin boards/Group discussion	1 to many	- Asynchronous 24/7 - Users have to go to a site to read messages (pull technology) - May be moderated or non-moderated - Usually require registration, but may be open - Discussions are threaded or linear - Many bulletin board services are set up to send an email to signal new - Messages, responses, and/or topics of interest	- No special equipment beyond Internet access - Participants may take time to reflect, compose and edit items posted to the list - It is easy to find an existing group to match your interests - Discussion threads provide historical context - Linear organisation provides separate topics for each conversation and is good for in-depth discussion	- Newcomers may find it hard to break into the conversations - Following threads may become confusing - May be difficult and time consuming to moderate a large board - Group norms may develop that stifle new points-of-view and participation

Technology	Type of communication	Description/Application	Advantages	Disadvantages
			- Participants may take time to reflect, compose and edit items posted to the list - Many Bulletin boards provide good search facilities that enable participants to search on topics, or people, or messages sent on or between particular dates, etc.	
Real-timer, text-based chats	1 to 1, 1 to many	- Synchronous, text environments - Messages are short and conversation moves on quickly - Real-time auditoriums may be structured to accommodate large number of persons in a public chat - Instant messaging provides real-time chats for private groups - Participants register, pull technology – you have to go to the site	- Provides a sense of immediacy - Allows people to communicant in real-time -Good for teaching classes, holding meetings, conducting interviews and to hang out and relax - Newcomers can learn to participate in chats easily - Participation is fast paced and entertaining	- Must be online at a specific time to participate - No time to reflect, compose and edit postings - Several conversations may appear at the same time and be confusing for participants - Conversations may get inter-twined because messages appear on a first come first displayed basis - Some types of real-time chat may require special download and configuration
Immersive graphic environments	1 to 1, 1 to many	-Synchronous, interactive, navigable environments using graphics, sound, animation and customizable characters (avatars) - Highly versatile gaming e-business, learning and entertainment environments - May be moderated or non-moderated, open for public - Pull technology – you have to go to the site	- Interactive, visual and aural environments allow individuals creative freedom to express themselves - Provide highly collaborative environments - May provide a broader experience - May generate a stronger sense of presence and engagement	- Many types of immersive environments require high memory computers with audio ports, headsets, microphone and fast Internet access - May require downloading programs or plug-ins that work with specific browsers - The space can become crowded with avatars which limits interaction - Unclear how much value is added by these environments

Source: Lewis and Allan (2005); Preece and Maloney-Krichmar (2003)

2.5.2. Benefits of using professional online communities

Online communities have emerged as an essential element of the knowledge economy and for organisations are often considered as a source of competitive advantage, as well as a channel for organisational learning (Balasubramanian and Mahajan, 2001, Guo and Sheffield, 2008, Millen et al., 2002)

According to the social constructivist theory, people can develop and improve their skills and creativity through solving work-related problems in collaboration with capable peers (Jonassen et al., 2002). In other words, one of the important and effective methods for professional development occurs when those professionals are involved in discussions with their peers about their ideas, experiences, and collaboratively solve work-related problems. Wenger (1998) emphasises that knowledge creation occurs in communities when members are involved and participate in problem solving and when they share their ideas and knowledge through articulating, illustrating, and negotiating on the better alternative solutions to solve the problems. In general, there are three distinct and different groups of benefits that might be obtained from a regular community of practice: individual, community and organisational (Millen et al., 2002). At the individual level, they suggest that there are benefits that might be obtained from increased understanding of others' efforts and increased levels of trust. The community's members will have access to experts and resources within the subject area relevant to their work. On the other side, communities benefit from increased idea generation, better quality of knowledge, and more effective problem solving. According to Millen et al. (2002), the individual and community benefits will generate tangible benefits at the organisational level in the form of positive business outcomes for the organisation. Such benefits may include improved communication, successful projects, product innovation, a reduction in time spent accomplishing tasks, and the greater operational efficiency.

Moreover, previous research suggests that online communities can result in economic benefits because of the quantity and quality of knowledge created and shared in these communities (Gu et al., 2007). The economic view of online communities suggests that these kinds of communities are economic entities in which value and resources can be produced and enhanced (Arena and Conein, 2008). Balasubramanian and Mahajan (2001) go a step further to consider online communities as a source of "virtual information capital", which can be conceptualised as a body of information created by the cumulative contribution of, and consumed by, the community's members. They stated that a virtual community can have increased economic returns because information does not deprecate; moreover, members usually choose to contribute and/or consume the generated information in a manner that maximises their total social interaction utility, which emerges from one or more of three sources (Balasubramanian and Mahajan, 2001):

"(a) Focus-related utility, which derives from the constituent's belief that the contributions of all the constituents, himself included, strengthen or advance the focus of the community (e.g., a constituent of an environment-conscious community may provide information that strengthens the case for specific nature conservation project),
(b) Consumption utility, which derives from the constituent's direct consumption of the contributions of other community constituents.
(c) Approval utility, which derives from the satisfaction that ensues when other constituents consume and approve of the constituent's own contributions". (pp.125-126)

In a similar vein, Lesser and Storck (2001) seem to believe that a community might be considered as a base for developing and supporting the social aspects that might be desired by individuals while they add value to the organisation. They explain that the theory is that online communities contribute to positive behavioural change that might lead to an environment where knowledge is shared, which certainly has a positive effect on organisational performance. They examined a number of communities in organisations, and they concluded that communities add value in four different ways: "*decreasing the learning curve of new employees; responding more rapidly to customer needs and inquiries; reducing rework and preventing "reinvention of the wheel"; spawning new ideas for products and services*" (p.836).

Vavasseur (2006) argues that "professional online communities" are similar to learning groups. In these communities, "*professionals can share their experiences and identify best practices associated with daily problems encountered in a work environment*" (p.51). Furthermore, he argues that a professional online community permits members to share information and knowledge, besides participating in discussions at their convenience. Dias (1999) tried to highlight the importance of online community by stating that *"the erosion of physical limits and of sense and identity frontiers has given rise to non-centralized and flexible computer mediated narratives that allow their authors to communicate in the cyberspace as if they were involved in some kind of social interaction*" (p.168).

[Lewis and Allan (2005)](#) outlined the benefits of online communities in three groups: individuals, organisations, and sectors. Regarding sectors, they believed that online communities may be sponsored by "*a professional or trade organisation or by regional strategic partnership*" to achieve the purposes of dissemination of good practice, innovation and improved practices, and multi-professional collaboration (p.18). As for the individual and organisational benefits, the following table (2.5) summarises these benefits as cited by Lewis and Allan (2005).

Table 2.5: The benefits of online communities

Benefits of membership	Benefits for continuous professional development	Benefits for organizations
• Access to information and expertise at a time and place to suit participants. • Access to kike-minded individuals. • Access to mutual support. • Opportunities to collaborate with and learn from others. • Shared perspectives. • Opportunities to interrogate data and theory with input from others. • Dynamic new approaches to learn. • Working out-of-the-box more creativity. • Opportunities to try out new ideas. • Empowered to challenge accepted institution/organisation assumptions. • Opportunity to find innovative solutions to complex problems. • Sense of identity and group membership. • Support and friendship. • Opportunity to "let off steam" in a safe environment. • Improved group outputs. • Collective responsibilities. • Confidence building.	• Encourages professional knowledge sharing and knowledge management. • Helps specialists assigned to individual project teams connect with specialists in other organizations in other geographical locations. • Encourages multi-professional working. • Virtual place to discuss issues related to effective daily practices; improved productivity and services; and enables community members to work more efficiently at lower cost. • Encourages cross-sector collaboration. • Online discussion automatically recorded and evidenced. • Experts can be brought in to give inputs on specific themes. • Provides flexibility in time, pace and place. • Opportunities for acquiring new knowledge. • Gives practitioners more effective ways to address problems or current issues. • Challenges people to be more creative. • Promotes leadership and peer support. • Collaborating activities promote new techniques.	• Shared information and expertise. • Team building. • Knowledge management. • Development of good practice. • Empowered to challenge accepted institutional assumptions. • Opportunity to find innovative solutions to complex problems. • Enhanced sense of identity and group membership. • Effective working across traditional departmental boundaries. • Improved communication. • More highly motivated staff. • Positive impact on staff morale. • Develops a culture of change and innovation. • Dynamic problem solving and "out-of-the-box" solutions. • Development of learning organisational practices. • Continuing professional development of those involved. • Increased productivity. • Increased levels of practitioner competence. • Service improvements.

Source: Lewis and Allan (2005: 15-18)

2.6. Knowledge sharing and online communities

Previous research has suggested that online communities (Preece, 2000, Zhang et al., 2010) and knowledge sharing behaviour are essential to knowledge management success (Kankanhalli et al., 2005, Wasko and Faraj, 2005). This perceived importance has motivated researchers to investigate knowledge sharing in online communities to understand and identify which determinants are crucial to motivate community members to share their knowledge and, consequently, to understand the factors of knowledge management success (e.g. Chen, 2007, Chiu et al., 2006, Hara and Hew, 2007, Lin et al., 2009, Wasko and Faraj, 2005, Posey et al., 2010).

Hersberger et al. (2007) developed a conceptual framework to examine online virtual communities. According to this framework, there is a four-tier pyramid (see Figure 2.7), with each successive tier up is more specific than the previous one. Moreover, moving up means more focus on the individual and less concentration on the community.

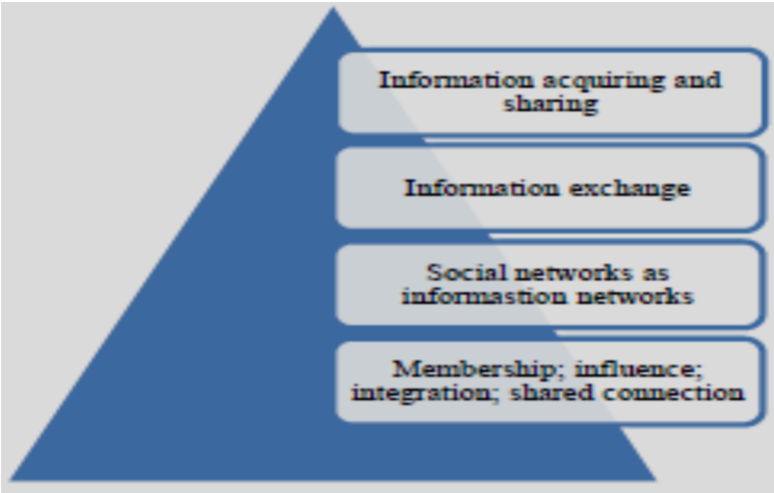


Figure 2.7: Conceptual framework for examining online virtual communities

As seen in the above figure, there are four-tiers: tier 1) the foundational building block; tier 2) social networks as information networks; tier 3) information exchange; tier 4) information sharing. They argue that tier 3 is different from tier 4, in that information exchange is reciprocal and multidirectional whilst information sharing describes a single and one-directional event. Furthermore, they strongly emphasise that online communities are mainly built and supported by formal and informal interactions which aim at information exchange.

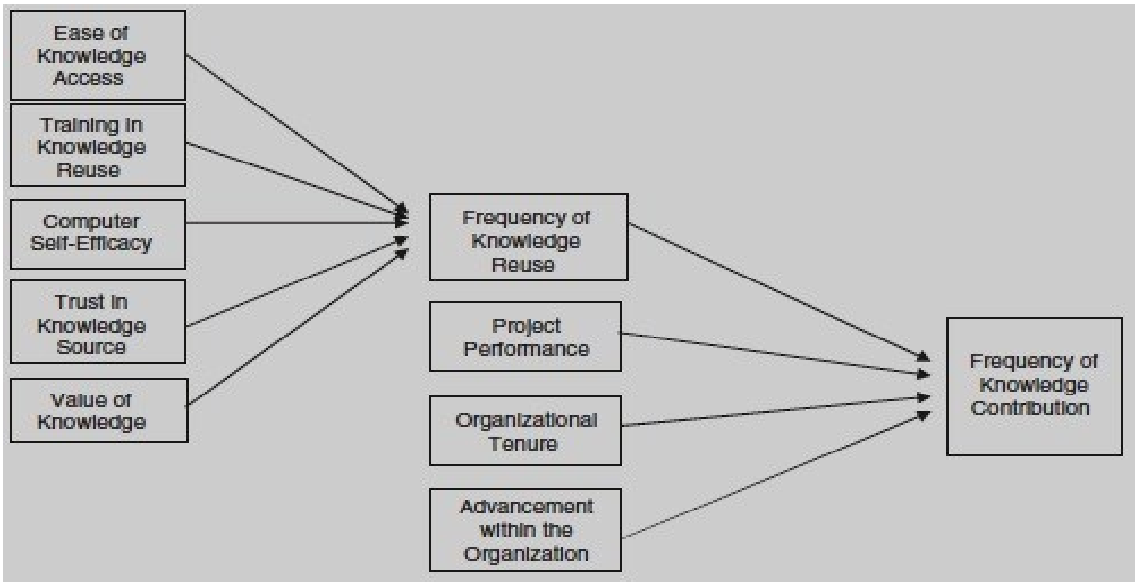
The role of online communities' users can be classified into two activities: knowledge acquisition and knowledge provision. Without these activities, this type of community might struggle to provide the benefits which are expected by members, might lose membership attraction, and ultimately members might become unwilling to participate because of the perceived unsatisfactory net benefits (Butler, 2001). By correlating the roles that may be played by community members and the progressive stages of community involvement, Kim (2000) identified five kinds of online community member roles. A) Visitors (individuals who pay a quick visit with no persistent membership or identity). B) Novices (fresh members who recently joined the community and need to learn about the community and to be introduced to the community life). This type of member seeks to discover the community, with no or limited involvement. C) Regulars (members who participate and get involved in community activities). D) Leaders (members who voluntarily run the community). E) Elders (regulars and leaders who share their knowledge and establish the culture to the rest of the community). According to Kim (2000), the degree of members' involvement in their communities increases as they move from one role to another. Zimmer et al. (2008) and Kim et al. (2011b) classify knowledge sources in this kind of community into static and dynamic knowledge sources. They argue that a static knowledge source is constituted from web pages where knowledge and information flow from the source to people who seek knowledge and information, and those people do not give any responses to the knowledge sources or contributors on the web page. Alternatively, according to Zimmer et al. (2008), a dynamic knowledge source is constituted from web pages where knowledge and information can flow between the provider and the receiver bidirectionally. In dynamic knowledge and information sources such as online communities the knowledge seekers can directly post their problems or questions, and then some other members (contributors) who have the ability to answer the question and/or help to solve the problem can respond.

Knowledge contributors are individuals who share information, opinions and experiences, and respond to other members' requests (Hooff and Ridder, 2004). Regarding online communities, contributors have unique knowledge and spend some time and energy to provide knowledge to others. Many studies have tried to explore the factors that motivate community' members to contribute their knowledge. Particularly in organisational settings, knowledge sharing behaviour was found to be influenced by social ties (e.g. Bagozzi and Dholakia, 2002, Chiu et al., 2006, Connelly and Kelloway, 2003), knowledge sharing self-efficacy (Chen et al., 2009, Chen et al., 2010, Kim et al., 2011a, Kankanhalli et al., 2005), reciprocity, reputation and enjoyment in helping others (e.g. Chiu et al., 2006, Kankanhalli et al., 2005, Wasko and Faraj, 2005), mutual trust (Chiu et al., 2006, Quigley et al., 2007), and subjective norms (Bock et al., 2005).

Knowledge collectors (seekers), on the other hand, browse or search for needed information in the online community. As stated by Wang and Fesenmaier (2004), if a seeker finds the required information unavailable or ambiguous, he/she may post a question, expecting other members (posters) to respond with appropriate answers in a form of advice and/or experience. Zhu and Chang (2013) reported that users and non-users' attitudes towards online communities were mainly determined by seeking information and social support. In their qualitative study to explore why community members are inclined to seek (lurk) instead of posting and helping community' members, Preece et al. (2004) argued that lurking behaviour might derive from the lack of ability to use the software for posting, members' thoughts that their participation might not be useful or important, needing more time to find out about the group, and finally, poor dynamics or poor fit with the group. They stated that lurking behaviour is a normal activity and should be supported by providing effective tools for reading and easily finding the required information. Therefore, they introduced several strategies that might encourage community members to participate and interact with other members. Encouragements by the moderators and explicit comments are important for members' participation and activities. Moreover, rewards and incentives might motivate lurkers to contribute. Hew and Hara (2007a), in their qualitative case study to examine the patterns of motivators and barriers of knowledge sharing between nurses, found that most nurses may not seek knowledge because of the perceived inability to utilise knowledge.

Unlike knowledge contribution behaviour, limited empirical studies have examined knowledge collecting behaviour. Bock et al. (2006), for example, conducted an empirical study using PLS-SEM to explore "*how collaborative norms in an organisation impact knowledge seeking with regard to a common knowledge management system type – the electronic knowledge repository (EKR)*" (p.357). They reported that EKR use for knowledge seeking by employees is mainly determined by collaborative norms, which in turn moderate the influence of the perceived usefulness. Moreover, they found that individuals' beliefs in their ability to collect knowledge and information from EKRs and the availability of resources (e.g. time, training and management support) have a significant influence on knowledge seeking from the EKRs. However, the results did not demonstrate a significant association between ease of use and future obligation, and using an EKR for knowledge seeking.

Exploring knowledge contribution and knowledge collection within a single study is still a theoretical gap (He and Wei, 2009). However, exclusively in organisational settings, several researchers have tried to address this gap. For example, Watson and Hewett (2006), based on the social exchange theory and the expectancy theory, conducted a study which aimed to: 1) investigate the factors that motivate employees to provide their knowledge to the company KMS, and 2) investigate the factors that motivate employees to access the system to reuse this knowledge (see Figure 2.8).

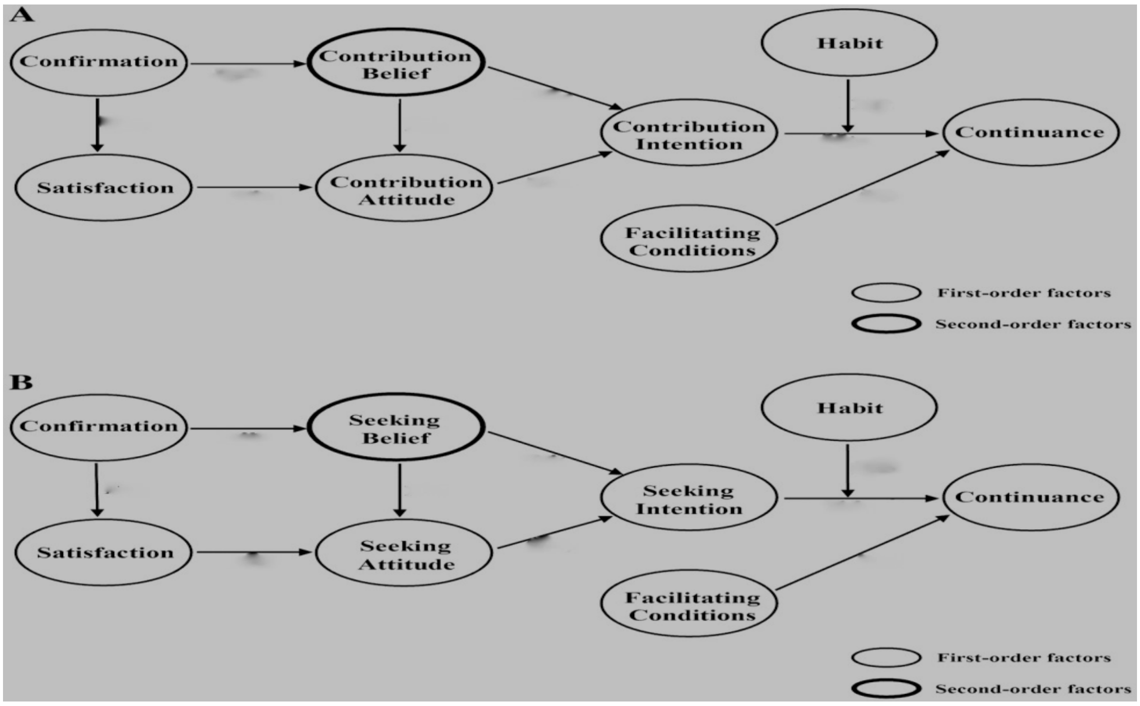


Source: Watson and Hewett (2006: 148)

Figure 2.8: Antecedents of knowledge provision and knowledge reuse

They reported that knowledge reuse was significantly determined by ease of knowledge access, trust in the knowledge source, and the expected value of the knowledge, whereas knowledge contribution was found to be explained by knowledge reuse, organisational tenure, and advancement within the organisation.

Phang et al. (2009) found that knowledge seeking and knowledge contribution were significantly influenced by perceived usability and perceived sociability. They reported that knowledge seekers were more influenced by perceived usability, while knowledge contributors tended to be more influenced by perceived sociability. In a similar manner, He and Wei (2009), based on the theory of cognitive integration and the IS continuous model, developed two separate models (Figure 2.9) to investigate knowledge contribution and seeking beliefs in knowledge management systems KMS in three different companies. They found that employees' contribution intention was determined by contribution attitude and contribution beliefs (management influence, social relationships and enjoyment in helping others), while seeking intention was influenced by seeking attitude and seeking beliefs (social influence, perceived usefulness and seeking effort). Furthermore, they reported that seeking/contribution intentions were found to be explained by different and distinct sets of determining beliefs. They demonstrated that management influence was a significant predictor of contribution belief but did not show significant influence on seeking beliefs. However, social relationships and facilitating conditions were found to reveal significant effects of employees' beliefs in both models.



Source: He and Wei (2009)

Figure 2.9: KMS continuance: (A) Contribution perspective; (B) Seeking perspective

Finally, in their study to examine how the contextual factors (norm of reciprocity and trust) and personal perceptions of knowledge sharing (knowledge sharing self-efficacy, perceived relative advantage, and perceived compatibility) can influence professional virtual community members' willingness to share knowledge with other members and their loyalty to their communities, Lin et al. (2009) collected data from 350 members in three Taiwanese communities. They reported that trust, besides revealing significant direct effect on members' behaviour, was found to be significant mediator between norm of reciprocity and knowledge sharing behaviour. Moreover, knowledge sharing self-efficacy, perceived relative advantage and perceived compatibility were found to be significant mediators between trust and knowledge sharing behaviour which, in turn, showed significant influence on members' loyalty.

As discussed in Chapter One and as Appendices A and B show, the on-going literature clearly indicates that work integrating the possible factors that could explain the use of professional online communities for knowledge sharing is extremely limited, and very little is known about which factors provide the main contribution in explaining professional online communities usage for knowledge sharing. Moreover, previous research argues that no single theoretical lens can explain knowledge sharing phenomenon. Online communities are web-based applications that operate through computer software and as the online community members are the main actors in the knowledge sharing process, it is expected that members' use behaviour will be influenced by individual cognition, social relations, and the technical aspects that constitute the environment.

Regarding the two kinds of usage behaviours, the existing literature has not highlighted how professional community members, who voluntarily use the community to share their knowledge, perceive the importance of the different factors in use for knowledge acquisition and use for knowledge provision. Furthermore, the previous studies in online communities and knowledge sharing show clear limitations of some theoretical perspectives that may help better explain the use of these communities for knowledge sharing. Technology acceptance and adoption theories, for example, can provide new insights and comprehensive understanding of use (Benbasat and Barki, 2007, Kankanhalli et al., 2005). The next chapter will discuss in detail the different theoretical perspectives that may help in filling the addressed gaps.

2.7. Summary

This chapter began by defining the concept of knowledge management and knowledge sharing. Then, it moved to discuss in detail and based on extensive literature review the different factors that have been found to affect knowledge sharing. Knowledge sharing determinants were classified into two main groups: personal and individual factors and contextual factors. Next, definitions of online community were introduced, followed by discussing online communities' tools and technology and the expected benefits of using and promoting professional online communities. Finally, the connection between knowledge sharing activities and online communities was discussed. The next chapter will present the theoretical foundations for the current study and introduce the research models.

Chapter Three: Theoretical background and hypothesis development

3.1. Introduction

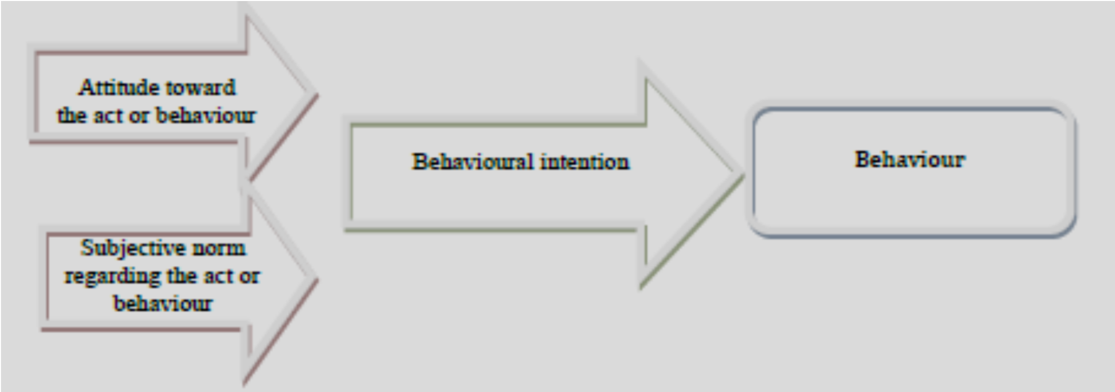
This chapter aims to discuss and present the theoretical background that was used to develop the study frameworks. Several well-established theories will be discussed in detail. Next, based on the review of past empirical research, the chapter will extend the argument in order to map three theoretical frameworks to model the hypotheses developed.

3.2. Theoretical background

Examining theoretical frameworks previously used to explore technology use and adoption in other disciplines may provide an appropriate framework for studying professional online community use for knowledge sharing. Therefore, highlighting the different theories that have guided previous research might be useful for building a suitable framework(s) to be used to explore using professional online communities for knowledge sharing. Several theories will be discussed in detail in the following sub-sections.

3.2.1. The Theory of Reasoned Action

The Theory of Reasoned Action (TRA), developed by Ajzen and Fishbein (1980), is one of several theories that have been used widely by many researchers for understanding factors affecting technology usage and knowledge sharing (see the previous chapter). Based on this theory, an individual's intention to act in a certain way is a function of the beliefs that a specific behaviour will lead to a certain outcome (see Figure 3.1). TRA employs two components, attitudes and norms (or the expectations of other people), to predict behavioural intention. According to Ajzen and Fishbein (1980), behavioural beliefs influence our attitude about performing the behaviour in question, and normative beliefs affect the subjective norms we associate with the behaviour.



Source: Ajzen and Fishbein (1980).

Figure 3.1: The Theory of Reasoned Action

From Figure 3.1, it can be seen that intentional behaviour is determined and mostly explained by individuals' attitudes towards doing or performing the action, and by what other people will think (social norms) if individuals do this action.

TRA has been argued to be a powerful theory in predicting and explaining a wide range of individual behaviour; therefore, it is widely adopted to identify and explain individuals' behavioural intention and their actual behaviour. For example, Gupta and Kim (2007) employed TRA to predict the mechanism by which commitment is developed and formed in online communities. They demonstrated a significant relationship between pleasure, functional usefulness and commitment. Moreover, system quality and pleasure were found to influence members' commitment through their attitude towards the community. Hsu and Lin (2008), based on TRA, developed a theoretical model to examine individuals' intention to blog. The findings indicated that community identification and attitudes toward using blog influenced the intention to blog. On the other hand, attitude significantly mediated the relationship between enjoyments, ease of use, reputation, and intentions to blog. (See Appendices A, B, and C for more studies applied TRA)

TRA is not without limitations. Correspondence is considered one of the limitations of this theory (Ajzen, 1985). Predicting specific behaviour requires that attitude and intentions must match each other on action, time, target, and specificity. Another limitation comes from the assumption that individuals' behaviour is under a process of cognitive control. According to this assumption, the theory only predicts behaviours and actions that are consciously thought out beforehand; however, behaviours that are not consciously thought out (e.g. irrational decisions and habitual actions) cannot be explained by this TRA (Bandura, 2002). In other words, and according to this theory, individuals will perform the behaviour only if they have the intention to do so. However, there is a possibility that this behaviour is not voluntary or within the individual's control. For instance, behaviour might be performed habitually or unconsciously, and different behaviours may require skills the individual does not possess.

3.2.2. The Theory of Planned Behaviour

For enhancing the predictive power of the TRA, Ajzen (1985) extended it by including individuals' perception of internal and external constraints or restrictions on behaviour. In other words, this extension involves adding one major predictor to the model which called "perceived behavioural control". However, this revised framework is named the Theory of Planned Behaviour (TPB).

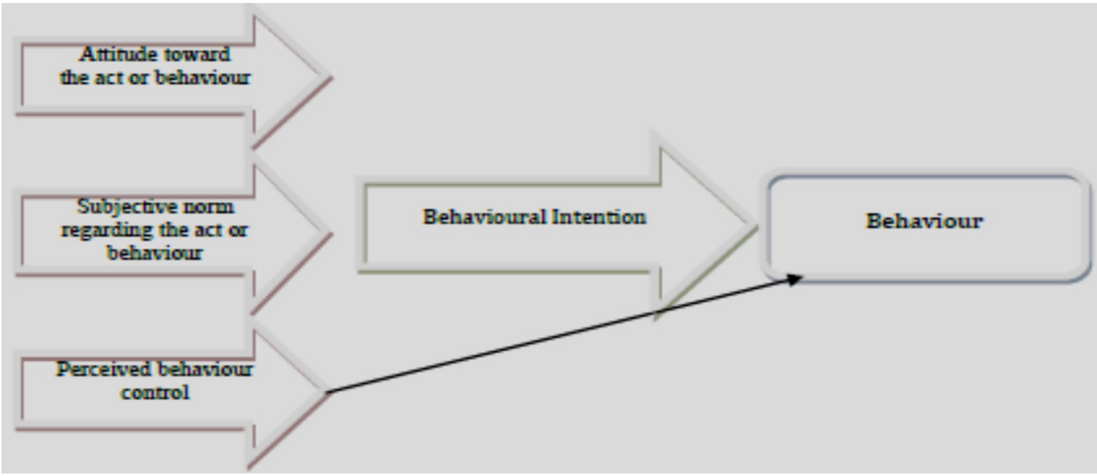


Figure 3.2: The Theory of Planned Behaviour

The above figure shows how the effects of perceived behavioural control (possessing the skills, abilities and any other resources to execute a specific action or behaviour), subjective norm (the influence of the social environment) and attitude toward the behaviour combine together to influence the person's intention to perform a given behaviour. In taking into account perceived behavioural control, according to (Ajzen, 1991, Ajzen, 1985), this model depends on the fact that the majority of behaviour is controlled and constrained to a greater or lesser degree by the availability of resources and the existence of outside restrictions. Hence, perceived behavioural control means individual's perception of the resources available or opportunities needed for performing certain behaviour (Ajzen and Madden, 1986).

TPB has become one of the most used theories to explain individuals' beliefs toward the behaviours. In a number of meta-analyses, researchers such as Ajzen (1991) and

Armitage and Conner (2001), and drawing on the previous TPB research, concluded that the constructs of TPB provide the required explanation power to predict human behaviours. Mathieson et al. (2001) commented that TPB can be employed "*to predict a wide range of behaviours*" (p.88). Although TPB has been utilised widely to understand human behaviour in diverse situations and contexts for a long time, recently some researchers, as discussed in the previous chapter, have revealed that TPB can be used as a theoretical foundation for understanding knowledge sharing intentions (see Appendices A and B). For example, in their study to explain consumers' decision in e-commerce use, Hsu and Lu (2004) revealed that TPB has the ability to predict e-service usage. They significantly found a direct relationship and indirect relationship (intention to use the service) between subjective norms (interpersonal norm and social norm), perceived behavioural control and the actual use of e-service. Chen et al. (2009) reported that subjective norm, behavioural control, and individuals' attitudes toward knowledge sharing behaviour influence and explain sharing behaviour via behavioural intention.

TPB, however, is also not without limitation and criticism. For example, Taylor and Todd (1995) claim that the TPB model requires an individual to be motivated to perform a specific behaviour. However, according to Taylor and Todd, this might be a drawback when examining adoption behaviour. Moreover, they argue that TPB has introduced only one factor (perceived behaviour control) to answer all non-controllable aspects of behaviour. Moreover, Ogden (2003), drawing from an intensive literature review, noted that the role of the construct of attitude, norms and behavioural controls is inconsistent. However, Ajzen and Fishbein (2004) acknowledged this issue and explained that the importance of these constructs might vary according to the situation, population and behaviour. In this regard, Mathieson et al. (2001) suggested that researchers should use customised instruments when they adopt TPB in obviously different settings or circumstances. Recently, Sharma and Atri (2010) believe that TPB may not be appropriate for studies that attempt to investigate individuals' behaviour modification, because the constructs of TPB cannot provide interpretations of behaviour that changes over time. In view of that, Benbasat and Barki (2007) appear to indicate that although TPB can provide a useful lens for technology acceptance and adoption, it is not free of problems such as exclusion of emotions and habits, and "*the lack of knowledge regarding the precise nature of the relationship between attitudes, subjective norms, and perceived behaviour control*" (p.215).

3.2.3. The Social Cognitive Theory

This theory was developed based on the "Social Learning Theory", which was first introduced by Miller and Dollard in 1941. Straub (2009) explained that the social learning theory has two main functions: (1) as an individual observes others doing a specific behaviour, adopting a technology for example, he/she tends to adopt the technology for himself/herself. (2) "*modelling was primarily conceptualized as a concrete phenomenon, but the technological developments of recent years and the accessibility of mass media, modelling, and vicarious learning suggest that vicarious learning also occurs in the symbolic realm*" (p.629). Moreover, he discussed that social learning does not only determine the decision whether or not to use and adopt a technology, but also affects the expansion of the Internet, television and radio, and even mobile phones worldwide.

Many theories have been developed based on the social learning theory. The common factor between these theories is their assertion of the importance of cognitive variables, their emphasis that cognitive factors mediate the different motivators and individuals' behaviour, and the introduction of individual control over behavioural responses to motivate. The social learning theory has undergone many developments by several scholars. The psychologist Albert Bandura (Bandura, 1991, Bandura, 1997, Bandura and Cervone, 1986, Bandura et al., 2001) introduced the concept "vicarious learning" or modelling as a social learning form. Furthermore, they introduced a number of new concepts (e.g. self-efficacy) and the belief that a significant temporary difference in time lapse occurs between an action and its influence. Bandura's developed model is called the social cognitive theory and some researchers call it the self-efficacy theory.

Fagan et al. (2003: 95) defined the Social Cognitive Theory as a "*theoretical framework for analysing human motivation, thought, and action that embraces an interactional model of causation in which environmental events, personal factors, and behaviour all operate as interactive determinants of each other*". Fiske and Taylor (1991) explained that social cognitive theory is more concerned with the analysis of how individuals think about themselves and about others in their environment. Thus, there are two pairs of factors; the first pair is related to a person in a specific situation and the second pair is related to cognition and motivation (Fiske and Taylor, 1991). It is based on the notion of the reciprocal determination of several environmental influences such as social pressures, unique situational characteristics, personal and other cognitive factors, and behaviour (Compeau et al., 1999). Accordingly, understanding how an individual behaves in a specific situation is determined by how he or she perceives and interprets the situation.

In general, Social Cognitive Theory tries to understand the psychological functioning in terms of "triadic reciprocal causation" between personal cognition, behaviour and external environment. According to the theory of behaviour, cognition and other personal factors and environmental events interact together, bidirectionally (Wood and Bandura, 1989, Bandura and Wood, 1989), and therefore people and environment are both products and producers of each other (Bandura and Wood, 1989). In other words, individuals, according to this theory, usually choose the environment in which they exist, besides being affected by this environment and in turn their behaviour influences this environment in a given situation. The following figure illustrates the association among the three reciprocal causal components: personal factors, behaviour, and external environment.

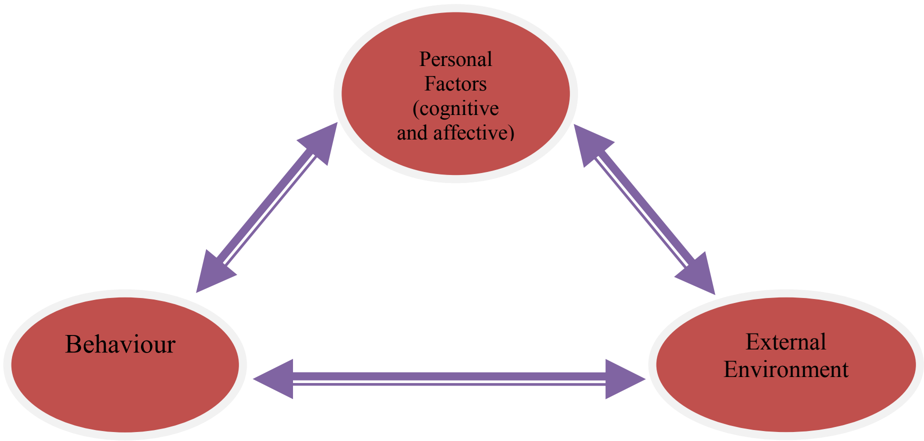


Figure 3.3: Triadic reciprocity or reciprocal determinism

Source: Wood and Bandura (1989: 362).

Bandura (1991) suggests that this triadic reciprocal causality (reciprocal determination) consists of three interactive relations. First, what individuals feel, think and believe will affect how they behave, and in turn these beliefs are modified by behavioural experience through the learning process (Bandura, 1989: 3). The second relation revolves around behaviour and the environment. According to Bandura (1989), people's behaviour influences environmental events, and as the environment changes, behaviour may be altered as well (Bandura, 1989). The third relation is between personal characteristics and the external environment. Individuals' cognitions and traits may be developed and modified through many social influences such as modelling, instruction and social persuasion (Bandura, 1989). At the same time, being affected by their characteristics, individuals select what they feel and perceive in their environment, so passively they may affect their social environment even before acting (Bandura, 1989). Moreover, he argues that some specific sources of effects are greater than others and the triadic relationships differ according to the person, the behaviour under examination, and finally the situation in which the behaviour happens.

Wood and Bandura (1989), who first introduced the Social Cognitive Theory to organisational studies, argue that this theory provides a conceptual framework able to describe, predict and improve employees' performance in organisations through understanding the psychological mechanisms that connect the different social-structural factors to organisational performance. According to Wood and Bandura (1989), there are three features of Social Cognitive Theory that are relevant to the organisational context: the development of people's cognitive, social and behavioural competencies through mastery modelling; the self-efficacy regulatory mechanism and self-regulation of motivations and actions through the goal system (p.362).

Self-efficacy and outcome expectations are considered the main components of the Social Cognitive Theory. It proposes that a person's behaviour is reciprocally determined by the interaction with environmental factors and cognitive factors. Generally, and according to Compeau and Higgins (1995a), these factors include self-efficacy and outcome expectations. Therefore the next two points will discuss these two concepts in more detail.

3.2.3.1. Self-efficacy

Self-efficacy is considered as a motivator that is gradually accumulated with individual experiences. Downey and McMurtrey (2007) posited that "*self-efficacy is an individual's confidence in their ability to successfully accomplish a given task or activity*" besides the intrinsic stimulus to carry out that behaviour (p.383). Based on Reid and Levy (2008), self-efficacy can influence individuals' goals, persistence and achievement. It can also determine the task that individuals choose or select. Moreover, self-efficacy determines the activities that an individual participates in, the effort that he/she makes in carrying out those activities, and the persistence that will be exerted in the face of difficulty.

Self-efficacy is different from self-esteem in that the latter is based on many aspects of a person's self-concept and ability, while self-efficacy is related to one specific domain (Bandura, 1997). Therefore, Brown et al. (2001) explained that an individual might have strong self-esteem; however, at the same time might have low self-efficacy for performing a specific behaviour.

An individual's self-efficacy belief can be developed from several sources of influence (Reid and Levy, 2008). One of the most effective ways of creating a strong sense of efficacy is through mastery experiences (Bandura, 1994). Bandura argues that experiences that are successful might build a strong self-efficacy belief. On the other hand, experiences of failure undermine self-efficacy, especially if those experiences take place before a sense of efficacy is firmly established.

As discussed by Bandura (1994), there is another possible way of creating and strengthening people's belief of efficacy, which is "the vicarious experiences provided by social models". For example, seeing someone succeed at a similar task or job might stimulate an individual's belief that he/she also possesses the ability to master or achieve any similar task. Similarly, seeing others' failures, for example, can lower an individual's judgment of his/her efficacy and moreover it might weaken their efforts. In this case, Bandura (1994) believes that *"the perceived similarity is determined and influenced by the impact of modelling on perceived self-efficacy*" (p.43).

Another way to improve and enhance an individual's self-efficacy is via "social persuasion" (Bandura, 1994). Individuals who are positively confident that they have the ability and/or the capability to succeed are more likely to dedicate more energy to prolong an effort "*than if they harbor self-doubts and dwell on personal deficiencies when problems arise*" (Bandura, 1994: 47). In this regard, Wood and Bandura (1989) emphasise that a person's self-efficacy not only determines how much energy he/she will exert in a task, but also how long he/she will endure in the face of obstacles. Individuals with strong beliefs in their capabilities might exert greater persistence to master a challenge (Bandura, 1997). Finally, physical and emotional states might be used as indicators of people's capabilities. According to Bandura (1994), "*in activities that require strength and stamina, they interpret fatigue, windedness, and aches and pains as indictors of low physical efficacy... thus, the fourth way of altering efficacy beliefs is to enhance physical status, reduce negative emotional states and correct misinterpretations of somatic sources of information*" (p.47).

Bryant (2006) discussed that self-efficacy involves dynamic self-beliefs that are specific to performance domains. These domains form part of complex interactions with other persons, behaviour, and environmental factors. Thus, one of the important features of the concept of self-efficacy is that of task-and-domain-specific (Bandura and Edwin, 2003). Similarly, Wilson et al. (2007) emphasise that an individual may have a high self-efficacy in one area; however, he or she might have low self-efficacy in another. Therefore, self-efficacy belief determines how an individual feels, thinks, what motivates him/her, and how he/she behaves, and produces diverse effects through cognitive, motivational, affective and selection processes (Reid and Levy, 2008). Because of this, there has been an increase in more domain-specific usage of efficacy, such as team collective efficacy and connective efficacy.

Collective efficacy has been defined as a "*group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments*" (Bandura, 1997: 447). Bandura (2002) argued that collective efficacy is the extent to which efficacy is shared across group members and "*can be established through collaborative, supportive experience among members within a community. Perceived collective efficacy is not simply the sum of the efficacy beliefs of individual members. Rather, it is an emergent group-level property that embodies the coordinative and interactive dynamics of group functioning*" (p.271).

As discussed by Cabrera and Cabrera (2002), people's willingness to act is directly influenced by their expectations about their potential effects of their actions (see the next Section). They added that when people believed that their actions would not have a discernible effect on the value of the shared good, they would be less likely to cooperate than when they perceived a direct link between their participation and the value their help created. Kalman (1999) described expectancy in terms of two functions, information self-efficacy and connective efficacy. Information self-efficacy referred to the individual's belief that the information they possessed would be helpful to others if those others received it. This author went on to say that connective efficacy referred to the individual's belief that if they shared information, that information would be received and used by others. Cabrera and Cabrera (2002) posited that both perceived efficacy of individual contributions and perceived connective efficacy could be increased with regards to knowledge sharing, if individuals were to receive feedback whenever others used their contributions.

Self-efficacy is a broad term, and it generally refers to two types of self-efficacy when it is extended to the domain of online communities. These two types of self-efficacy encompass computer self-efficacy and knowledge sharing self-efficacy. Other self-efficacy types might help in understanding knowledge sharing in the context of offline communities; however, most self-efficacy research in technology acceptance and online communities has focused on computer self-efficacy, but little research about community's system self-efficacy and members' ability to generate and participate in the knowledge sharing process in the context of professional online communities.

3.2.3.2. Outcome expectations

Outcome expectation is the second component of the Social Cognitive Theory. Generally and in simple words, it denotes an individual's beliefs that performing and achieving a specific task will produce a specific outcome or lead to a beneficial outcome (Chiu et al., 2006). Therefore, "outcome expectations" is the desired consequences or the expected results of an action in which an individual chooses to engage (Bandura and Cervone, 1986), how much task-related efforts will be used, and how long that effort will be maintained in spite of disconfirming evidence (Stajkovic and Luthans, 1998). There are three types of outcome expectations; physical, social reactions and self-evaluative (Bandura, 1997), and all these types of expectations depend on the same sources of information, like self-efficacy. Bandura (1997) emphasises that outcome expectations are dependent on self-efficacy beliefs as they depend on the same sources of information. However, they are different from self-efficacy because any person might have the belief that a specific behaviour will produce a favourable outcome, but he/she might not have the required capabilities for doing the behaviour.

This relates to collective efficacy, "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments" (Bandura, 1997, p. 447). Lindsley, Brass, and Thomas (1995) defined the terms group efficacy and organizational efficacy as being a little more narrowly directed, representing the belief among individuals within the collective that the group can successfully perform a specific task. In work-related contexts, collective efficacy has been related to group problem solving (Kline & MacLeod, 1997) and group learning (Edmondson, 1999), as well as to performance in service (Gibson, 1999), manufacturing (Little & Madigan, 1997), and simulated settings (Gibson et al., 2000). The

The Social Cognitive Theory has been used in Information Systems to understand computer usage behaviour (Compeau et al., 1999, Compeau and Higgins, 1995b, Compeau and Higgins, 1995a). Compeau and Higgins (1995a) conducted a study to develop valid and reliable measurements for computer self-efficacy. In this regard, they differentiated between three dimensions of self-efficacy. The first dimension is magnitude, which reflects "*the level of task difficulty one believes attainable*" (p.192). They argued that individuals who have high magnitude will be able to perform complicated tasks. Strength is the second dimension, which denotes one's ability and the confidence to achieve a specific task. Finally, generalisation or the domain limitation refers to the extent to which self-efficacy is exclusive to a specific domain. In the light of these three dimensions, they defined computer self-efficacy as a "*judgment of one's capability to use a computer*" (p.192). However, they adjusted the above three dimensions to apply to computer use as follows:

1- For magnitude or the level of capability expected, people who have high level of computer self-efficacy magnitude tend to consider themselves as able to achieve difficult and complicated computer tasks compared to people who have low computer self-efficacy magnitude. Moreover, high computer self-efficacy magnitude might mean working or using the system without external support and assistance.

2- The strength of computer self-efficacy revolves around the confidence a person has regarding the ability to achieve an assigned task. That means that regardless of the availability of computer self-efficacy, an individual should have high confidence regarding the ability to complete a task successfully.

3- Self-efficacy generalisability revolves around the degree to which an individual's judgments are limited to or excludes to a certain domain of activity, which might be particular hardware of software. Individuals who have high computer self-efficacy generalisability would have higher confidence to use different, for example, systems or software packages. On the other hand, people who do not have high self-efficacy may perceive that their capability is only limited to a specific system and/or software package.

Using the social cognitive theory, Compeau and Higgins (1995b), Compeau and Higgins (1995a) developed a model to explain computer usage. Self-efficacy and outcome expectations were determined by encouragement by others, others' use and technical support. They found that computer self-efficacy and outcome expectations significantly predicted usage behaviour directly and indirectly via affect and anxiety. With 1020 respondents and using PLS, they supported the perspective of social cognitive and self-efficacy on computer use behaviour. Except for an unexpected negative relationship between support and computer self-efficacy and support with outcome expectation, all relationships were supported and, more importantly, the measure of computer self-efficacy was validated.

To further validate their developed model and to overcome the limitation of cross-sectional research, Compeau et al. (1999) conducted a longitudinal study with the aim of testing their model and confirming the impact of computer self-efficacy and outcome expectations on computer usage. A mail survey was employed to collect data from 394 Canadian business periodical subscribers. Compeau et al. (1999), using PLS, confirmed that "outcome expectations" is a multi-dimensional construct composing performance-related outcomes and personal-related outcomes. "Performance-related outcomes" refers to the expected job improvement that might be obtained when individuals use computers while "personal outcome expectations" refers to the expected rewards, change in image, status, and reputation, for example. The results supported the previous study. Self-efficacy and outcome expectations (performance) significantly predicted computer usage; however, outcome expectations (personal) negatively influenced computer usage. Moreover, it was found that the affect construct is significantly determined by computer self-efficacy and outcome expectations (performance). Anxiety, which is significantly determined by computer self-efficacy, did not demonstrate a significant relationship with computer usage as hypothesised.

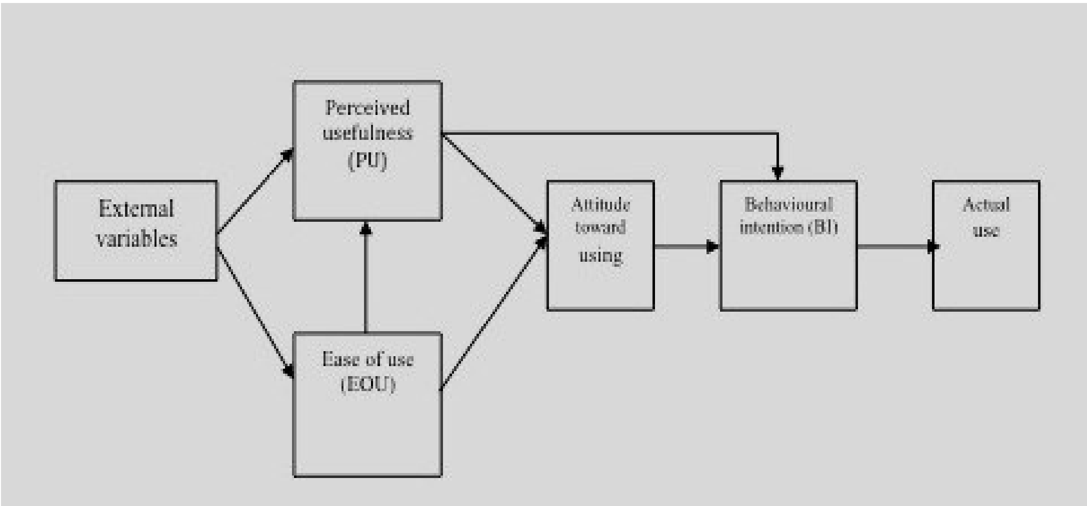
3.2.4. Information system models

Professional online communities are a type of communication channel to facilitate the interaction among the community members with each other. Turban et al. (2005) discussed that knowledge management systems are developed based on three groups of technologies; a) communication technologies that help users to contact with each other and to have an access to the required knowledge; b) collaboration technologies that facilitate group work; c) database management systems that work as a repository to store and retrieve knowledge. As a result, from the technical view, online communities are a "form of Internet-based information system" (Lin and Lee, 2006). Moreover, previous research has demonstrated that the online technical attributes influence members' participation (Preece, 2001, Kuo and Young, 2008), and loyalty (Lin, 2008) in online communities.

Chung (2001) stressed that information technology can be an important enabler to knowledge sharing. Therefore, if the community system is inconvenient for members to use, they will not find the community useful and their participation might decline or they might not participate at all. In a similar manner, if insufficient or poor quality knowledge (useless knowledge and information) is found in the online community, that community would not be considered useful; therefore, a decrease in usage would result. Thus, from the technical perspective and based on the literature review, there are two streams of research for studying professional online community based on this perspective: the Technology Acceptance Model (TAM) and the Information Systems Success model (IS Success). The following sections discuss both approaches, with the related extensions.

3.2.4.1. Technology Acceptance Model (TAM)

Based on the TRA (Ajzen and Fishbein, 1980) and TPB (Ajzen, 1985, Ajzen, 1991) theories, Davis (1989) and Davis et al. (1989) established the technology acceptance model (TAM) to study people's adoption and acceptance of new technologies. Specifically, the aim was to understand the different determinants of computer acceptance. TAM proposes that there are two main determinants that explain new technology acceptance: ease of use, "*the degree to which a person believes that using a particular system would be free of effort*" and perceived usefulness, "*the degree to which a person believes that using a particular system would enhance his or her job performance*" (Davis, 1989: 120). The following figure illustrates the original model.



Source: Davis et al. (1989: 985)

Figure 3.4: Technology Acceptance Model (TAM)

As discussed above in TRA and TPB, behavioural intention refers to "the degree to which a person has formulated conscious plans to perform or not perform some specified future behavior" (Venkatesh and Bala, 2008: 383). Behavioural intention to use a new system is a key variable in TAM models. According to the TRA theory, individual behaviour is determined by intention, and "*intentions are jointly determined by the person's attitude and subjective norm concerning the behavior*" (Fishbein and Ajzen, 1975: 216).

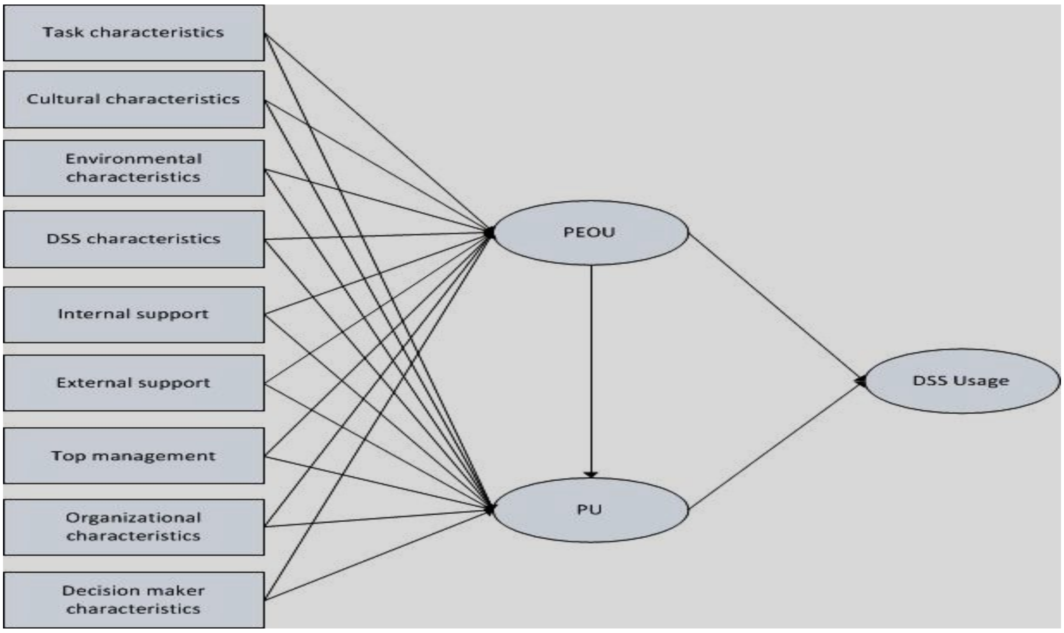
Based on the empirical validation of the above model, the attitude towards using was excluded from the final model. According to the final model, ease of use (EOU) determines, besides use behaviour, the perceived usefulness (PU), while other external variables influence the behavioural intention and actual use through ease of use and usefulness.

The TAM model, since its development by Davis (1989), has been subjected to many attempts by many researchers at extra validation and extension (see Appendix C). Moreover, it has been widely used in a variety of settings such as spreadsheets (Mathieson, 1991), email (Venkatesh and Davis, 1996), computer usage (Igbaria et al., 1995), and expert systems (Keil, 1995). Adams et al. (1992) conducted two studies to replicate the work of Davis (1989). They aimed to examine the psychometric properties of the original measurements of the TAM and to retest the hypothetical relationships. The findings, besides confirming the causal relationships, revealed that the TAM model is valid and reliable. Moreover, they found that its reliability and validity are stable in extended settings. Regarding the ability to explain system usage, they found that perceived usefulness and perceived ease of use are significant antecedents of technology use. In his study to compare TAM to TRA and its enhanced version TPB in explaining technology use, the information provided and the ability to apply the model, Mathieson (1991) found that TAM and TRA outperform TPB in explaining technology acceptance and use; however, they further reported that TAM is much easier to adopt and apply. Similarly, Taylor and Todd (1995) found that TAM has better ability to explain use behaviour; however, TPB has the ability to provide more understanding of the intention to use.

Moreover, recently many studies have tried to extend the model by adding other external variables and integration with other theories to increase its comprehensiveness and to better explain technology usage. For example, Jackson et al. (1997) discussed that situational involvements and intrinsic motivations should be integrated with TAM. Other researchers have proposed that subjective norm and perceived behaviour control have significant effects on behavioural intention to use the system (Taylor and Todd, 1995, Venkatesh and Morris, 2000).

In their study to integrate the TAM model with the task-technology fit model (TTF), Dishaw and Strong (1999) conducted an empirical study in three companies for software maintenance with 60 projects. He empirically found that the integrated model was able to "*explain much more of the variance in the dependent variable, utilisation, than did either TAM or TTF alone*" (p.17) although the TAM's two variables (EOU and PU) were still significant contributors to explain technology use. In their study to integrate TAM with the diffusion theory for explaining Web-based customer relationship software e-CRM, (Wu and Wu, 2005), based on data collected from 190 sample units, found that the majority of factors derived from the diffusion theory were significantly able to influence the attitude toward using the software. They concluded, moreover, that the integrated model is much better in understanding the diffusion of the e-CRM. Similarly, Karahanna et al. (2006) in their study to integrate TAM with the compatibility beliefs derived from the Innovation Diffusion theory with a sample of 278 customers who used the system of customer relationship management in the context of a large bank, found, among several other contributions, that compatibility beliefs (with existing practice and experience) are crucial in technology acceptance and usage and, thus, "*should be included in models that attempts to explain and predict this phenomenon*" (p. 798). Moreover, by using PLS-SEM, they found that PU and EOU were significant predictors of usage scope and usage intensity.

Drawing from the work of Rose and Straub (1998), Elbeltagi et al. (2005) examined the usage of a decision support system (DSS) among managers in Egyptian local authorities. They extended the TAM model by adding some external factors that might influence DSS usage through PEOU and PU. The following figure shows the developed conceptual framework developed by Elbeltagi et al. (2005).



Source: Elbeltagi et al. (2005)

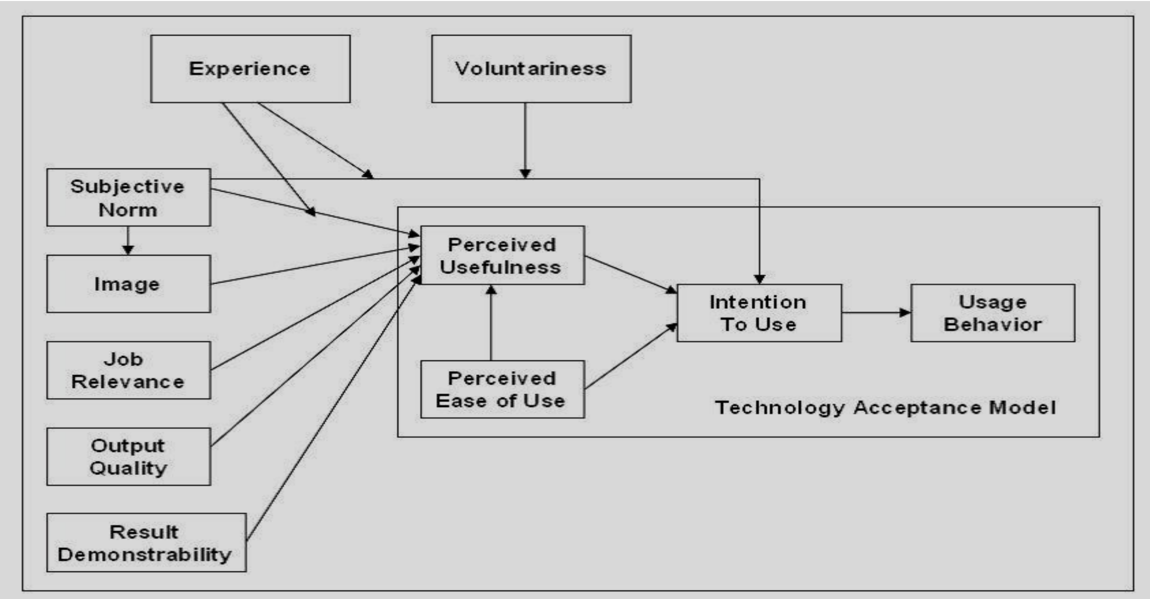
Figure 3.5: Conceptual DSS usage model for local authorities' managers

Data were collected from 294 local authority managers. After summing the external constructs in parcels (calculating the average for each construct), path analysis was employed to test the research hypotheses. Surprisingly, the findings showed insignificant influence, and mostly negative, for all external variables except the relationship between top management and EOU. However, it was found that PU and EOU positively influence DSS usage. The researchers concluded that managers in Egyptian local authorities are inclined to use DSS technology on the basis of EOU rather than PU. Moreover, they emphasised the importance of considering external factors when applying IT technology adoption globally.

Abbasi et al. (2011) conducted an empirical study to extend and examine TAM in Pakistan. The main aim of their study was to present an extended model of TAM in a non-Western culture. The model was extended to examine the cognitive behaviour of academics' acceptance towards the Internet, which was hypothesised to be affected by social norms and management support, and moderated by experience and voluntariness. Based on data collected from 504 full-time public and private universities' academics and using SEM-PLS, they found that PU is the most important determinant of Internet acceptance in comparison with the behavioural intention and the actual usage. Moreover, academics who showed higher usage of the Internet were less influenced by usefulness perceptions. Voluntariness showed insignificant influence on academics' perceptions of PU, EOU, and social norms toward both behavioural intentions and behaviour usage. In a similar manner, Teo et al. (2009) attempted to validate the TAM model in an "*educational context by exploring the intention to use computers among pre-service teachers in Singapore and Malaysia"* (p. 1007). Using 495 participants (250 from Singapore and 245 from Malaysia) and SEM as a statistical technique, they found that attitude toward computer usage explained 89% of the intention to use in the Malaysian sample, while it explained 38% of that intention in the Singapore sample. However, the variance accounted for by the intention to use by the model overall for the Malaysian sample was 54%, while it was 8% for the Singapore sample. They argued that a possible explanation for these significant differences between the Singapore sample and the Malaysian sample might be attributed to the levels of attitudes and perception of use that were obtained by both samples. Generally, they concluded that "*TAM is a parsimonious model that explains 8% and 53.7% of the endogenous variable (ITU) for the Singapore and Malaysian sample respectively*" (p. 1007). For more studies that were conducted to validate and to extend TAM, see Appendix C.

3.2.4.2. The extended TAM (TAM2 and TAM3)

One of the important developments and extensions of TAM is the study by Venkatesh and Davis (2000). In response to calls for the addition of new variables to TAM, they empirically developed a new model - TAM2 - as an extension of the original TAM, which includes "social influence processes" and "cognitive instrumental processes" as further antecedents of PU and usage intentions (Venkatesh and Davis, 2000). In TAM2, besides the two main cores technology determinants (PU and PEU), two groups of factors were integrated: three "social influence processes" group (subjective norms, voluntariness, and image) and four "cognitive instrumental processes" group (Job relevance, output quality, result demonstrability, and perceived ease of use). The following figure 3.6 shows TAM2 with the proposed variables and relationships.



Source: Venkatesh and Davis (2000: 188)

Figure 3.6: Extension of the Technology Acceptance Model (TAM2)

Consistent with TRA theory, Venkatesh and Davis (2000) posit that subjective norms, *"person's perception that most people who are important to him think he should or should not perform the behaviour in question"* (Fishbein and Ajzen, 1975: 302), influence image, PU, and intentions to use. This influence is moderated by experience and voluntariness (Venkatesh and Davis, 2000). Regarding voluntariness, Venkatesh and Davis (2000) define it as "*the extent to which potential adopters perceive the adoption decision to be non-mandatory*". TAM2 hypothesises that, "*in a computer usage context, the direct compliance-based effect of subjective norm on intention over and above PU and PEOU will occur in mandatory, but not voluntary, system usage settings*" (p. 188). In this extended model of the TAM, voluntariness is considered as a moderating variable.

Regarding image, Moore and Benbasat (1991) defined it as "*the degree to which use of an innovation is perceived to enhance one's…. status in one's social system*" (p. 195). Hence, according to TAM2, people will behave in accordance with their perception of subjective norms only in an attempt to build a positive image in their social group. TAM2 posits that subjective norm positively determines image (Venkatesh and Davis, 2000). On the other hand, experience revolves around the individuals' knowledge and beliefs regarding a specific system and is developed through the repeated usage of the system. Venkatesh and Davis (2000) postulate that "intention to use" changes over time, based on the experience acquired through continuous usage. In addition to its influence on the relationship between subjective norms and intentions to use, experience works as a moderating variable that affects the relationship between subjective norms and PU.

Regarding the cognitive instrumental processes in TAM2, Venkatesh and Davis (2000) posit that people evaluate or perceive the usefulness of a system based on job relevance, the relation between their jobs and the outcomes of using the system. The same is applicable for outcome quality and demonstrability. If they are effective, then system usage will be perceived as useful.

TAM2 increased the explanatory power of the original TAM. In general, examining gender as a moderator variable increased the explanatory power from 35% to 52%. Moreover, including experience and voluntariness increased the explanatory power from 35% to 53% (Venkatesh and Davis, 2000). Furthermore, TAM2, like the original TAM, was adopted and subjected to validation by several researchers. For instance, in their research to test the applicability of the extended model TAM2 to Internet adoption by paediatric physicians, Chismar and Wiley-Patton (2003) empirically validated the applicability of TAM2.

In a recent study, Venkatesh and Bala (2008) developed a new model (TAM3) to explain technology acceptance and usage. In addition to the variables included in TAM2, they further explained the determinants of EOU by adding two groups of variables: anchors or variables that are related to an individual (computer self-efficacy, perceptions of external control, computer anxiety and computer playfulness) and adjustments or variables that are related to system characteristics (perceived enjoyment and objective usability). The relationship between anchors, adjustments, and EOU is moderated by experience. The main aims of TAM3 were to 1) examine the effect of EOU on PU, which is moderated by experience. 2) prove that the determinants of EOU (anchors and adjustments) will not have any significant influences on PU over and above the determinants of PU. In order to achieve these aims, the authors conducted a longitudinal field study at three levels and models in four different organisations implementing new ITs.

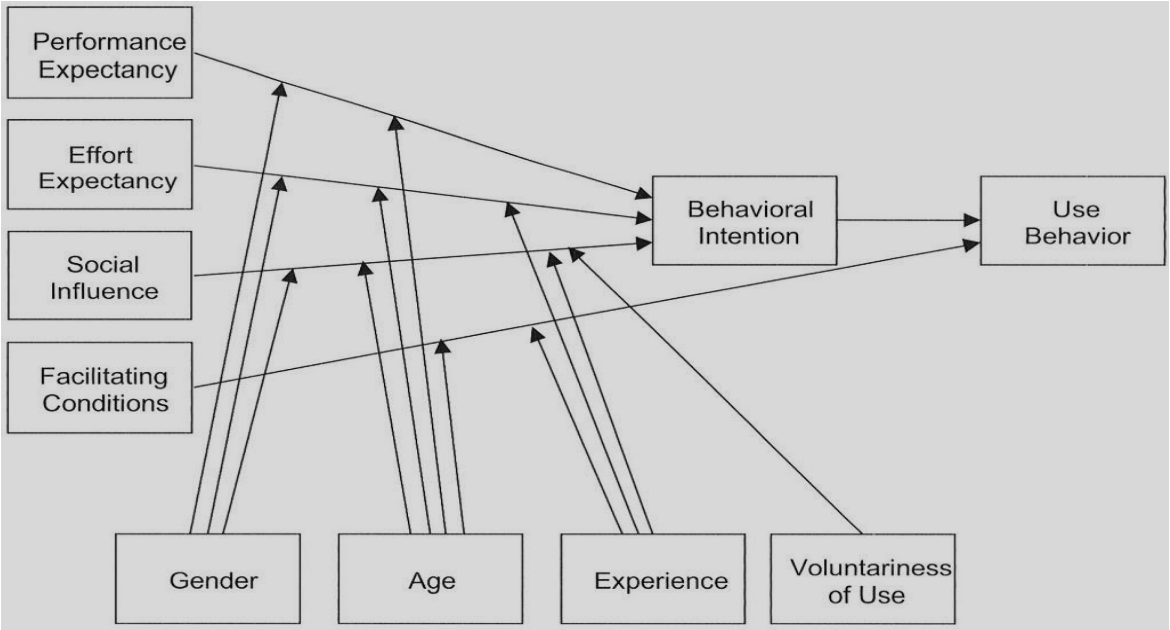
By using PLS, TAM3 explained between 52% and 67% of the variance in PU across the three levels and models. In general, it was able to show between 40% and 50% of variance in users' behavioural intentions across all three models, and explained between 31% and 36% in actual use. Moreover, they reported that PU was the strongest predictor of users' behavioural intention in the three models. However, EOU was not able to show significant effect on behavioural intentions in model three.

The research findings have confirmed that TAM is a parsimonious and powerful model that helps to understand technology acceptance and usage (e.g. Gefen et al., 2003a, Gefen et al., 2003b, Legris et al., 2003). Many empirical studies and tests have been carried out on TAM and the tools employed in these tests have confirmed its superior quality; however, previous research reported that TAM is not free of limitations. The common and most reported limitation is using self-reported measurement to capture actual use. Moreover, Legris et al. (2003) argued that most previous studies were conducted using undergraduate/postgraduate students, which might affect the ability of generalisation. Adams et al. (1992) reported that TAM has a limitation in understanding technology acceptance in mandatory and "captive use" environments. They pointed out that PU and EOU have less influence on usage behaviour when usage is compulsory or part of the job. Regarding captive use, they argued that when usage is not mandatory but there is no other way to perform the job effectively except using the system, in this case usage will be high regardless of its usefulness. Lee et al. (2003), in a comprehensive meta-analysis, noticed that the majority of previous studies used a single system and/or a restricted subject such as one organisation or one department. In another meta-analysis study, Sun and Zhang (2006) reported two major limitations of TAM. First, they examined TAM against other models. They found that TAM showed limited explanatory power. Second, based on the comparison among three groups of TAM studies (10 experimental studies using students as subjects, 42 empirical studies using general users as subjects, and 17 empirical studies using students as subjects), they found significant differences regarding the explanatory power among the three groups. In general, studies that used an experimental design showed greater explanatory power than the two empirical studies. On the other hand, the empirical studies that used students as subjects showed higher explanatory power than empirical studies that used actual users as subjects. Moreover, based on the aggregate of previous studies' results, they reported some inconsistencies in the major relationships in TAM.

In his commentary that aimed to point out limitations with the TAM model, Bagozzi (2007) argued that the TAM model has three main shortcomings. 1) It suffers from the same problems of TRA and TPB. 2) It is too simple and, thus, it neglects other important variables (e.g. cultural and social variables) and processes that may affect technology adoption and use. 3) It neglects identifying the determinants of technology adoption beliefs (perceived usefulness and perceived ease of use). Common method variance CMV is another serious limitation of TAM. Although some studies used actual use measures found a support for the TAM model, CMV is a serious problem when self-reported usage is applied (Straub and Burton-Jones, 2007). Besides the lack of reaching a comprehensive model by identifying the antecedents of the beliefs contained in the TAM model, Benbasat and Barki (2007) argued that taking information technology adoption literature behind the TAM model requires (pp. 214-215): 1) revisiting other theories such as TRA and TPB to extend the belief set to include salient determinant factors. 2) To broaden the dependent variable (system usage) to include wider perspectives such as "frequency, duration, or verity of system function used". 3) Other methodologies such as longitudinal and multi-stage models may perform better in capturing the influence of beliefs on usage. Another limitation lies in the lack of attention to possible moderating variables such as users' gender and age, experience, and voluntariness (Venkatesh et al., 2007, Venkatesh et al., 2003).

3.2.4.3. The Unified Model of Technology Acceptance (UTAUT1 and UTAUT2)

After reviewing and comparing eight previous models, Venkatesh et al. (2003) developed their new model, UTAUT, which aimed to combine the previous models to develop a new model that better explains technology acceptance and usage (Figure 3.6). They empirically examined the eight developed models in longitudinal design research using four different organisations. They examined their model at three different times (before training, one month after using the new technology, and three months after using the new technology) whereas the actual usage behaviour was examined over the three measurement schedules. The authors divided the subjects into two groups; mandatory users and voluntary users. In general and by using PLS-SEM, they found that the new model was able to increase the explanatory power or the explained variance especially with including the moderators. This model explained 70% of the total variance in behavioural intentions. They empirically found that performance expectancy, facilitating conditions, effort expectancy and social influence are significant predictors of behavioural intention and use behaviour. Moreover, they found that users' age, gender, voluntariness and users' experience are significant moderators under particular circumstances, discussed below.



Source: Venkatesh et al. (2003: 447)

Figure 3.7: The unified model for technology acceptance (UTAUT)

Venkatesh et al. (2003) developed four constructs called the core technology adoption beliefs. These constructs are supposed to determine user acceptance and technology usage. In the light of the other eight models, Table 3.1 summarises the findings related to these four constructs and their sources.

Table 3.1: UTAUT's constructs, definitions, and key findings

Construct	Definition	Pertained constructs and their sources	Reliability and validity (N = 215)	Key Findings regarding each construct
Performance expectancy	"The degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p. 447).	-Outcome expectations (SCT) -Perceived usefulness (TAM/TAM2) - Job-fit (MPCU) -Extrinsic motivation (MM) -Relative advantage (IDT)	- 4 indicators - Factor loadings (.89-.94) - Construct validity (.92, .91, .91) - Squire root of shared variance (.94, .92, .94)	For every model, performance expectancy was the most significant determinant of intention in both conditions (mandatory and voluntary)
Effort expectancy	"The degree of ease associated with the use of the system" (p. 450)	-Perceived ease of use (TAM/TAM2) - Complexity (MPCU) - Ease of use (IDT)	- 4 indicators - Factor loadings (.87-.93) - Construct reliability (.90, .92, .92) - Squire root of shared variance (.91, .90, .91)	Effort expectancy is significant in both voluntary and mandatory usage contexts during post-training. However, over extended periods of time, it becomes insignificant.
Social influence	"The degree to which an individual perceives that important others believe he or she should use the new application" (p. 451)	-Subjective norm (TRA, TAM2, TPB/DTPB and C-TAM-TPB) - Social factors (MPCU) - Image (IDT)	- 4 indicators - Factor loadings (.89-.94) - Construct reliability (.91, .92, .92) - Squire root of shared variance (.88, .88, .93)	- Only significant in the early stages of mandatory setting. - Individuals may subject to other influencers and use the system to obtain a favourable response; however, the role of these influences fades and becomes unimportant with continuous use.
Facilitating conditions	"The degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system" (p. 453)	-Perceived behavioural control (TPB/ DTPB, C-TAM-TPB) -Facilitating conditions (MPCU) -Compatibility (IDT)	- 4 indicators - Factor loadings (.84-.88) - Construct reliability (.85, .88, .88) - Squire root of shared variance (.89, .86, .89)	- It has a direct effect only on use behaviour and not intentions in both settings (mandatory and voluntary) - has strong effect initially at the training period and this effect turns down with the actual usage.
Behavioural intentions	Intention is assumed to mediate the relationship between the motivational factors and behaviour; it is a signal of an individual's willingness and readiness to behave (Fishbein and Ajzen, 1975)	- TRA and TPB	- 3 indicators - Factor loadings (.90-.92) - Construct reliability (.89, .88, .90) - Squire root of shared variance (.84, .87, .89)	- It has a direct effect only on usage behaviour (mandatory and voluntary)

Developed by the researcher based on Venkatesh et al. (2003)

As seen in Table 3.1, four constructs called the core technology adoption beliefs (performance expectancy, effort expectancy, social influence and facilitating conditions) are supposed to influence people intention to use and adopt technology. Unlike the TAM model, Venkatesh and his colleagues (2003) identified four moderators variable (age, gender, experience, and voluntariness) assumed to influence users' behavioural intentions to use and usage behaviour. The influence of facilitating conditions on usage behaviour was hypothesised to be moderated by age and experience. The influence of performance expectancy on users' intention was hypothesised to be moderated by age and gender; while the influence of effort expectancy on users' intention to use the system was hypothesised to be moderated by gender, age, and experience. Finally, the prediction of social influence to users' intention was hypothesised to be moderated by the four moderators.

In a similar manner to TAM, UTAUT since its development has been subjected to several attempts at validation and extension. For example, Neufeld et al. (2007) integrated charismatic relationship theory with UTAUT to "*examine the role of project champions influencing user adoption*" (p. 494). PLS-SEM analysis of survey data collected from 209 employees in seven organizations that had engaged in a large-scale IT implementation confirmed UTAUT validation and supported the extension. They found, besides the significance of all UTAUT relationships, that project champion charisma significantly influenced performance expectancy, effort expectancy, facilitating conditions and social influence perceptions of users.

Chan et al. (2008) carried out a study to investigate the determinants of users' intentions to use short message services (SMS) in China and Hong Kong. In addition to the main variables developed by Venkatesh et al. (2003), they added three variables (perceived critical mass, visibility, and perceived cost-effectiveness). With data collected from 471 SMS users and using PLS, they validated and tested their model. They found that the significant determinants varied across the two countries. For example, In China, they found that user's intention was determined by, for example, PU, perceived critical mass, subjective norm and perceived enjoyment (moderated by gender). On the other hand, in Hong Kong, user intention was found to be determined significantly by PU and perceived enjoyment. The findings of multi-group analyses additionally confirmed that the influences of EOU, perceived enjoyment and subjective norm tended to differ between the two countries. Chan et al. (2008) concluded that these findings highlighted the need to investigate closely "the possible differences in users' concerns, which may be attributed to the differences in culture and the telecommunication markets" across the different countries (p. 9).

In their study to examine the validity of UTAUT to explain the adoption of information and communication technology (ICT) to enhance and improve government-to-employees (G2E) interactions in government organisations in India, Gupta (2008) with data collected from 102 employees in a governmental organisation found that performance expectancy, effort expectancy and social influence significantly impact the employees' intentions to adopt and use the system. However, using PLS and regression, they found that facilitating conditions positively influence usage but at a 90% level of statistical significance. Surprisingly, they did not find a significant relationship between employees' behavioural intention and actual use. They argue that this insignificant relation was expected as the Internet technology had already been used in the organisation when they conducted their study, whereas, intention to use is more relevant to using new technologies (Gupta, 2008: 152).

In another study to extend the UTAUT model to examine individuals' satisfaction with mandatory adoption of e-Government information systems in Hong Kong and drawing on Easingwood and Koustelos (2000's) model for introducing and launching technology products, Chan et al. (2010) identified a number of external factors which are related to the key strategy in each launch stage. These stages and the related factors are: 1) market preparation stage (awareness); 2) targeting stage (compatibility and self-efficacy); 3) positioning stage (flexibility and personal interaction); and 4) execution stage (trust, convenience and assistance). By integrating these external factors with UTAUT core determinants to explain citizens' satisfaction with the e-government information system and by using PLS with data from 1179 respondents, they demonstrated that the core technology adoption beliefs in the UTAUT model are positive determinants of citizens' satisfaction with the adoption and using the e-Government information system. For the external variables, they found that compatibility, flexibility, and the avoidance of personal interactions showed significant influence on citizens' satisfaction through performance expectancy. Moreover, convenience, assistance and self-efficacy showed significant influence on citizens' satisfaction through effort expectancy and facilitating conditions.

Venkatesh et al. (2012) developed a new extension of UTAUT to study acceptance and use of technology in a consumer context. They called the new model UTAUT2. The proposed model integrates three new constructs into the original UTAUT: hedonic motivations, price value, and individual habits. "Hedonic motivations" refers to "the fun or pleasure derived from using a technology" (Venkatesh et al., 2012). The individual moderator constructs (age, gender, and experience) were theorised to moderate the relationships between the UTAUT's independent (exogenous) constructs, the behavioural intention and technology usage (See the following figure).

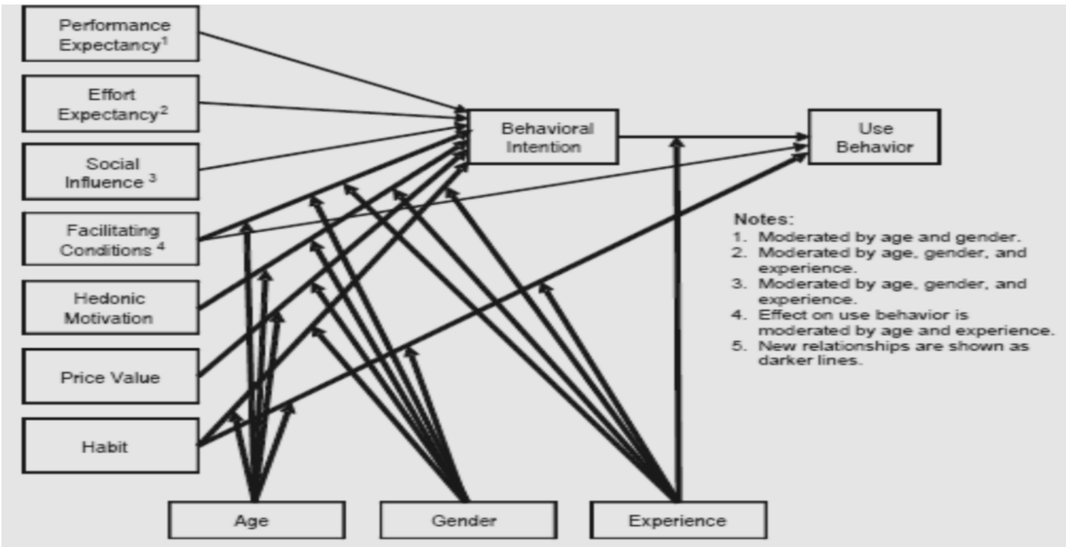


Figure 3.8: UTAUT 2

The researchers conducted a two-stage online survey with 1512 mobile users. The results of PLS showed that, in general, the new model explained from 56% to 74% variance in behavioural intention, and 40% to 52% of technology use. Four different models: original UTAUT (direct effect), original UTAUT (direct and moderated effect), UTAUT2 (direct effect), and UTAUT2 (direct and moderated effect) were run. Regarding the direct effect for both models, the study confirmed the influence of the four core technology adoption beliefs besides hedonic motivation, price value, and habit on behavioural intention. UTAUT2 was found to be determined by behavioural intention and facilitating conditions in both direct models. Regarding the direct and moderated models, a significant moderator role was confirmed for users' age and gender, which moderated most relationships.

Finally, unlike the TAM model, a limited number of studies have used UTAUT to investigate knowledge adoption and use. As the following table shows, the empirical findings of these studies confirm that UTAUT is a powerful and parsimonious model that helps to understand technology adoption behaviour (Venkatesh et al., 2003, Venkatesh et al., 2012, Venkatesh et al., 2011). The following table summarises the UTAUT model validity and reliability addressed by a number of these studies.

Table 3.2: UTAUT's reliability, validity, and main causal relationships

Reference	Method	Construct	Number of items	Construct Reliability	Validity		Main results
					AVE	Factor loadings	
Neufeld et al. (2007)	-209 employees use large-scale systems (Canada) - PLS	Performance expectancy PE	4	0.95	0.86	0.91 - 0.95	PE -- 0.40-- > BI
		Effort expectancy EE	3	0.92	0.80	0.88 - 0.92	EE – 0.31-- > BI
		Social influence SI	4	0.89	0.67	0.76 - 0.86	SI – 0.10 -- > BI
		Facilitating conditions FC	3	0.84	0.63	0.72 - 0.83	FC – 0.34 -- > USE
		Behavioural intention BI	3	0.83	0.63	0.75 – 0.85	BI – 0.53 -- > USE
		Charisma	10 (formative)	0.95	0.66	0.68 – 0.88	Charisma – 0.40 -- > PE Charisma – 0.30 -- > EE Charisma – 0.35 -- > SI Charisma – 0.38 -- > FC
		IT project USE	3	0.90	0.76	0.78 – 0.93	Dependent
Cheng et al. (2008)	-313 Internet banking users (China) - SEM	Performance expectancy PE	6	0.91		0.88 – 0.90	PE -- 0.52-- > BI
		Effort expectancy EE	6	0.88		0.84 – 0.89	EE -- -0.02-- > BI (ns)
		Social influence SI	5	0.82		0.75 – 0.80	SI -- 0.14 -- > BI
		System quality SQ	15	0.93		0.63 – 0.75	SQ -- 0.38-- > S SN -- 0.54-- > TI
		Information quality IQ	8	0.93		0.66 – 0.90	IQ -- 0.01-- > S (ns) IQ -- 0.50-- > TA
		Service quality VQ	12	0.94		0.56 – 0.91	VQ -- 0.46-- > S
		Trust perception TP	3	0.89		0.74 - 0.89	TP -- 0.29-- > PE
		Trust-benevolence TB	3	0.87		0.78 – 0.89	TP -- 0.12-- > TP
		Trust-integrity TI	4	0.93		0.84 – 0.90	TI -- 0.38-- > TP
		Trust-ability TA	5	0.89		0.85 – 0.89	TA -- 0.06-- > TP
		Satisfaction S	5	0.87		0.58 – 0.86	S -- 0.12-- > BI
		Personal innovativeness PI	4	0.88		0.83 – 0.87	PI -- 0.41-- > PE
		Behavioural intention to use Internet banking BI	3	0.94		0.90 – 0.93	Dependent
Chan et al. (2008)	-471 students use SMS services (China) - PLS	Perceived usefulness PU		0.89	0.73		PU -- 0.33-- > INT
		Perceived ease of use (PEOU)		0.85	0.58		PEOU -- 0.12-- > INT PEOU -- 0.01-- > PU (ns)
		Perceived enjoyment (PENJ)		0.89	0.73		PENJ -- 0.24-- > INT
		Perceived critical mass (PCM)		0.95	0.86		PCM -- 0.14-- > INT PCM -- 0.26-- > PEOU PCM -- 0.29-- > PU
		Visibility (VS)		0.90	0.76		VS -- 0.01-- > INT (ns)
		Subjective norms (SN)		0.86	0.66		SN -- 0.08-- > INT SN -- 0.32-- > PU

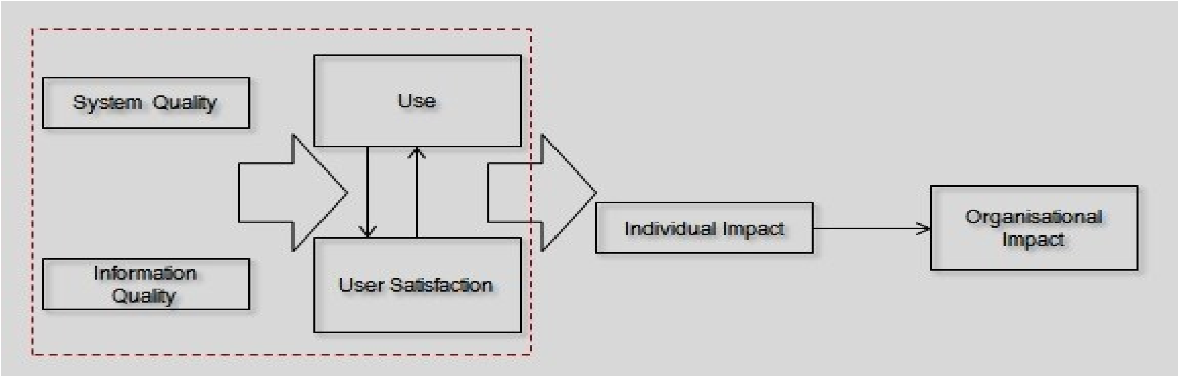
Reference	Method	Construct	Number of items	Construct Reliability	Validity		Main results
					AVE	Factor loadings	
		Perceived cost-effectiveness (PCE)		0.92	0.79		PCE -- 0.05-- > INT (ns) PCE -- 0.27-- > PU
		Intention to use SMS (INT)		0.92	0.79		Dependent
		- They found that participants' gender is a significant moderator between PENJ and INT.					
Zhou et al. (2010b)	-250 users of mobile banking (Taiwan) - SEM	Performance expectancy PEE	4	0.87	0.62	0.70 – 0.84	PEE – 0.37-- > USE
		Effort expectancy EFE	4	0.86	0.62	0.69 – 0.83	EFE – 0.06-- > USE (ns)
		Social influence SOI	2	0.85	0.73	0.85 – 0.86	SOI – 0.22-- > USE
		Facilitating conditions FAC	3	0.84	0.64	0.64 – 0.89	FAC – 0.24 -- > USE
		Mobile banking adoption USE	3	0.86	0.68	0.76 – 0.87	Dependent
		Task characteristics TAC	3	0.87	0.69	0.79 – 0.85	TAC – 0.37-- > TIF (ns)
		Technology characteristics TEC	3	0.84	0.64	0.68 – 0.86	TEC – 0.47-- > TTF TEC – 0.36-- > EFE
		Technology fit TTF	3	0.91	0.78	0.84 – 0.95	TTF – 0.30-- > USE TTF – 0.53-- > PEE
Chan et al. (2010)	-1179 users of smart IDs (Hong Kong) - PLS	Satisfaction SAT (Dependent)	3	0.95	0.87	0.86 – 0.87	Dependent
		Performance expectancy PE	3	0.96	0.90	0.70 – 0.74	PE -- 0.26-- > SAT
		Effort expectancy EE	3	0.95	0.87	0.72 – 0.77	EE -- 0.13-- > SAT
		Facilitating conditions FC	3	0.89	0.73	0.71 – 0.76	FC -- 0.19-- > SAT
		Social influence SI	3	0.95	0.86	0.78 – 0.86	SI -- 0.02-- > SAT (ns)
		Compatibility COMP	3	0.95	0.87	0.70 – 0.73	COMP -- 0.27-- > PE
		Flexibility FLEX	3	0.95	0.85	0.73 – 0.79	FLEX -- 0.11-- > PE
		Avoidance of personal interaction AVOID	3	0.92	0.78	0.84 – 0.87	AVOID -- 0.13-- > PE
		Mandatory e-Government TRUST	3	0.92	0.80	0.73 – 0.80	TRUST -- 0.42-- > PE
		e-Government Mandatory system self-efficacy	3	0.84	0.64	0.72 – 0.85	SE -- 0.10-- > EE SE -- 0.08-- > FC
		Convenience CONV	3	0.92	0.79	0.70 – 0.76	CONV -- 0.45-- > EE CONV -- 0.38-- > FC
		Assistance ASSI	3	0.93	0.81	0.70 – 0.74	ASSI -- 0.28-- > EE ASSI -- 0.37-- > FC
		Awareness AWARE	3	0.90	0.75	0.73 – 0.75	AWARE -- 0.42-- > SI
		- Gender has been found as a significant moderator between performance expectancy and satisfaction.					
Yu (2012)	-441 users of mobile banking (Taiwan) - PLS	Mobile banking adoption USAGE	-	-	-	-	Dependent
		Performance expectancy PE	4	0.70	0.57	0.72 – 0.80	PE -- 0.32-- > BI
		Effort expectancy EE	4	0.94	0.76	0.87 – 0.91	EE – 0.08 -- > BI (ns)
		Social influence SI	4	0.77	0.57	0.71 – 0.83	SI – 0.72 -- > BI
		Perceived credibility PC	4	0.88	0.65	0.75 – 0.83	PC – 0.15 -- > BI
		Perceived financial cost PFC	4	0.64	0.53	0.70 – 0.76	PFC -- -0.32 -- > BI (ns)

Reference	Method	Construct	Number of items	Construct Reliability	Validity		Main results
					AVE	Factor loadings	
		Facilitating conditions FC	4	0.92	0.76	0.72 – 0.96	FC –0.56 -- > USAGE
		Perceived self-efficacy PSE	3	0.90	0.82	0.81- 0.88	PSE –0.16-- > USAGE (ns)
		Behavioural control BI	3	0.84	0.60	0.78 – 0.79	BI – 0.72 -- > USAGE
		- Age and gender directly has been found to influence BI, while age has been found to influence USAGE - Age has been found as a positive moderator between PFC, SI, EE, and BI - Gender has been found as a significant moderator between PFC and BI - Age has been found as a significant moderator between PC, PSE, and USAGE.					
Im et al. (2011)	- 501 users of Internet banking (USA and South Korea) - SEM	Performance expectancy PE	3	0.89	0.74	0.84 – 0.89	PE -- 0.31 -- > BI
		Effort expectancy EE	3	0.93	0.82	0.85 – 0.94	EE -- 0.42 -- > BI
		Social influence SI	3	0.83	0.66	0.56 – 0.95	SI -- 0.19 -- > BI
		Facilitating conditions FC	2	0.87	0.79	0.80 – 0.98	FC -- 0.79 -- > USE
		Behavioural intention BI	3	0.97	0.86	0.95 – 0.97	BI -- 0.39 -- > USE
		Use behaviour (frequency of use)	1	-	-	-	Dependent
Venkatesh et al. (2012)	-1512 users of mobile Internet (Hong Kong) - PLS	Performance expectancy PE	4	0.88	0.75	0.82 – 0.87	PE -- 0.21 -- > BI
		Effort expectancy EE	4	0.91	0.74	0.78 – 0.82	EE -- 0.16 -- > BI
		Social influence SI	3	0.82	0.71	0.75 – 0.80	SI -- 0.14 -- > BI
		Facilitating conditions FC	4	0.75	0.73	0.79 – 0.85	FC -- 0.16 -- > BI FC -- 0.19 -- > USE
		Hedonic motivation HM	3	0.86	0.74	0.78 – 0.85	HM -- 0.23 -- > BI
		Price value PV	3	0.85	0.73	0.70 – 0.73	PV -- 0.14 -- > BI
		Habit HT	3	0.82	0.76	0.82 – 0.84	HT -- 0.32 -- > BI HT -- 0.24 -- > USE
		Behavioural intention BI	3	0.93	0.82	0.84 – 0.87	BI -- 0.33 -- > USE
		Consumer acceptance of technology USE	1	-		-	Dependent
		- Age and gender have been found to be significant moderators between PE and BI. - Age and gender have been found to be significant moderators between FC and BI. - Age and experience have been found to be significant moderators between FC and USE. - Experience has been found to affect negatively the relationship between HT, BI and USE.					

From Table 3.2 and as discussed in Chapter One, TAM and UTAUT are two models established for understanding technology use and adoption in the organisational settings. Although these two theories are able to explain behavioural intention and usage behaviour, the UTAUT model is still new and its explanatory power have not been fully demonstrated (Straub, 2009, Venkatesh et al., 2012). Hence, as recommended by scholars (Barnes and Vidgen, 2012, Straub and Burton-Jones, 2007, Straub, 2009, Benbasat and Barki, 2007, Venkatesh and Bala, 2008, Venkatesh et al., 2007, Venkatesh et al., 2012, Venkatesh et al., 2011), additional research is needed to understand how the UTAUT may be applied in settings outside of the organisational and cultural contexts, such as professional online communities and non-Western culture. Furthermore and from a knowledge sharing behaviour standpoint, Kankanhalli et al. (2005) advocate that other perspectives such as the technology acceptance models may "*help to better account for ease of use and usefulness*" of online communities use. Benbasat and Barki (2007) agree with Kankanhalli et al. by recommending the extension of acceptance models to "*different IT contexts in order to reach a more comprehensive understanding of what influences adoption and acceptance, … and to provide more useful recommendations for practice*" (p.216).

3.2.4.4. IS Success Model (DeLone and McLean)

Although a variety of approaches have been used to evaluate information technologies and their effectiveness, in general there are two main approaches, one relying on user satisfaction as an indicator of success, and the other investigating technology acceptance in Information Systems research. Based on the review and the integration of 180 studies, DeLone and McLean (1992) developed their comprehensive model to measure information system success. Based on these studies, they developed a model of ‘‘temporal and causal interdependencies" among six factors of information system success literature. According to DeLone and McLean (1992), the main purpose was to "*explore the research that has been done involving MIS success since Keen first issued his challenge to the field and attempt to synthesize this research into a more coherent body of knowledge*" (p.161). Drawing on Mason's (1978) model for communication, they developed their model, which named six factors of IS success: information quality, system quality, use, user satisfaction, individual impact and organisational impact. The following figure shows DeLone and McLean (1992) IS success model, its components discussed in more detail below.



Source: DeLone and McLean (1992)

Figure 3.9: DeLone and McLean's IS Success Model

Information Quality: Information quality revolves around the quality of the output produced by an information system (DeLone and McLean, 1992). Previous research used many attributes for measuring the concept of information quality. For example, Nelson et al. (2005) suggested that the definition of information quality has two views: intrinsic and contextual. The intrinsic view refers to "*the properties of information largely in isolation from a specific user, task, or application*" (p.202). In contrast, the contextual definition suggests that information quality needs to be defined in the light of user, the task and the used application. Based on these two definitions, they suggest that four dimensions can be used to manifest the concept of information quality: accuracy, completeness, currency and format. The following table shows the definition of the four dimensions.

Table 3.3: Information quality dimensions

Dimension	Definition
Accuracy	"The correctness in the mapping of stored information to the appropriate state in the real world that the information presents" (p.203).
Completeness	"The degree to which all possible states relevant to the user population are represented in the stored information" (p.203).
Currency	"The degree to which information is up to date, or the degree to which the information precisely reflects the current state of the world that represents" (p.203).
Format	"The degree to which information is presented in a manner that is understandable and interpretable to the user, and thus aids in the completion of a task" (p.203).

Source: Nelson et al. (Spring 2005: 199-235)

Wang and Wang (2009), in their study that aimed to develop an instrument to measure KMS success, state that knowledge management systems suffer from the lack of a validated instrument to measure knowledge quality. In general, they argue that "*the lack* *of a validated instrument points to the importance of establishing such a measurement instrument that can be used to evaluate KMS success and suggest improvements in terms of its usage*" (p.95). Thus, they developed an instrument that can be utilised to measure the quality of knowledge content, which defines seven dimensions: accuracy, logic, consistency, suitable for use, meaningful/understandable, important and helpful, and unambiguous. Wang (2009) emphasised that this instrument can be used as a diagnostic and analytic tool to assess and to find the problems in any knowledge management system context.

System Quality: DeLone and McLean (1992) approached the concept of system quality as "measures of the information processing system itself". Seddon (1997) defines system quality in relation to ''*whether there are bugs in the system, the consistency of user interface, ease of use, quality of documentation, and sometimes, quality and maintainability of program code"* (p.246). In the context of knowledge management, Wu and Wang (2006) argue that system quality is more interested in "*whether there are errors in the system, its ease of use, response time, flexibility, and stability*" (p.731).

Sedera and Gable (2004) developed and validated a comprehensive instrument for measuring the quality of a system. They determined ten dimensions to evaluate and measure system quality: system features, customization, ease of use, ease of learning, user requirements, system accuracy, sophistication, integration, integration and flexibility. A few scholars link system quality with ease of use. Davis (1989) developed two variables to measure system quality: perceived usefulness and ease of use. However, Nelson et al. (2005) stated that although system quality and ease of use are related, they are not the same. They further argued that "*a system that is perceived to be easy to use may also be perceived to be high quality; therefore, ease of use may be a consequence of system quality*" (p.205). In general, system quality revolves around five major dimensions: accessibility, reliability, response time, flexibility, and integration.

Table 3.4: System quality dimensions

Dimension	Definition
Accessibility	"The degree to which a system and information it contains can be accessed with relatively low effort" (p.205).
Reliability	"The dependability of a system over time" (p.206).
Response time	"The degree to which a system offer quick (or timely) responses to requests for information or action" (p.206).
Flexibility	"The degree to which a system can adapt to a variety of user needs and to a changing conditions" (p.206).
Integration	"The degree to which a system facilitates the combination of information from various sources to support business decision" (p.207).

Source: Nelson et al. (Spring 2005: 199-235)

Table 3.5 illustrates some previous studies that tried to operationalise and to understand the consequences of information quality and system quality.

Table 3.5: IS Success Model and information/system quality operationalisation

Author	Aim	Context and Methodology	System/information quality operationalisation	Results
Bharati and Chaudhury (2004)	To understand the different factors that influence decision-making satisfaction in web-based decision support systems.	- Web-based decision systems - Experimental, 24 undergraduate students in USA. CFA	- Information quality (accuracy, completeness, relevance, content needs, timeliness) - System quality (reliability, convenient to access, ease of use, flexibility)	Both system quality and information quality have positive and significant influence on decision making satisfaction in web-based decision systems.
Lee and Chung (2009)	To study how information quality, system quality, and interface design quality influence customer satisfaction and trust with mobile baking.	- Mobile banking use - 276 bank clients in South Korea, PLS	- Information quality (accuracy, completeness, relevance, preciseness, timeliness) - System quality (secure, convenient to access, ease of use, availability)	Both system quality and information quality showed positive influence on customer satisfaction and trust.
Wang and Liao (2008)	This study aimed to adapt DeLone and McLean's IS success model in the context of e-Government.	- e-Government - Empirical. 119 users in Taiwan. SEM	- Information quality (preciseness, sufficient, up-to-date) - System quality (user-friendly system, ease to use)	Information quality has a positive effect on both e-Government use and user satisfaction; however, system quality only positively influenced user satisfaction.
Chung and Kwon (2009)	To study whether or not trust affects the relationship between system quality, information quality, information presentation, and customer satisfaction.	- Mobile banking - 397 bank clients in South Korea. PLS	- Information quality (accuracy, completeness, relevance, content needs and timeliness) - System quality (as ease of use, convenience of access, reliability and flexibility)	System quality and information quality positively influenced mobile banking customer satisfaction through trust.
Liang and Chen (2009)	This study tries to develop and empirically examine "a model examining the relations between website quality, customer satisfaction, customer trust and customer relationship length, depth and breadth with the online financial services" (p. 971)	- Online financial services. - Empirical, 656 online customers of a Taiwanese securities corporation. SEM	- Information quality (up-to-date, relevance, wide selection of financial services) - System quality (user-friendly, reliable, navigational)	System quality influence customer satisfaction and trust. Information quality positively influenced customer satisfaction on the online financial services.
Wang and Liao (2008)	The main purpose is to validate the DeLone and McLean's model in the context of e-commerce.	- e-commerce system success - Empirical, 240 e-commerce users in Taiwan. SEM	- Information system (up-to-date, preciseness, sufficient) - System quality (ease of use, user friendly)	Information quality and system quality were able to predict customer satisfaction and perceived value.

As seen in Table 3.5, various measures have been developed and identified for information quality and system quality dimensions. Particularly in the context of professional online communities, information and knowledge delivery is the main task of these communities; thus, it is vital to consider issues such as accuracy, completeness, relevance, content needs, timeliness when it comes to community content (e.g. Wixom and Todd, 2005, Ahn et al., 2007, Bharati and Chaudhury, 2004, Seddon, 1997, Seddon and Kiew, 1996). On the other hand, system characteristics may also have different relative importance in professional online communities where enormous amounts of information and knowledge are being posted and shared daily and, thus, information/knowledge overload is more likely to occur. Therefore, members need an effective system to facilitate their interaction process and minimise information/knowledge processing cost. System quality or the functionality and performance of a community system is measured by the desirable characteristics such as reliability, accessibility, response time, flexibility and integration (e.g. Nelson et al., 2005, Bharati and Chaudhury, 2004, Wang and Liao, 2008, Lee and Chung, 2009, Ahn et al., 2007).

System use: use, usage and utilisation are different interchangeable expressions. Adams et al. (1992), for example, defined system usage as the actual use, not the degree of use of a system, while Hamner and Qazi (2009) define utilisation as behaviour to measure the actual use of the system. However, Petter et al. (2008) define system use as "*the degree and manner in which staff and customers utilise the capabilities of an information system*" (p.239). Regarding usage, Bhattacharyya (2004) differentiates between two types of system usage; initial usage (adoption) and long-term usage (continuation).

Straub et al. (1995), in their study of 458 voice mail users, argue that system use, which is the core of information system research, can be defined as the utilisation of an information technology. System use/usage is a measure that has been used to measure information system success (DeLone and McLean, 1992). They stated that system use can be used as an indicator of success. Conversely, and according to Seddon and Kiew (2007), when people abandon a system, it can be understood that this system is not useful. Accordingly, when an information system application is not used or is used too little, it might indicate that the system does not meet the assigned objectives. Agarwal and Prasad (1997) examined both initial use and peoples' intention to use in the future. They found that both dependent variables - initial and intention - were determined by different predictors. Moreover, the findings indicated that use intention was not affected by actual use. They concluded that continuity is not a consequence of actual use when perceived usefulness is missed. In a similar manner, as discussed above, Karahanna et al. (1999) found that the factors that affected the intentions to use Windows software depended on the type of user (potential adopters or continuing users).

Literature on information systems indicates that the concept of use has been debated among researchers (Wu and Wang, 2006). Some researchers assert that system use is not appropriate to be used as an information system success measure (Seddon, 1997, Staples and Seddon, 2004, Staples et al., 2002). Seddon (1997) recommended that this measure is an appropriate measure only when using the system is voluntary. However, when system use is mandatory, the frequency of using a system is not an appropriate measure to evaluate its success. Therefore, when usage is compulsory, perceived usefulness can be used to reflect the success of the system. Generally, Petter et al. (2008) stated that system use can be operationalised by different measurements such as "*amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use*" (p.239).

User Satisfaction: this construct is one of the key determinants of information system success. Tessier (1977) stated that satisfaction is "*ultimately a state experienced inside the user's head"* (p. 383). Seddon and Kiew (2007) define user satisfaction as "*the result of the individual taking outcomes that have been received and evaluating them on a pleasant-unpleasant continuum*". Halawi et al. (2007) define user satisfaction as "*the recipient response to the use of the output of IS. Degree of satisfaction with IS function is a measured item*" (p.122). Besides system usage, user satisfaction is an important factor to measure the success of an information system. According to Seddon and Kiew (1996) and based on the expectancy theory, users have expectations about the benefits that they will obtain if they use the system. However, based on the disconfirmation theory, the level of users' satisfaction is determined by the ability of the system to meet their expectations.

Net Benefits are ***"****the extent to which IS are contributing to the success of individuals, groups, organizations, industries, and nations*" (Petter et al., 2008: 239). Net benefits was developed to be measured at the individual and organisational level. At the individual level, some measures such as satisfaction and perceived usefulness have been used as individual net benefits (DeLone and McLean, 1992). At the organisational level, a number of financial and outcome measures can be employed to measure the net benefits.

Delone and McLean did not validate their model. However, they suggested that further development and validation are needed. Thus, since the development of DeLone and McLean's model, many other researchers have worked to validate and improve its factors by integrating new factors, replacing one of the main factors by a newly developed factor (Seddon and Kiew, 1996, Seddon, 1997, Delone, 2003), or by taking the model in a new context with slight change of one or more factors. In this regard, Seddon and Kiew (1996) modified the model by substituting the use factor by usefulness. They appear to believe that DeLone and McLean's (1992) endeavour to combine the variance (i.e. causal) model with the process model resulted in potential "*confusing meanings when trying to interpret the model, especially regarding the use variable*" (Seddon, 1997: 242). Seddon (1997) further adds that the "use variable" might refer to one of three completely different meanings, "benefits from use, impact of use and future information system use"; however, after analysing each meaning, he noted that only one of these (benefits from use or usefulness) can be applied to Delone and McLean's model. Clearly, he argued that "*the critical factor for IS success measurement is not system use, but that net benefits should flow from use*" (p.242). Therefore, in the re-specified model, Seddon made two major changes: he grouped the individual impact the organisation impact, and the society impact into one measure named net benefits; and added expectations of future benefits as a determinant of system use. Figure 3.10 illustrates the re-specified model.

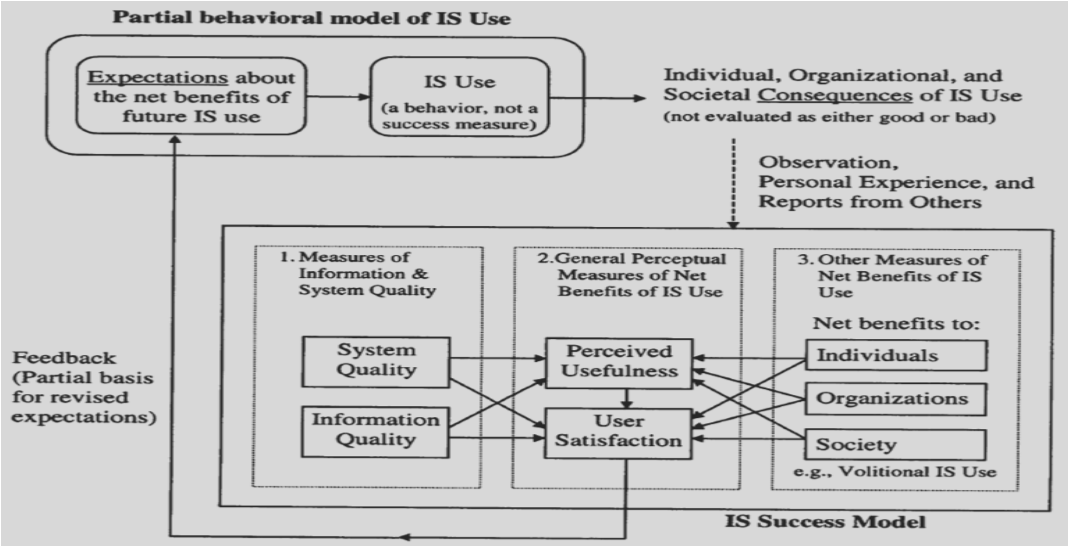


Figure 3.10: IS Success Model (Seddon, 1997)

As mentioned above, Seddon (1997), Seddon and Kiew (1996) stated that using an information system is not a definite indicator of system success but rather it is the expected or perceived benefits from using the system that can be used to measure its success. Thus, they argued that the main motivator to use a system is the expected benefits and its ability to satisfy their needs. DeLone and McLean (2002), however, disagree with Seddon (1997) by stating that usage decrease can be used as a reflective sign or measure that net benefits are not being achieved. However, taking all arguments and researchers' considerations, they re-specified the IS success model by including the intention to use developed the modern DeLone and McLean IS model as shown in the Figure 3.11.

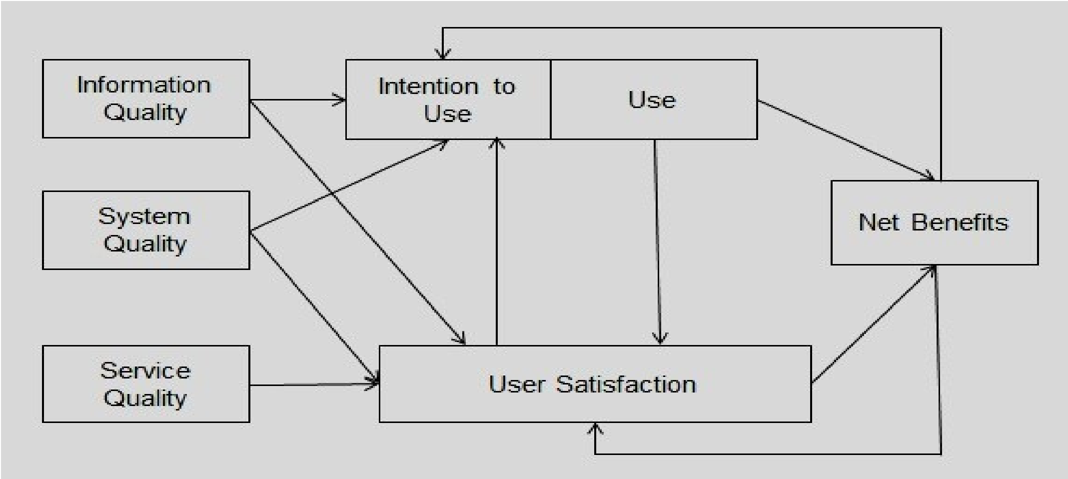


Figure 3.11: Updated D&M IS Success Model

Wixom and Todd (2005) believe that information quality and system quality are object-based beliefs and should not directly explain intention to use and/or use. Alternatively, they can explain behavioural-based beliefs and attitude variables such as behavioural attitudes, ease of use and usefulness. In this regard, they concluded that the IS success model (DeLone and McLean, 1992) and the TAM model (Davis, 1989) are not competing models to explain IS usage. However, *"they represent complementary steps in a causal chain from key characteristics of system design, to beliefs and expectations about outcomes that ultimately determine usage*" (p.91). Empirically, they reported that information satisfaction and system satisfaction are significant predictors of ease of use and usefulness, which, in turn, were found to be significant determinants of attitude and behavioural intention.

There is a general limitation of models developed from empirical research to evaluate knowledge management system success in general and online communities in particular (Lin, 2008, Wu and Wang, 2006, Chen et al., 2012). However, measuring the effectiveness of information systems activity in knowledge management systems has been an issue of several works of research (Halawi et al., 2007, Kulkarni et al., 2007, Wu and Wang, 2006, Chen et al., 2012). In their study to re-specify and to validate Delone and McLean's IS model to measure knowledge management system success, Wu and Wang (2006) conducted an empirical research with data collected from top-500 firms that had been using a knowledge management system. KMS use was determined by the obtained benefits of using the system and user satisfaction. They found that knowledge/information quality affects the perceived KMS benefits and user satisfaction. Furthermore, they found that system quality has a significant influence on

KMS users' satisfaction; however, the relationship between KMS quality and the perceived benefits was not supported. They argued that KMS with system quality might be important but not sufficient to provide the benefits. System quality might be important and influence benefits during the initial implementation; however, over time it might subside as users become more familiar with the system. Kulkarni et al. (2007) integrated four organisational support measures (leadership, incentive, co-worker and supervisor) with DeLone and McLean's model to explain knowledge use. They reported that knowledge use is determined by user satisfaction and the expected benefits. They, furthermore, found that user satisfaction, but not the expected benefits, is influenced by KM system quality and knowledge content quality.

As discussed earlier, an online community is a form of Internet information system. However, the literature indicates that no previous study has adapted DeLone and Mclean's model to the context of online communities in general, except for the works of Lin and Lee (2006) and Lin (2008). Lin and Lee (2006) conducted an empirical study in Taiwan to identify the key determinants of online community member loyalty. By adapting the updated model of DeLone and Mclean (2003), they found that member loyalty is explained by the member's satisfaction and his/her behavioural intention. Nevertheless, they found that all system and technical characteristics explained user satisfaction and behavioural intention significantly. In another empirical study, Lin (2008) replaced behavioural intention with sense of belonging. She found that user satisfaction, which is determined by system quality and information quality, influenced member loyalty directly and through the sense of belonging.

The main purpose of these two studies was to examine members' loyalty, which was reflected by continuous membership. Although members' loyalty is a favourable and desirable outcome, it does not explain a member's involvement in the process of knowledge sharing. One of the aims of the current study is to explain knowledge sharing in the professional online communities through the actual use of these communities which, according to Seddon and Kiew (1996), Seddon (1997) and Seddon and Kiew (2007), might not take place without including the perceived and/or the expected usefulness of using an information system.

3.2.5. Social capital

There is no one definition for social capital and many researchers consider it as a wide term that might indicate many things to different people (Wasko and Faraj, 2005). For example, Morrow (1999) states that "*social capital is a rather nebulous concept that can include anything from how parents interact with their children to how people feel about where they live, to whom they know, to how much they use their 'networks,' and how much they trust their politicians*" (p.749). Adler and Kwon (2000) have pointed out that social capital tends to be understood from the perspective of the researcher's specific area of expertise. Thus, finding a comprehensive definition of social capital might be hard. Regardless, the literature has offered a number of definitions based on researchers' understanding of social capital. The following table shows some definitions of social capital.

Table 3.6: Social Capital definitions

Author(s)	Definition
Coleman (1990b)	"Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: They all consist of some aspects of social structure, and they facilitate certain actions of individuals who are within the structure" (p. 302)
Putnam (1995)	"Features of social organisation such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefits" Later he identified trust as an outcome of social capital, which he redefined as social networks and norms of reciprocity (Putnam, 2000).
Portes (1998)	"The ability of actors to secure benefits by virtue of membership in social networks or other social resources" (p.6).
Nahapiet and Ghoshal (1998)	"The sum of actual and potential resources embedded within, available through and derived from the network of relationships possessed by an individual or social unit, and social capital thus comprises both the network and the assets that may be mobilised through that network" (p.243).
Prusak and Cohen (2001)	"Consists of the stock of active connections among people: the trust, mutual understanding, and shared values and behaviours that bind the members of human networks and communities and make cooperative actions possible" (p.4).
Adler and Kwon (2002)	"Social capital is the goodwill available to individuals or groups. Its source lies in the structure and content of the actors' social relations. Its effects flow from the information, influence, and solidarity it makes available to the actor" (p.10).

From Table 3.6, these diverse definitions demonstrate that reaching a comprehensive social capital definition is still at an early stage. However, these definitions identify some important common characteristics of social capital. For example, these definitions agree that social capital is a kind of investment that people make to build and maintain relationships with others. This network of relationships, either informal or formal, empowers and enables persons to maintain access to resources (Huysman and Wulf, 2006). The available resources can take a number of forms (e.g., information, influence and solidarity) and might make individuals more valuable when they act to use these resources (Lu and Yang, 2011).

Moreover, the above definitions reveal that previous research has approached social capital from different perspectives within different fields. For example, Putnam (2001); Adler and Kwon (2002) define two different approaches to social capital: the bonding approach and the bridging approach. According to Putnam (2002), bonding social capital as interested in the social ties that link people together and represents more the connection among people who share similar social class, norms and ethics values. Furthermore, he argues that the bonding approach of social capital can be achieved through individual personal networks. On the other hand, bridging social capital is inclusive and more interested in the connections that are built from a specific social network to another social network (Putnam, 2001). Therefore, this type of social capital might broaden individuals' social horizons and/or world view, and creates access to new information and resources. This conclusion is based on Granovetter (1983)'s work, "The strength of weak-ties". According to Granovetter, bridging relations or "weak-ties" provides an access to more people in different experiences and life situations that will lead to a broader set of information and opportunities. In this regard, Vidgen et al. (2007) suggest that "*weak ties are essential to the flows of information that integrate what would otherwise be disconnected social clusters*" (p.11). Empirically, Constant et al. (1996) demonstrated that weak ties relationships are more useful than strong ties in computer-mediated networks. They concluded that weak ties provide more valuable and diverse information. Regardless of the benefits gained, bridging social capital lacks provision of emotional support (Williams, 2006). Putnam (2001) claims that bridging social capital is more challenging because it requires an individual to abandon his/her comfort levels and connect to another group that might have some differences.

Many definitions of social capital, furthermore, point out that there are two aspects of social capital: structural aspects and cultural aspects (Roberts and Roche, 2001). The structural aspects are the social aspects that emphasise the networks or connections between individuals and groups. However, the cultural aspects of social capital are the aspects that emphasise norms and trust.

Cohen (2007), after defining social capital as "*an organisational resource that can be deliberately managed and elaborated upon*" (p.251), identified four elements that should be followed to create social capital in an organisation. These elements are: (a) developing mutual trust and understanding when time, space for meeting and work closely together are available'; (b) building trust through demonstrating trustworthiness plus delegating responsibilities; (c) ensuring equality in terms of opportunities, rewards and to foster 'commitment and cooperation'; (d) examining the current social networks to understand where valuable relationships can be conserved and reinforced.

Nahapiet and Ghoshal (1998) and Tsai and Ghoshal (1998) examined social capital through three different dimensions which are discussed below in detail.

The structural dimension: this dimension, as argued by Widen-Wulff and Mariam (2004), defines the access to the other actors within a network. From a general view, structural capital comprises two main sub-dimensions (Lee and MacMillan, 2008): network ties (e.g. the access to the online community resources) and configurations (e.g. the structure and organisation in the community). These two sub-dimensions are embraced within the community's system itself. According to Huysman and Wulf (2006), the technological infra-structure, or the hardware and/or applications used to enable network members to communicate with each other, points to the structural aspect of social capital (p.44). Therefore, they argue that the communication system represents the structural opportunity to understand how knowledge is shared between network members. Based on the system used, members can create connections and share their knowledge with one another. Therefore, the structural dimension is more interested in the community's system and its ability to grant access to other members and to effectively and efficiently facilitate the process of interaction among the community members to share knowledge and information. Moreover, as mentioned above and consistent with Granovetter (1973) and Burt (1992), Constant et al. (1996) empirically demonstrated that computer-mediated networks, besides their ability to "link people across distance, time, country and hierarchal level and organisational subunit" (p.130), are more useful in producing superior information. They attribute this usefulness to the bridging capacity that distinguishes the weak tie theory.

The cognitive dimension, according to Mäkelä and Brewster (2009), this dimension refers to "*shared paradigms, understandings, and interpretations, including aspects such as shared discourse and narratives, behavioural and linguistic codes, and systems* *of meaning*" (p.596). Huysman and Wulf (2006) define the cognitive dimension of social capital as "*the ability of the human actors to cognitively connect with each other to understand what the other is referring to when communicating*" (p.46). In other words, this dimension revolves around the individuals' ability to understand each other when they communicate. However, so far, there is no agreement among researchers about a unified operationalisation for this dimension (Liao and Welsch, 2005). Regarding information systems research, Widen-Wulff and Mariam (2004) have titled this dimension of social capital as "the content dimension", which is interested in the information and knowledge that are shared and exchanged in a community. Language and the other content characteristics have direct impact on social exchange and are necessary for forming and building relationships among the community members. According to Widen-Wulff and Mariam (2004), among the three dimensions, the content dimension is responsible for establishing the relationships that shape social capital. In any type of community, communication and information share are provided by the community's members. In the context of professional online communities, knowledge and information, the main commodity in these communities, are usually provided by the community's members in written text to answer an enquiry or to solve a problem; therefore, according to Hazleton and Kennan (2000), the quality of content is influential and a key factor in forming social capital.

And finally, ***the relational dimension,*** deals with those resources created and leveraged through relationships (Nahapiet and Ghoshal, 1998). This dimension of social capital revolves around the affective nature of relationships embedded in a social group (Wasko and Faraj, 2005), and mostly concentrates on the behavioural assets and the requirements rooted in a relationship, such as norms, trust, obligation and expectations (Inkpen and Tsang, 2005). Lu and Yang (2011) defined relational capital as "*social actors trusting other actors within the group and being willing to reciprocate favors or other social resources in the community*" (p.531). Kumar et al. (1998) and Huysman and Wulf (2006) refer to relational capital as the "info-cultural" dimension which relates to "*the stock of background knowledge actors take for granted and is embedded in the social relationships*" (p.43).

In the organisational setting and drawing on the social exchange theory, one of the most important objectives is to build and maintain trusting, cooperative and productive relationships among employees (Yang et al., 2009). Relational capital represents the strength of ties among group members. This strength comes from and builds on the history of previous interactions and goal congruence among network members over time (Tsai and Ghoshal, 1998). However, in the information systems and knowledge management context, according to Huysman and Wulf (2006), while structural capital refers to the opportunity and the cognitive capital refers to the ability, relational capital refers to the motivational aspect of social capital, which tries to answer the question "*why and when knowledge is shared*" (p.47).

There are two different approaches to defining relational capital. These approaches are the narrow viewpoint and the broad viewpoint. According to Gulati and Kletter (2005), the narrow approach to relational capital uses the cost-benefit analysis to evaluate the value reverted on the organisation because of the relationships developed internally and externally; and the exchange process constructed on trust, social interactions and shared goals/vision among parties. Some researchers describe this approach as an economic-based relationship that can be formed by rational evaluation of the expected costs and the expected benefits of another party cooperating in this relationship (Ratnasingam, 2005). On the other hand, the broad approach focuses on relational capital as a collective asset, which establishes and guides the organisation or community's relationships with its stakeholders. Agreeing to this approach, the resources are obtained mainly from the benefit and outcomes of mutual trust between parties (Inkpen and Tsang, 2005, Tsai and Ghoshal, 1998). Granovetter (1992) stressed that relational capital embodies social relationships that individuals develop gradually over time through their interactions.

Previous literature has discussed and identified several facets and components of relational capital such as reciprocity (Arena and Conein, 2008, Posey et al., 2010), obligations (Coleman, 1990b, Burt, 1992, Bryk and Schneider, 2002), norms (Coleman, 1990a, Putnam, 1995), identifications (Snehota and Hakansson, 1995, Chang and Chuang, 2011), friendship (Dyer and Singh, 1998) and trust (e.g. Inkpen and Tsang, 2005, Lee and Choi, 2003, Tsai, 2000, Fukuyama, 1995). Reciprocity was discussed earlier (see Section 2.4.1.2) as one of the extrinsic stimulus that motivates people to share their knowledge (Kankanhalli et al., 2005, Wasko and Faraj, 2005, Lin, 2007a). However, from Social Capital perspective, reciprocity can be defined as member's perceptions of how the social environment affects technology usage by examining the degree to which using the community for knowledge provision will result in the reciprocal action of using the community for knowledge acquisition. Empirically, reciprocity was found to be positive determinant of employees' attitude toward knowledge sharing (Bock et al., 2005) and knowledge contribution to electronic knowledge repositories (Kankanhalli et al., 2005) and electronic networks of practice (Wasko and Faraj, 2005).

"Obligations" are feelings of responsibility towards a community that leads a member to share their information and knowledge in return for past or future actions (Nahapiet and Ghoshal, 1998, Coleman, 1990a). It acts as credit slips among community users to be redeemed later (Coleman, 1990a). Based on the Social Exchange Theory perspective, obligations are unique from other economic commodities in that they have no exact monetary value (Blau, 1964) and often the exchanges are symbols of mutual support (Shore and Barksdale, 1998). When there is a history of repeated successful exchanges among community users mutual obligation will occur. Nahapiet and Ghoshal (1998) proposed that obligations might affect both access and motivation for exchanging and integrating knowledge among network users.

Another resource of relational capital is "norms". Norms or rules are shared standards that govern community users' relationships, behavior and perceptions (Cohen, 2007). Norms represent a degree of agreement in social systems (Coleman, 1990a) and have the effect of moderating human behavior in accordance with the expectations of the group or community (Bock et al., 2006). Moreover, it can identify which behaviors are acceptable and which are unacceptable to the community. As discussed by Dholakia et al. (2004), besides enhancing the process of information sharing, social norms can increase the effectiveness of community discussions, influence how community members interpret and evaluate information/knowledge and making decisions about which is important and which is not important and should be neglected. Identification has been considered as another source of relational capital. It is defined as "*the process whereby individuals see themselves as one with another person or group of people*" (Nahapiet and Ghoshal, 1998: 256) and represents the extent to which individuals view themselves as identical or belonging together with other members of the community (Bagozzi and Dholakia, 2002, Widen-Wulff and Mariam, 2004). Scott (2002: 120) defines identification as "*the extent to which members are psychologically identified with a group*". This psychological connection is "*impersonal bonds derived from common identification with some symbolic group or social category*" (Brewer and Gardner, 1996: 6). According to Wei et al. (2008), identification occurs when members adopt attitudes and behaviors to achieve a satisfying and self-defining relationship with another person or group (p.223). Coleman (1988) argued that identification and its strength, which are formed from continuous interaction, determine critical beliefs and behaviors in the community such as internalisation of group norms and practices, desire to remain with the group and willingness to cooperate with others. Chiu et al. (2006) stated that social identification may foster knowledge sharing in a community, since identification acts as a driver, influencing the motivation to exchange knowledge.

Finally, Burt (1992) summarised the dimension of relational capital as meaningful personal relationships that individuals had developed with each other through a history of interactions. Nahapiet and Ghoshal (1998) added that this concept focuses on the particular relations people have with each other such as respect and friendship. Hays (1989) argued that friendships are built on a foundation of trust and of giving and receiving various types of support, mainly during the early stage of the relationship. However, the social network literature differentiates between instrumental and expressive network ties (Adler and Kwon, 2002, Hazleton and Kennan, 2000, Zhou et al., 2010a). Instrumental network ties focus on weak ties that carry information benefits while expressive network ties focus on strong ties that provide friendship and social support. Expressive ties are strong intimate links (e.g. friendship) connecting people who share personal characteristics and tend to involve frequent interactions (Granovetter, 1983, Granovetter, 1973, Constant et al., 1996), while weak ties are characterised by little emotional investment and low frequency of interactions (Seibert et al., 2001). Constant et al. (1996) noted that personal friendships are uncommon across geographically distances spanned by computer networks. Empirically, Gupta and Kim (2007) found that social usefulness manifested in feeling of friendships did not show significant influence on members' attitude towards participation in online communities. They reported that the relationship building is a consequence of interaction, not the prime motivator for members to participate in the online communities. Furthermore, Zhou et al. (2010a) reported that instrumental ties were found to be more important than expressive ties in the knowledge transfer process. The reason is, as addressed by the researchers, instrumental networks are more heterogeneous and lead to less redundant information as well as more novel knowledge (p.459).

Regardless of the different resources and facets of relational capital, "*selecting any of these viewpoints depends on the nature of the study and the viewpoint that researcher believe in*" (Mohamed, 2011: 77). This study adopts trust as the main facet of relational capital. The main reason for this adoption is that the broad definition, and consequently the developed operationalisation, of trust includes all other facets of relational capital (e.g. Inkpen and Tsang, 2005, Lee and Choi, 2003, Tsai, 2000, Staples and Webster, 2008, Coleman, 1988, Bryk and Schneider, 1996, Bryk and Schneider, 2002). Mutual expectations and obligations among individuals can also be met by establishing relational trust shaped by continuous social interactions (Bryk and Schneider, 1996, Bryk and Schneider, 2002). In this regard, Staples and Webster (2008) discussed that, under weak structures, trust plays a stronger role in determining knowledge sharing because future obligations are unspecified and the meeting of these obligations is uncertain; thus, knowledge sharing approaches a pure social exchange, implying that trust is the critical enabler (p.622). Inkpen and Tsang (2005) attributed the importance of trust to its reliance upon different social judgments (e.g. assessment of the other party's benevolence, competence, integrity, etc.), together with assessment of the costs if the other party turns out to be untrustworthy (p.154). Cohen (2007) summarised the role of trust in building social capital as, "*Trust is the bedrock of social capital*" (p.245). The following section discusses relational capital (trust) in more detail.

3.2.5.1 Relational capital (trust)

Ridings et al. (2002) emphasise that trust is one of the important key elements that can foster the voluntary online cooperation among members joining in online communities. Lack of face-to-face interaction and communication, anonymity and the absence of legal guarantees might make it harder for community's members to share their information and knowledge. However, trust is an important facilitator that can reduce these problems, help interpersonal communication become more open and honest, promote frequent exchange of information and rule out undesired and opportunistic behaviours (Ridings et al., 2002).

There is no consensus about the definition of trust and its facets, which reflects its complexity. For example, Fukuyama (1995) defines trust from an individual's expectations "*that arises within a community of regular, honest and cooperative behaviour, based on commonly shared norms, on the part of the members of the community*" (p.26). Mayer et al. (1995) extended Fukuyama's definition by arguing that trust relationships carry some risks, when they define trust as "*the willingness of a party to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party*" (p.712).

Govier (1997: 4) defines trust as "*an attitude, based on beliefs and feelings and implying expectations and dispositions*". Based on this definition, he describes four features related to this attitude (Cited in Zou and Park, 2011: 6): 1) expectations of harmless behaviour based on beliefs about the trusted person's motivations and competence; 2) an attribution or assumption of general integrity on the part of the other, a sense that the trusted person is a good person; 3) a willingness to depend on the trusted person, an acceptance of risk and vulnerability; and 4) a general disposition to interpret the trusted person's actions favourably. In a similar vein, Gefen et al. (2003a) discussed that previous research views trust as a) a group of person's beliefs about other persons' integrity, ability, and benevolence; b) a developed general belief that other persons can be trusted; c) generated affect which is reflected in confidence of other persons caring; and d) a combination of all the above elements (p.55).

In information system literature, trust has been studied by many researchers in the organisational context and e-commerce communities (See chapter two, section 2.4). However, the following table summarises some trust related studies in virtual and online communities.

Table 3.7: Trust definitions and operationalisation in the context of online communities

Reference	Aim	Trust conceptualisation	Trust object and context	Consequences of trust
Ridings et al. (2002)	To study the trust related factors that affect the desire to give and obtain information about services and products in the virtual communities.	Empirical Ability or competencies of other members, in addition to benevolence and integrity.	Organisational online communities.	Community's members desire to give and obtain information.
McKnight et al. (2002)	The study aims to investigate "the development of trust in a Web-based vendor during two stages of a consumer's Web experience: exploration and commitment". (p. 532)	Empirical Trusting beliefs that deal with benevolence, competence, and predictability which lead to a trusting intention.	E-commerce	Trusting intention in the in Web businesses.
Gefen et al. (2003a)	The main objective is to integrate trust-based antecedents and the technological attribute-based antecedents found in TAM into a theoretical model in online shopping.	Empirical A set of specific beliefs; integrity, benevolence, ability, and predictability	E-commerce	Trust was found to affect the intended use of a business-to-consumer Web sites and perceived usefulness of these sites.
Bart et al. (2005)	The main aim is to "develop a conceptual model that links Web site and consumer characteristics, online trust, and behavioral intention" (p. 133)	Empirical Integrity: perception of the firm's good intention behind the online storefront Competence: perception of a site's competence to perform the required functions	E-commerce and online consumer behaviour	Online trust showed significant impact on consumer behavioural intent (willingness to conduct tasks such as: clicking through further on a Web site, abandoning or returning to the site, sending e-mail messages, downloading files, and ordering from the sit)
Usoro et al. (2007)	This study aims to examine "the role of trust in knowledge sharing within the context of organisational virtual communities of practice" (p. 199)	Empirical Perceptions of trustworthiness that contains: competence, honesty or integrity, and benevolence.	Virtual communities of practice in an organisation	- Competence-based trust has positive and significant correlation with knowledge sharing. - Integrity-based trust has positive and significant correlation with knowledge sharing. - Benevolence-based trust has positive and significant correlation with knowledge sharing.
Casalo et al. (2008)	This study aims to investigate the relationship between relational capital (trust) and consumer commitment to the virtual community.	Empirical Perception of trust, which includes: honesty, benevolence, and competence.	E-commerce. Consumers' commitment in a free software virtual community.	- Trust (honesty, benevolence, and competence) has positive influence on consumers' commitment to the virtual community.

McAllister (1995) explained that trust can be divided into two dimensions: affect-based trust and cognitive based trust. Affective trust refers to the emotional bonds or benevolent facet of trust in a relationship between individuals. He argued that this type of trust only exists when people emotionally invest in their relationships. According to Wu et al. (2007), in these relationships, individuals tend to help others not because *"they expect future obligations or benefits, but simply because their help is needed"* (p.328). However, cognitive-based trust or the rational aspect of trust depends on the historical interaction between individuals (McKnight et al., 1998). Therefore, trusters search for historical clues to the trust in other individuals, and then categorise them on the basis of whether they can be viewed as trustworthy or not. Valenzuela et al. (2009), in their study to examine if college students' use of Facebook was positively associated with students' life satisfaction, social trust, civic and political participation, reported non-significant difference between Facebook users and nonusers in terms of social trust and life satisfaction. However, there was a significant difference on civic engagement, with Facebook users reporting higher levels of participation in non-political activities. Using regression analysis, they reported that the intensity of Facebook use was able to predict 6% of social trust and 9% of life satisfaction. Moreover, the associations between Facebook use and social trust was not found to be moderated by students' gender and parental education.

Trust is a complex concept and composed of several components (Zou and Park, 2011). For example, Moorman et al. (1992) claim that trust is the willingness to rely on an exchange partner in whom an individual has confidence. They suggest that an expectation of trustworthiness may result from the ability to perform (expertise), reliability and intentionality. According to McKnight et al. (2002), trust, which reflects consumers' confidence in an organisation, can be manifested in four types of individual beliefs: ability, benevolence, integrity and predictability. In a similar manner, Gefen et al. (2003a), in their study to integrate trust with the technology acceptance model (TAM) to explain intended online shopping use, argue that ability, integrity, benevolence and predictability can reflect consumers' trust in e-vendors. Usoro et al. (2007), as shown in the above table, see that trust is the perception of three beliefs: competence, honesty and benevolence.

Competence or capability refers to an individual's perception of an other party who has the power, ability, and capability to achieve a specific task for that individual (Suh and Han, 2003). According to Bakker et al. (2006), competence or capabilities refers to "*the* *groups of skills, competences, and characteristics that enable a party to have influence within some specific domain*" (p.598). Competence-based trust occurs when an individual acquires the belief that another person has knowledge and has sufficient expertise to answer questions or solve problems related to a specific domain (Usoro et al., 2007).

Honesty is the belief that the second person will keep their word, act fairly, and fulfil their promises and be sincere (Flavian et al., 2006). This facet of trust depends on the previous interactions and behaviours. Usoro et al. (2007) emphasise that "*consistent and reliable past behaviour creates confidence in future actions*" (p.203). Finally, benevolence reflects the belief that an individual or a community member is "*interested in the well-being of the other without intention of opportunistic behaviour and motivated by a search for a mutually beneficial relationship*" (Flavian et al., 2006: 3). Therefore, benevolence focuses on the welfare of other parties in every interaction and to what extent these parties are motivated to seek joint gain (Doney and Cannon, 1997). A benevolent attitude is expected to condition the behaviour of the other party in the event that unforeseen circumstances arise (Ganesan, 1994). In the context of virtual communities, as stated by Ridings et al. (2002), benevolence refers to the embedded expectations that community users have the ability, the intention and the desire to help, support and care for the other members of the virtual community.

Trust is a commonly discussed research concept in the information system discipline (Gefen et al., 2003a, Gefen et al., 2003b, McKnight et al., 2002, Ridings et al., 2002). However, although many studies have been carried out to investigate trust in the organisational online communities and e-commerce settings (see the above table), in general, limited research has been carried out towards offering an integrated model for exploring trust in the context of non-organisational online community (Casalo et al., 2008). For example, in their study to examine the determinants and consequences of trust in virtual communities, Ridings et al. (2002) indicated that one of the major limitations of their model is not examining issues surrounding trust that users have in the organisation that hosts the investigated virtual community. Moreover, as mentioned above, knowledge sharing is a behaviour that occurs between two parties: knowledge provider and knowledge collector (Kwok and Gao, 2005/2006). Although there are several studies that have examined the role of trust in knowledge provision in an online community (Chiu et al., 2006, Chen et al., 2010, Ridings et al., 2002), the literature clearly reveals a lack of studies that have examined the role of trust in using professional online communities for knowledge sharing as a process between two parties and whether this role is perceived equally or differently by the two parties. Hence, and according to Huysman and Wulf (2006), Casalo et al. (2008), the issue of trust in online communities still remains largely under-explored and insufficiently investigated.

There is a stream of research in management information systems that tries to draw the relationship between information success factors that can explain online members' behaviours (Phang et al., 2009). However, the literature indicates clearly that no previous study has studied the causal association between any of the technological online aspects and social relations in the contexts of professional online communities. Huysman and Wulf (2006) emphasise that examining the relationship between the technological aspects of technology and social relations is "*still largely an open question*" (p. 47).

Moreover, as noted in Chapter One, this study will be guided by the social cognitive theory, the information success model and the theory of relational capital and the unified theory of acceptance and use of technology. In general, technology acceptance and the unified theory of acceptance and use are two models developed specifically for investigating technology use and adoption in the organisational settings. Although these two theories are able to explain behavioural intention and usage behaviour, the unified theory is still new and untested (Barnes and Vidgen, 2012, Venkatesh et al., 2012, Venkatesh et al., 2011, Straub, 2009). Hence, additional research is needed to understand how the unified theory of acceptance and use of technology may be applied in settings outside of the organisational and cultural contexts, such as professional online communities and non-Western culture. Furthermore and from a knowledge sharing behaviour standpoint, Kankanhalli et al. (2005) advocated that other perspectives such as the technology acceptance models may "*help to better account for ease of use and usefulness*" of online communities use. Benbasat and Barki (2007) agree with Kankanhalli et al. by recommending the extension of acceptance models to "*different IT contexts in order to reach a more comprehensive understanding of what influences adoption and acceptance, … and to provide more useful recommendations for practice*". The Social Cognitive Theory, on the other hand, is a "*widely accepted, empirically validated model of individual behaviour*" (Compeau and Higgins, 1995a: 190). It proposes that environmental influences such as social pressures or unique situational characteristics, cognitive and other individual factors including personality as well as demographic characteristics, and behaviour are reciprocally determined (Compeau and Higgins, 1995a). In more detail and according to this theory, individuals have the tendency to make decisions about the environment in which they want to exist, in addition to being influenced by those environments. When individuals participate in online communities, they actually interact with each other in a dynamic context (Hansen et al., 2005); therefore, members' participation is considered as a dynamic interpersonal relationship building process in which members seek achieving a sequence of social psychological needs (Chow and Chan, 2008). How individuals are connected in social relations could "*determine to what extent and in what way they can draw upon and contribute knowledge*" (van den Hooff and Huysman, 2009: 2). Hence, relational capital (trust) will be more relevant to understand and obtain more details of interpersonal needs regarding using professional online communities for knowledge sharing.

3.3. The theoretical models and hypothesis development

Creating a conceptual framework is considered as "*a means of simplifying the research task*" (Fisher, 2007: 122). A conceptual framework is "*a representation, either graphically or in narrative form, of the basic concepts or variables, and their presumed relationship with each other; it is usually best shown as a diagram*" (Punch, 2005). The conceptual framework, basically, represents a movement from confusion to certainty (Dwivedi, 2008) and provides clarity, focus and simplicity to the research task (Punch, 2005). Furthermore, it clears away all the issues that are not relevant to the research question and aim(s) (Dwivedi, 2008), helps to make explicit what we already know and think about the research topic (Punch, 2005), and finally it provides structure and coherence to the researcher's dissertation (Dwivedi, 2008). A conceptual framework is usually drawn on well-developed theories by previous research. It is a fundamental part in a quantitative research study as it explains the research questions or hypotheses, while in a qualitative study, it may be less important or less clear in its structure (Collis and Hussey, 2003, Punch, 2005).

As argued in Chapter One, understanding professional online community usage requires studying two sets of beliefs. Nine distinct and common predictors were examined from two perspectives of usage behaviour (use for knowledge acquisition and use for knowledge provision). Additionally, a comprehensive model was developed to combine both usage behaviours in one model. Thus, three conceptual research models were developed to explain professional community use. The proposed models consisted of 11 constructs; two dependent variables (use for knowledge acquisition UKA and use for knowledge provision UKP) and nine independents/predictors variables. Performance expectancy, personal outcome expectancy, effort expectancy, and social influence were adopted from the UTAUT model (Venkatesh et al., 2003, Venkatesh et al., 2012); system quality and content quality were adopted from (Delone, 2003, DeLone and McLean, 2002); knowledge self-efficacy and system self-efficacy were adopted from the Social Cognitive Theory (Bandura, 1997, Bandura and Cervone, 1986, Bandura et al., 2001, Compeau et al., 1999, Compeau and Higgins, 1995b, Compeau and Higgins, 1995a); and finally the relational capital (Trust) was adopted from the Social Capital Theory (Nahapiet and Ghoshal, 1998, Tsai and Ghoshal, 1998). Drawing on these theories and along with other empirical studies, a set of hypothetical relationships is formulated as discussed below.

3.3.1. Performance expectancy

Performance expectancy is defined as "*the degree to which an individual believes that using technology would enhance his or her job performance*" (Venkatesh et al., 2003: 447). Performance expectancy of using professional online communities can serve as a motivator for members to use the community to seek and acquire knowledge. In the professional online communities, members' primary goal is to evaluate the benefits that they gain from seeking and obtaining knowledge. The more they perceive that the results they find are useful for their work and profession, the more likely they are to be motivated to use the community system and vice versa.

Professional online communities are a type of communication channel to facilitate the interaction among community members. As discussed earlier, knowledge management systems have been developed based on three groups of technologies: communication technologies, collaboration technologies, and database management systems (Turban and Aronson, 2001). Therefore, from the technical view, online communities are a "*form of Internet based information system*" (Lin and Lee, 2006: 480). The UTAUT model explains the relationship between performance expectancy (perceived usefulness) and system use through behavioural intention (Venkatesh et al., 2003, Venkatesh et al., 2012, Venkatesh et al., 2011). Actual professional online community users are the main targets of this study. Therefore, the construct of behavioural intention was not included in the study model. The prior research strongly documented positive and significant influence of behavioural intentions upon actual use behaviour; therefore, as continuity is not under investigation, there is no logical reason to include the construct of behavioural intentions in the current research model.

The relationship between performance expectancy and behavioural intentions is strongly documented in previous research (Venkatesh and Bala, 2008, Venkatesh et al., 2003, Venkatesh et al., 2012). However, empirically and based on the social cognitive theory, it has been found that actual technology usage was also directly determined by expected outcomes (Compeau et al., 1999) and perceived usefulness (Igbaria and Iivari, 1995, Igbaria et al., 1995, Karahanna et al., 2006). Compeau et al. (1999) reported that "performance-related outcome expectations" of using computers significantly explain actual usage ($\beta = 0.25$; $p < 0.001$). Igbaria and Iivari (1995) demonstrated that perceived usefulness was able to predict 41% ($p < 0.001$) of the dependent variable – actual computer usage behaviour. In another study, perceived usefulness explained 0.10 ($p < 0.05$) of perceived microcomputer usage (Igbaria et al., 1995). Karahanna et al. (2006), in their study to discover factors influencing employees to use banks' customer relationship management (CRM) system, confirmed that the construct of perceived usefulness was able to explain 0.35 ($p < 0.001$) of usage scope and 0.39 ($p < 0.001$) of usage intensity. Based on these results, it can be concluded that the more community members believe that using the community to acquire knowledge helps them to improve their job performance, the more likely they are to be motivated to use the community for knowledge acquisition. Thus, the following hypothesis is suggested:

> H1: A higher level of performance expectancy will lead to a greater level of use of professional online communities for knowledge acquisition behaviour.

3.3.2. Personal outcome expectancy

Generally, without incentives, people will not waste their time and effort in using the community system to contribute their knowledge to others (Wasko and Faraj, 2000). Thus, the perceived outcomes provide potentially strong incentives for community members to share their knowledge. Social exchange theory explains individuals' behaviours in social exchange situations. As explained by this theory, individuals value the expected benefits in relation to the costs and build their action decision on the expectations that the action will produce some favourable rewards (Blau, 1964). In this study, personal outcome expectancy of using professional online communities to provide knowledge refers to an individual community member's belief that his or her behaviour will produce reputation, image, reciprocity, sense of accomplishment, enjoyment and competency.

Previous research has found that the perceived benefits and costs play an important role in motivating individuals to share their knowledge (Havakhor and Sabherwal, 2013). In the organisational context, Kankanhalli et al. (2005) concluded that the perceived benefits and costs play an important role in motivating employees to participate in organisational electronic knowledge repositories. They found that extrinsic benefits (organisational rewards) and intrinsic benefits (enjoyment in helping others) explained the majority of use of electronic knowledge repositories for contribution behaviour (22% and 43% respectively). Wasko and Faraj (2005) found that only centrality and reputation were able to explain both dependent variables, helpfulness of contribution and volume of contribution. However, they did not find significant relationships between commitment and reciprocity and the dependent variables. Level of contribution was captured by the perceived obligation to reciprocate and enhance professional reputation (Lin, 2007a). Furthermore, He and Wei (2009) reported that image and enjoyment in helping others, among several other factors, were significant determinants of employees' contribution beliefs. Hence, it can be concluded that the more community members believe that using the community to share knowledge helps them achieve some personal benefits, the more likely they are to be motivated to use the community for knowledge provision. Thus, this results in the following hypothesis:

> H2: A higher level of personal outcomes expectancy will lead to a greater level of use of professional online communities for providing knowledge.

3.3.3. Effort expectancy

Derived from a number of competing models (the technology acceptance model TAM, innovation distribution theory, and the model of PC utilisation), Venkatesh et al. (2003) developed the concept of "effort expectancy" which is defined as the degree to which an individual believes that using technology is free of effort. Prior research proposes that individuals have the tendency to avoid using complex information technologies and systems. In other words, when a user believes that the information system is easy to use and does not require much effort, it is more likely that he/she will use that system. On the other hand, if a technology or system was perceived as hard to use, people would not use it.

As discussed in section 3.2.4.3, UTAUT posits that effort expectancy, together with two other main factors, determines the behavioural intention toward using and adopting technology (Venkatesh et al., 2003). Furthermore and drawing on this theory, users satisfaction was found to be influenced by effort expectancy (Chan et al., 2010), and a main determinant influencing people's intention to use computers (Al-Gahtani et al., 2007), mobile technology (Park et al., 2007, van Biljon and Renaud, 2008), the Internet

(Abbasi et al., 2011), MP3 and internet banking (Im et al., 2011), mobile banking (Zhou et al., 2010b, Yu, 2012), and system contentious use (Venkatesh et al., 2011, Hong et al., 2006). As effort expectancy is one of the core technology adoption and using beliefs (Venkatesh et al., 2003, Venkatesh et al., 2012, Venkatesh et al., 2011), and as discussed above, many previous studies have demonstrated the generalisability of the ease of use construct in different technology contexts, it can be hypothesised that:

> H3a: A lower level of effort expectancy will lead to a greater level of use of professional online communities for knowledge acquisition behaviour.

> H3b: A lower level of effort expectancy will lead to a greater level of use of professional online communities for providing knowledge.

3.3.4. Social influence

Social influence is defined as the degree to which an individual perceives that other important people to them believe he or she should use the community for knowledge sharing (acquisition and provision). Similar to effort expectancy, Venkatesh et al. (2003) mainly developed this construct to represent subjective norms (the Theory of Reasoned Action and the Theory of Planned Behaviour), social factors (Model of PC Utilization), and image (Innovation Diffusion Theory). However, regardless of the label and the applied model, each variable revolves around the idea that people's intention to adopt and use a specific system is significantly influenced by their perceptions about how other people react to their use of the system or the technology. Thus, social influence explains the impact of environmental factors (e.g. friends, co-workers, relatives, and superiors) on users' behavioural intention (Zhao et al., 2010).

Previous research suggests that social influence of, for example, managers, peers, friends and co-workers plays a significant role in people's intention to use and adopt technology. For instance, Karahanna et al. (1999) found that subjective norms toward computer use and adoption influenced behavioural intentions to use and adopt computers. The intention toward a knowledge management programme was determined by social influence (Wu et al., 2007). Amin (2008) reported that social influence was a main predictor of intention to use mobile banking. Barnes and Vidgen (2012) found that social influence explained 0.31 ($p < 0.001$) of behavioural intention to use an organisational intranet. In the context of e-Government service, Gupta (2008) reported that using this service was significantly determined by social influence. Moreover, previous research has shown that social influence/subjective norms significantly influenced perceived usefulness, especially in the mandatory context (Lewis et al., 2003).

In summary, as grounded in the UTAUT model and based on the results of many studies in diverse contexts, it was documented that social influence is a main determinant of systems and technologies use. Thus, we propose the following hypotheses:

> H4a: A higher level of social influence will lead to a greater level of use of professional online communities for knowledge acquisition behaviour.
>
> H4b: A higher level of social influence will lead to a greater level of use of professional online communities for providing knowledge.

3.3.5. Relational capital (Trust)

Relational capital is conceptualised as the nature and the quality of the relationships that exist among individuals, and how these relationships influence their behaviour (Lu and Yang, 2011). As discussed earlier (Section 3.2.5.1), trust is regarded as the bedrock of social capital and includes all other facets of relational capital. It is the focal factor in all social exchange relationships (Wasko and Faraj, 2005) and plays an important role in mitigating and reducing the uncertainty in an unfamiliar setting in all social exchange relationships (Blau, 1964). Previous research has portrayed trust in terms of behaviour with ideal outcomes from relationships, promising and healthy relationships, shared goals, opportunistic behavior, suspicion and doubt, calculative act, predictive action, cooperative behaviour and network relations (Ha and Akamavi, 2009: 95). According to Bradach and Eccles (1989), trust is commonly used to reduce uncertainty or vulnerability in exchanges, particularly when people have limited knowledge or prior experience. In this regard, Usoro et al. (2007) suggest that the availability of communication and information systems does not automatically guarantee people's willingness to share information and develop new knowledge. Previous studies which tried to address this challenge have pointed to social relations as a key determinant in motivating people to share their unique knowledge (Huang, 2009, Chowdhury, 2005, Usoro et al., 2007). Lin and Lee (2006) argues that "*trust is crucial in virtual communities where the absence of workable rules creates reliance on others behaving in a socially acceptable manner, that is trust, essential for community continuity*" (p. 542). According to Chen et al. (2010), when individuals trust each other in online communities, they will "*liberally exchange, seek, and collect knowledge*" (p.228).

Empirically, Tsai and Ghoshal (1998) reported significant influence of trust on the exchange of resources between intra-organisational business units ($\beta = 0.40$; $p < 0.001$). Lee and Choi (2003) revealed that lack of trust is considered as a major barrier in knowledge sharing activities. They found that trust is one of the organisational cultural enablers that showed a significant impact on the knowledge creation process overall ($\beta=0.35$; $p < 0.001$) and the four knowledge creation processes individually (socialisation ($\beta = 0.24$; $p < 0.01$), externalisation ($\beta = 0.31$; $p < 0.001$), combination ($\beta = 0.40$; $p < 0.001$), and finally internalisation ($\beta = 0.32$; $p < 0.001$). Huang et al. (2011) demonstrated that cognitive based trust had a significant influence on employees' intention to share tacit knowledge ($\beta = 0.23$; $p < 0.01$) and their intention to share explicit knowledge ($\beta = 0.31$; $p < 0.001$). In the context of general online communities, Ridings and his colleagues (2002) reported that trust (benevolence/integrity of other members and ability of other members) had a significant influence on the desire to give information ($\beta = 0.29, 0.22$; $p < 0.01$) and the desire to get information ($\beta = 0.15, 0.28$; $p < 0.05, 0.01$ respectively). Gefen et al. (2003a) confirmed that the intention to use online shopping was significantly influenced by trust ($\beta = 0.26$; $p < 0.001$). In their study to examine stickiness and information sharing among virtual community consumers in a Taiwanese telecom company, Wu and Tsang (2008) reported a significant relationship between trust (predictability) and information sharing ($\beta = 0.31$; $p < 0.001$) but not stickiness. This results in the following hypotheses.

> H5a: A higher level of trust will lead to a greater level of use of professional online communities for knowledge acquisition behaviour.

> H5b: A higher level of trust will lead to a greater level of use of professional online communities for knowledge provision behaviour.

3.3.6. System self-efficacy

In the current study, system self-efficacy refers to professional community members' perception of their ability to use the community system and its tools to share their knowledge (acquisition and provision). Regarding the context of this study, system self-efficacy might be necessary. Drawing on the Social Cognitive Theory, people who are low in technology self-efficacy would find it difficult to deal with any form of web-based online communities and may judge them as complex and difficult to use, while people who have technology self-efficacy and easily adapt to technology may perceive the same situation as easy and able to be utilised (Compeau et al., 1999, Compeau and

Higgins, 1995b). As discussed by Reid and Levy (2008), self-efficacy beliefs can determine how people feel and think, what motivates them, and how they behave.

Generally, self-efficacy judgments are expected to influence the outcome expectations as the outcomes which an individual expects derive from the judgments of how well he or she can execute the required behaviour (Compeau and Higgins, 1995a). Through conducting a meta-analysis, Stajkovic and Luthans (1998) found that there is a correlation ($r = 0.38$) between self-efficacy and the criterion of general work performance. Likewise, Salgado and Moscoso (2000) demonstrated the validity of predicting a number of consequences by self-efficacy. For example, they found that self-efficacy showed ($\beta = 0.39$; $p < 0.001$) of predicting job performance ratings by supervisors, ($\beta = 0.41$; $p < 0.001$) for predicting job performance self-evaluation, and ($\beta = 0.26$; $p < 0.01$) for predicting job satisfaction. Moreover, previous research, especially in information systems studies, has provided strong support for a positive and significant association between self-efficacy and expected outcomes. For example, Compeau et al. (1999), Compeau and Higgins (1995b) demonstrated that computer self-efficacy significantly predicted both performance-related outcome expectations and personal outcome expectations. In a similar vein, Johnson and George (2000) confirmed and supported the findings of Compeau and Higgins by empirically reporting a positive and significant influence of computer self-efficacy on work performance, which in turn influenced outcome expectancy. These findings seem to support the hypothesised relationships between system self-efficacy and performance expectancy and personal outcome expectancy. Therefore, the following hypotheses are suggested:

> H6a: A higher level of system self-efficacy will lead to a greater level of performance expectancy.

> H6b: A higher level of system self-efficacy will lead to a greater level of personal outcomes expectancy.

The proposed relationship between community system self-efficacy and effort expectancy is based on the theoretical argument by Davis (1989). He, theoretically, developed the two well-known concepts, ease of use and usefulness, based on Bandura's self-efficacy theory. He recognised that self-efficacy, which is defined as an individual's judgment of how well he/she can perform a course of action in order to deal with a potential situation is linked to ease of use. In this regard and using the theory of planned behaviour (TPB), Mathieson (1991) contended that TPB suggests two different types of control factors: internal control factors, which include skill and willpower, and external control factors, which include time, opportunity and cooperation of others. They further argued that while the external control issues are not considered in TAM, *"EOU (ease of use) corresponds to the internal control factor of skill"* (p. 179). Therefore, there is theoretical support for the suggestion that community system self-efficacy, as an internal control factor of skill, will directly affect effort expectancy.

Understanding the antecedents of effort expectancy is crucial from a theoretical perspective because of its key influence in determining system acceptance and use. Prior research has consistently documented the key role of self-efficacy in the computing context (e.g. Compeau et al., 1999, Compeau and Higgins, 1995b). When a community member assesses the effort required to utilise the community's system to carry out a particular task, the evaluation of his/her ability to perform this task is likely to be a key factor in the assessment. In this regard, and based on Chan et al. (2010's) discussion, the importance of community system self-efficacy may be explained from two points of view: the effort requirement perspective and the facilitating conditions perspective. Firstly, from the effort requirement perspective, community members who are comparatively high in self-efficacy are more likely to perceive that using the community requires less effort in comparison to members with lower self-efficacy. Thus and in this case, self-efficacy may enhance members' beliefs in their ability to use the community system. Secondly, from a facilitating conditions perspective, community members with higher self-efficacy are more likely to have the required resources (i.e. knowledge and baseline skills) to use the community system.

Empirically, in a longitudinal study to understand how various interventions can impact employees' intention to adopt and use technology, Venkatesh and Bala (2008) found that ease of use was significantly influenced by computer self-efficacy in the three study stages: T1 (β= 0.35; $p < 0.001$), T2 (β = 0.30; $p < 0.001$), T3 (β = 0.28; $p < 0.001$) and pooled (β= 0.31; $p < 0.001$). In the context of mandatory e-government technology, Chan et al. (2010) found that computer self-efficacy significantly influenced e-government user satisfaction through effort expectancy (β= 0.10; $p < 0.001$). Therefore, it can be hypothesised that community members anchor effort expectancy perceptions to their community system self-efficacy:

> H6c: A higher level of system self-efficacy will lead to a lower level of effort expectancy.

3.3.7. Knowledge self-efficacy

Self-efficacy is considered one of the most influential elements of the cognitive structures and one of the major cognitive forces that guide behaviour (Bandura, 1986). According to Bandura (1997), self-efficacy is an individual's belief that he/she possesses the required ability to carry out a specific task. They argue also that these beliefs affect decisions about the choice of challenges to undertake, the amount of effort to expend, and the length of time an individual perseveres at a task in spite of difficulties. It is concerned ''*not with the number of skills you have, but with what you believe you can do with what you have under a variety of circumstances*" (Bandura, 1997: 37). Bandura (1986) argues that the stronger individuals' perceived their self-efficacy to be in regard to meeting their standard (goal), the more they would intensify their effort.

All things being equal, knowledge self-efficacy judgments are expected to influence outcome expectations since "*the outcomes one expect derive largely from judgments as to how well one can execute the requisite behaviour*" (Bandura, 1978: 241). Compeau et al. (1999) argue that "*our expectations of positive outcomes of behaviour will be meaningless if we doubt our capability to successfully execute the behaviour in the first place*" (p.146). Conversely, individuals with low degrees of efficacy expect poor outcomes as the result of their efforts, and they focus on costs and risks (Bandura, 2002). Obviously, outcome expectations will be evaluated before carrying out any actions. Thus, positive outcomes can strengthen an individual's behaviour (Bandura, 1997); otherwise, individuals who do not have the required skills question their ability and capabilities to execute a specific task or action and may perceive their activities or actions as meaningless and pointless (Compeau et al., 1999). Furthermore, if an individual believes he/she will be able to execute an activity skilfully in the given context (e.g. contributing knowledge), then he/she may expect more favourable outcomes than individuals who are uncertain of their abilities (Compeau et al., 1999).

> H7: A higher level of knowledge self-efficacy will lead to a greater level of personal outcome expectancy.

3.3.8. System quality

As explained by Nelson et al. (2005), the functionality of any system is mainly measured by its quality. System reliability, convenience of access, appropriate design and flexibility are examples of qualities valued by system users. Generally speaking, these characteristics are fundamental to increasing and to improving "objective usability of the system" because a user, in this case, will be able to achieve his/her tasks quickly and easily (Venkatesh and Bala, 2008: 294). According to Reichheld and Schefter (2000), members tend to prefer systems which are simple in design and user-friendly. Maloney-Krichmar and Preece (2005) contend that the most important technical concern for the online community's members is to have reliable communication. They indicate that when members are committed to their community, they become uncomfortable in the case of any malfunction such as server breakdown. System quality is especially important in the context of professional online communities because many community members might be reluctant to use the community system when they experience lack of access, difficulty in navigating the website, frequent delays in response and frequent disconnection. A high-quality community system can generate a comfortable environment where members can easily identify functional groups and navigation aids, and ensure efficient information exchange.

The relationship between system quality and perceived usefulness has been demonstrated in the literature (Hsieh et al., 2010, Lin and Huang, 2008, Seddon and Kiew, 2007, Sørum et al., 2012a). Seddon (1997) suggests that using an information system is not a definite indicator of system success but rather it is the expected or perceived benefits from using a system that will highlight its success. According to Seddon (1997), the perceived usefulness is one of the crucial determinants of using a system, since people who are satisfied with the outcomes will use the system more to increase the net expected benefits. Therefore, he argues that the relationship between information quality (the output of a system) and system use is mediated by the expected benefits. Empirically, he found that information quality and system quality are the main determinants of system use, through the perceived usefulness. In another study, Seddon and Kiew (1996) found that perceived usefulness is a significant mediator between system characteristics (information quality and system quality) and user satisfaction. Together with the construct "the importance of the system", system characteristics explained 63% of variance in the perceived usefulness construct. In the context of e-commerce, previous studies have found that e-commerce sites' usability significantly predicted users' search strategies and performance (Flavian et al., 2006). Lin (2008) reported that perceived usefulness is a significant mediator in the relationship between information quality and system quality with members' satisfaction. In another study, she found that perceived usefulness is a significant mediator between information and system quality and sense of belonging (Lin et al., 2007). Wells et al. (2011) found that website quality is a main determinant of perceived benefits and quality of products. The perceived benefits of using public websites were also found to be determined by system quality and information quality (Sørum et al., 2012b). Accordingly, we predict the relationship between system quality and both expectancies as follows:

> H8a: A higher level of community's system quality will produce a higher level of performance expectancy.

> H8b: A higher level of a community's system quality will produce a higher level of personal outcome expectancy from using the professional online system.

As discussed above, Venkatesh et al. (2003) define effort expectancy as "the degree of ease associated with the use of the system" (p.450). Davis (1989) suggests that the dimension of system quality represents the perceptions of user interactions with the system over time, therefore, a higher-quality system should be perceived as easier to use. Nelson et al. (2005) asserted that system quality and ease of use are two different but related constructs. They concluded that "*a system that is perceived to be easy to use may also be perceived to be high quality; therefore, ease of use may be a consequence of system quality*" (p. 205).

Wixom and Todd (2005) used satisfaction as a mediator between the constructs of system quality and ease of use. As theorised, they found that user satisfaction is a significant mediator; however, they also found, in their alternative model, that system quality showed a significant direct effect on the construct of ease of use ($\beta = 0.66$, $p < 0.001$). In their study to explore the factors that impact user acceptance of online retailing, Ahn et al. (2007), in the context of user acceptance of online retailing, found that system quality had a significant influence on perceived ease of use ($\beta = 0.58$, $p < 0.001$). Nov and Ye (2008) reported that system characteristics, which were manifested in two dimensions: screen design and relevance, had a significant influence on the perceived ease of use of digital libraries (β=0.22, $p < 0.01$; and β= 0.23, $p < 0.01$ respectively). Accordingly, we predict the relationship between system quality and effort expectancy as follows:

> H8c: A higher level of a community's system quality will lead to a lower level of effort expectancy.

In online communities and based on the social capital theory, the dimension of structural capital is more interested in the community system and its ability to grant access to other members and to effectively and efficiently facilitate the process of interaction among community members to share their knowledge and information (Huysman and Wulf, 2006). Widen-Wulff and Mariam (2004) explained that this dimension is more related to whether or not the system users have access to communicate with each other. Therefore, if users of the community are unable to access the system or the system is perceived as unreliable, then this will impede their ability to increase their relational capital and most likely they will not use this system. In this regard, Zou and Park (2011) stressed that achieving and building trust in the online context is strongly "*dependent upon the technological medium of the internet and built-in web systems and tools*" (p.11).

The relationship between structural capital and relational capital - trust - has been documented in the social capital literature (Lu and Yang, 2011). However, from an information system perspective, Vance et al. (2008), in their study to investigate the effect of trust in information technology artefacts, found that system quality (measured by two dimensions: navigational structure and visual appeal) showed significant influence on trusting beliefs ($\beta = 0.29$, $p < 0.001$; $\beta = 0.19$, $p < 0.01$ respectively). Furthermore, previous studies on online consumer behaviour have documented the relationship between system quality and trust in the exchange interactions (e.g. Flavian et al., 2006, Liang and Chen, 2009, Wang and Emurian, 2005). Thus, we propose the following hypothesis:

> H8d: A higher level of professional online community's system quality will produce a greater level of trust between the community's members.

3.3.9. Content quality

"Without rich and valuable knowledge, online communities are of limited valus" (Chang et al., 2013: 801). In the context of professional online communities, even if a member feels that the community system is quite reliable and convenient to access, the member might still perceive the quality of the knowledge and information provided as not valuable and not worth the time necessary to use the community system. Hence, correctness, clarity, and consistency, for example, are significant features of content and highly appreciated by community members (Petter et al., 2008). In this respect, Chen (2007) considers that there are two factors that might prevent members from sharing their knowledge in professional online communities. One of these factors is related to the quality of the website. He states that the quality of the website refers to "*knowledge quality and system quality*", which are responsible for members' participation and

sharing of their knowledge (p.452). He further adds that many members might stop using the community because of the perceived poor quality of the content offered by the website. Although a significant relationship between knowledge content quality and the perceived usefulness of knowledge sharing was not supported, Kulkarni et al. (2007) posited that if the content quality is high, knowledge workers are more likely to perceive that knowledge management initiatives contribute to enhanced work performance. Cabrera and Cabrera (2002) emphasised that if individuals find that the shared contents are not worth the time necessary to explore them, they may not participate in the sharing process. Thus, on the one hand, if the professional online community system can provide the knowledge seeker, for example, correct, consistent and accurate knowledge and information, it is more likely that he/she will perceive a higher job relevance of the community, and higher level of performance expectancy. Otherwise, if the content quality is evaluated as poor or disappointing, knowledge seekers will be negatively rewarded and will very likely lose their interest in obtaining knowledge. On the other hand, if a knowledge provider feels that the content is exceptional, he/she may contribute to build a personal image of expertise (Cabrera et al., 2006).

Statistically, according to the IS success model (DeLone and McLean, 1992, DeLone and McLean, 2002), information systems success is indirectly influenced by information quality via some mediators such as user intention/behaviour and user satisfaction. In their re-specified information system success model, Seddon and Kiew (1996) found that usefulness and benefits of using the system is a significant mediator between information quality and user satisfaction ($\beta = 0.21$, $p < 0.05$). In another re-specification of DeLone and McLean's (1992) model, Wu and Wang (2006) found that knowledge/information quality was a significant driver of the user's perceived usefulness ($\beta = 0.69$, $p < 0.001$). Lin-Fen (2007), statistically, reported that perceived usefulness significantly mediated the relationship between information quality and a sense of belonging ($\beta = 0.19$, $p < 0.01$). In the context of acceptance of online retailing, Ahn et al. (2007) reported a significant and positive relationship between website information quality and perceived usefulness ($\beta = 0.36$, $p < 0.001$). Thus, we propose the following hypotheses:

> H9a: A higher level of knowledge quality will produce a higher level of performance expectancy.

H9b: A higher level of knowledge quality will produce a higher level of personal outcome expectancy of using the professional online system.

Knowledge and information are usually provided by the community's members in the form of written text to answer an enquiry or to solve a problem, therefore, according to Widen-Wulff and Mariam (2004), the quality of content is influential in the building of trust among the community members. From a social capital interrelations perspective, they argued that, among the three dimensions of social capital, the content (cognitive) dimension is responsible for establishing trust and trustworthiness, which shape the concept of relational capital. Keen et al. (2004) propose that information quality is an important key to the trust-building mechanism in online interaction. In more detail, they argue that including some positive and favourable information traits (e.g. accuracy, clearness, and understanding), should influence trust-belief integrity in the exchange process. Furthermore, as explained by McKnight et al. (2002), showing care toward other parties through providing timely and helpful information is a significant and important driver to build benevolence. In a similar manner, as proposed by Goodhue and Thompson (1995), the availability of accurate and reliable knowledge is a source of information competence, which is, as discussed earlier, a dimension of trust-building.

In the context of inter-organisational data exchange, Nicolaou and McKnight (2006) propose that perceived information quality is crucial for building trust-beliefs in terms of integrity, benevolence, and competence. Empirically, they found a significant and positive path coefficient between the perceived information quality and trust ($\beta = 0.45$, $p < 0.001$). In the context of e-commerce, the influence of information quality on customer trust was documented by many researchers. For example, Everard and Galletta (2006) revealed that perceived information quality was a strongly significant predictor of trust in the online stores ($\beta = 0.73$, $p < 0.001$). Lee and Chung (2009), furthermore, reported a significant effect of information quality on customer trust in the mobile banking ($\beta = 0.36$, $p < 0.001$). Thus, we can propose the following hypothesis:

H9c: A higher level of content quality will lead to a greater level of relational capital (trust).

3.3.10. The effect of moderators

Several studies have empirically examined the impacts of users' demographic characteristics on technology acceptance and adoption. However, in comparison to the innovation diffusion studies which demonstrated that people who adopt technology innovations early tend to be relatively younger, educated and have higher income and higher social status and occupation, the literature review shows inconsistent results. Regardless, as mentioned earlier in the original UTAUT model and its extensions (Venkatesh and Bala, 2008, Venkatesh et al., 2003, Venkatesh et al., 2012), users' age, gender, voluntariness and experience are supposed to affect the hypothesised relationships between the UTAUT variables of use. In this study, professional online community usage is voluntary; consequently, voluntariness moderation was excluded.

A- Gender moderation impact

Gender has been mentioned as an effective moderator in prior research related to the TAM model and TPB theory. In a longitudinal investigation study and based on the Planned Behaviour theory, Venkatesh and Davis (2000) concluded that men and women showed different decision processes when they evaluated and adopted new technologies in the workplace. They reported that gender exerted significant influence on the obtained results. They found that men were more salient regarding the influence of attitude toward behaviour. However, they found that women were more salient regarding subjective norms and perceived behaviour control. Drawing on the TAM model, Venkatesh and Morris (2000) report stronger results in men when they measure perceived usefulness and in women when they measure ease of use. They found that men were clearly more influenced by perceived usefulness, whereas women tended to be more affected by ease of use and subjective norms. In another study, Venkatesh et al. (2003) found that the participants' gender significantly moderated all the hypothesised relationships in the developed model. They reported that the association between performance expectancy and behavioural intention to use was stronger for men, while the relationship between effort expectancy and usage intentions was more salient for women. Regarding the relationship between social influence and intention to use, they reported a stronger influence for women only under the condition of mandatory usage. Therefore, the influence of gender on the relationship between social influence and system use was excluded in that study.

In general, limited empirical research has studied statistically the difference between men and women in the context of technology adoption and use (Venkatesh et al., 2012). For example, by initially using the homogeneity of variances and Levene's test to check for discreteness, Wu et al. (2012) found a significant difference between males and females regarding the intention toward using an electronic ticket system (IPass). They reported that male respondents stressed the relationship between perceived expectancy and the behavioural intentions. On the other hand, female respondents placed greater emphasis on the relationship between effort expectancy and social influence, individually, and behavioural intentions. Thus, the following hypotheses are suggested:

> H10: The influence of performance expectancy, personal outcome expectancy, and effort expectancy on using professional online communities for knowledge acquisition/provision will be moderated by gender. Specifically:
>
> H10.1a: The effect of performance expectancy on use for knowledge acquisition will be moderated by gender (stronger for men).
>
> H10.1b: The effect of personal outcome expectancy on use for knowledge provision will be moderated by gender (stronger for men).
>
> H10.2a: The effect of effort expectancy on use for knowledge acquisition will be moderated by gender (stronger for women).
>
> H10.2b: The effect of effort expectancy on use for knowledge provision will be moderated by gender (stronger for women).

B- Age moderation impact

Age has been studied as a moderator related to the planned behaviour theory. Morris and Venkatesh (2000), in their study to examine the impact of age differences on technology use and adoption decisions based on the theory of planned behaviour, found that younger workers tended to weigh the attitude toward using the new technology as more salient than older workers. However, the older workers weighed the importance of social influence (subjective norms) and perceived behaviour control more than the younger workers. Except for the subjective norm, these results were consistent in long-term usage decisions. In the original UTAUT, Venkatesh et al. (2003) found that the influence of performance expectancy on intention to use was more salient for younger workers. For older workers, the influence of effort expectancy on intention to use was more salient. However, only under the conditions of mandatory use, the relationship between social influence and behavioural intentions was more salient for older workers.

Wu et al. (2012) demonstrated that the influence of performance expectancy and effort expectancy on respondents' intention to use new technology was moderated by the age of users. In his study to examine the factors affecting mobile banking use, Yu (2012) reported age as a significant moderator in the proposed model. Although he did not support the influence of age on the prediction of behavioural intention to use mobile banking by performance expectancy, he found that the impact of effort expectancy and social influence on the respondents' intentions to use and adopt mobile banking were significant. Thus, the following hypotheses are suggested:

> H11: The influence of performance expectancy, personal outcome expectancy and effort expectancy on using professional online communities for knowledge acquisition/provision will be moderated by respondents' age. Specifically:
>
> H11.1a: The effect of performance expectancy on use for knowledge acquisition will be moderated by age (stronger for younger members).
>
> H11.1b: The effect of personal outcome expectancy on use for knowledge provision will be moderated by age (stronger for younger members).
>
> H11.2a: The effect of effort expectancy on use for knowledge acquisition will be moderated by age (stronger for older members).
>
> H11.2b: The effect of effort expectancy on use for knowledge provision will be moderated by age (stronger for older members).

C- Experience moderation impact

Unlike gender and age, experience has been studied widely by many researchers and, based on the level of experience, most results in most prior theories and models showed significant differences. For example, Triandis (1971) posits that the relationship between individuals' behaviour and some determinants such as social norms and affect will decrease as individuals become more experienced. Davis et al. (1989) reported that when the level of users' experience increases, the influence of ease of use becomes less important and tends to be insignificant. In their PC model, Thompson et al. (1994) reported that more experienced users tend to be less influenced by several factors such as complexity, affect, and social factors. On the other hand, they found that "long-term benefits" was more salient for high experience users. In their study to compare pre-adoption and post-adoption, Karahanna et al. (1999) found that users' attitude toward using and adopting technology was stronger for high experience users; on the contrary, the subjective norm was less important.

Regarding experience and the UTAUT model, Venkatesh and his colleagues (2003) reported that the impact of effort expectancy and social influence on users' behavioural intention is more salient for users with limited experience. Wu et al. (2012) reported a significant moderating influence of experience on the relationship between effort expectancy and behavioural intention. Furthermore, the relationship between social influence and behavioural intention was found to be moderated by users' experience as well. Thus, the following hypotheses are suggested:

> H12: The influence of effort expectancy and social influence on use for knowledge acquisition/provision will be moderated by respondents' experience. Specifically:
>
> H12.1a: The effect of effort expectancy on use for knowledge acquisition will be moderated by experience (stronger for less experience).
>
> H12.1b: The effect of effort expectancy on use for knowledge provision will be moderated by experience (stronger for less experience).
>
> H12.2a: The effect of social influence on use for knowledge acquisition will be moderated by experience (stronger for less experience).
>
> H12.2b: The effect of social influence on use for knowledge provision will be moderated by experience (stronger for less experience).

Inclusive of the research hypotheses described above, two research models were developed to describe using professional online communities for knowledge acquisition/provision. Figure 3.12 (A) depicts the hypotheses related to use of professional online communities for knowledge acquisition (UKA), while Figure 3.12 (B) displays the hypotheses related to use of professional online communities for knowledge provision (UKP).

3.3.11. Use for knowledge sharing (acquisition and provision)

According to Nonnecke et al. (2006), once people who mainly search for information have learned more about the community and gain familiarity with the method of posting messages or have different attitudes toward the community, they will actively provide information. Blau (1964) argues that "*an individual who supplies rewarding services to another obligates him. To discharge this obligation, the second must furnish benefits to the first in turn*" (p. 89). In this regard, the social exchange theory suggests that "*when an individual receives a favour from another party, there is an expectation of some future return, although when it will occur and what form it will take is usually unstated*" (Watson and Hewett, 2006: 148). Furthermore, based on the reciprocity theory, Wasko and Faraj (2005) argued that "*individuals usually reciprocate the benefits they receive from others, ensuring ongoing supportive exchange*" (p.43).

In the organisational context, it was found that employees' knowledge provision behaviour was significantly influenced by their seeking and collecting behaviour (Hooff and Ridder, 2004, Hooff and Weenen, 2004, Watson and Hewett, 2006). Although the relationship between knowledge collecting behaviour and knowledge provision behaviour was not hypothesised in the theoretical model, Hooff and Ridder (2004) found that adding a direct effect from knowledge collecting behaviour to knowledge provision behaviour significantly created a fitting model to replicate the empirical correlation matrix. Hooff and Weenen (2004) found that knowledge collecting within a department significantly influenced knowledge donating within a department ($\beta = 0.26$; $p < 0.001$), and knowledge collecting outside a department significantly influenced knowledge donating outside a department ($\beta = 0.37$; $p < 0.001$). Watson and Hewett (2006) found that benefitting from accessing and using knowledge from the firm's knowledge management system significantly affected the frequency of knowledge contribution ($\beta = 0.29$; $p < 0.001$). In their qualitative study, Lottering and Dick (2012) found that people who seek knowledge usually share their knowledge. They concluded that knowledge seeking and knowledge sharing "*are closely related and hard to separate in practice*" (p. 7). In the virtual community context, Wang and Fesenmaier (2004) examined empirically the relationship between community members' level of participation and their extent of active contributions to the online travel community. They reported that the level of involvement, manifested in seeking advice and other benefits, positively influenced behaviour to give information ($\beta = 0.36$; $p < 0.001$). Therefore, the following hypothesis is suggested:

> H13: A higher level of use of the community for knowledge acquisition will lead to a greater level of use of the community for knowledge provision.

Inclusive of the research hypothesis suggested above, a new research model was developed to combine both usage behaviours in a comprehensive model. Thus, Figure 3.12 (C) depicts the hypotheses related to use of professional online communities for knowledge acquisition and provision (UKA and UKP). Table 3.8 presents all research hypotheses of the current study.

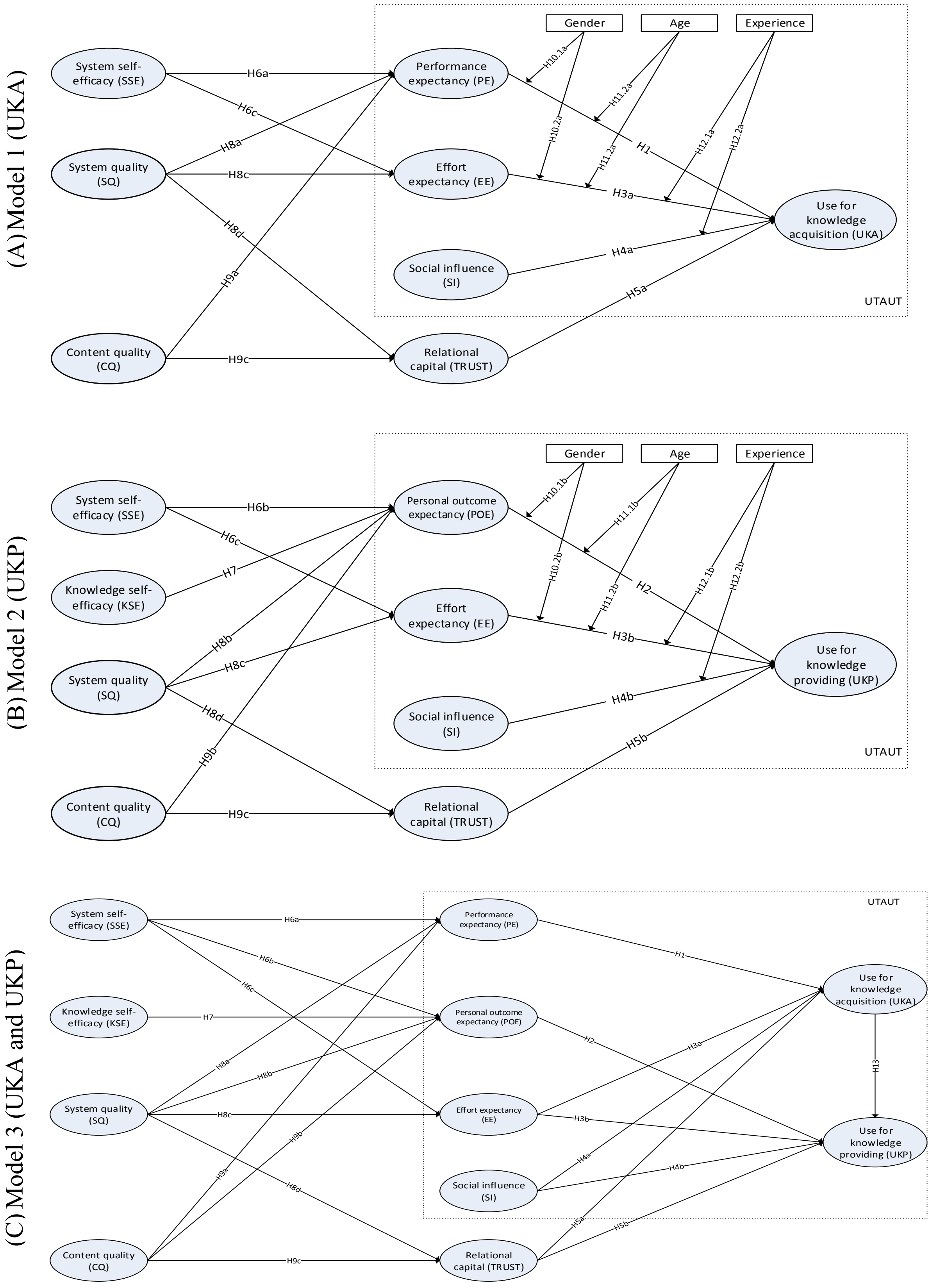


Figure 3.12 A, B, and C: The proposed research frameworks

Table 3.8: List of research hypotheses

No.		Model	Research Hypotheses
H1		1 & 3	A higher level of performance expectancy will lead to a greater level of use of professional online communities for knowledge acquisition behaviour.
H2		2 & 3	A higher level of personal outcomes expectancy will lead to a greater level of use of professional online communities for providing knowledge.
H3	H3a	1 & 3	A lower level of effort expectancy will lead to a greater level of use of professional online communities for knowledge acquisition behaviour.
	H3b	2 & 3	A lower level of effort expectancy will lead to a greater level of use of professional online communities for providing knowledge.
H4	H4a	1 & 3	A higher level of social influence will lead to a greater level of use of professional online communities for knowledge acquisition behaviour.
	H4b	2 & 3	A higher level of social influence will lead to a greater level of use of professional online communities for providing knowledge.
H5	H5a	1 & 3	A higher level of trust will lead to a greater level of use of professional online communities for knowledge acquisition behaviour.
	H5b	2 & 3	A higher level of trust will lead to a greater level of use of professional online communities for knowledge provision behaviour.
H6	H6a	1 & 3	A higher level of system self-efficacy will lead to a greater level of performance expectancy.
	H6b	2 & 3	A higher level of system self-efficacy will lead to a greater level of personal outcomes expectancy.
	H6c	1, 2 &3	A higher level of system self-efficacy will lead to a lower level of effort expectancy.
H7		2 & 3	A higher level of knowledge self-efficacy will lead to a greater level of personal outcome expectancy.
H8	H8a	1 & 3	A higher level of community's system quality will produce a higher level of performance expectancy.
	H8b	2 & 3	A higher level of community's system quality will produce a higher level of personal outcome expectancy.
	H8c	1, 2 &3	A higher level of community's system quality will lead to a lower level of effort expectancy.
	H8d	1, 2 &3	A higher level of professional online community's system quality will produce a greater level of trust between the community's members.
H9	H9a	1 & 3	A higher level of knowledge quality will produce a higher level of performance expectancy
	H9b	2 & 3	A higher level of knowledge quality will produce a higher level of personal outcome expectancy of using the professional online system.
	H9c	1, 2 &3	A higher level of content quality will lead to a greater level of relational capital (trust).
H10	H10.1a	1	The effect of performance expectancy on use for knowledge acquisition will be moderated by gender (stronger for men).
	H10.1b	2	The effect of personal outcome expectancy on use for knowledge provision will be moderated by gender (stronger for men).
	H10.2a	1	The effect of effort expectancy on use for knowledge acquisition will be moderated by gender (stronger for women).
	H10.2b	2	The effect of effort expectancy on use for knowledge provision will be moderated by gender (stronger for women).
H11	H11.1a	1	The effect of performance expectancy on use for knowledge acquisition will be moderated by age (stronger for younger members).
	H11.1b	2	The effect of personal outcome expectancy on use for knowledge provision will be moderated by age (stronger for younger members).
	H11.2a	1	The effect of effort expectancy on use for knowledge acquisition will be moderated by age (stronger for older members).
	H11.2b	2	The effect of effort expectancy on use for knowledge provision will be moderated by age (stronger for older members).
H12	H12.1a	1	The effect of effort expectancy on use for knowledge acquisition will be moderated by experience (stronger for less experience).
	H12.1b	2	The effect of effort expectancy on use for knowledge provision will be moderated by experience (stronger for less experience)
	H12.2a	1	The effect of social influence on use for knowledge acquisition will be moderated by experience (stronger for less experience).
	H12.2b	2	The effect of social influence on use for knowledge provision will be moderated by experience (stronger for less experience).
H13		3	A higher level of use of the community for knowledge acquisition will lead to a greater level of use of the community for knowledge provision

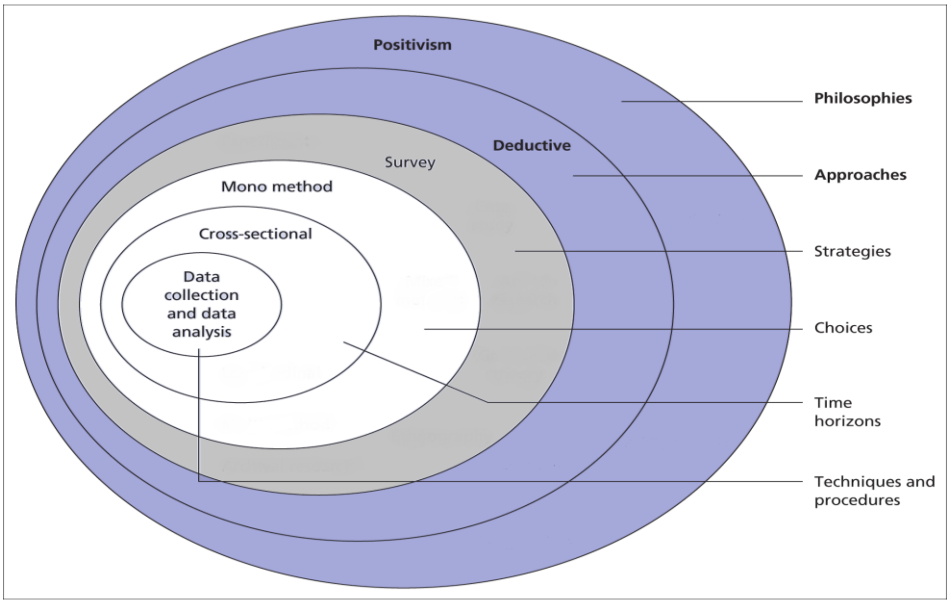
3.4 Summary

This chapter explained in detail the theoretical foundations of the current research. In this regard, several theories were discussed in detail. Then, the linkages between the adopted variables were developed. Drawing from the importance of linkage, theoretical foundations, and prior research findings, the research frameworks of the study were outlined. Subsequently, 13 general research hypotheses were developed to achieve the research aims and to address answers for the raised questions. The following chapter will discuss the approach and methodology applied in data collection for the research and the analysis techniques selected for hypothesis testing.

4.1. Introduction

This chapter discusses, in detail, the adopted research paradigm, the process of generating knowledge, which was used to explore the research objectives, and the methods that were employed in this research, as well as the rationale for using these methods.

The design and methodology will be discussed in the light of the sequence of Figure 4.1, which reflects Saunders et al. (2009)'s research process "onion" Figure.



Source: *Saunders et al. (2009, 108)*

Figure 4.1: Research onion (the sequence of the chapter)

4.2. Research Philosophy (Paradigm)

The philosophy of science aims to answer some questions such as: what makes a distinction between science and what is called non-science? What procedures should be followed by scientists? How can we know that an explanation is scientifically correct? (Newton-Smith, 2000)). Collis and Hussey (2003) define research philosophy as "*the progress of scientific practice based on people's philosophies and assumptions about the world and the nature of knowledge*" (p.46). Likewise, Saunders et al. (2009) argued that this term relates to developing new knowledge, and defined it as "*an over-arching term related to the development of knowledge and the nature of this knowledge*" (p.107). According to Creswell (2009), a paradigm or "worldview" is "a basic set of beliefs that guide action" that determines researcher's view about the world and the nature of knowledge (p.6).

Deshpande (1983) discussed that a paradigm has four objectives (p.102):

1- Works as a guide to benchmark researchers in a specific discipline for the issues and research problems that confront that discipline.
2- Helps in developing an "explanatory scheme" or theories for researchers to solve these issues.
3- Establishes criteria that help in selecting the appropriate research tools that help in solving "disciplinary puzzles".
4- Builds the main principles, procedures and strategies that might be employed if these issues or similar issues occur again.

Malhotra and Birks (2003) have defined a paradigm as a "*set of assumptions consisting of agreed-upon knowledge, criteria of judgment, problem fields and ways to consider them*" (p.136). Therefore, it is important first to note that the research philosophy adopted by a researcher carries a number of important assumptions that determine and support the research strategy and methods (Maxwell, 2005, Saunders et al., 2009).

4.2.1. Paradigm assumptions

Each assumption has an influence on the way in which the researcher thinks about the research methodology (Saunders et al., 2009). The ongoing debates regarding research philosophy in the social sciences are linked mainly to assumptions about ontology, epistemology and human nature or axiology (Morgan and Linda, 1980).

Ontology (what is the nature of reality?) is the first assumption, which is concerned with the way a researcher views the world or the nature of reality (Denzin and Lincoln, 1994, Saunders et al., 2009). Burrell and Morgan (1979) state that ontology concerns the nature of existence in terms of whether the realities of the social world are perceived as objective or subjective in nature. Thus, it can be concluded that ontology has two aspects; objectivism and subjectivism. Objectivism, or "how the view that social entities exist independent of social actors", means that the researcher will not be affected by the opinions or beliefs of the participants. This viewpoint imposes some constraints on the role of participants in the research process and interpretation of its results. Objectivists rely on pre-established and pre-validated theories, which are usually integrated to build and explore new causal relationships. On the other hand, subjectivism, or "understanding the meanings that individuals attach to social phenomena", revolves around the view that social phenomena are created from the perceptions and consequent actions of participants (Saunders et al., 2009). It means that the respondents' opinions can build or at least modify the author's beliefs. The subjectivist considers reality as the outcome of social interaction among the participants (Collis and Hussey, 2003). Therefore, subjectivists create and construct new laws, which are derived from the minds of participants rather than pre-established theories. However, according to Morgan and Linda (1980), reality can fall anywhere along the subjective–objective continuum, producing different ontological assumptions, epistemological stances and research methods.

The second assumption is called *axiology* (the role of values), which focuses on the researcher's view of the role of values in research (Bryman and Bell, 2007). Clearly, there are two axiological standpoints: value-free and value-involvement. The value-free view means that the researcher's values are set aside and the adopted theoretical propositions/hypotheses guide the research, and thus removing any chance of potential bias. On the other hand, the value-involvement viewpoint reflects the involvement of the researcher's values in the research process and interpretation of the results. In other words, the researcher's values affect who he/she questions, the posed queries, and how he/she interprets the data (Saunders et al., 2009). This assumption is strongly related to the ontological assumption. The value-free standpoint is compatible with the objectivist viewpoint, while the subjectivist viewpoint describes a high degree of involvement of the researcher's values in the research process (Creswell, 2009, Collis and Hussey, 2003).

The final assumption is the *epistemology* or the relationship between the researcher and the researched. Epistemology concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline (Bryman and Bell, 2007). Moreover, it addresses the relationship between the researcher and reality (Bryman and Bell, 2007). Literature illustrates that there is inconsistency in the number of research philosophies or paradigms identified, and the terminology used to describe them. Collis and Hussey (2003) simply identify two main research paradigms; positivism and phenomenological or interpretivism. Positivists are concerned with phenomena that can be observed, measured and validated (Collis et al., 2003). They usually use statistics and collect a large amount of data. On the other hand, the interpretive paradigm refers to "*an approach to the study of the social world which seeks to describe and analyse the* *culture and behaviour of humans and their groups from the point of view of those being studied"* (Bryman, 1988: 46). Table 4.1 presents the two paradigms :

Table 4.1: Positivism vs. interpretivism

Issue	Positivism	Interpretivism
Ontology	The researcher and reality are separate	The researcher and reality are inseparable
Epistemology	An objective reality exists behind the human mind	Knowledge of the world exists in the human experiences and social interaction
Research object (the phenomena under investigation)	Has inherent quality that exists independently of a researcher	Usually interpreted according to the meanings developed by the researchers
Truth (beliefs regarding the research findings)	The truth is determined by how it describes and relates to the world.	The truth is determined when the interpretation coincides with meaning given to the phenomena through the researcher' experience.
Researcher language	Formal and impersonal	Informal and personal
Values (the relationship between the researcher's value and the research process and research object)	Researcher's values are set aside and established theoretical propositions guide the research, and removing potential biases is an important task. Value-free = unbiased	Researchers' own values influence how he/she questions, probes, and interprets. Value-laden = biased
Reliability	The research is reliable if the findings can be replicated.	The research is reliable when the "researcher can demonstrate interpretive awareness (Weber, 2004: ix)
Validity	The data collected reflects true measures of reality.	Researchers are more concerned "that their claims about the knowledge they have acquired via their research are defensible" (Weber, 2004: viii).
Theory and research design (Malhotra and Birks, 2003: 139)	Simple determinist Cause and effect Static research design Context free Laboratory Prediction and control Reliability and validity Representative surveys Experimental design Deductive	Freedom of will Multiple influences Evolving design Context-bound Field/ethnography Understanding and insight Perceptive decision making Theoretical sampling Case studies Inductive

Source: Malhotra and Birks (2003); Weber (2004)

The selected research paradigm should be translated into an appropriate research methodology for achieving the research objectives. The following section sheds more light on the different types of research methodology.

4.2.2. The methodological assumptions (qualitative-quantitative dichotomy)

A methodological distinction based on the positivist-interpretivist epistemologies is the quantitative-qualitative dichotomy. The qualitative methodology is based on interpretivism. According to this methodology, the ontological position is to advocate the existence of multiple truths that could be found based on people' construction of reality (Sale et al., 2002: 45). Epistemologically, it is assumed that a person's mind plays a critical job in constituting and forming reality. Moreover, there is high interaction between the researcher and the researched object. Therefore, the results are jointly produced, depending on the contextual situation. On the other hand, the quantitative methodology highlights the ontological position that asserts the existence of only one truth, independent of human perceptions (Sale et al., 2002: 44). Epistemologically, the researcher and the researched object are independent entities, which means that the researcher can only research the phenomenon under investigation without being influenced by and/or influencing it.

Maxwell (2005) attributes the qualitative-quantitative debate to the dissimilarity between two disparate approaches; "variance theory" and "process theory". On the one hand, variance theory is interested in variables and the true associations among these variables through adopting precise measurements. Moreover, this approach highlights the importance of extensive pre-structuring, hypotheses, unbiased sample units, quantitative measuring and analysis, and correlational design. On the other hand, the process theory is interested in events and the processes that connect these events. Furthermore, the process theory is founded on exploring causal processes, since events impact one another. Therefore, and according to Maxwell and Loomis (2003), it is well-matched with qualitative studies.

Onwuegbuzie and Leech (2005) consider that three major schools of thought have evolved from the quantitative–qualitative debate, namely, purists, situationalists, and pragmatists. First, purists believe that quantitative and qualitative methods result from different ontological and epistemological assumptions about the nature of research and those paradigms cannot be mixed, because each of them has a different position regarding how the world is viewed. Therefore, they support mono-method studies (Onwuegbuzie and Leech, 2005: 377). Second, like purists, situationalists maintain the mono-method; however, they believe that certain research questions are more suitable to quantitative approaches, whereas other research questions are more appropriate to qualitative methods. Thus, although representing very different orientations, the two approaches are treated as being 'complementary'. In a similar vein, Bryman differentiates between philosophical and technical issues. Philosophical issues relate to questions of ontology and epistemology, while technical issues relate to the consideration of the superiority or appropriateness of methods of research in relation to one another (Bryman, 1984). As Bryman mentioned:

"*At the technical level, researchers seek to achieve a degree of congruence between a research problem and a technique, or cluster of techniques, to answer the issue at hand…*

Indeed, there may be a case for saying that techniques are neutral in respect of epistemological issues and debate" (p.88).

Finally, pragmatists, unlike purists and situationalists, argue that "*quantitative methods are not necessarily positivist, nor are qualitative techniques necessarily phenomenological*" (Onwuegbuzie and Leech, 2005: 378). Therefore, pragmatists promote combining methods within a single study. Moreover, they articulate that researchers might use the strengths of both techniques by combining them in order to better understand any social phenomenon. Thus, pragmatists adopt the epistemology that researchers may determine the method(s) used according to their research questions (Onwuegbuzie and Leech, 2005: 338).

Bickman et al. (1998) explain that combining both qualitative and quantitative research approaches within the same study is called mixed methods. Tashakkori and Teddlie (1998) discuss how mixed methods can combine both quantitative and qualitative methodologies in a single study or a multiphase study, either at the same time (parallel) or one after the other (sequential). This means that quantitative data are analysed quantitatively and qualitative data are analysed qualitatively. However, Sale et al. (2002) emphasised that as the two methodologies do not study the same phenomena, *"combining the two methods for cross-validation/triangulation purposes is not a viable option. (Cross validation refers to combining the two approaches to study the same phenomenon), …., Combining the two approaches in a complementary fashion is also not advisable if the ultimate goal is to study different aspects of the same phenomenon because, as we argue, mixed-methods research cannot claim to enrich the same phenomenon under study. The phenomenon under study is not the same across methods. Not only does cross-validation and complementarity in the above context violate paradigmatic assumptions, but it also misrepresents data. Loss of information is a particular risk when attempts are made to unite results from the two paradigms because it often promotes the selective search for similarities in data"* (p.49).

Morgan (1998), however, suggests that without violating the basic paradigmatic assumptions, qualitative-quantitative mixing or "triangulation" can be achieved on the technical aspect (knowledge generating). He developed a matrix combining the two paradigms on the data collection level. This matrix differentiates between two kinds of decision: the priority decision and the sequence decision. The priority decision concerns which one should be the primary and which one should be the secondary method, whilst the sequence decision concerns the order in which they will be used, preliminary and follow-up. Table 4.2 shows the priority-sequence model created by Morgan (1998).

Table 4.2: The Priority-Sequence Model for Morgan (1998)

Priority-Sequence Model		**Priority Decision**	
		Principal method: Quantitative	**Principal method: Qualitative**
Sequence Decision	**Complementary method: Preliminary**	**(1) Qualitative preliminary** Smaller qualitative study helps guide the data collection in a principally quantitative study. **Purpose**: Can be used for generating hypotheses; construct development; content validity; …. etc.	**(2) Quantitative preliminary** Smaller quantitative study helps guide the data collection in a principally qualitative study. **Purpose**: Can be used for guiding a purposive sampling; establishing preliminary results to be studied in depth; … etc.
	Complementary method: Follow-up	**(3) Qualitative follow-up** Smaller qualitative study helps in evaluating and interpreting findings from a principal quantitative research **Purpose:** Can be used to provide explanations and interpretations for poorly understood data; explaining and understanding outliers.	**(4) Quantitative follow-up** Smaller quantitative study helps in evaluating and interpreting findings from a principal qualitative research. **Purpose**: Can be used to generalise the findings to different sample; testing elements of emergent theories.

Source: Morgan (1998)

Based on Table 4.2, there are two choices. The first one is to start with a smaller preliminary qualitative research provides complementary support in developing a larger quantitative study. In choice two, the researcher conducts a small-scale preliminary quantitative method to help guide the decisions him/her makes in the larger qualitative research project.

Collis and Hussey (2003), based on Easterby-Smith et al. (1991), define four different types of triangulation: 1) Data triangulation (collecting data from different sources and at different times, whether quantitatively or qualitatively or both). 2) Investigator triangulation, which occurs when two or more researchers independently research a phenomenon and then compare their results. 3) Methodological triangulation or employing the qualitative and quantitative paradigms together in one study. 4) Theoretical triangulation, which occurs when the researcher adopts a theory from a specific discipline and uses it to understand a phenomenon in another discipline.

Goerres and Prinzen (2012) discussed that combination of qualitative and quantitative methods might be advisable under two levels of conditions. The first-level underlines two necessary conditions that must be met. For the first-level necessary conditions for employing a mixed method paradigm, they argue that the phenomenon of interest must have an acceptable degree of inertia in the characteristics to be measurable at several points in time, which allows for a sequential application of methods. The second first-level necessary condition that must be met is the nature of the research project and questions, which allows the meaningful conducting of qualitative-quantitative research.

If these two conditions are met, then "*at least one sufficient condition out of six should be met in order to make a multi-method approach superior to a mono-method approach*" (Goerres and Prinzen, 2012: 419). The following are the second-level sufficient conditions of which at least one should be met for a mixed method rationale.

"Varying possibilities of data collection; cases fit the quantitative model to varying degrees; generating or testing a quantitative measurement; generating hypotheses or concepts and testing for scope; unexpected research results in a quantitative study" (p. 423).

To sum up, the ongoing research reveals that both quantitative and qualitative are mostly accepted within information systems research (Kaplan and Duchon, 1988). However, the emerging question is which paradigm is relevant to this study.

4.2.3. Research paradigm and methodology choice

The research paradigm and methodology of the current study is based on the research 'onion' introduced by Saunders et al. (2009). With respect to the research paradigm assumptions and several related factors, this study followed the positivist paradigm.

Epistemologically or looking at what constitutes acceptable knowledge in a specific field of study, this study followed the position of Polanyi (1967) who considered knowledge as "justified true belief" that begins from knowledge embedded in peoples' minds. Drawing from this perspective, this research considered knowledge as objective and detached from the researcher, and, basically, only previous research that is grounded on externally observable and measurable sources was accepted. Consequently, the relationships between the research variables were theorised based on the existence of a priori fixed relationships that can be identified and tested through hypothetic-deductive logic and analysis. Additionally, according to a vast number of studies (see Appendices A, B, and C) in knowledge sharing, online communities and technology acceptance, the quantitative is the prominent methodology and most accepted as a source of knowledge (Wang and Noe, 2010).

Ontologically, unlike the subjective view of reality, which aims to create new laws and build new theories, the objective view of reality depends on the existence of predetermined laws and valid theories to build a set of relationships (Sale et al., 2002). Regarding this research, the researcher views professional online communities' use for knowledge sharing and its determinants as an external reality that exists independently and that can be measured. Furthermore, this research aims to explain online communities' use for knowledge sharing through integrating well-established and validated theories; therefore, using the objectivist view is an appropriate and ideal choice to answer the research questions and to examine the research hypotheses.

Axiologically, based on the former assumption, well-established theories and prior empirical research were used to establish the research hypotheses, and the research instrument (questionnaire) employed to collect the required data (see Chapter Five). The interaction with the participants was at the minimum level. Therefore, the researcher undertook a value-free position, which means that the researcher was independent and maintained an objective stance; therefore, the object of this study would not be affected by the research activities.

In more detail, the following points address the rationale for selecting the adopted methodology:

First, according to the methodological assumptions, this study adopts the situational school of thought regarding the debate between positivist-phenomenological paradigms. The researcher strongly believes that both quantitative and qualitative paradigms are valuable; however, the research purpose and questions should drive the appropriate research method (quantitative or qualitative). Maxwell and Loomis (2003) describe the design of a study as a systemic or interactive model in which five components (research questions, aim, conceptual framework, methods and validity strategies) interact together and influence the other design components. However, they emphasise that the research questions play the most important role. Onwuegbuzie and Leech (2006) state that research questions determine the type of data collection and play a key role in selecting the research paradigm. They stated that "*quantitative research questions, unlike their qualitative counterparts, tend to be very specific in nature. Moreover, most quantitative research questions fall into one of three categories: (a) descriptive, (b) comparative, and (c) relationship*" (p.480).

Second, this research aims to provide and examine a theoretical explanation grounded by the UTAUT model, the social cognitive theory and information system models for the impact of knowledge and systems' self-efficacy, personal outcome expectancy, performance expectancy of knowledge acquisition, system and knowledge quality, and relational capital on using professional online communities for knowledge sharing (providing and acquisition). In other words, this research follows a confirmatory strategy of research, which adopts the process of confirming or disconfirming predetermined causal relationships (hypotheses). Hair et al. (2010) emphasise that confirmatory research is used when a researcher seeks to test and/or confirm pre-specified relationships.

Third, the majority of research conducted in information systems is to test hypotheses and verify a proposed model. Kaplan and Duchon (1988) argue that the dominant paradigm in information systems studies is the positivist approach, where researchers examine the impact of one or more variable on another. Guo and Sheffield (2008) conducted a comprehensive methodological study "*to examine the knowledge management theoretical perspectives, research paradigms, and research methods reported in influential journals in order to see what they tell us about knowledge management research as a whole*" (p.674). Moreover, they tried to understand whether the five first-tier information systems journals and the five top-tier management journals use methods and paradigms that are sufficient to encompass the different theoretical perspectives. They found that among 120 empirical studies, 77% were positivist, 22% were interpretivist, and only one study was classified as critical pluralist.

Fourth, this research also, principally, used pre-validated instruments adopted from previous studies to measure the attributes of the phenomena and structural equation modelling (SEM) was employed as the method of data analysis. The existence of pre-validated instruments is the main core of confirmatory research. Furthermore, the researcher validated the research instruments using a variety of techniques such as pre-test interviews, Q-sorting and a large-scale pilot study. Validation of instruments in MIS is a critical issue in three main respects. First, in general, valid instruments bring rigour into MIS methodology. Second, their use can promote cooperative research among researchers through allowing other researchers to use pretested instruments across heterogeneous settings and time. Finally, it helps in achieving more clarity in the formulation and understanding/explanation of study questions (Straub et al., 2004).

Fifth, one of the objectives of this study was to conduct a group comparison and test for moderation. This test requires use of the structural equation modelling (SEM) advanced statistical technique. Urbach and Ahlemann (2010) emphasise that research that "*applies SEM usually follows a positivist epistemological belief*" (p.9).

Finally, Creswell (2009) argues that, besides the discipline area and the advisers' orientation, the researcher's past experience and preferences are main factors shaping the selected philosophy. Buchanan et al. (1988: 59, cited in Saunders et al. 2009: 129) state that the "*needs, interests and preferences (of the researcher) ... are typically overlooked but are central to the progress of fieldwork*". The researcher has good knowledge and experience with working with statistical analysis techniques, which made it a personal preference.

4.3. Research Approach

Literature clearly defines two research approaches; the deductive approach and the inductive approach. The deductive research is "*a study in which a conceptual and theoretical structure is developed and then tested by empirical observation; thus particular instances are deduced from general inferences*" (Collis et al., 2003: 15). According to this approach, a researcher, based on what is known in a particular domain and the theoretical consideration in this domain, develops a hypothesis or hypotheses that must be operationalised and subjected to empirical investigation (Bryman and Cramer, 2009).

On the other hand, inductive research is "*a study in which theory is developed from the observation of empirical reality; thus general inferences are induced from particular instances*" (Collis et al., 2003: 15),

Inductive reasoning is more open-ended and exploratory in its nature. The deductive approach starts from the general and ends with the specific. On the other hand, the inductive approach starts with specific observations and ends with general conclusions or theories. In accordance with research philosophy, deductive reasoning is a process by which a researcher arrives to a reasoned conclusion by logical generalisation of known facts. Moreover, theories play an important role in the deductive reasoning approach. Malhotra and Birks (2003: 45) emphasise that theories, besides their roles in the selection of the research procedures, "*serve as a foundation on which a researcher can organise and interpret the findings,….., by neglecting theory, the researcher increases the likelihood that they will fail to understand the data obtained or be unable to interpret and integrate the findings of the project with findings obtained by others*". They outlined the role of theory as illustrated in Table 4.3:

Table 4.3: The role of theory in research

Research task	Role of theory
Conceptualising and identifying key variables	Provides a conceptual foundation and understanding of the basics processes underlying the problem situation. These processes suggest the key dependent and independents variables.
Operationalisation	Provides guidance for the practical means to measure or encapsulate the concepts or key variables identified.
Research design	Causal or associative relationships suggested by the theory may indicate whether a causal, descriptive or exploratory research design should be adopted.
Sampling	Identifies the nature of the population, characteristics that may be used to stratify populations or to validate samples.
Analysing and interpreting data	The theoretical framework, model, research questions, and hypotheses, which are based on the theory, guide the selection of data analysis strategy and the interpretation of results.
Integrating findings	The findings can be interpreted in the light of the previous research and integrated with the existence body of knowledge.

Source: Malhotra and Birks (2003: 45).

According to Table 4.3, theories contain concepts, their definitions and assumptions. More significantly theories determine research design and specify how concepts relate to one another. Theories tell us whether concepts are related or not. If they are related, the theory states and explains how and why they relate to each other. In addition, theories give reasons for why the relationship does or does not exist (Neuman, 2007). In more detail, Saunders et al. (2009) summarised the differences between the two approaches in Table 4.4.

Table 4.4: Major differences between deductive and inductive approaches

Deduction emphasises	Induction emphasises
• Scientific principles • Moving from theory to data • The need to explain causal relationships between variables • The collection of quantitative data • The application of controls to ensure validity of data • The operationalisation of concepts to ensure clarity of definition • A highly structured approach • Researcher independence of what is being researched • The necessity to select samples of sufficient size in order to generalise conclusions	• Gaining an understanding of the meanings humans attach to events • A close understanding of the research context • A more flexible structure to permit changes of research emphasis as the research progresses • A realisation that the researcher is part of the research process • Less concern with the need to generalise

Source: Saunders et al. (2009: 127)

According to Table 4.4, the deductive analysis is operationalised in a way that enables facts to be measured quantitatively. Additionally, the deductive approach is characterised by causality, generalisation, concern for measurement and replication (Bryman and Bell, 2007). With an inductive approach, the results of the analysis are used to formulate theory (Saunders et al., 2009). Researchers usually work with qualitative data and use a variety of methods to collect data in order to establish different views of phenomena. Data collection is the first step of the inductive reasoning, and then proceeds to analyse these data and forming a theory. The theory developed moves from individual observation to general patterns (Collis and Hussey, 2003).

Based on the hypothetic-deductive method, this study employed a deductive approach to elaborate activities and to generate hypotheses from theoretical reflections. Thus, the deductive approach was followed to build a final framework for linking the individual factors and the contextual factors with knowledge sharing behaviour. Moreover, it was used for developing hypotheses and collecting primary data from a large sample in order to test these hypotheses.

4.4. Research strategy

Research strategy is "*a general plan of how the researcher going to answer the research questions*" (Saunders et al., 2009: 631). Although there are several strategies that can be employed in research, there is no superior research strategy, which is better than others. The most important questions are whether a particular strategy fits with the assumption of the chosen research philosophy or not, and whether it enables the researcher to answer the research questions and achieve the research objectives or not (Saunders et al., 2003).

There are several research strategies which may belong either to the deductive approach or to the inductive approach or to both inductive and deductive. The following Table 4.5 summarises some of these strategies.

Table 4.5: The different research strategies

Strategy	Definition	Advantages	Disadvantages
Experimental	"An experiment is a study involving intervention by the researcher beyond the required for measurement. The usual intervention is to manipulate some variable in a setting and observe how it affects the participants or subjects being studied" (Cooper et al., 2006: 302).	- The ability to manipulate the independent variable and thus measure the change in the dependent variable. - The ability to use control group. - It can be easily replicated.	- The participants' perceptions may be affected by surrounding environment. - There are problems regarding generalizing the results of this strategy.
Case studies	"An empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2003: 13).	- One of the effective strategies that can help in gaining depth understanding of the context. - An effective strategy to find answers about most research questions.	- It is often used in exploratory and explanatory research. - There is a difficulty of generalizing the research findings.
Survey	"A research technique in which information is gathered from a sample of people by use of a questionnaire or interview; a method of data collection based on communication with a representative sample of individuals" (Zikmund, 2003: 75).	- The ability to administer; quick; inexpensive; easy to code, analysis and interpret; and provide an accurate means of assessing information about the target population. - The ability to collect a large sample of data. - The ability to reduce the variability in the findings due to using fixed questions.	- Individuals may refuse to participate; tend to give false answers and tend to answer in a certain direction (response bias). - Questions structure, forming and wording may affect respondents' answers. - The problem of systematic error.
Action theory	Action research is a design that simultaneously combines *action* to bring about change in a setting and *research* to increase and/or develop understanding on the part of the researcher, client group, etc. about that social system in order to develop knowledge " (Tharenou et al., 2007: 89).	- Action research focuses on learning and bringing about change in a social system. - It provides deeper understanding of system processes is sought, as well as comprehension of what was not understood before, in order to contribute to knowledge.	- Requires close cooperation between the researcher and the objects. - This strategy is time consuming in building relationship with researched objects. - The difficulty of generalizing the research findings.
Grounded theory	"An inductive and more structured approach in which each subsequent depth interview is adjusted based on the cumulative findings from previous depth interviews with the purpose of developing general concepts or theories" (Malhotra, 2010: 189) 189).	- It can be used for building new concept and/or theory and for conducting in-depth interviews. - It requires contentious interplay between the processes of data collection and analysis.	- The difficulty of dealing with the large mount of emerged data. - The difficulty of generalizing the research findings.
Ethnography	Ethnographic research "is the study of human behavior in its natural context and involves observation of behavior and setting along with depth interviews" (Malhotra, 2010). "It is a distinct form of qualitative data collection that seeks to understand how social and cultural influences affect people's behavior and experiences" (Hair, 2007: 184).	- It provides rich information about human, organisation, social, and aspects. - The ability to use audio and visual recording. - The questioning and observation method are combined to understand the behaviour of respondents.	- This strategy is time consuming in collecting data, interpreting and reporting findings. - Besides the difficulty of selecting the research object(s), it requires building a high degree of trust between the researcher and the researched.

According to the above discussion of research strategies, action research was not an option for this study as neither the time frame nor the researcher's circumstances were conductive to building a relationship with the communities. The ethnography strategy, as well, was not an ideal option because the research was not observational and the researcher was not in a long-term relationship with the communities. This research does not aim to develop a theory. It is an explanatory research and thus the grounded theory strategy was not an appropriate choice. Because of the difficulty in controlling the experimental conditions and variables, and the difficulty of creating an online community or "artificial setting" in a laboratory setting, the experimental strategy was not used.

Regarding the case study strategy, this strategy is often perceived as producing soft data, which means it lacks the rigour required in social science research. Moreover, it lacks the ability of generalisation and it might be difficult to define the boundaries of the case (Denscombe, 2007).

Saunders et al. (2009) asserted that what matters is not the label that is attached to a particular strategy, but whether it is appropriate for the research question(s) and objectives. In this respect, this study used the survey method. Zikmund (2003) defines surveys as a "*research technique in which information is gathered from a sample of people by use of a questionnaire; a method of data collection based on communication with a representative sample of individuals*" (p.167).

The survey strategy was used for collecting data in order to test the research hypotheses. It is relatively inexpensive, and is most appropriate for collecting data about a relatively large number of variables from a large number of persons. Surveys using standardised questions enable the data to be easily aggregated and analysed using quantitative methods, and when used with an appropriate sampling technique, the research results can be generalised to a larger population (Neuman, 2007: 166-177). Other major advantages of surveys are their ease of administration in comparison to other strategies such as experiments.

Moreover, all respondents are given the same questions, which allows the researcher to examine the difference between respondents and groups. According to Hair (2003), one of the key advantages of surveys is that "*they collect quantitative data ripe for advanced statistical analysis*", which allow the researcher to "*identify large and small differences within the data structures*" (p.257). Moreover, this strategy enables the researchers to easily determine and identify factors and concepts that are not directly observable.

In addition to gathering data to examine the research hypotheses, demographic data was collected by using the survey strategy, to ensure that the collected data perfectly represent the research population.

4.5. Research Method

Based on the research paradigm, approach and strategy, this research used questionnaires as a data collection method. Questionnaires is "*a general term to include all techniques of data collection in which each person is asked to respond to the same set of questions in a predetermined order*" (Saunders et al., 2009: 360). Questionnaires can be used for both descriptive and explanatory researches. For this study, this method enabled the researcher to examine and explain the relationships between the variables and, thus, the cause and effect relationships. Moreover, a questionnaire was used because of its ability to accommodate a large sample size, so that advanced statistical techniques could be used. Hair et al. (2003: 356) argue that using questionnaires with quantitative designs gives the researchers the "*abilities of tapping into factors and relationships not directly measurable*"[4].

Data collection using questionnaires can be conducted by several methods; person-administrated surveys; telephone-administrated surveys; self-administrated surveys; and web-based surveys. The following table summarises the advantages and disadvantages of the different methods of data collection (Hair, 2003, Sekaran and Bougie, 2010).

[4] For more details about the measurement and the questionnaire development and design, see Chapter Five.

Table 4.6: advantages and disadvantages of the different research methods

Mode of data collection	Advantages	Disadvantages
Personal interviews (the presence of the researcher who asks questions and records the participant' answer)	- Can establish rapport and motivate respondents. - Can clarify the questions, clear doubts, add new questions. - Can read nonverbal cues. - Can use virtual aids to clarify points. - Rich data can be obtained.	- Takes personal time. - Costs more when a wide geographic region is covered. - Respondents may be concerned about confidentiality of information given. - Interviewers need to be trained. - Can introduce interviewer bias.
Telephone interviews (questions and answers are conducted via telephone)	- Less costly and speedier than personal interviews. - Can reach a wide geographic area. - Greater anonymity than personal interviews.	- Nonverbal cues cannot be read. - Interviews will have to be kept short. - Obsolete telephone numbers could be contacted, and unlisted ones omitted from the sample.
Personally administrated questionnaires (the participants read the questions and record the answers without the presence of the researcher)	- Can establish report and motivate sample units. - Doubts can be clarified. - Less expensive when administered to groups of respondents. - Almost 100% response rate ensured. - Anonymity of respondents is high.	- Organisations maybe unwilling to give up company time for the survey using groups of participants assembled for the purpose.
Mail questionnaires (the participant receives the questionnaire by mail to answer the questions and returned by mail)	- Anonymity is high. - Wide geographic region can be reached. - Token gifts can be enclosed to seek compliance. - Sample units can be allowed to have time to complete the questionnaire at convenience and can be used with web-surveys.	- Response rate is almost always low. - Cannot clarify questions. - Follow-up procedures for nonresponse are necessary.
Electronic questionnaires (a self-administrated questionnaire is placed on the World Wide Web site for prospective subjects to read and complete)	- Can reach globally. - Very inexpensive. - Fast delivery. – People can respond at their convenience.	- Computer literacy is a must. - Access must be available - Respondents must be willing to complete the questionnaire.

Source, Hair et al. (2009); Sekaran and Bougie (2010)

The choice of data collection methods depends on the available resources and how best the method can generate the required information (Peterson, 2000). Personal interviews were not used because of money, time, and geographical distribution of the population. Telephone interviews were also ruled out because the researcher did not have the telephone numbers of target respondents. Moreover, the questionnaire used in this research was not one that could be easily answered through a phone interview.

The most suitable data collection method for this study was the web-based survey method. Web-based survey, which is a special form of mail survey, has been widely employed and gained popularity since the beginning of the 1990s. The wide spread of the Internet and communication technologies has largely facilitated the extensive use of web-based surveys, not only for online population research but also for traditional research that adopts web-based surveys to collect data from Internet-friendly populations. In this regard, Evans and Mathur (2005) reported that about 500 million US dollars spent on web-based surveys in the USA in 2002. Furthermore, McDaniel Jr and Gates (2005) stated that online survey has become successful and widely accepted because, as reported by the US Census, the different findings indicate that the online population characteristics such as marital status, age distribution and gender distribution, tend to be very similar to those of the general (offline) population. In this regard, Coderre et al. (2004) found no statistically significant difference between the data collected by online surveys and the data collected by mail and telephone regarding its quality. Furthermore, it was found that the socio-demographic make-up of respondents to online surveys is not significantly different from that of respondents to conventional mail surveys (Fleming and Bowden, 2009).

This method, besides its effectiveness in saving cost and time, and overcoming geographical constraints, was considered appropriate for the context of this study, and perfectly matched the characteristics of the respondents, as all participants of the professional online communities were Internet users, well-educated, and undoubtedly had access to the questionnaire. Thus, the disadvantages of the web-surveys did not affect the data collection in this research. In other words, this method is completely consistent with the context of this study.

4.6. Time Horizon

Determining the time horizon entails deciding whether the research should be a "*snapshot (cross-sectional) taken at a particular time" or "more akin to a diary (longitudinal) which is a presentation of events over a given period"* (Saunders et al., 2009: 155).

According to Bryman and Bell (2003), cross-section research entails the collection of data from more than one case and at a single point in time in order to collect data in connection with two or more variables, which are then examined to detect patterns of association. On the other hand, longitudinal research is used to investigate variables or a group of subjects over a long period of time. The aim is to examine the dynamics of a research problem by investigating the same variables or group of people several times over the period in which the problem runs its course. This can be a period of several years (Collis and Hussey, 2009, Malhotra and Birks, 2003).

This research collected data at one time using a cross-sectional approach for two reasons. Firstly, this research was not concerned with changes or developments in the relationship between variables but it investigated the association between variables at a single point of time (Bryman and Bell, 2003). Secondly, time constraint was another reason for choosing cross-sectional research. Saunders et al. (2009) discussed that most research projects carried out for academic courses are time constrained. In addition, a cross-sectional design is usually used with the positivist philosophy, which is the main paradigm of this study and often "employs the survey strategy" (Saunders et al., 2009).

4.7. Sampling design and procedures

The broad description of the term population is "*a set of units that sample is meant to represent*" (Vaus, 2007: 69). However, as stared by Malhotra (2010), census is unrealistic if the population is large. In this regard, Hair (2007) argues that locating all elements of the population is difficult and can be unpractical; thus, an appropriate precisely selected sample can provide sufficient information. The process of sampling design involves five general steps (Cooper et al., 2006, Hair, 2007, Malhotra, 2010, Zikmund, 2003). These steps are summarised in Table 4.7. Next they are discussed in more detail.

Table 4.7: The process of sampling design

Sampling design steps	Definition	The current study
1- Define the target population	The aggregations of "*elements (e.g. people, products, organisations, physical entities) that are of interest of the researcher and pertinent to the specified information problem*" (Hair et al., 2003: 334).	The target population comprises of any and all Egyptian professionals have used professional online communities for knowledge sharing. Time: three months (September 15, 2012 to November 15, 2012)
2- Determine the sampling frame	A list of all eligible sampling units.	The sampling frame involves all Egyptian professionals engaging in usage of online communities for knowledge acquisition/provision.
3- Select a sampling technique(s)	Selecting a sample technique depends on several decisions of a broader natural, such as using probability or nonprobability sampling.	Online intercept sampling method was selected as the most appropriate sampling technique.
4- Determine the sample size	The number of elements that should be included in a study.	366 participants were included in this study
5- Implement the sampling process	Taking all previous steps in consideration, this step refers to executing the sampling plan	Web-based survey through http://www.qualtrics.com/

4.7.1 Target population

The professional online communities refers to any online social space where individuals get together to receive and provide information, support, and to learn (Preece, 2001). Regarding this study, there are 24 professional unions (syndicates) in Egypt (SIS, 2011); however, as the following table shows, nine of them have electronic sites and support and encourage their members to participate in online communities for social interaction, and information and knowledge sharing. Table 4.8 shows the different Egyptian professional unions and the numbers of members.

Table 4.8: The Egyptian professional syndicates (Unions)

	Syndicate (union)	Members (2009/2010)			Electronic site
		Male	Female	Total	
1	Lawyers' syndicate*	256013	86754	342767	http://www.baegypt.org/
2	Syndicate of journalists	5194	2140	7334	http://www.ejs.org.eg
3	Engineers' union*	416258	83706	499964	http://www.eea.org.eg/
4	Medical (physicians) syndicate*	140896	72509	213406	http://www.ems.org.eg/
5	Dental syndicate*	18742	16321	35063	http://egdentunion.com/
6	Pharmacists' syndicate*	71694	67759	139453	http://www.eps-egypt.net
7	Veterinarians' syndicate*	31335	18665	50000	http://www.egy-vet-synd.org
8	Agrarians' syndicate	327917	104320	432237	
9	Teachers' syndicate*	-	-	1508437	http://www.egyedu.edu.eg
10	Filmmakers' syndicate	1929	955	2884	
11	Dramatic arts syndicate	2786	1085	3871	
12	Musical arts syndicate	29753	7200	36953	
13	Commercial profession syndicate*	568091	457529	1025620	http://www.togareen-egypt.com
14	Scientific profession syndicate*	63481	30703	94184	http://www.essp-egypt.com
15	Socialists' syndicate	67000	43000	110000	
16	Applied art profession syndicate	764462	41450	805912	
17	Applied art designers' syndicate	-	-	-	
18	Fine artists' syndicate	9225	8593	17818	
19	Nursing profession syndicate	18136	195239	213375	
20	Tourist guides' syndicate	10555	4070	14625	http://www.egtgs.org.eg/
21	Sport-profession syndicate	46483	13655	60138	
22	Customs officers' syndicate	-	-	-	
23	Physical Therapy syndicate	3444	3541	6985	
24	Public utilities workers' syndicate	-	-	-	
	Total	2853395	1259194	5621026	

Source: ***State Information Service (SIS)****, http://www.sis.gov.eg/Ar/LastPage.aspx?Category_ID=890*
Central Agency for Public Mobilization and Statistics (CAPMAS)
http://www.capmas.gov.eg/reports/legg2/legg1.aspx?parentid=413&id=430
** Unions support and sponsor online communities*

4.7.2 Sampling frame

A sampling frame is a list of all elements or subjects from which the research sample may be drawn (Zikmund, 2003: 373). For the current research, the sample fame is constituted from all professionals who were actual members of online communities and used this type of community to either share their knowledge and/or pursue other members' knowledge. Unfortunately, for practical, security and confidentiality considerations, it was unfeasible to obtain a list of all professionals who were actually using professional online communities for knowledge sharing. In this regard, Hair et al. (2003: 336) discussed that "*regardless of the source, it is usually very difficult and expensive for a researcher to gain access to truly accurate, or representative, current sampling frame*".

4.7.3 Sampling technique

In general, technology acceptance and knowledge sharing research has been criticised for heavily depending on students samples (e.g. Ahn et al., 2007, Ha and Stoel, 2009, Huang, 2009, Lin, 2008, Thompson et al., 2006, Wang and Noe, 2010), which further affected the ability to generalise the findings. Following the recommendations of the empirical prior research conducted in the context of online communities (e.g. Preece et al., 2004, Ridings and Gefen, 2004, Ridings et al., 2002), this study collected data from diverse professional online communities. For this study, all Egyptian professionals who had users of professional online communities were eligible to complete the study questionnaire. In order to reach a general and valid conclusions, all unions that support and/or sponsor online communities were contacted to advertise and distribute the questionnaire link among their members. However, eight unions agreed to support and distribute the questionnaire link among their members (see Chapter Six). All professionals who are members in these professional communities were invited to participate in the research questionnaire. Invitation online sampling technique, which is classified as a type of convenience sample (e.g. Burns and Bush, 2010; Malhotra, 2010), was used as the most appropriate sampling technique for the context of this study.

Self-selection might be a limitation of intercept-based surveys, which can be confronted by conducting a comparison between the demographics of the research sample with the demographics of similar studies (see Section 6.2.3). This procedure has been widely used in similar Web-based survey research (Ridings et al., 2002). The demographic characteristics of the current study sample appear to be quite similar to other surveys of online communities and technology acceptance (Chiu et al., 2006, Wasko and Faraj, 2005). Although self-selection may affect the findings of a research, as discussed earlier, investigating actual online communities' members and including different communities counters this risk and gives this study external validity. Regardless, Table 4.9 shows some selected studies published in top-tier IS journals where Web-based surveys were used through convenience sample method via invitation – intercept – online sampling.

Table 4.9: Selected IS studies and data collection method

Author(s)	Journal	Research aims	Methodology	Data collection method
Chiu et al. (2007)	Information Systems Journal	Integrating the IS success model with the fairness theory to understand online learners' satisfaction and continuance intention.	- Data were collected from web-based learning service provided by NKNU in Taiwan. - 289 usable questionnaires.	All online learners were invited to participate through providing a hyperlink.
Wang and Chiang (2009)	Decision Support Systems	To examine the social interactions and the intention to continuance online auctions use	- Data were collected from the largest online auction in Taiwan "Yahoo! Taiwan Auction". - 202 usable questionnaires.	All "Yahoo! Taiwan Auction" were invited to participate through providing a hyperlink to complete the survey.
Al-Maghrabi et al. (2011)	Journal of Enterprise Information Management	This research aimed to understand the antecedents of the continuance intentions towards e-shopping.	- Data were collected from students in KSA. - 928 participants (465 usable)	A hyperlink with invitation was distributed to all students who were applicable and had experience with e-shopping to complete the survey.
Chan et al. (2010)	Journal of The Association for Information Systems	Understanding citizen satisfaction with a new technology and mandatory system in Hong Kong	- Data were collected from citizens in Hong Kong. - 1179 usable questionnaires.	The survey was advertised on a governmental portal through inviting all users to participate in the survey.
Lu and Yang (2011)	Decision Support Systems	To study the effect of social capital dimensions on information exchange in extreme disaster situations.	- Data were collected from students and their families in China - 475 usable questionnaires.	All students and their families who are members and have an experience with web forum after Wenchwan earthquake.
Venkatesh et al. (2011)	Information Systems Journal	Integrating the expectation-confirmation theory with the UTAUT model to explain the continuance intention.	- Data were collected form visitors to an e-government portal in Hong Kong. - 3159 usable questionnaires.	All visitors to an eGovernment portal were invited to participate through a banner advertisement.
Jin et al. (2012)	International Journal of Information Management	This study aimed to investigate why users keep answering other user's questions in the "Yahoo! Answers China".	- Data were collected form Yahoo! Answers China community. - 301 respondents.	A message with a link was distributed to all users.
Venkatesh et al. (2012)	MIS Quarterly	Extending the UTAUT theory to study acceptance and use in the consumer context.	- Data were collected form web portal for e-government services in Hong Kong. - 4127 for the first stage study and 2220 for the second stage study.	All visitors to an eGovernment portal were invited to participate through a banner advertisement.
Lou et al. (2013)	Journal of The American Society for Information Science and Technology	Studying the motivational factors the influence the quantity and quality of knowledge provided in Online questions and answering websites (Q&A)	- Data were collected from a leading Q&A community in China. -- 381 usable questionnaires.	Members from 14 different categories were invited to participate in the survey.

4.7.4 Sample size

Regarding the sample size, although a number of researchers argue that the typical sample size in studies where SEM is used is about 200 cases (Kline, 2011) which reflects the approximate median sample size in published studies up to 2006 (Shah and Goldstein, 2006), other researchers attribute the sample size to several factors such as the degree of model complexity or the number of parameters, the estimation method used, the amount of missing data, the degree of freedom and the statistical power (Harrington, 2009, Kline, 2011, MacCallum et al., 1996, Marcoulides and Saunders, 2006). However, as a rule of thumb and based on previous studies, Harrington (2009) suggests that "less than 100" is a small sample but deemed acceptable for very simple models; "100 to 200" may be appropriate as a "*minimum sample if the model is not too complex; and greater than 200 is probably acceptable for most models*" (p.46).

MacCallum et al. (1999) stated that "*under some conditions, relatively small samples may be entirely adequate, whereas under other conditions, very large samples may be inadequate*" (p.86). Therefore, a number of researchers have suggested that an adequate sample size should be determined in the light of several aspects related to the nature of the study and other factors. For example, although Hair et al. (2006) postulate that 200 is a recommended sample size, "*which provides a sound basis for estimation*" (p.741), they suggested that further crucial considerations in determining the required sample size for SEM include the following: estimation technique, the amount of average error variance (communality) among the reflective indicators, the complexity of the model and the amount of missing data.

As for the estimation technique, the most familiar and widely used SEM estimation technique is the maximum likelihood (ML) estimation. When the normality assumption is met (acceptable skewness and kurtosis), and there is no missing data, absence of severe outliers, and continuous variable data exist (Schumacker and Lomax, 2010), a sample size of 50 or less can give valid results (Tabachnick and Fidell, 2007, Byrne, 2010). However, and according to Bagozzi (2010) and Hair et al. (2010), 100-150 (preferably 200) is recommended as a minimum sample size to guarantee stable ML estimation results.

As for the average error variance of indicators, more recently researchers preferred the communality[5] concept, as it was found to be a more relevant way to approach the issue of the sample size, based on an assumption that models containing multiple constructs with communalities less than 0.5 and standardised factor loading estimation less than 0.7 require a larger sample size for model stability and convergence (Hair et al., 2006). In this regard, MacCallum et al. (2001) concluded that the communality level plays an important role regarding sample size. Preacher and MacCallum (2002) extended this conclusion and clearly stated that "*as long as communalities are high, the number of expected factors is relatively small, and model error is low (a condition which often goes hand-in-hand with high communalities), researchers and reviewers should not be overly concerned about small sample sizes*" (p.160). Taking fit statistics into consideration, Chin (1998), in a *MIS Quarterly commentary*, argues that "*sample size is not an issue when the model is correct and the resulting fit is perfect*" (p.xi).

Empirically, Mundfrom et al. (2005), in a simulation study addressed that *"the minimum sample size requirement for 180 different population conditions that varied in the number of factors, the number of variables per factor, and the level of communality*" (p.159), found that a minimum sample size of 260 is sufficient for all examined levels of communality (low, wide, and high) and a ratio of around six between the observed variables and factors. In two recent publications of *Structural Equation Modelling: A Multidisciplinary Journal*, Jackson (2007) concluded that a sample size of 400 is sufficient to detect mis-specified models if these models have larger levels of misspecification and indicator reliability of 0.60 or higher. In the second study, which aimed to take model fit statistics into account, Jackson et al. (2013) found that a sample size between 200-400 is sufficient when the ML estimation method is applied; five indicators or less are loaded on one latent variable; and population loading value for all measured variables = 0.40 (200) - 0.80 (400).

As for the complexity of the model, which is usually measured by the ratio (r) of the observed variables or indicators (p) to the factors (f), Marsh and Bailey (1991) suggest that this ratio can be calculated and then used as a threshold for determining the minimum sample size. They reported that when r = 4, the minimum required sample size is 100; and when r = 2, the minimum required sample size is 400. In another simulation study, Marsh et al. (1998) ran 35,000 Monte Carlo solutions analyses on

[5] Communality or the squired multiple correlations refers to the total amount of variance an indicator has in common with the latent variable upon which it loads.

LISREL CFA analysis. Considering only the fully proper solutions[6], they concluded that, if r = 2 it would require a sample size of at least 400; r = 3 would require at least 200 sample size; and r = 12 would require a sample size of at least 50.

For the amount of missing data, generally, a larger sample is required if there is a higher level of missing values (> %10) (Hair et al., 2010). In this matter, Harrington (2009) stressed that when a significant number of missing values exists and inappropriate handling is applied, the power of the findings will be reduced and collecting further data may be needed.

The sample size for this research was 366, which can be considered sufficient and satisfactory in the light of the above discussion and the following reasons:

- This sample size is sufficient according to the recommended sample size by Bagozzi (2010), Hair et al. (2010) and Harrington (2009) to provide stable and reliable ML estimation solutions, especially, as will be seen in Chapter Six, all the distributional properties (skewness and kurtosis) showed satisfactory and acceptable results.

- As will be discussed in Chapter Six, all indicators showed factor loading > 0.70, all communalities were > 0.5 (the majority of items showed SMC around 0.8), and all models showed an acceptable and satisfactory fit. Thus, according to Chin (1998), Hair et al. (2010), Jackson et al. (2013) and Preacher and MacCallum (2002), this sample size is satisfactory and adequate to detect any misspecification problem with the research models.

- Based on Marsh and Bailey (1991) and Marsh et al. (1998) suggested ratio, this research ratio is 4 (44/11), which suggests that the current study sample size is in the acceptable range.

- As well be discussed later in Chapter Six, all variables showed missing values less than 5%. In fact, all contentious variables had less than 2% missing values. Additionally, all missing data were handled by using the estimation maximization (EM) imputation method, which is recommended by scholars for producing the smallest bias in results.

- As suggested by Byrne (2010: 83) and Schumacker and Lomax (2010: 99), both 0.05 and 0.01 Critical N (CN) values should be larger than 200 as evidence of

[6] Fully proper solutions are defined as "converged solutions with no negative uniquenesses, no factor correlations greater than ±1, and reasonable SEs for parameter estimates" (Marsh et al. 1996: 198).

the adequacy of the sample size to run both CFA and SEM. In this study, as will be seen in Chapter Six, all measurements and structural models showed CN larger than 200 for both 0.05 and 0.01 values.

4.7.5 Data collection

An online survey instrument was developed and posted on http://www.qualtrics.com/. The host system assigned each participant a unique identification number; but since respondents were not asked for personal identifying features such as their name, national identification or passport number, address, the system ensured the anonymity of the participants. However, for technical use and only during the data collection period, the system was configured to use the Internet Protocol - IP address - associated with each respondent to prevent taking the questionnaire more than one time to further ensure accurate data.

Using incentives to encourage participation is supported by many social sciences scholars (Bryman and Bell, 2003, David and Sutton, 2004, Dillman, 2007, Groves et al., 2009a, Groves et al., 2009b). Among five suggested elements to create a respondent-friendly questionnaire, Dillman (2007) points out that using incentives (monetary and material) is an important element, especially when mail and web-surveys are used for data collection. He, based on the results of many empirical studies, strongly recommends using incentives due to its significant influence on response rate. Mathematically, Groves et al. (2009b) proved that using incentives can reduce the total cost of the survey through reducing the non-response and follow-up costs. Furthermore, they argue that using incentives can affect the participation of individuals less interested.

As for IS research, using incentives (monetary and material) has been commonly used to motivate participants to be more interested regarding the research questionnaire (e.g. Barnes and Vidgen, 2000, Chen, 2007, Chiu et al., 2006, He and Wei, 2009, Jin et al., 2012, Venkatesh et al., 2012, Venkatesh et al., 2011). Thus, all participants were allowed to leave their mobile phone number or email if they wished to participate in a pool (10 participants randomly selected) for a draw of 100 Egyptian pounds (~ £10) mobile top-up voucher. However, after obtaining the HUBS ethical permission to use incentives and to commence data collection, the research questionnaire was launched online. The data collection process lasted for three months (16/8/2012 to 15/11/2012). Once the survey had closed, the data were downloaded with an initial descriptive analysis (mean and frequencies) from the host server (see Chapter Six for more details about the sample characteristics).

As recommended by Ridings et al. (2002), in Web-based survey, response rate can be measured by the number of completed questionnaires per the number of clicks on the questionnaire hyperlink. Regarding this study, the number of members who completed the questionnaire were 366 while the total number of members who clicked the link and/or saved partially but never completed the questionnaire were 814. Thus, the response rate was 31%. This rate is considered satisfactory and acceptable in mail and Web-based survey methods (e.g. Cahu and Hu, 2002; Karahana et al., 1999; Malhotra and Grover, 1998; Chen and Huang, 2009; Sax et al., 2003; Kohtamäki et al., 2012).

4.8. Data Analysis Techniques

Sekaran (2002) explains that the main objective of data analysis is "*getting a feel for the data, testing the goodness of data, and testing the hypotheses developed for the research*" (p.306). SPSS v20 and AMOS v20 were used to analyse the quantitative data. The following sub-sections will discuss the different statistical techniques that were used in the current study.

4.8.1. Descriptive and preliminary statistics

A number of descriptive statistics were used as follows:

Firstly, the data were examined for quality. Levy (2006) reported that data analysis includes conducting pre-analysis data screening to ensure accuracy of the data collected, to deal with the issue of response-set, to deal with missing data, and to deal with extreme cases or outliers.

The independent sample t-test was run to assess non-response bias. This assessment aims to determine the extent to which non-respondents are different from the respondents to the survey (Dillman, 2000). In addition to the response rate to the survey, non-response bias might affect the researcher's ability to generalise the findings of the current research to the population under investigation (Armstrong and Overton, 1977). As it is difficult to obtain data from non-responders, late responders were used as a substitute for non-responders (Armstrong and Overton, 1977, Gefen et al., 2011).

Moreover, the common method variance was tested using Harman's one factor test. Common method variance is "*variance that is attributable to measurement method* *rather than the constructs the measures represent*" (Podsakoff et al., 2003: 879). Campbell and Fiske (1959) emphasise that common method variance is a source of measurement error and might threaten the validity of explanations and conclusions regarding the relationships between the research variables. Harman's one factor test is a strategy to test for common method variance using exploratory factor analysis (EFA) of all the variables in the study "*where the un-rotated factor solution is examined to determine the number of factors that are necessary to account for variance in the variables*" (Podsakoff et al., 2003: 889). Podsakoff et al. (2003) stated that the basic assumption of this test is that common method variance exists when (a) a single factor occurs and accounts for all extracted variance or (b) the majority of the covariance among the measures is attributed to one factor.

Secondly, descriptive statistical analysis techniques were run to present, and summarise the data and describe variances for each single variable in the study in order to make them more easily interpretable. A variety of descriptive statistics were used such as the mode, mean, range, standard deviation and variance, as well as using diagrams and charts for graphic illustration of data.

Thirdly, to make the research findings comparable with other studies, existing measures from pre-validated instruments were used after modifying the wording to fit the context of this study. However, new items were added based on pre-test interviews (see Chapter Five). Therefore, Structural Equation Modelling using Partial Least Squares (PLS-SEM) was used with a large scale-pilot study to validate the constructs before the main study (see Chapter Five, section 5.4.2.3 for more details about using PLS).

4.8.2. Confirmatory factor analysis (CFA)

In general, factor analysis (FA) is used to extract the latent factors of a set of observed variables. It is used to: (a) extract a subset of variables from a larger number based on those that have the highest correlations with the principal component factors, (b) extract factors that can be treated as uncorrelated variables, (c) demonstrate that scale items load on a particular factor and identify which items cross-load on multiple factors, (d) identify clusters or outlier cases, and (e) establish that multiple tests measure the same factor, justifying the elimination of some of the tests (Garson, 2008)

Confirmatory factor analysis (CFA) was employed to evaluate and validate the research instrument with the main data. CFA determines if the number of factors and the loading of the indicator variables on them conform to expectation based on theory. The key objective of CFA is to determine if the relationships among the different observed variables in the hypothesised model resemble the relationships between the variables in the observed data set. CFA was used mainly to examine whether the adopted and developed measures are appropriate for the population investigated in this study (Harrington, 2009). Moreover, it was used to examine the significance of the theoretical measurement model, whether or not the sample data confirm the model and its validity (Schumacker and Lomax, 2010). According to Bollen and Long (1993), the development and evaluation of CFA typically involves five different steps, which are discussed below, in SEM.

4.8.3. Structural Equation Modelling (SEM)

SEM was used since it is considered important to determine the extent to which the theoretical models are supported by sample data. Tabachnick and Fidell (2007) define SEM as a "*collection of statistical techniques that allow a set of relationships between one or more independent variables DVs, either continuous or discrete, and one or more dependent variables DVs, either continuous or discrete, to be examined. Both 1Vs and DVs can be either factors or measured variables. Structural equation modelling is also referred to as causal modelling, causal analysis, simultaneous equation modelling, analysis of covariance structures, path analysis, or confirmatory factor analysis*" (p.676).

SEM is mainly used to "*explain the relationships among multiple variables, ….., and examines the structure of interrelationships expressed in a series of equations…… depict all of the relationships among constructs involved in the analysis*" (Hair et al., 2010: 608). Rigdon (1998) defines SEM as a "*method for representing, estimating, and testing a theoretical framework of (mostly) linear relations between variables, where those variables may be either observable or directly unobservable, and may only be measured imperfectly* (p.251). Based on this definition, the author grouped the outputs of SEM into five groups (p. 252):

i. Estimating model parameters.
ii. Estimating standard errors of the estimated parameters.
iii. Estimating the dependent variable (s) variance explained.

iv. Assessing the overall consistency between the specified model and the observed data (goodness-of-fit).
v. Statistics that help in pinpointing the sources of any fit problems.

SEM was selected because it is widely used for testing substantive theories, and explicitly allows researchers to measure error and the imperfect nature of the selected measures, which is ever present in most disciplines, including social work (Raykov and Marcoulides, 2006). SEM is regarded as flexible and designed to work with multiple related equations simultaneously. Moreover, it can help in dealing with the multicollinearity problem at the structural level, since items are modelled as measures of the same factor, which in turn is used as a single variable (Rigdon, 1998).

The use of SEM in the current study is reported through five steps: model specification, model identification, model estimation, model evaluation and model modification.

4.8.3.1. Model specification

Model specification, or diagramming relationships and parameters in a model means that every relationship and parameter in the model is determined and firmly specified. According to Schumacker and Lomax (2010), if the hypothesised model is mis-specified, there is a possibility of obtaining biased parameter estimates; parameter estimates that are significantly different from what they are in the actual population model, that is, specification error. As noted by Harrington (2009), previous research and theory are crucial for specifying CFA and SEM. Regarding this study, all the latent variables and parameters, as will be discussed later in Chapter Five, were developed after conducting extensive review of the prior research in technology use and knowledge management. Additionally, as discussed earlier in Chapter Three, all the hypothesised relationships were developed based on well-established theories. All variables were assigned the role of either exogenous or endogenous variables.

4.8.3.2. Model identification

Model identification is the next step. To identify a model means that it is possible to find enough estimates for each parameter with unknown value in the model (e.g. correlation and factor loadings). Thus, model identification has to do with the difference between the number of variables, and the number of parameters that need to be estimated by the model (Meyers et al., 2006). In general, to identify and solve a model, the degrees of freedom (*df*) must be greater than zero. The *df* is obtained by subtracting the number of freely unknown parameters from the number of non-redundant (known) elements[7]. Based on this equation, if the result is more unknown elements (-*df*), the model is called "*under-identified model*" and cannot be estimated because of the infinite number of parameter estimates. If the result is equal unknown elements (*df* = 0), the model then is called a "*just-identified model*". A just-identified model, as explained by Hair et al. (2010), must show perfect fit to be accepted. However, an *over-identified model* emerges when *df* > 0, that means that the number of known elements is higher than the number of unknown parameters. Schumacker and Lomax (2010) argue that a model is *over-identified* when there is more than one way of estimating a parameter(s) because there is more than enough information in the matrix *S*.

4.8.3.3. Model estimation

The main objective of CFA and SEM is to obtain estimates (such as factor loadings, variances, covariances, and errors) for every parameter and path in the hypothetical model. There are several methods that can be used for model estimation. Maximum likelihood (ML) was used as an estimation method for the model parameters. Brown (2006) states that ML "*aims to find the parameter values that make the observed data most likely (or conversely) maximize the likelihood of the parameters given the data*" (p.73). Breckler (1990), after reviewing SEM research over 15 years, reported that ML is commonly used with data collected by using a Likert scale. According to Harrington (2009), ML is considered the most commonly employed method for two distinctive reasons; its ability to provide standard error for each parameter used for calculating p-value; and "*its fitting function is used to calculate many goodness-of-fit indices*" (p. 29). More specifically, this study used ML for four reasons.

1- ML was found to be the most commonly used estimation method with SEM (Iacobucci, 2010, Hair et al., 2010).

2- ML is scale free and has desirable and acceptable asymptotic properties (e.g. minimum variance and un-biasedness) (Schumacker and Lomax, 2010: 60).

3- ML, as reported by Bagozzi (2010), Iacobucci (2010), is more robust with observations that are slightly skewed or peaked (slight non-normality). According to Jöreskog and Sörbom (1985), ML has proven robust with self-

[7] The number of known elements is calculated by the equation P (1+ P)/2, where P = the number of the observed variables.

reported studies, which are likely to yield slight to moderate deviation from normality. Furthermore, Lei and Lomax (2005), in their simulation research, have found that the ML estimation method outperforms the general least square (GLS) estimation method in the case of small to moderate deviation from normality.

4- Compared with ordinary least square (OLS) estimation method, (Fan et al., 1999) found that ML has proven more sensitive to model misspecification.

4.8.3.4. Model evaluation

Having obtained the parameter estimates, the next step is to evaluate the solution obtained from the estimation method. In other words, the aim of this step is find out if the theoretical model is supported by the observed sample data (Schumacker and Lomax, 2010). The evaluation process can be achieved at three levels of solution evaluation: at the overall model, at the measurement model, and at the structural model. The measurement model specifies relations between the observed variables and latent variable (Hair et al., 2010). Evaluating the measurement model entailed the use of CFA to test the factor loadings of each observed variable on the latent variable. This permitted the assessment of the constructs in terms of uni-dimensionality, convergent validity, and discriminant validity (See Chapter Five, Section 5.3). On the other hand, the structural model can be evaluated by examining the paths between the latent variables (hypotheses). Thus, like measurement model fit, the sign, magnitude and statistical significance of the structural path coefficients are examined in testing the hypotheses (Shah and Goldstein, 2006).

Regarding the overall model fit, a number of goodness-of-fit (GOF) indices were selected to evaluate the overall model fit. These indices will be discussed in detail.

Chi-square (x^2) is considered a fundamental GOF to measure the difference between two matrices: the observed and the estimated (Hair et al., 2010: 665). A non-significant x^2 indicates that the two matrices are similar. In other words, significant x^2 indicates that the two metrics are different, which points to a problem with the model fit. However, using x^2 statistics for model assessment might be misleading in at least two ways (Byrne, 2010, Schumacker and Lomax, 2010, Hair et al., 2010): 1) Type II error, or rejecting the model, is more likely to occur with large sample sizes (> 200); furthermore, with large sample sizes any slight difference between the observed model and the estimated model may be found significant. On the other hand, Hooper et al. (2008) reported that x^2 with small sample size might lack power and, thus, may not discriminate between good models and poor models. 2) It has been found that the x^2 fit statistic is extremely sensitive to violations of the normality assumption (Jöreskog and Sörbom, 1986). Consequently, according to Byrne (2010), "*findings of well-fitting hypothesised models, where the x^2 value approximates the degrees of freedom, have proven to be unrealistic in most SEM empirical research*" (p.76). Hair et al. (2010) discussed that models tend to be complex and use sample sizes that can make the x^2 test useless as a model fit index. Irrespective of the problem of using x^2 as a GOF, MacCallum and Browne (1993) suggested that researchers should report the x^2 value regardless of whether it is significant or not. However, a way to address the problem of x^2 is to use the x^2/df ratio (normed chi-square) to minimise the influence of the sample size. An accepted and recommended ratio for this statistic is to be as low as 3.0 (Bentler and Bonett, 1980, Segars and Grover, 1993).

Regardless of the limitations of the Chi-square statistic, many alternative GOF indices have been developed to evaluate model fit. In general, the literature indicates that those GOFs can be grouped into three categories: absolute fit statistics, relative fit statistics, and parsimonious fit statistics.

Absolute Fit Measures revolve around "*how well the correlation/covariance of the hypothesised model fits the correlation/covariance of the actual or observed data*" (Meyers et al., 2006: 558). The goodness-of-fit index (GFI) is an absolute fit index which compares the proposed model with the case of no model at all. GFI depends on the ratio of the sum of the squared difference between the observed and estimated matrices to the observed variances (Schumacker and Lomax, 2010: 86). A value close to 1 indicates good fit; it should be equal to or greater than 0.90 for a model to be acceptable (Hu and Bentler, 1995). However, many researchers have recently argued that GFI has become less popular because of its sensitivity to sample size and model misspecification (e.g. Gefen et al., 2011, Hair et al., 2010, Hooper et al., 2008, Hu and Bentler, 1998, Shah and Goldstein, 2006, Sharma et al., 2005). In their study which aimed to use "*simulations to investigate the effect of sample size, number of indicators, factor loadings, and factor correlations on the frequencies of the acceptance/rejection of models (true and misspecified) when selected goodness-of fit indices were compared with the prespecified cutoff values*", Sharma et al. (2005) strongly recommend that GFI should not be used because of its sensitivity to sample size and its poor sensitivity to detecting misspecified models (p.935). Shah and Goldstein (2006), in their comprehensive study to the review application of SEM in operation management research, argue against using GFI and state that "*use of index is not recommended*" (p.160). In IS studies, as well, it has been recommended not to use GFI because of its bias and sensitivity to sample size (Gefen et al., 2011). However, in an attempt to adjust the GFI to take into account the number of parameters estimated, the adjusted GFI (AGFI) was developed by Tanaka and Huba (1989). Unlike GFI, AGFI with values > 0.80 indicate good model fit (Segars and Grover, 1993, Straub et al., 2004, Chau, 1997).

RMSEA (the root mean square error of approximation) is another absolute fit index that has recently been recognised as one of the most informative and widely used indices in covariance structure modelling (Byrne, 2010, Hair et al., 2010). RMSEA "*estimates the lack of fit in a model compared to a perfect (saturated) model*" (Tabachnick and Fidell, 2007: 717). Unlike x^2, RMSEA has been deemed as a widely accepted GOF indicator because of its ability to avoid rejecting models with large sample sizes and/or a large number of indicators (Hair et al., 2010). According to Hair et al. (2010), with CFI > 0.90; observed variables (M) ≥ 30; and sample size (N) > 250, a cutoff value of 0.07 is acceptable as a good fit indicator. Hu and Bentler (1999) suggested that RMSEA ≤ 0.06 is an indicator of good fit. Moreover, Jöreskog (1993) and MacCallum and Browne (1993) suggested that values ≤ 0.08 is an indicator of good and acceptable model fit.

Iacobucci (2010), based on the results of several simulation studies, concluded that RMSEA does not perform well and inclines to over-reject true models for small sample sizes (N < 250) and relatively large number of variables (p.96). Nevertheless, she recommends the Standardised Root Main Square Residual (SRMR) index as an alternative absolute fit measure. SRMR evaluates "*the size of the residuals between the actual covariance and the proposed model covariance*" (Meyers et al., 2006: 559). SRMR's values range between 0 to 1; however, values less than 0.08 indicate a satisfactory model fit (Hooper et al., 2008, Hu and Bentler, 1995, Hu and Bentler, 1998, Hu and Bentler, 1999, Iacobucci, 2010).

Incremental Fit Measures, incremental or comparative fit measures, in contrary to the absolute fit measures, assess how well the estimated model fit relative to the baseline or null model (Hair et al., 2010: 668). Therefore, these measures are more useful to validate the fit of a single model with multi-item constructs. The comparative fit index (CFI) is one of the most widely used indices. A CFI value that is greater than 0.90

usually suggests a well-fitting model (Bentler, 1992, Hair et al., 2010). The normed-fit index (NFI) is another incremental fit measure which assesses the model by comparing its x^2 value to the null model's x^2 (Hooper et al. 2008). Like CFI, NFI has a range of 0-1, and values > 0.90 are usually accepted as an indicator of model fit (Meyers et al., 2006).

The Tucker-Lewis index (TLI) and the relative noncentrality index (RNI) are different from NFI in that they are not normed and TLI takes into account the complexity of the model (Hair et al., 2010), while RNI takes into account the degree of freedom (Byrne, 2010). TLI was developed mainly "*to quantify the degree to which a particular exploratory factor model is an improvement over a zero factor model when assessed by maximum likelihood*" (Hu and Bentler, 1995; Cited in Hoyle, 1995: 84). Sharma et al. (2005: 942) found that TLI and RNI are the best indictors and the most recommended for model evaluation, especially when the factor loadings are large (> 0.5). Among other fit indices, Bollen (2011: 376) asserts that TLI is one of the fit indices that performs well and is highly recommended to be reported. TLI and RNI's values range between 0 and 1, and values greater than 0.90 usually indicate good model fit (Bentler and Bonett, 1980, Sharma et al., 2005).

Parsimony Fit Indices, the parsimony fit indices, or adjusted fit measures, were developed specifically to provide information about which model, among a number of competing models, has the best fit relative to its complexity (Hair et al., 2010). Consequently, although these indices are not useful for validating a single model, they are more useful in comparing the fit of two or more models. PNFI (the parsimony normal fit index) adjusts the incremental fit index NFI by multiplying its value by the parsimony ratio (PR) (Hair et al., 2010: 669). PNFI's values can be used to compare different models taking into account the degree of model complexity. Similar to PNFI is the parsimony comparative fit index (PCFI). PNFI and PCFI both have a 0-1 range; however, their values are much lower than what is accepted on the basis of normed indices. According to Meyers et al. (2006: 559) and Mulaik et al. (1989: 439) , values greater than 0.50 indicate a good fit.

IBM's AMOS provides 25 different GOF indicators, however, making decision about which to report has been a matter of disagreement among scholars, who strongly argue that researchers do not need to report all GOF indices (e.g. Byrne, 2010, Hair et al., 2010, Hu and Bentler, 1999, Tabachnick and Fidell, 2007). For example, Hair et al.

(2010: 672) recommend reporting, besides x^2 with the associated *df*, at least one incremental index, one absolute index, and one parsimony index when comparing models of varying complexity. More specifically, they state that x^2 with the associated degree of freedom, CFI or TLI, and the RMSEA are informative enough to evaluate model fit. They added that when a researcher aims to compare models of varying complexity, he/she may also wish to use PNFI. Meyers et al. (2006: 562) agree with Hair and his colleague that a researcher should report at least three fit tests: one absolute, one incremental and one parsimonious, to reflect diverse criteria. In this respect, Tabachnick and Fidell (2007: 720) state that CFI and RMSEA, are the most frequently informative reported fit indices, especially RMSEA which is helpful if a researcher aims to perform power calculations. Iacobucci (2010: 90) and MacKenzie et al. (2011: 313) argue that reporting RMSEA, SRMR, and CFI is indicative enough for a well-fitting model. Following these recommendation, this study used GOF indices to reflect the three categories; absolute, incremental and parsimonious. Table 4.10 summarises the recommended cutoff values and the supporting references.

Table 4.10: The recommended cutoff values for SEM fit indices

Goodness-of-fit		Cut-off value	References
x^2		> 0.05	(Bagozzi, 2010); (Boyle et al., 1995); (Hu and Bentler, 1999)
x^2/df		< 3	(Bentler, 1990); (Chau, 1997); (KLINE, 2004); (Segars and Grover, 1993).
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	(Hair et al., 2010); (MacCallum et al., 1996); (Meyers et al., 2006); (Sharma et al., 2005)
	SRMR	< 0.08	(Hair et al., 2010); (Hooper et al., 2008, Hu and Bentler, 1995)
	AGFI	> 0.80	(Chau, 1997); (Hair et al., 2010); (Segars and Grover, 1993, Straub et al., 2004)
Incremental fit indices	CFI	> 0.90	(Bentler, 1992); (Hu and Bentler, 1999); (Hair et al., 2010); (Iacobucci, 2010)
	TLI	> 0.90	(Bentler and Bonett, 1980, Hu and Bentler, 1995, Hu and Bentler, 1998); (Sharma et al., 2005)
Parsimony fit indices	PNFI	> 0.50	(Hair et al., 2010); (Chow and Chan, 2008); (Meyers et al., 2006); (Mulaik et al., 1989)
	PCFI	> 0.50	(Hair et al., 2010); (Chow and Chan, 2008); (Meyers et al., 2006); (Mulaik et al., 1989)

4.8.3.5. Model modification (re-specification) and validation

Finally, if the model fit statistics are unsatisfactory, a model re-specification will be required to obtain a better fitting of the hypothesised model to the observed sample variance-covariance matrix (Kline, 2011). Regarding the measurement model, factor loadings, squared multiple correlations SMC, modification indices MI, and regression residuals can be used to modify and to validate the model by deleting and/or freely estimating the problematic indicator(s). The model improvement stage involves reviewing the SEM's outputs and applying the following recommended criteria:

1) Factor loading[8] for every indicator should be significant and greater than 0.5 (ideally 0.7) (Bagozzi, 2011, Hair et al., 2010, Chin, 1998, Hulland, 1999). However, loadings above +1 or less than -1 are considered out of the feasible range and an indicator of problem with the research data (Hair et al., 2010).

2) Squared multiple correlations[9] (SMC) which represent indicator reliability should be greater than 0.5. This means that the majority of variance in an indicator is due to the latent variable (Bollen, 1998, MacKenzie et al., 2011).

3) Standardized residual covariances (the raw residuals divided by the standard errors of the residuals) should be below |2.58| (Brown, 2006, Byrne, 2010, Jöreskog and Sörbom, 1986, Tabachnick and Fidell, 2007). Values greater than |2.58| indicate "*that a particular relationship is not well accounted for by the model*" (Schumacker and Lomax, 2010: 173) and should be eliminated.

4) Modification indices MI (relationships that are not estimated in the model), that show significant covariance between same construct measurements' errors accompanied by significant regression weight, should be used to covary those errors only in case significant fit improvement is anticipated. Thus, all errors' MI – covariances that have a significant value with expected parameter change accompanied by high MI – regression weights are candidates to be freed or deleted (Byrne, 2010, Hair et al., 2010, Kenny et al., 1998). As suggested by (Hair et al., 2010: 713), unless theoretically justified, deletion is a recommended strategy as long as no more than 20% of the measured indictors.

However, to avoid an over-fitted model, indictors were considered problematic and candidates to be deleted only if they significantly violated one or more of these assumptions. In this regard, MacCallum et al. (1992) cautioned, "*when an initial model fits well, it is probably unwise to modify it to achieve even better fit because modifications may simply be fitting small idiosyncratic characteristics of the sample*" (p.501).

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[8] In AMOS factor loading labelled (Standardized Regression Weights)
[9] SMC or the communality = (indicator's factor loading)^2

For the structural model, one or more coefficients may be added or deleted to fit and validate a mis-specified structural model. MI regression weights and parameter changes statistics can be used to re-specify the structural model (Byrne, 2010). However, as noted by Hair et al. (2010) and Meyers et al. (2006), deleting or adding a coefficient needs to be theoretically justified.

4.9. Summary

This chapter discussed in detail the research design (research philosophy, research approach, research strategy, time horizon, sampling procedures, data collection methods and employed statistical techniques). Standpoints of research design were presented to understand the assumptions that underlie the methodology. The choice of methodology was justified and the following procedures were highlighted to introduce an integrated discussion and conclusive statements, which guided the next phase of the research process. The positivistic philosophy was the appropriate paradigm to explore the causal hypotheses relationships. Thus, a quantitative approach was adopted to collect and analyse data. The next chapter discusses the research instrument development and validation.

Chapter Five: Instrument development and testing (pilot study)

5.1. Introduction

Besides drawing on a solid theoretical foundation, one of the important factors in conducting a quantitative research is to use valid and reliable measures. The theoretical foundation of this study has been discussed in Chapter Three; this chapter describes in details how the different constructs and their items were developed. In addition, the different methods that were followed to validate and test the developed questionnaire will be discussed. Finally, the questionnaire design and testing will be discussed.

5.2. Instrument development and constructs operationalisation

After completing the definitional domain (see Chapter Three), which establishes the scope of the study, and developing the conceptual models, the next step is to develop the research instrument. Straub (1989) argues that the first stage of instrument development is "items generation". The most important concern when items are generated is the content validity (Lewis et al., 2005, Straub et al., 2004), which has been defined as "*the degree to which a measure's items are a proper sample of the theoretical content domain of a construct*" (Schriesheim et al., 1993: 386).

There are two main approaches to items generation; inductive or "classification from below" and deductive or "classification from above" (Hinkin, 1995: 969). The inductive approach is applied when there is little theory that can be used to construct and to generate measures (Hinkin, 1995). On the other hand, the deductive approach requires, first, an understanding of the phenomenon under investigation, and based on this understanding, a theoretical definition can be developed through the literature review. Second, the theoretical definition is then used as a main guide in developing the items that properly measure the construct under investigation (Schwab, 2004). MacKenzie et al. (2011) discuss that there are many sources that can be used to obtain and generate research items, including "*reviews of the literature, deduction from the theoretical definition of the constructs, previous theoretical and empirical research on the focal construct, suggestions from experts in the field, interviews or focus group discussions with representatives of the population(s) to which the focal construct is expected to generalise, and an examination of other measures of the construct that already exist*" (p.304).

"*Empirical research on knowledge sharing is still in its infancy*" (Lu et al., 2006: 22), especially in the online context (Al-Busaidi et al., 2007, Li and Jhang-Li, 2010). Because there are no well-developed measures for some of the constructs of the current research, the study used and combined reliable and pre-validated scales from a pool of research. Using pre-validated scales is strongly supported by MIS researchers (Chan et al., 2010, Leidner and Jarvenpaa, 1995, MacKenzie et al., 2011, Straub, 1989, Venkatesh et al., 2011). Straub (1989), for example, postulates that using pre-validated scales reduces the threat of misspecification and strengthens findings. Furthermore, he advocates that MIS researchers will be able to replicate their studies in "heterogeneous settings" when validated instruments are used (p.149). However, Straub strongly emphasises that researchers should be careful not to make significant alterations in the validated instrument without revalidating instrument content, constructs, and reliability (see the next Section).

Thus, every construct underwent intensive search to determine if pre-validated items existed that could be adopted, and that were consistent with the context and definition domain of this study. Items and scales adopted from the previous literature were modified to fit the current study context with three items, at least, for every construct (Dillon et al., 1997).

Operationalisation or model identification means making decisions about the items and manifestations - measures - that are used to estimate and to evaluate the research model (Chin et al., 2008). As mentioned above, this study employed pre-validated measures whenever possible. However, later in this Chapter, pre-test content validity, Q-sort, and a pilot study conducted to refine and validate these measures will be reported. For now, the following illustrates the different constructs that constitute the research model[10].

Knowledge self-efficacy (KSE)

In this study, knowledge self-efficacy measures were mainly obtained from Kankanhalli et al. (2005). The adopted scales were originally designed to measure general knowledge self-efficacy in the organisational context. Therefore, the wordings of these scales were subject to some modifications to fit the context of the current research. Generally, the items of the self-efficacy scale measure and assess members' confidence in participation in the knowledge sharing process in professional online communities.

[10] For more details about the used measures, see Appendix E

According to Bandura and Cervone (1986), Bandura (1997), self-efficacy should be operationalised in a domain by using and reflecting actual tasks, to deliver explanatory and predictive capability. Many leading researchers agree. Downey and McMurtrey (2007), in their attempt to measure computer self-efficacy, argue that "*the more the measure of self-efficacy moves from specific tasks to a more general measure, the greater the deterioration in the relationship between self-efficacy and its consequences, such as performance*" (p.384). Therefore, seven items (KSE1 to KSE7) were employed, not only for measuring members' ability to provide knowledge, but also for measuring members' ability to communicate this knowledge to the other members. Four items were adapted from Kankanhalli et al. (2005) with factor loadings 0.86 to 0.92 and reported composite reliability of 0.96. Moreover, three items were developed based on the literature review to measure members' ability to communicate their knowledge to the other members.

System self-efficacy (SSE)

The measurement of system self-efficacy in this research followed Bandura's original approach (Bandura, 1997) to measure self-efficacy beliefs by asking sample units to assess their level of confidence and their ability to use the community system and execute courses of action regarding knowledge sharing (acquisition and provision). Five items (SSE1 to SSE5) were derived and adapted from Lin and Huang (2008) study of using task technology fit to explore the antecedents of organisational knowledge management systems usage. These items showed factor loadings 0.88 to 0.93 and reported composite reliability of 0.94. The items were marginally modified to fit the context of the current study.

Personal outcome expectancy (POE)

Personal outcome expectancy refers to the degree to which a professional online community member believes that using the community for sharing his/her knowledge would produce preferable potential consequences (Bandura, 1997, Compeau and Higgins, 1995b). This construct was operationalised by six items (POE1 to POE6). These items were adapted from three previous studies and one item was developed based on the literature review. Two items were borrowed from Compeau et al. (1999), and two items were adapted from Kankanhalli et al. (2005). One item was adapted from Moore and Benbasat (1991), and one item was developed based on Ensign and Louis

(Winter 2010). These items revealed factor loadings ranging from 0.58 to 0.96 and reported composite reliability ranging from 0.79 to 0.96.

Performance expectancy (PE)

Within the domain of this study, performance expectancy is defined as the degree to which an individual believes that using the community system for acquiring knowledge would enhance and improve his/her job performance (Venkatesh et al., 2003: 447). According to Willem and Buelens (2007), performance relates to productivity, improved processes or products, and the degree to which the use of professional online communities to acquire new knowledge is associated with creativity and better effectiveness of working. Six items (PE1 to PE6) were used to measure the construct of performance expectancy. Three items were derived from Compeau et al. (1999), one from Kang et al. (2008), one developed based on Willem and Buelens (2007) and one developed based on the interviews. These items were subjected to modification to suit the definition domain and the context of this study. All adopted items revealed acceptable validity and reliability.

Effort expectancy (EE)

As discussed earlier, effort expectancy, which pertains to perceived ease of use in the technology acceptance model (TAM) and complexity in the PC utilisation model, is one of the main core technology acceptance determinants (Venkatesh et al., 2003). This variable, in regard to this study, is defined as the degree to which a community's members believe that using the community system for sharing knowledge (acquisition and provision) is free of effort. Three items were adapted to manifest effort expectancy (EE1 to EE3). Two items were derived from Taylor and Todd (1995) and one item was derived from Barnes and Vidgen (2012). All showed acceptable and satisfactory reliability and validity.

System quality (SQ)

Based on the domain of this research, a number of dimensions have been suggested by different researchers for measuring system quality (e.g. Bharati and Chaudhury, 2004, DeLone and McLean, 2002, Heo and Han, 2003). System quality, according to this study, and based on its context, concerns to what extent the community's system is a user friendly system (availability of the system, stability, reliability and the appropriate design of the system). Thus, system quality is a multidimensional construct measured by several items.

The instrument of Bharati and Chaudhury (2004) was adapted to measure the dimension of “user friendly system”. The system quality factor revealed unidimentionality (0.99), convergent validity (0.98), GFI (0.99) and composite reliability (0.73). One item, availability, was developed based on Al-Busaidi et al. (2007)’s study, and one item, appropriate design for users, was developed based on the pre-test interviews. Therefore, system quality was operationalised by five items (SQ1 to SQ5).

Content quality (CQ)

Like system quality, content quality is a multidimensional construct adopted from system success models and usually referred to as “information quality”. Knowledge is not explicitly distinguishable from information. In the context of this study, the distinction between knowledge and information depends on the context and the user. Information becomes useful and meaningful knowledge only when it is given a context and interpreted by individuals (Chou and He, 2004). Therefore, this study depended on Wang and Wang (2009) adjusted and validated instrument to measure this construct. According to Wang and Wang (2009), content quality was operationalised as a multidimensional construct relating to knowledge and information accuracy, consistency, availability at a suitable time, usefulness, clearness and unambiguousness, and meaningful and practicable knowledge. This instrument showed criterion, nomological, convergent, and discriminant validity. Moreover, it revealed an acceptable level of internal homogeneity (0.86) and internal consistency (0.88). Hence, seven items (CQ1 to CQ7) were adopted to measure the construct of content quality.

Relational capital – Trust (TR)

As mentioned in Chapter Three, this study uses trust as the main source of relational capital because of its broad definition, which includes all other resources and facets of relational capital.

As stated by Gefen et al. (2003b), “*trust refers to an implicit set of beliefs that the other party will refrain from opportunistic behaviour and will not take advantage of the situation*” (p.55). However, trust is a broad term consisting of multiple levels and dimensions (Sargeant and Lee, 2004). In the context of online communities, trust is viewed as the degree to which one member feels that other members of the community have a reciprocal faith in one another in terms of intention and behaviour. In the light of this definition, this study modified and used Lee and Choi (2003's) instrument to measure the construct of trust in the organisational context. This instrument revealed validity ranging from 0.79 to 0.83 and composite reliability of 0.89. Hence, six items (TR1 to TR6) were used to measure the construct of relational capital (Trust).

Social influence (SI)

For the context of this study, social influence is defined as the degree to which a community system's member believes that influential others such as friends, family members, and managers believe he/she should use the community system for knowledge sharing. Social influence pertains to subjective norms in the theory of planned behaviour and social factors in the PC utilisation model. Four items (SI1 to SI4) manifested social influence: three were adopted from Venkatesh et al. (2012); and one item was adopted from Thompson et al. (1991). All showed satisfactory validity and reliability.

Regarding the dependent variables, *using for knowledge provision* and *using* for *knowledge acquisition* were measured by adapting Kankanhalli et al. (2005)'s instrument for measuring knowledge acquisition and knowledge provision. Thus, two items (how often? and how regularly?) were adapted and modified to reflect both usage behaviours. However, to avoid the possibility of obtaining an inflated usage as a result of using self-reported scales, two additional questions were adapted from Venkatesh et al. (2012) to measure the frequency of using the community for knowledge acquisition/provision. All items revealed acceptable reliability and validity.

Based on this operationalisation, a draft instrument was developed (See Appendix E). To verify the completeness, wording, and the content validity of the constructs and their items, an extensive review process was conducted by pre-testing the research instrument and conducting a Q-sorting validity and reliability technique. Moreover, this review process was followed by a large-scale pilot study (see Section 5.4).

5.3. Reliability and Validity

The issue of whether information systems researchers validate their quantitative instruments rigorously has been recently raised. Absence of solid instrumental validation might put the scientific basis of MIS research at risk (Straub et al., 2004). DeLone and McLean (1992) proposes that rigour is problematic in Management Information Research, especially with regard to measurement. Straub (1989: 147-148) stresses that a validated instrument in MIS is a critical issue at least two main aspects. First, instrumentation brings rigour in MIS methodology. Second, it can promote cooperative research among researchers through allowing other researchers to use pretested instruments across heterogeneous settings and time. Moreover, "*with validated instruments, researchers can measure the same research constructs in the same way, granting improved measurement of independent and dependant variables and, in the long run, helping to relieve the confounding that plagues many streams of MIS literature*" (Straub, 1989: 148). Finally, validity helps in achieving more clarity in the formulation and interpretation of research questions.

Developing an acceptable measurement instrument requires achieving an adequate level of construct validity. *Construct validity* refers to the degree to which "*the measure, based on a suitable operational definition of the construct, appropriately reflects the concept of interest*" (Lewis et al., 2005: 396). The American Psychology Association (1985) stated that measures have to demonstrate some qualities to be accepted. These qualities are content validity, criterion validity, internal consistency and construct validity.

Regarding construct validity, the following table illustrates the different measurement properties of assessing this type of validity.

Table 5.1: Measurement properties of assessing construct validity

Measurement properties	Definition and computing
Content validity (face validity)	The appropriateness of the items on the instrument for measuring the construct. Generally, content validity can be achieved by achieving the definitional domain (conceptual definition and model specification) and by using an expert panel to review and evaluate the adopted measurement.
Factorial validity	The degree to which a factor analysis solution reflects the theoretical dimensions of a construct. This measurement property is determined by comparing the items from factor analysis.
Reliability	The consistency or stability of a measure across different samples. Reliability is evaluated by computing the internal consistency for each of the empirically derived components of the construct.
Convergent validity	The degree to which different and repeated attempts to measure the same concept are in agreement. It can be evaluated by inspecting the factor loadings for every construct, composite reliability, and average variance extracted. According to Bagozzi et al., (1994), convergent validity is proved by calculating the correlation among construct components.
Discriminant validity	The degree to which the measures of theoretically different concepts are distinct. It can be inspected by comparing the estimated correlations between the research's constructs and the squire root for the average variance extracted for a construct.
Nomological validity	The ability of a construct to predict measures of other constructs in a network of constructs. This aspect of validity is evaluated examining the relationships among the different constructs.

Source, developed based on: Lewis et al. (2005); Moore and Benbasat (1991); Straub (1989).

This study followed the suggested procedures by Straub (1989) and Lewis et al. (2005) for validating instruments in the field of MIS.

Thus, to ensure *content validity*, besides the extensive literature review to correctly define the conceptual domain for every construct and adopting appropriate measures that reflect every aspect of each construct, pre-test interviews were conducted to locate and correct any weaknesses in the draft questionnaire. Malhotra and Grover (1998) emphasise that content validity is achieved first when the researcher develops the research items. They argue that verifying that all main facets of the conceptual definition are manifested is an important measure of content validity and instrument construction. Furthermore, Chin et al. (2008); Cronbach (1971); Lewis et al. (2005); Straub et al. (2004) and Straub (1989) report that further content validity can be confirmed by using experts in the field and representative of the sample units to validate the research items and make sure they do reflect the conceptual definitions and the domain of the study.

Moreover, Lawshe (1975) suggests that content validity can be assessed by examining the level of agreement between evaluation panels as they categorise measurement items. Q-sorting is a technique employed for examining content validity, discriminant validity and convergent validity in information systems studies, especially when the researcher combines and/or develops new measures (e.g. Davis, 1989, Moore and Benbasat, 1991, Xiao and Benbasat, 2003, Ekbia and Hara, 2011, Kankanhalli et al., 2005, Petter et al., 2008, Segars and Grover, 1998, Sharma et al., 2009, Straub et al., 2004). In their seminal work in IS, Straub et al. (2004) state that Q-sorting is one of the most suggested innovative means to examine construct validity for IS researchers. They explain that "*Q-sorting combines validation of content and construct through experts and/or key informants who group items according to their similarity. This process also eliminates (i.e. discriminates among) items that do not match posited constructs*" (p.20). It "*uses a rank order procedure in which objects are sorted into piles based on similarity with respect to some criterion*" (Malhotra, 2010: 294). The following table presents a number of IS empirical studies that employed the Q-Sorting technique to examine content validity and to capture prior qualitative construct validity.

Table 5.2: Q-sorting technique and some selected empirical MIS studies

Author	Journal	Questions/Aim	Variables and constructs
Segars and Grover (1998)	MIS Quarterly	The study aimed to develop and to test a measurement model of strategic information systems planning success (SISP)	Planning alignment; planning analysis; planning cooperation; and planning capabilities.
Vaccaro et al. (2010)	Technological forecasting and social change	The study aimed to examine the organisational factors and knowledge management tools that can support innovation capabilities, which, in turn, influence the financial results.	Collaborative experience; Trust; Naturalness in ICTs' use; Culture for change; Reliance on KMTs; Speed to market; New product performance; and Financial performance
Furneaux and Wade (2011)	MIS Quarterly	The study aimed to examine the organisational and system-related factors that may affect organisations to discontinue use information systems.	System performance shortcomings; Organizational initiative; Environmental change; System investment; System embedding; Institutional pressures; Discontinuance intentions; Discontinuance decision.
Bassellier and Benbasat (2004)	MIS Quarterly	The study aimed to define the concept of business competence of information technology professionals and to explore the contributions of construct to the development of partnerships between IT professionals and their business clients.	Intentions for partnership; Organizational overview; Organizational unit; Organizational responsibility; IT-business integration; Knowledge networking; Interpersonal communication skills; Leadership skills
Siemsen et al. (2009)	Manufacturing and service operation management	This study aims to integrate some contextual and individual factors with workers' psychological safety to examine the influence of the behaviour of knowledge sharing among workers.	Communication space; Leadership consideration Communication frequency; Codification; Confidence in knowledge Psychological safety; Motivation to share

According to Moore and Benbasat (1991), there are two rounds of Q-sorting. The first round is called "unstructured sorting" or "close card-sorting" where the sorter does not have any prior knowledge about the research variables and the definitions of the constructs. The sorter's task in this round is to sort the various items into groups then label them with a specific name that best describes the items under each group. On the other hand, "structured sorting" or "open card-sort" is conducted with satisfactory knowledge of the constructs under investigation and their definitions. The sorter's task, after inspecting the different constructs of the study and their definitions, is to sort the research items into related sets (Kankanhalli et al., 2005).

Thus, in order to determine whether the domain content described for the developed measurements was properly covered by the content of the items created, eight lecturers and PhD students, divided into two rounds, examined the individual items and independently categorised them based on the scale to which they should belong. The results of the Q-sort exercise were assessed by using Cohens' kappa coefficient (Cohen, 1968). Cohens' kappa coefficient is commonly used for inter-rater reliability to examine the validity and reliability of a qualitative work (Straub et al., 2004). Nahm et al. (2002) state that the kappa coefficient or "coefficient of agreement" is "*a measure of agreement that can be interpreted as the proportion of joint judgment in which there is agreement after chance agreement is excluded*" (p.3).

Kappa scores range from -1 to +1. A score of (-1) means complete disagreement below chance by the raters, a score of (0) means that the agreement is equal to chance, and (+1) means perfect agreement beyond chance by the raters. Although there is no general agreement about the required and acceptable scores, several researchers have considered that scores greater than 0.65 might be acceptable (Nahm et al., 2002). However, Landis and Koch (1977) suggest a more detailed guideline to interpret Kappa; less than 0.39 is poor; 0.40 to 0.75 is fair to good (moderate) and greater than 0.75 is excellent.

For the *construct validity* (factorial, convergent, and discriminant), structural equation modelling utilising partial least squares (PLS) was used to validate the constructs and test the initial model using a large-scale pilot study. As mentioned above, construct validity is the extent to which an operationalisation correctly measures the concepts that it purports to measure (Straub, 1989). The focus of construct validity is on whether the selected items move together in such a way that they can be considered as a conceptual whole and whether a particular measure relates to other measures consistent with theoretically derived hypotheses concerning the constructs being measured (Boudreau et al., 2001). Carmines and Zeller (1979: 23) argue that "*Construct validity involves three* *distinct steps. First, the theoretical relationship between the constructs themselves must be specified through a literature review. Second, the empirical relationship between the measures of the constructs must be examined. Finally, the empirical evidence must be interpreted in terms of how it clarifies the construct validity of the particular measure*".

The internal consistency or reliability, which refers to the stability and consistency of the adopted measures, was assessed by the "alpha coefficient" (Cronbach, 1971). Coefficient alpha is the first evaluation of the quality of the research's instrument and is considered as one of the best estimates of internal consistency (Churchill and Iacobucci, 2005). Chau (1997) argued that Cronbach's alpha outperforms other estimation methods because it is easy to calculate and less restrictive. A high coefficient alpha means that the items efficiently capture the construct, while a low coefficient alpha means that the items do not satisfactorily capture the construct.

Internal validity relates mainly to the issues of causality and is "*concerned with the question of whether a conclusion that incorporates a causal relationship between two or more variables is sound*" (: 570Bryman and Bell, 2007). Internal validity raises the question of whether the observed effects could have been caused by or correlated with a set of un-hypothesised and/or unmeasured variables (Straub, 1989, Straub et al., 2004). Sekaran and Bougie (2010) differently define internal validity as researcher's confidence placed on the cause-and-effect relationships. This confidence depends on the data that the survey yields to allow the researcher to draw an accurate conclusion about the cause-and-effect relationship. However, this study followed several recommendations to maximise internal validity. These recommendations include using well-established theories, adopting pre-validated instruments and measures, evaluating the appropriateness of the instrument (pre-testing), and minimising the threat of common method variance (Boudreau et al., 2001, MacKenzie et al., 2011, Moore and Benbasat, 1991, Straub et al., 2004, Straub, 1989).

Although well-established theories and prior empirical research were used to establish the research hypotheses, any statements and/or conclusions about the causal relationships were based on a theoretical foundation rather than the empirical evidence of the study. The research models drew from well-established theories (see Chapter Three), aiming to focus more on using professional online communities for knowledge sharing. The empirical testing showed that this study effectively provided a broader view of the professional use of online communities for knowledge sharing by examining multiple antecedents.

The value of quantitative research is measured by how well threats to internal validity have been managed and by the validity of instruments as measures of the phenomenon under investigation. This study followed the deductive approach that requires, as discussed earlier in this Chapter, an understanding of the phenomenon under investigation, and based on this understanding; a theoretical definition can be developed through the literature review. Theoretical definition is then used as a main guide in developing the items that properly measure the construct under investigation (Schwab, 2004). The use of valid and reliable instruments minimised the internal validity threat for this study. The instruments that were used in this study stems from a pool of valid and reliable measuring tools previously tested in research. However, as will be discussed in Section 5.4.2, a small part of the question was carefully developed on the basis of literature review and interviews. Moreover, according to Malhotra (2010), Web-based surveys offer the advantage of avoiding any human intervention that may cause data errors while entering responses into a database. This study used a Web-based survey to prevent any threat to internal validity due to the data handling during the study.

Common method variance is a potential threat to internal validity, particular to research using surveys that collect responses in a single setting. This research addressed this threat using procedural and statistical techniques (see Section 6.4). Conducting three rounds of pre-tests along with empirical evidence (Harman’s one factor and unmeasured latent method factor) were used to assess the severity of common method variance. All revealed that the common method variance is not a serious problem and was not responsible for the relationships among the research latent variables.

5.4. Questionnaire design

As discussed above, the current research items were mostly drawn and modified from the existing literature. A five-point Likert scale (strongly disagree, …., strongly agree) was used to measure all adopted items except for items UKA3 and UKP3 (“I never use the community” to “several times a day”). The following steps were employed to design the study questionnaire.

5.4.1. Questionnaire translation

First, the research instrument was translated into Arabic. An Egyptian associate professor (Cairo University) who obtained his PhD in knowledge management and organisational learning from a British university (the University of Nottingham), translated the questionnaire into Arabic. The researcher provided him with all required materials that might help him, such as the definitions of the constructs, the target population and the survey method. Using a bilingual who understands empirical social science and is familiar with the research area is advocated by researchers (e.g. Brislin et al., 1973, Sekaran and Bougie, 2010). Brace (2008) emphasises that, besides requiring knowledge of the research process, the questionnaire translation should be carried out by a native speaker. He argues that although there are different routes that might be followed for obtaining a good translation, using a native speaker is probably the most important step that must be followed, especially when the questionnaire is translated for the first time. He suggests that native speakers are most likely to know and understand every slight semantic of the language. For further validity, the translation was reviewed by two lecturers who had PhD degrees from English universities in the social sciences (Education and Management).

Finally, after conducting a pre-test pilot study (see the next Section), a back-translation technique was applied to convert the Arabic language version of the questionnaire into English and compare the translated English version with the original English items, as recommended by Reynolds et al. (1993) and Sekaran and Bougie (2010). The back translation was done by an Egyptian professional translator who has worked at the British Broadcasting Company (BBC–Arabic) in London for nine years.

The final Arabic copy was then matched to the English copy to validate the translation process. Insignificant variations, mostly related to sentence structure, were detected but did not change the questions' meaning. However, slight modifications were required to better match the two versions.

5.4.2. Instrument construction

One of the challenges for this research was to develop and adapt the appropriate measurements that manifest the constructs of this study. Hinkin (1998: 104) argues that the greatest possible difficulty in conducting research in management and organisational studies is confirming the accuracy of the observed measurements for each latent variable under investigation. Therefore, this study tried to validate the used measures, not only statistically, but also through collecting as many different types of evidence as possible.

Although the majority of items were derived from previous pre-validated instruments, the research instrument was subjected to an extensive evaluation for several reasons:

> ***First,*** because of the lack of previous research on using professional online communities for knowledge sharing, the majority of the employed items were adapted from other contexts. Therefore, the majority of the employed items were used for the first time for predicting the use of professional online community for knowledge sharing.
>
> ***Second,*** some new measures were developed based on the review of previous research and the pre-test interviews. Moreover, some items were combined together to measure a specific construct (e.g. personal outcome expectancy). Boudreau et al. (2001), in their recommendations for validating instruments in IS, argue that no matter how skilled the researcher is and even if pre-validated measurements were used, research instruments should be pretested before a final survey is conducted.
>
> ***Third,*** MacKenzie et al. (2011) recommend that evaluating data by conducting pre-tests is required even with pre-validated scales. They assert that "*scale properties may differ cross-culturally, across demographic groups, by experience, by education level, by position within the organisation, etc.*" (p.310).
>
> ***Finally,*** according to Aiken (1996), "*much work and a great deal of frustration can be avoided*" (p.59) by examining the research instrument before conducting the main study.

For the above reasons, the research instrument was subjected to three rounds of pre-tests to determine its validity and reliability.

5.4.2.1. Pre-test interviews:

After model identification, a pre-test of the questionnaire should be run next. Frazer and Lawley (2000) discuss that a pre-test is extremely important to identify and eliminate any potential problems with the questionnaire. Oppenheim (1992) emphasises the importance of pre-testing questionnaires, arguing that: "*every aspect of a survey has to be tried out beforehand to make sure it works as intended*" (p.47).

Pre-testing might be the first attempt to empirically test the questionnaire with a representative sample for evaluating the appropriateness of the research instrument. Oppenheim (1992: 47-64) advises that pre-test units should be selected in accordance with the determined unit of analysis and should be knowledgeable about the constructs under study. They should be asked to complete the instrument first and then critique matters important for initial instrument design, such as format, content, understandability, terminology, and ease and speed of completion. Moreover, respondents should also be asked to identify specific items that should be added or deleted from the instrument, as well as to make suggestions for enhancements. For the researcher, responses should be reviewed and adjustments made to the research instrument based on the feedback of the respondents.

A purposive sample was used during the pre-test stage. Oppenheim (1992) discussed that researchers should be cautious when they use these kinds of samples due to lack of accurate parameters for the population. However, he states that this technique might be appropriate "*for preliminary investigations and for some parts of the pilot work*" (p.43). Zikmund (2003) suggests that in pre-tests and pilot studies data collection methods are "*informal and the findings may lack precision because rigorous standards are relaxed*" (p.58).

Thirteen participants were involved in the pre-test (two professors, four PhD research students in management disciplines, and seven professionals). Regarding the professionals, the researcher tried to get the maximum feedback from different areas of expertise and different professions; therefore, they represented a variety of selected professions (three engineers, two medical doctors, and two teachers). All participants were active members of different online professional communities.

The participants were asked first, after confirming that they were active members in one or more professional online communities, to answer, "What is the main purpose of participation in professional online communities? Among four answers, "social communication, knowledge and information sharing, entertainment, and other – please mention", all participants indicated that knowledge and information sharing was the first purpose of their participation. Social communication was the second purpose of participation. Two participants mentioned that “to be updated” and “contentious learning” were main reasons for their participation in professional online communities.

After defining every construct, the participants were then asked to determine to what extent they agreed or disagreed with every item used to measure the defined construct. Five-point Liker scales (strongly disagree to strongly agree) and open-ended questions were used to permit the addition of any items that might work as a dimension of a construct (Lewis et al., 2005).

Although an extensive literature review had been carried out, based on participants’ suggestions, one item was added to the construct of performance expectancy of knowledge acquisition (“Using knowledge from the community will decrease the time needed to perform my job”), and one item was added to the construct of system quality (“The community system is well designed for its users”). The researcher added these two items, pending the outcome of confirmatory factor analysis (CFA).

Furthermore, the participants were asked to complete the questionnaire and write their comments on the items. They were also asked to review the wording of each scale item and comment on its readability and content validity. The time involved to complete the questionnaire was estimated to be 15 to 20 minutes. Their comments were used to reword several items. Two items of the construct knowledge self-efficacy were reworded because they conveyed the same meaning. Generally, based on this pre-test, the questionnaire was revised in accordance with participants’ feedback.

5.4.2.2. Q-sort for scale development and content validity

After revising the questionnaire and adding the suggested measurements based on the participants’ feedback, all items underwent two stages of conceptual and content validation (Kankanhalli et al., 2005). The researcher followed the steps recommended by Moore and Benbasat (1991) to conceptually validate the constructs of this study.

Making initial construct validity assessment and discovering any unclarity of the questionnaire items are the main objectives of the Q-sort technique (Moore and Benbasat, 1991). According to this technique, every sorter is given all research items printed on cards and mixed up, and his/her task is to sort the items according to their relationships and their convergence to reflect an underlying construct. In other words, the sorter must place all related items that measure the same construct together (Kankanhalli et al., 2005: 124). At the same time, the underlying items in one category should show dissimilarity to the items in the other categories. As mentioned above, two-rounds of Q-sorting were conducted; the first round is called "unstructured sorting" where the sorter does not have any prior knowledge about the research variables and the definitions of the constructs. The sorter's task in this round is to sort the various items into groups and label them with a specific name that best describes the items under each group. On the other hand, "structured sorting" is conducted with satisfactory knowledge of the constructs of the study and the definitional domains. The sorter's task, after inspecting the different constructs of the study and their definitions, is to sort the research items into related sets. Whatever the technique used and prior to every round, the researcher has to explain the technique for the sorters before embarking on the sorting activity and every sorter must have the chance to ask questions until it is certain that the technique is totally understood (Straub et al., 2004). Moreover, the sorters must endeavour to put the related items in one group so that every group should contain items that deliver similar meaning, and are different in meaning from the items in the other groups.

Four academic researchers working in Al-Azhar University (two lecturers and two PhD students) from different disciplines (management, accounting, economics and statistics) individually participated in the first round, "unstructured sorting". Two of the participants might be classified as experts in professional online communities as they were using and are highly active members in two different professional online communities for more than eight years.

Using blank cards, the researcher first asked each sorter to name two different constructs in their field of study, with which they were quite familiar. Then they were asked to retrieve as many variables as they could to measure these two constructs. The researcher then practically presented a trial sort. After making sure that they understood the procedures and the idea of this technique, every sorter was given 53 printed cards mixed up randomly. They were asked to classify the 53 items into groups according to the above instructions. After finishing the sorting, every sorter gave a label to each group of related items. The following table shows the findings of the first round of Q-sorting.

Table 5.3: The findings of the first round "unstructured Q-sorting"

Target category	Actual category											Total	Hit rate (%)
	KSE	SSE	POE	PE	BI	RC	SQ	CQ	UKP	UKA	Other		
KSE	20						1(KSE3)				7 (KSE3, KSE4)	28	71.4
SSE		18					2 (SSE1, SSE5)					20	90
POE			23								1 (OEOP5)	24	95.8
PE			1 (OEOA4)	23								24	95.8
BI	1 (RC1)				11							12	91.6
TR						24						24	100
SQ		1 (SQ1)					30				1 (SQ7)	32	93.8
CQ				2 (CQ6)				26				28	92.9
UKP									8			8	100
UKA										12		12	100
Total	21	19	24	25	11	24	33	26	8	12	9	212	
	Average												93.1

UKA – Using for knowledge acquisition. PE – Performance expectancy. POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. BI- Behavioural intention. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

The above table illustrates that 93.1% of the research items (212) were loaded on their correct places (constructs). Except for knowledge self-efficacy (KSE), all ratios are more than 80%. The diagonal cells represent the number of items that were correctly placed by the four judges, while the hit rate column shows the percentage of the items correctly placed to the total items for every construct. On the other hand, the off-diagonal numbers are the items that were wrongly loaded on other constructs. Wrong loading means that these items are ambiguous and need rewording. After rewording and running the second round, if these items show the same ambiguity, they should be deleted. However, before deleting any item, a check must be made to ensure that the content validity of the construct will not be violated (MacKenzie et al., 2011).

As discussed above, although there is no specific guideline for determining the acceptable levels of the placements, Moore and Benbasat (1991) reported that a hit rate greater than 70% might be considered acceptable.

Cohen's kappa coefficient for every pair of judges was calculated to examine the level of agreement between sorters and exclude any chance agreement. Table 5.4 indicates that the average of inter-rater reliability was 0.82.

Table 5.4: Cohen's kappa for unstructured sorting

Sorters	A-B	A – C	A - D	B – C	B – D	C – D	Average
Cohen Kappa	0.78	0.84	0.79	0.84	0.81	0.85	0.82

Following in the footsteps of Kankanhalli et al. (2005), every sorter was asked to give a name for each sorted category. Table 5.5 shows that the labels given corresponded closely to the actual constructs.

Table 5.5: Raters' construct labels

Constructs	Sorter 1	Sorter 2	Sorter 3	Sorter 4
Knowledge self-efficacy (KSE)	Confidence in your ability to generate knowledge	The experience to provide knowledge	Your ability to give your knowledge to others	Knowledge sharing ability
System self-efficacy (SSE)	The required skills for using the online systems	System using confidence	System using ability	The ability to use the online systems
Personal outcomes expectancy (POE)	The incentives for donating knowledge	The reasons for giving knowledge	The expectations of giving our knowledge to others	The outcomes of giving my knowledge
Performance expectancy (PE)	The incentives for using knowledge from communities	The reasons for getting knowledge from the community	The expectations of knowledge seeking	The outcomes of asking others' knowledge
System quality (SQ)	System characteristics	System design and ease to learn and use	Community System quality	System design quality
The quality of content (CQ)	Knowledge quality	The quality of knowledge	Knowledge quality	Knowledge quality
Relational capital (TRUST)	Trust in other members	Relationships	Loyalty and relationships among members	Relations inside the community
Knowledge providing (UKP)	Sharing knowledge with others	Knowledge providing to others	Knowledge sharing	Helping other members
Knowledge acquisition (UKA)	Looking for others' knowledge	Getting others' knowledge	Looking for others' knowledge	Seeking knowledge from other members

For the structured sorting, a new group of four postgraduate research students in Hull University from different disciplines (education, tourism, marketing and human resources) participated in this round. The four raters were individually given 53 items printed and shuffled randomly after rewording the ambiguous items from the former round. Unlike the first round, the sorters had the names and definitions of all constructs. After explaining the sorting technique and making sure of their full understanding of the sorting task, the sorters were given the cards and the name and definition of every construct. They were asked to sort the items by placing and loading each item on a construct or unclassified group "other" if the item did not fit any construct category.

Table 5.6: The results of “structured Q-sorting”

Target category	Actual category											Total	Hit rate (%)
	KSE	**SSE**	**POE**	**PE**	**BI**	**TR**	**SQ**	**CQ**	**UKP**	**UKA**	**Other**		
KSE	23	1 (KSE4)				1(KSE3)					3 (KSE3, KSE4)	28	82
SSE		20										20	100
POE			23								1 (OEOP5)	24	96
PE				24								24	100
BI					11						1 (RC2)	12	91.6
TRUST						24						24	100
SQ							32					32	100
CQ								28				28	100
UKP									8			8	100
UKA										12		12	100
Total	23	21	223	24	11	25	32	28	8	12	5	212	
	Average												97%

UKA – Using for knowledge acquisition. PE – Performance expectancy. POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. BI – Behavioural intention. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

Table 5.6, apart from the two knowledge self-efficacy items (KSE3 and KSE4), one personal outcome expectancy of knowledge provision item (POE5), and one relational capital item (TR2), all items or questions were correctly placed in their hypothetical categories (hit rate 97%).

Moreover, from Table 5.6, the existence of some problematic items (i.e. KSE3 and KSE4) is observable, that should be eliminated. However, these were retained pending close scrutiny during the statistical validation.

Table 5.7: Cohen's kappa for "structured Q-sorting"

Sorters	A-B	A – C	A – D	B – C	B – D	C – D	Average
Cohen Kappa	0.95	0.85	0.95	0.90	0.90	0.81	0.89

Cohen's kappa coefficient for every pair of judges was also calculated to examine the extent to which the raters agreed and to exclude any agreements by chance. Table 5.7 clearly indicates that the average of inter-rater reliability is 0.89.

5.4.2.3. Large-scale pilot study

A pilot study is a brief test version of the study conducted before the main one in order to detect any weaknesses or potential problems with the instrument or the data collection method. Therefore, pilot studies might be used in order to: (a) calculate the time needed, in average, to complete the questionnaire, (b) help clarify and identify questions that may not be meaningful to participants, and (c) evaluate the data collection process. Boudreau et al. (2001) consider that a pilot study, which is a brief preliminary survey, is crucial for anticipating difficulties with the research instruments. In the same vein, Brace (2008) argues that the objective of large-scale pilot studies *"is to extend the pilot exercise to a larger number of interviewers and to a broader range of respondents, and for there to be a sufficient number of respondents for some analysis to be carried out to confirm that the questions asked are delivering the data required to answer the project objectives*" (p.181). In more detail, Brace reports that piloting the questionnaire is required for three main reasons; reliability (to what extent do the respondents understand the questions?); validity (to what extent do the questions posed adequately address the objectives of the study?); and error testing (to what extent is the questionnaire free of errors?).

Robson (2002) asserts that pilot studies provide the researcher with an opportunity to revise the research design, focus in depth on the theoretical framework, and might help the researcher to reconsider the sampling strategy. He suggests that the first stage of any data gathering should, if at all possible, be a test or a pilot study. Regardless of whether the researcher develops the instrument, adopts, or purchases an existing instrument, survey research should be piloted on a small scale "*in virtually all circumstances*" (p.383).

Procedure: The sample size for the second pilot study was 193 participants. Data were collected by using Google's documents. By using this service, the researcher was able to design an online questionnaire and establish access to the target respondents, for them to answer it.

Two techniques were employed to collect the pilot study questionnaires. A) All academic staff of the Egyptian universities, who were members in the electronic page "let's help each other in questionnaires" (470 members) and "Union of Academic Staff in all Egyptian Universities" (13800 members), were invited to participate in this study. The members of these groups were from different academic fields and disciplines. B) A snowball data collection method was used through professional and members' friends and colleagues to solicit online community users to participate in this research. As discussed earlier, Oppenheim (1992) discussed that researchers should be cautious when they use the snowballing technique, due to the lack of accurate parameters for the population. However, he states that this technique might be appropriate "*for preliminary investigations and for some parts of the pilot work*" (p.43). In this regard, Boudreau et al. (2001: 4) found that, in the previous IS surveyed studies, pilot studies tended to use "small, convenience sample". However, the collected data shows a wide variety to include many professions that reflected the majority of the target population, as shown in the Table 5.8.

Table 5.8: Demographic of participants (pilot study)

Demographic		Frequency	%
Gender	Male	161	83.4
	Female	32	16.6
	Total	**193**	**100**
Age	From 25 to 35 years	101	52.3
	From 35 to 40 years	45	23.3
	From 40 to 45 years	13	6.7
	Less than 25 years	31	16.1
	More than 45 years	3	1.6
	Total	**193**	**100**
Occupation	Academic staff	90	46.6
	Accountant and financial services	18	9.3
	Medical doctor	5	2.6
	Researcher	19	9.8
	Teacher	22	11.4
	Engineer	33	17.1
	Missing	6	3.1
	Total	**193**	**100**
Education	Bachelor or Licentiate	70	36.3
	MBA or MSc	77	39.9
	PhD	46	23.8
	Total	**193**	**100**

Because the majority of respondents were expected to receive the questionnaire outside the online communities, the first question was, "Are you a member of one or more online professional community?" If the answer is "yes", the respondent was allowed to proceed to complete the questionnaire; with the instruction to focus only on the professional online community he or she used to share knowledge more than the other communities, if he/she was a member of more than one professional online community. If the answer was "no", the respondent was not allowed to proceed to complete the questionnaire.

Statistical technique: Partial least square **"**PLS" is a statistical technique for estimating the numerical measurement of the latent variables in the model from their related measured variables. PLS is a variance-based structural equation modelling statistical technique that is accepted and widely used in IS research (Gefen and Straub, 1997, Bock et al., 2005, Wasko and Faraj, 2005, Ringle et al., 2012) for simultaneous assessment of the reliability and validity of the measures of latent variables (Wasko and Faraj, 2005). In their study of PLS and MIS by conducting a systematic analysis of all articles published in the most prestigious international information systems journals (MISQ and ISR) from 1994 to 2008, Urbach and Ahlemann (2010) found that PLS is increasingly used. Unexpectedly, they found that PLS using structural equation modelling has been employed more than covariance-based SEM in the two tier journals investigated.

PLS does not have an identification problem, and this implies that latent constructs do not need to have the minimum of three indicators required by covariance-based SEM techniques for identification purposes (Chin, 2000). Moreover and according to Gefen et al. (2000), PLS is particularly suitable under conditions of unknown data distributional characteristics such as non-normally distributed data. In their comprehensive study, Urbach and Ahlemann (2010) summarised researchers' arguments for choosing PLS as the statistical means for testing structural equation models as follows (p.9):

- PLS does not demand a large sample size like other similar statistical techniques.
- PLS is much more suitable for theory in its developmental stage than for theory testing.
- Distributional free (can be used with categorical data).
- Can be used with complex models with a large number of indicators.
- Can be used with formative models in addition to the reflective models.
- Outperforms covariance-SEM in terms of prediction.

PLS has been criticized for overestimating the measurement loading and underestimating the structural paths among constructs which might result in significant relationships between constructs going undetected (Chin et al., 1996). However, it can be used to assess the measurement model and path analysis to assess the structural model (Hair et al., 2006), and it is more suited to theory building (Westland, 2007). Barclay et al. (1995) discuss that: "1) *PLS is recommended for predictive research models where the emphasis may be more on theory development. 2) SEM is more suited for confirmatory testing of how the theoretical model fits observed data, requiring much stronger theory than PLS*" (p.288). Götz et al. (2010) point out that PLS, compared to covariance-based models, can be conducted with fewer requirements; however, it produces consistent estimation results.

Similarly, Chin (1998: 299) emphasises that linking measures to the constructs is one of the main contributions of PLS. He argues that although PLS can be employed for theory confirmation (confirmatory analysis), it is more suited to theory building (exploratory analysis).

In a study that aimed to compare empirically how PLS and Maximum Likelihood (ML) perform under holding and violating the assumptions of distribution symmetry and reflective modelling indicators, Vilares et al. (2010) reported that PLS outperforms ML especially "*in terms of bias and precision*" (p.302). The following table summarises some of the results and implications that have been introduced.

Table 5.9: PLS vs. ML

Criteria	Results
Auxiliary measurement theories (reflective and formative model)	For the reflective model, both estimation models showed similar and acceptable degree of quality. However, for the formative model, PLS showed "most significant gains when compared to the covariance based model" p. 302
Robustness	For formative blocks and skewed data, PLS was more robust since it showed modest increase in bias and mean square errors. However, ML was more sensitive to deal with skewed and asymmetry data and model specification deficiency, thus, normality is crucial for using ML.
Sample size	PLS have shown high stability in estimating indicator loadings with small sample size when compared to using ML for measurement estimation.
Estimation	PLS has shown tendency to overestimate the outer model and a tendency to underestimate the inner model. However, ML has shown the opposite tendencies (underestimating the indicator loadings and overestimating the model coefficients).
Conclusion	PLS is "a useful tool when the primary interest is to obtain indicator weights and produce the predications of the latent variables. On the other hand covariance-based methods are usually presented as useful when the interest is to obtain model coefficient". (p.303)

Prepared by the researcher based on Vilares et al. (2010: cited in Vinzi et al. 2010: 302-303)

Briefly, PLS was used with the pilot study for drawing an initial picture about the validation of the measurement model for the following reasons:

***First**,* as mentioned above, PLS-SEM is more appropriate to theories in the early stage, while covariance-based SEM is more appropriate for theory testing. In this research, although the majority of the employed items were derived from previous research, some measures were developed and some others were integrated together to measure a specific unobserved latent variable. According to Chin (1998), Chin and Dibbern (2010) and Westland (2007), PLS, besides its confirmatory power, is an appropriate statistical technique for assessing the operationalisation of theories and assessing measurement models.

Second, in comparison to SEM that uses the covariance analysis, PLS employs a regression analysis approach to test the hypothesised relationships. PLS applies an iterative sequence of Ordinary Least Squares (OLS), analysing one construct at a time (Chin, 1998). Instead of estimating the variance of all latent variables, as in the case of SEM, PLS, in contrast, estimates the model parameters in a way that minimises the variance of the residuals of all the dependent variables (Chin, 1998). Therefore, PLS is more suitable for theory building, in contrast to SEM.

Third, PLS analysis can assess a model with a relatively small number of samples. PLS is less influenced by small sample sizes and, furthermore, is also less affected by deviation from normality. None of the PLS significance estimation methods requires parametric assumptions (Gefen et al., 2000). Therefore, as stated by Chin (1998), PLS is "*suited for the analysis of small data samples and for data that does not necessarily exhibit the multivariate normal distribution required by covariance-based SEM*".

Finally, as discussed above, the purpose of this pilot study was to assess the psychometric properties and to provide an initial picture of the constructs under investigation. However, covariance-based SEM (CB-SEM) was used to assess the final measurement model and to examine the research hypotheses.

Thus, the psychometric properties of the research constructs were examined by using SmartPLS 2.0 M3 (Ringle et al., 2005).

Sample size: As discussed above, PLS was the selected statistical technique in analysing the data collected from the large-scale pilot study only to produce an initial picture about the psychometric properties of the research variables and constructs. The minimum sample for PLS, as determined by Chin (1998) and Chin (2010), was utilised for determining the required sample size for this study. Chin reported that 10 times the maximum number of items in a theoretical construct should be used as a formula for calculating the minimum sample size for running a PLS model (Chin, 1998, Chin, 2001). In regard to the current study, the content quality latent variable was measured by using seven items (see Appendix E). Thus, the acceptable sample size for this large-scale pilot test was determined by the equation proposed by Chin (1998) (10 X; where x is the maximum number of indicators to measure a latent variable). Thus the minimum accepted sample size is (10*7 = 70).

Hair et al. (2012) state that "*although this rule of thumb does not take into account effect size, reliability, the number of indicators, and other factors known to affect power and can thus be misleading, it nevertheless provides a rough estimate of minimum sample size requirements*" (p.240). Therefore, in addition to using Chin's approach to make decision about the minimum sample size for using PLS, a "priori power analysis" was also followed to calculate the sample size (Cohen, 1992). Employing the statistical power analysis method for determining sample size requires deciding each of effect size, significance criterion and a desired level statistical power (Cohen, 1992). The significance criterion was set to 1% ($\alpha < 0.01$), where α is the risk of rejecting a true null hypothesis; the effect size set to medium ($f^2 = R^2/(1-R^2) = 0.15$), where R^2 is the coefficient of determination; and a level of power set to 80% ($1 - \beta = 0.80$), where β is the probability of rejecting a false null hypothesis (Cohen, 1992). Power analysis was calculated by using G*Power 3.1.3 (Faul et al., 2009). By applying the above determined values, 154 cases were found to be the minimum sample size.

Data analysis and results: The objective of the large-scale pilot study is to obtain an initial insight as to the reliability and validity of the research constructs. Assessing the outer model's reliability and validity "*involves examining individual indicator reliabilities, the reliabilities for each construct's composite of measures (i.e., internal consistency reliability), as well as the measures' convergent and discriminant validities*" (Hair et al., 2012: 423).

As suggested by researchers (Hair et al., 2012, Henseler et al., 2009), assessment of the reflective outer model includes evaluating indicators' reliability, internal consistency reliability and convergent and discriminant validity. Table 5.10 illustrates the different criteria for evaluating the measurement model, accompanied by the recommended and rule of thumb values.

Table 5.10: The recommended cutoff values for SEM-PLS reflective models

<table>
<tr><th>Reliability and validity type</th><th colspan="2">Criterion and heuristic/cutoff values</th><th>Source</th></tr>
<tr><td>Indicator reliability</td><td colspan="2">Indicator loadings: standardised loadings ≥ 0.70 (in exploratory studies, loadings of 0.40 are acceptable)</td><td>(Chin, 1998); (Hair et al., 2011); (Hulland, 1999)</td></tr>
<tr><td>Internal consistency reliability</td><td colspan="2">Composite reliability (CR) ≥ 0.70 (in exploratory and early stage research 0.60 is considered acceptable)</td><td>(Bagozzi and Yi, 1988); (Hair et al., 2010); (Gefen et al., 2000)</td></tr>
<tr><td>Convergent validity</td><td colspan="2">Average variance extracted (AVE) ≥ 0.5</td><td>(Bagozzi and Yi, 1988); (Hair et al., 2011)</td></tr>
<tr><td rowspan="2">Discriminant validity</td><td>Fornell-Larker criterion</td><td>The square root of the AVE for each latent variable should be higher than its correlations with the other latent variables.</td><td>(Fornell and Larcker, 1981); (Götz et al., 2010)</td></tr>
<tr><td>Cross loadings</td><td>Each indicator should show the highest loading for its designed construct than for any other construct.</td><td>(Chin, 1998); (Götz et al., 2010); (Hulland, 1999)</td></tr>
</table>

Source, adapted from Hair et al. (2012: 429-430)

The measurement model at each latent variable should be purified first by calculating the Cronbach's Alpha (α) reliability coefficients for all latent variables. Cronbach's Alpha coefficient was calculated for each latent variable using SPSS 19. All coefficients calculated, except for the KSE construct, were greater than the cutoff value of 0.70. Table 5.11 illustrates the values of these coefficients.

Table 5.11: Cronbach's alpha coefficients (Pilot study)

Constructs	Number of items	Cronbach's Alpha
Personal outcome expectancy (POE)	6	0.83
Performance expectancy (PE)	6	0.89
Effort expectancy (EE)	3	0.83
Knowledge self-efficacy (KSE)	7	0.59
System self-efficacy (SSE)	5	0.83
Behavioural intention (BI)	3	0.89
Relational capital (TRUST)	6	0.94
System quality (SQ)	5	0.84
Content quality (CQ)	7	0.86
Knowledge providing behaviour (UKP)	2	0.75
Knowledge acquisition behaviour (UKA)	3	0.74

Regarding the knowledge self-efficacy construct, the item-total statistics table reveals that KSE3 and KSE4 have "corrected item-total correlation" less than 0.3. These two items showed corrected item-total correlation 0.155 and 0.160 respectively. According to Field (2010), with a value less than 0.3 means the item "*does not correlate very well with the scale overall…. items with low correlations may have to be dropped*" (p.678). MacKenzie et al. (2011) strongly recommend deleting problematic items "*provided that the essential aspects of the construct domain are captured by the remaining items*" (p.316). The two items were deleted because the preceding analysis identified them as problematic indicators. The construct domain was not affected by deleting these two items since the domain was captured by the remaining indicators. Kankanhalli et al. (2005) discuss that knowledge self-efficacy is "*typically manifested in the form of people believing that their knowledge can help to solve job-related problems, improve work efficiency or make a difference to their organisation*" (p.122). After deleting these two problematic items (KSE3 and KSE4), the construct of KSE showed a reliability coefficient 0.85.

As discussed earlier, the convergent validity can be examined using AVE. As shown in Table 5.12, all AVE values are > 0.50 which is the recommended cutoff (Chin, 2010, Urbach and Ahlemann, 2010). Discriminant validity was assessed by examining the square root of the AVE as recommended by Fornell and Larcker (1981). The square root of the AVE for each latent variable should be greater than its correlation with the other latent variables. The diagonal cells in Table 5.12 represent the square root of the

AVE for every construct. Table 5.12 shows that every square root of AVE for each construct is higher than its correlations with the other constructs. This means that every latent variable shares more variance with its hypothetical indicators than with any other indicators.

Table 5.12: construct reliability, AVE, and latent variables correlations (pilot data)

	AVE	CR	CQ	EE	KSE	PE	POE	SQ	SSE	Trust	UKA	UKP
CQ	0.564	0.898	**0.751**									
EE	0.753	0.901	0.372	**0.868**								
KSE	0.640	0.898	-0.096	-0.054	**0.800**							
PE	0.656	0.918	-0.070	0.039	0.385	**0.810**						
POE	0.536	0.872	-0.229	-0.080	0.414	0.611	**0.732**					
SQ	0.590	0.877	0.502	0.711	-0.069	0.252	0.023	**0.768**				
SSE	0.604	0.883	-0.032	0.140	0.491	0.522	0.411	0.085	**0.777**			
Trust	0.767	0.952	0.444	0.579	0.336	0.100	0.174	0.376	0.113	**0.876**		
UKA	0.647	0.845	0.010	0.217	0.150	0.201	0.317	0.197	0.218	0.408	**0.804**	
UKP	0.800	0.889	0.056	-0.133	0.432	0.214	0.277	-0.156	0.196	0.232	0.250	**0.894**

- The diagonal bold cells present the square root of AVE.
- UKA – Using for knowledge acquisition. PE – Performance expectancy. POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. UKP- Use for knowledge provision.

Furthermore, and at the items level, discriminant validity can be examined using the cross-loadings. According to (Chin, 1998), cross loadings are obtained by correlating the component scores of each latent variable with the other items. Hulland (1999) states that acceptable discriminant validity using cross-loadings is achieved when the shared variance between the theoretical construct (latent variable) and its indicator exceeds the variance explained and shared with the model's latent variables (p.199). The following table shows the cross-loadings for every indicator.

Table 5.13: Factor and cross loadings (pilot data)

	CQ	EE	KSE	PE	POE	SQ	SSE	Trust	UKA	UKP
CQ1	0.76	0.12	-0.11	-0.04	-0.19	0.25	-0.03	0.23	-0.02	0.08
CQ2	0.73	0.16	-0.04	0.01	-0.18	0.29	-0.01	0.25	-0.07	0.09
CQ3	0.78	0.23	-0.14	-0.07	-0.17	0.31	-0.01	0.26	-0.04	0.06
CQ4	0.42	0.57	-0.11	-0.05	-0.08	0.66	-0.07	0.36	0.06	-0.22
CQ5	0.82	0.24	-0.07	-0.01	-0.20	0.32	0.00	0.36	0.11	0.11
CQ6	0.88	0.29	0.02	-0.04	-0.18	0.42	0.04	0.45	-0.02	0.08
CQ7	0.78	0.26	-0.10	-0.16	-0.19	0.31	-0.09	0.32	0.00	0.09
EE1	0.33	0.90	-0.18	0.00	-0.17	0.67	0.02	0.43	0.19	-0.09
EE2	0.38	0.95	0.05	0.11	0.01	0.73	0.12	0.65	0.26	-0.13
EE3	0.22	0.75	-0.02	-0.06	-0.06	0.38	0.31	0.39	0.07	-0.13
KSE1	-0.15	-0.13	0.88	0.44	0.51	-0.13	0.44	0.24	0.05	0.41
KSE2	-0.06	0.07	0.77	0.25	0.33	0.11	0.30	0.40	0.23	0.39
KSE5	0.05	0.09	0.81	0.31	0.23	0.06	0.34	0.36	0.06	0.29
KSE6	-0.10	-0.20	0.79	0.21	0.19	-0.14	0.43	0.07	0.12	0.23
KSE7	-0.06	-0.02	0.75	0.19	0.18	-0.21	0.50	0.25	0.20	0.33
PE1	-0.09	-0.01	0.40	0.91	0.54	0.16	0.45	0.07	0.12	0.21
PE2	0.00	0.08	0.34	0.81	0.50	0.25	0.44	0.15	0.27	0.22
PE3	-0.02	0.11	0.13	0.61	0.31	0.20	0.30	0.10	0.03	-0.03
PE4	-0.10	-0.01	0.42	0.89	0.58	0.19	0.46	0.12	0.11	0.26
PE5	-0.06	0.04	0.37	0.92	0.60	0.24	0.44	0.09	0.21	0.22
PE6	-0.07	0.00	0.14	0.66	0.37	0.17	0.41	-0.05	0.20	0.09
POE1	-0.27	-0.14	0.30	0.44	0.82	-0.05	0.39	0.06	0.31	0.20
POE2	-0.09	-0.05	0.32	0.44	0.79	0.02	0.35	0.21	0.25	0.25
POE3	-0.25	-0.14	0.22	0.37	0.77	-0.03	0.26	0.02	0.21	0.15
POE4	-0.14	-0.02	0.40	0.62	0.80	0.18	0.32	0.15	0.25	0.30
POE5	-0.06	0.01	0.22	0.34	0.62	0.05	0.23	0.13	0.21	0.02
POE6	-0.18	0.02	0.31	0.40	0.56	-0.13	0.21	0.22	0.14	0.20
SQ1	0.26	0.41	-0.35	-0.02	-0.09	0.69	-0.11	-0.04	-0.09	-0.48
SQ2	0.55	0.64	0.18	0.26	0.06	0.82	0.34	0.52	0.24	-0.04
SQ3	0.25	0.68	-0.18	0.28	0.10	0.87	0.07	0.25	0.19	-0.07
SQ4	0.15	0.18	-0.21	0.23	0.06	0.68	-0.13	-0.16	0.08	-0.14
SQ5	0.52	0.50	-0.03	0.13	-0.09	0.77	-0.17	0.36	0.16	-0.13
SSE1	-0.03	0.15	0.35	0.62	0.43	0.22	0.85	0.06	0.19	0.07
SSE2	0.10	0.11	0.39	0.40	0.31	0.05	0.77	0.20	0.21	0.39
SSE3	-0.11	-0.02	0.44	0.24	0.25	-0.15	0.72	-0.02	0.15	0.15
SSE4	-0.07	0.10	0.47	0.37	0.30	0.02	0.82	0.12	0.11	0.17
SSE5	-0.06	0.18	0.29	0.17	0.22	0.02	0.71	0.04	0.19	-0.06
TRUST1	0.36	0.47	0.34	0.11	0.15	0.16	0.16	0.89	0.30	0.23
TRUST2	0.44	0.42	0.31	0.20	0.15	0.23	0.17	0.88	0.33	0.21
TRUST3	0.41	0.48	0.32	0.00	0.05	0.30	0.08	0.89	0.37	0.29
TRUST4	0.33	0.50	0.35	0.04	0.13	0.32	0.08	0.91	0.38	0.17
TRUST5	0.30	0.56	0.18	0.07	0.22	0.53	-0.01	0.82	0.39	0.09
TRUST6	0.47	0.60	0.27	0.10	0.21	0.39	0.12	0.87	0.35	0.22
UKA1	0.06	0.11	0.05	0.03	0.14	0.07	0.16	0.29	0.82	0.26
UKA2	0.03	0.22	0.19	0.32	0.38	0.24	0.23	0.40	0.88	0.24
UKA3	-0.12	0.20	0.08	0.02	0.18	0.13	0.10	0.27	0.70	0.02
UKP1	-0.08	-0.18	0.39	0.10	0.19	-0.20	0.08	0.06	0.24	0.85
UKP2	0.14	-0.08	0.39	0.25	0.29	-0.10	0.25	0.31	0.21	0.93

As Table 5.13 shows, the cross-loadings of each indicator demonstrate high loading on its hypothetical construct compared to the other constructs, which indicates adequate discriminant validity (Chin, 2010, Urbach and Ahlemann, 2010). The only exception was item CO4, which has a loading less than the highest cross-loadings. However, as seen in Table 5.11, the Cronbach's alpha (α) for the content quality (CQ) construct as a whole is high (0.86), and its AVE is far above the recommended cutoff value (0.50) and in addition, as seen in Table 5.12, the square root of the AVE is much higher than the correlation between the mentioned construct and other different constructs. Thus, this is not deemed to be problematic. The same applies to all items that showed cross-loading higher than 0.02 and/or factor loading less than the suggested cutoff 0.70 (PE3, PE6, POE4, POE5, POE6, SQ1, SQ4). Moreover, and according to Hair et al. (2010), with early stage research, a 0.50 cutoff value might be considered an acceptable value.

The previous results indicate that the different measurements have acceptable and adequate validity and reliability. However, some revisions were made before starting the main study.

1- As discussed above, two items were deleted from the knowledge self-efficacy (KSE) construct because they showed very low correlation with the other construct items. However, omitting these two items did not affect the content validity of this construct as all definition aspects are covered by the retained five items.

2- Use for knowledge provision (UKP) was measured by two items, whereas use for knowledge acquisition (UKA) was measured by three items. However, some modifications were carried out for both constructs. As for the UKA construct, the item "I use this community when I want advice on how to carry out some tasks" was deleted. However, to avoid the possibility of obtaining an inflated usage resulted in using self-reported scales, two new items "what is your frequency of using this community for acquiring (providing) knowledge? (Never to several times a day)" was adapted from Venkatesh et al. (2012) and was added to both constructs to reflect the frequency of using the community for knowledge acquisition/provision.

3- As discussed earlier, actual professional online community users were the main targets of this study. Additionally, prior research reported positive and significant influence of users' intentions upon actual use. Thus, as continuity was not under investigation in this study, there was no logical reason to include the construct of behavioural intentions. Consequently, this construct was not included in the main study models.

4- Eckhardt et al. (2010) suggest that social influence is of particular importance, especially in the context of collaboration and group technologies. In this regard, Olschewski et al. (2013) state that the influence of social environments on technology usage is still not sufficiently examined (p.620). Particularly, they emphasise that researchers still struggle from both theoretical and empirical perspectives to understand how social influence can explain system usage, especially when the degree of freedom in decision-making (mandatory use vs. voluntary use) is considered. Thus, in order to be consistent with the UTAUT theory, the social influence SI construct was added to the research models in the main study.

5.5. Summary

This chapter examined the study instrument used in this research. A survey questionnaire was the main method used. This chapter has defined the questionnaire, and explained how the different constructs were operationalised. The issue of reliability and validity in quantitative research was also discussed. The reliability and the different types of validity were considered through three rounds of pretesting.

6.1. Introduction

This chapter sets out the findings by presenting the quantitative analysis of the data obtained from the research questionnaire (main study) in order to test and examine the measurement model and to test the structural model. Firstly, data screening was carried out for some issues such as missing data, outliers, non-response bias, normality, linearity, homoscedasticity, and multicollinearity. The next step of data analysis was to validate the measurement model through using CFA. Common method variance (CMV) was carried out by using different procedural and statistical techniques. Next, the use of SEM to assess the relationships (paths) between the latent variables (constructs) and to validate the research models is introduced. Finally, the issues of alternative models are presented.

6.2. Preliminary data analysis

As discussed in Chapter Three, statistical rigour is fundamental for SEM, thus, some issues that can violate the quality and reliability of multivariate tests are discussed in this section. The handling of missing values and some assumptions such as outliers, linearity, multicollinearity, homoscedasticity, and normality are discussed in more detail as follows.

6.2.1. Missing values

Tabachnick and Fidell (2007) explain that "missing values" is one of the serious problems in data analysis because of its significant effects on reliability, validity and generalizability (p.62). The SPSS missing value analysis (MVA) was used to analyse the problem of missing values in the present research. The univariate statistics revealed that all variables showed less than 5% missing values except for the variable "age", which showed 6% missing values. The MVA also showed that a number of cases had missing values in excess 10%. For testing whether the missing values were "missing completely at random" (MCAR), Little‘s test (Little and Rubin, 2002) for testing randomness was used. The results revealed that the absence of complete randomness was significant (Chi-Square = 1165.892, DF = 818, Sig. = 0.000). Consistent with Tabachnick and Fidell (2007) and Meyers et al. (2006), and according to Hair et al.

(2010: 48), before proceeding to select the method for imputation of missing data, it is preferable to "consider the simple remedy of deleting offending case (s) and/or variable (s)". They argue that the researcher might find that deleting these cases may reduce the extent and concentration of missing data.

The use of missing value analysis (MVA) in SPSS revealed that there were no offending variables; however, it was found that there are 14 cases that could be considered offending cases (e.g. concentration on a specific set of questions and/or missing values more than 50%). These 14 cases were deleted. The MVA and Little's MCAR tests were conducted again to analyse the pattern of missing data with the remaining cases (352). The results indicated that missing values for variables ranged between 0.3% - 0.6% for the quantitative variables and 1.4% – 3.4% for the categorical variables.

When missing values are small (< 0.05), almost any imputation method will yield similar results (Cohen et al., 2003, Tabachnick and Fidell, 2007, Meyers et al., 2006, Hair et al., 2010). However, as recommended by Cohen et al. (2003: 450); Hair et al. (2010: 50) and Tabachnick and Fidell (2007: 71), with missing values less than 5% and missing at random (MAR), the expectation maximization (EM) imputation method can be used to remedy the missing values. EM, which depends on both the covariance matrix and maximum likelihood (ML) estimation, was used for three reasons: 1) According to Hair et al. (2010), this method "*has been shown to work quite effectively in instances of non-random missing data process*" (p.50), 2) This method is the most commonly used with structural equation modelling (Hair et al., 2010, Meyers et al., 2006), 3) As it depends on the covariance matrix, it provides the smallest analysis bias if compared with the other imputation methods (Tabachnick and Fidell, 2007: 71).

6.2.2. Outliers

Outliers are defined as "*observations with a unique combination of characteristics identifiable as distinctly different from the other observations*" (Hair et al., 2010: 64). Tabachnick and Fidell (2007) discuss that an outlier is "*a case with such an extreme value on one variable (a univariate outlier) or such a strange combination of scores on two or more variables (multivariate outlier) that it distorts statistics*" (p.22). Outliers may occur for four different reasons: error or incorrect data entry, wrong missing data codification, sampling errors, extraordinary observations that could not be explained by the researcher – and/or observations that might fall within the acceptable range of values on each of the variables (Meyers et al., 2006, Tabachnick and Fidell, 2007).

Outliers can be assessed in a univariate context (cases have an extreme value on single variable) or a multivariate context (cases have extreme values on more than one variable or a number of variables). In a univariate context, the current study checked the outliers by converting the data values to standard scores (z-scores) as recommended by Hair et al. (2010); Tabachnick and Fidell (2007); and Tinsley and Brown (2000)). The assumption is that any case that shows a standard score (z-score) > 3.29 ($p<0.001$) is considered as a potential outlier (Tabachnick and Fidell, 2007: 73). The results revealed that four variables had standard values exceeding 3.29. These variables were KSE1, KSE5, KSE6, and KSE7. The numbers of cases (n) that showed outlier behaviour were 3, 5, 3, and 4 respectively. Although dealing with these outliers depends on examining the data at a complete variate, Cohen et al. (2003: 128) advise that "*if outliers are few (less than 1% or 2% of n) and not very extreme, they are probably best left alone*". The highest number of outliers for one variable (KSE5) was five values, which represent 1.41%. Thus, according to Cohen et al. (2003), this percentage is meaningless and can be ignored.

Mahalanobis distance (D^2/df, where df = the number of variables) was used to assess the research data at the multivariate level. Mahalanobis distance is "*the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all variables*" (Tabachnick and Fidell, 2007: 74). Hair et al. (2010) recommend that "*observations having D^2/df value exceeding 2.5 in small samples and 3 or 4 in large samples (> 200) can be designated as possible outliers*" (pp.66-67). Linear regression analysis was used to examine Mahalanobis distance. For this purpose, a dummy variable was used as a dependent variable and all observed variables were modelled in the multiple regression equation as independent variables. Mahalanobis distance scores, which were divided by the number of variables (53), revealed the absence of multivariate outliers, as all values were less than 3. Therefore and based on the previous analyses, it was concluded that outliers were unlikely to be a serious issue in this study. Table 6.1 shows the demographic characteristics of the selected sample.

Table 6.1: Research sample characteristics

Factors	Variables	Frequency	%
Gender	Male	245	69.6
	Female	101	28.7
	Missing	6	1.7
	Total	**352**	**100**
Age	Less than 25 years	16	4.5
	25 - less than 30 years	81	23
	30 - less than 35 years	102	28.9
	35 - less than 40 years	96	27.2
	40 - less than 50 years	40	11.3
	> 50 years	5	1.4
	Missing	12	3.4
	Total	**352**	**100**
Occupation	Lawyer	41	11.6
	Teacher (general/high education)	84	23.9
	Physician	31	8.8
	Dentist	24	6.8
	Engineer	42	11.9
	Veterinarian	19	5.4
	Accountant/financial services	74	21
	Pharmacist	29	8.2
	Other	2	0.6
	Missing	6	1.7
	Total	**352**	**100**
Education	Technical institution (2 years)	17	4.8
	University graduate	227	64.4
	Diploma/Master	76	21.5
	Doctorate or equivalent	25	7.1
	Missing	7	2
	Total	**352**	**100**
Tenure in the Internet	1- less than 3 years	1	0.3
	3 – less than5 hours	21	5.9
	5 – less than 7 hours	41	11.6
	> 7 hours	285	80.9
	Missing	4	1.4
	Total	**352**	**100**
Internet browsing time (h/w)	Less than 7 hours	24	6.8
	7 – less than14 hours	63	17.6
	14 – less than 21 hours	97	27.7
	21- less than 28 hours	78	22.2
	29 – less than 36 hours	59	16.7
	More than 36 hours	27	7.6
	Missing	4	1.4
	Total	**352**	**100**

Table 6.1: Research sample characteristics (continued)

Tenure in the online community	Less than one year	46	13
	1 – less than 2 years	94	26.8
	2 – less than 4 years	119	33.8
	More than 5 years	87	24.7
	Missing	6	1.7
	Total	**352**	**100**
Community browsing time (h/w)	Less than one hour	43	12.2
	1 – less than 3 hours	111	31.6
	3 – less than 6 hours	112	31.6
	6 – less than 10 hours	60	16.9
	More than 10 hours	21	5.9
	Missing	5	1.4
	Total	**352**	**100**
What is your frequency of using this community to obtain knowledge?	Never	3	0.9
	One time in a month	52	14.8
	Many times in a month	84	23.9
	Many times in a week	164	46.6
	Daily	49	13.9
	Total	**352**	**100**
What is your frequency of using this community to provide knowledge?	Never	22	6.3
	One time in a month	81	23
	Many times in a month	116	33
	Many times in a week	108	30.7
	Daily	25	7.1
	Total	**352**	**100**

6.2.3. Non-response bias

As a result of using a sampling technique, non-response bias might be a problem. Non-response bias refers to the difference between the answers of respondents and the answers from non-respondents to the research questionnaire. According to Burkell (2003), non-response can introduce some bias in the sample, even if it cannot be easily detected by statistical techniques. Consistent with Burkell (2003)'s suggestion, in this study, besides conducting qualitative validation and a large-scale pilot study, the following steps were applied to minimise the effect of nonresponse bias: 1) verifying that the research questionnaire instructions (see Section 5.4) were unambiguous and easy to follow and comprehend; 2) the research questions were presented in a logical order, to avoid common variance problems (see Section 6.4); 3) as discussed in Chapter Four, the research method (Web-based survey) perfectly matched the characteristics of the respondents and finally, 4) the time needed to complete the research questionnaire was not too long.

Non-response bias refers to "*the bias that exists when respondents to a survey are different from those who did not respond in terms of demographic or attitu- dinal variables*" (Sax et al., 2003: 411). Thus, practically, one of the common methods to examine for non-response bias is to compare the demographics of the research respondents with the demographics of either a second wave of respondents or the target population (e.g. Churchill and Iacobucci, 2005, De Valck et al., 2007, Wasko and Faraj, 2005, Fan and Yan, 2010). With respect to gender, the respondents of this study did not differ significantly from the published characteristics of the population (see Table 4.8 and Table 6.1). The female respondents represented 28.7% in this study, while they represented 30.6% in the population (see Table 4.8). With regard to age, the percentage of members under 35 years is about 56%, which is quite similar to the large-scale pilot study (52%). The slight difference might be attributed to collecting data from eight different communities in the main study. Moreover, comparing the demographic characteristics with other similar studies is recommended by researchers (e.g. Hudson et al., 2004, De Valck et al., 2007, Ziegenfuss et al., 2012). Of direct relevance of this study is the work of Chiu et al. (2006). In terms of the comparable demographics such as membership history (experience) and age, this study did not show significant and noticeable differences from Chiu et al.'s study.

Statistically, as recommended by Armstrong and Overton (1977), non-response bias was checked by verifying that early respondents were not statistically different from late respondents. The rationale behind this test is that last wave of respondents should be more similar to non-respondents than early respondents (De Valck et al., 2007). Although this method is less strong approach to assessing non-response bias, it has been widely used by MIS researchers to assess the non-response bias (e.g. Karahanna et al., 2006, Sun and Zhang, 2006, Venkatesh et al., 2012, Gefen et al., 2011). As suggested by Compeau and Higgins (1995b) and Gefen et al. (2011), if people who respond late do not show significant differences from people who respond early in certain characteristics, it is unlikely that non-respondents differ significantly from respondents. However, even though this is a commonly and widely used method to assess non-response bias, the possibility of bias is not partially eliminated and the findings of this study should be interpreted accordingly (see Section 8.5 for more detail about the research limitations).

To detect non-response bias, the independent samples t-test for the difference of means between groups was used to determine if the early responders were (statistically) significantly different from the late responders (Karahanna et al., 2006). Time-stamp was used to divide the research respondents into two groups. Following Armstrong and Overton (1977) recommendations to examine non-response bias, a t-test was run to compare the resulting means (between early respondents – group one- and late respondents – group two) for all observed and demographic variables. The results of the t-test indicated that only one construct (using online community for knowledge acquisition) and one demographic variable (level of education) revealed significant differences. However, these differences were logical and not surprising. Regarding "using online community for knowledge acquisition", the slight difference between early and late respondents (3.71 vs. 3.50) is consistent with Ma and Agarwal's argument that early respondents are the more active and more frequent users; thus, they respond earlier (Ma and Agarwal, 2007: 53). In a similar manner, it was concluded that early respondents tend to have a higher educational level (i.e. diploma, master, and doctorate). This conclusion agrees with Dillman (2007: 22) in that people differ in their responses according to their demographic characteristics. In the field of MIS, Wakefield et al. (2008: 444) found that older people tend to respond early. In this respect, Rogelberg et al. (2003) argue that carelessness and conscientiousness are important variables that affect responses. Thus, it is concluded that highly educated people (i.e. master and doctorate) tend to respond early.

6.2.4. Normality

As explained by Meyers et al. (2006), the "*shape of a distribution of continuous variables in a multivariate analysis should correspond to a (univariate) normal distribution*" (p.67). Assessing normality can be achieved on a univariate and/or multivariate level. Hair et al. (2010) argue that the severity of non-normal distribution depends on two distinct dimensions: the shape of the offending distribution and the sample size. For the sample size, they state that significant departure from normality with a small sample size (< 50) may have a substantial impact on the results, however, this small significant departure from normality can be neglected with a sample size > 200.

The shape of distribution can be examined by calculating skewness and kurtosis statistics. Skewness is defined as "*a measure of the symmetry of a distribution*" (Meyers et al., 2006: 68). A skewed variable means that its mean is not in the centre of distribution. As for kurtosis, it refers to the measurement of the general peakedness of a distribution (too peaked or too flat). Skewness and kurtosis were used to examine the probability that the data used are normally distributed. Basically and according to Lei and Lomax (2005), the cutoff values for skewness and kurtosis range between the absolute values -2.0 and +3.5. They state that "*most researchers tend to categorize the absolute values of skewness and kurtosis less than 1.0 as slight nonnormality, the values between 1.0 and about 2.3 as moderate nonnormality, and the values beyond 2.3 as severe nonnormality*" (p. 2).

Regarding normality and the statistical technique used, CB-SEM, especially when maximum likelihood (ML) estimation is used, is robust to "mild" and "slightly moderate" deviation from normality (Meyers et al., 2006). Similarly, Lei and Lomax (2005), in their simulation research, noted that a slight deviation from normality has insignificant impact on the parameter estimates especially when ML is used (See section 6-3). Michon and Chebat (2008) assert that ML in SEM is more tolerant to non-normality especially with large samples. Hair et al. (2010) agree with Michon and Chebat by asserting that non-normality has negligible effects on large sample size (>200).

This research used a sample size of 352 and ML was selected as a preferable estimation method (see Section 6.3); therefore, the absolute values ±1 were used as a threshold to assess the deviation from normality (Meyers et al., 2006). The results of skewness and kurtosis statistics revealed that all values were between ±1 except the kurtosis statistics for three variables (KSE5, KSE6, and KSE7) that showed slight deviation from the cutoff kurtosis criterion (see Table 6.3). However, as discussed above, with a large sample and using ML, insignificant deviation has negligible impacts on the research results.

Furthermore, probability plot was used to examine for normality (Hair et al., 2010). As shown in the Figure 6.1, the values fall along the diagonal with no substantial departure; therefore, the residuals are considered to present normal distribution (Hair et al., 2010).

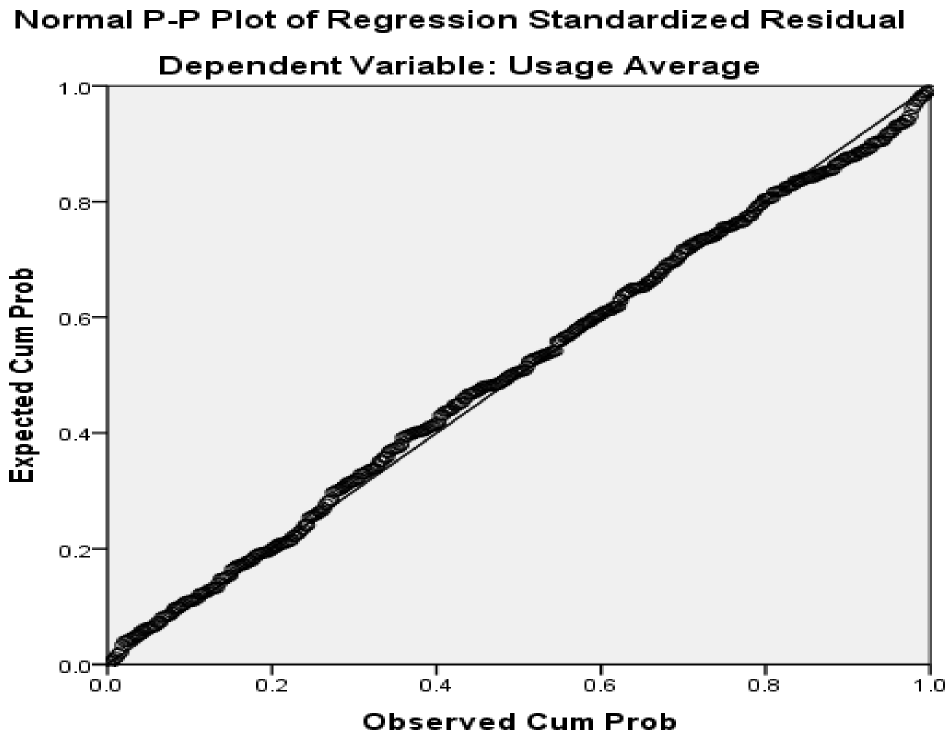


Figure 6.1: p-p plot for assessing normality

6.2.5. Linearity and homoscedasticity

Linearity can be evaluated through the analysis of residuals. In this regard, linearity is achieved when the standardised residuals show a straight-line association with the predicted (dependent) variable scores. Alternatively, if the association between the standardised residuals and dependent scores show curved line, then non-linearity is achieved (Meyers et al., 2006). The above figure reveals that there is a straight-line relationship between the independent variables and the dependent variable.

Regarding the homoscedasticity assumption, it means that the "*dependent variable(s) exhibit different equal levels of variance across the range of predictor variable(s)*" (Hair et al., 2010: 74). Accepted homoscedasticity means that the dependent variable's variance is explained by a wide, not concentrated, range of the independent values. Using the graph of regression showed that the dots tended to be equally distributed around the horizontal line of zero except for some outliers which did not have a major influence. Statistically, homoscedasticity can be examined by computing Spearman's rho correlation between the absolute value of the residuals and the independent variables (e.g. Bollen, 1983, Johnston, 1997, Pivac, 2010). Therefore, regression analysis was used to generate the un-standardised residuals, which were statistically examined by Spearman's rho correlation with all independent variables. Spearman's rho revealed that all correlation coefficients were not significant ($p > 0.05$) which means that hetreoscedasticity is not present in this study.

6.2.6. Multicollinearity

Examining the assumption of multicollinearity is considered a main concern in terms of the measurements used in the structural equation modelling. Initially, the correlations matrix between all variables revealed the absence of any correlation coefficient exceeding 0.9, which is recommended as a critical value that would indicate serious multicollinearity issues (Hair et al., 2010: 200, Tabachnick and Fidell, 2007: 88). In fact, all correlation coefficients were less than 0.8. Moreover, the Variance Inflation Factor (VIF) values and their accompanying tolerance values were calculated and inspected to further assess multicollinearity. Hair et al. (2010: 201) define tolerance as "*the amount of variability of the selected independent variable not explained by the other independent variables*". VIF values greater than 10 accompanied by tolerance value less than 0.10 indicate a possible violation of the assumption of multicollinearity (Hair et al., 2010: 205). Using multiple regression analysis to compute VIF, it was found that all values were less than 10 (all values were less than 5 except for four values: 5.3, 5.4, 5.4, and 6.5), and no tolerance values were less than 0.1. Therefore, based on the correlation matrix and VIF, multicollinearity was not considered to be a problem in this study.

Having examined and scanned the data for errors and clearing the assumptions for multivariate analysis, Table 6.2 shows the study constructs and measures used before proceeding to CFA and SEM analyses.

Table 6.2: Study constructs and measures

Construct	Variables	Code	Mean	S.D.	Skewness		Kurtosis		VIF
					Stat.	S.E.	Stat.	S.E.	
Performance expectancy	Using the community would increase the quality of the output of my job	PE1	3.18	1.122	-.211	.130	-.679	.259	3.1
	Using the community would increase the output of my job.	PE2	3.13	1.072	-.229	.130	-.576	.259	2.2
	Using the community would make me less reliant on my colleagues.	PE3	2.98	1.211	-.039	.130	-.914	.259	4.2
	Using the community would help me reducing errors at work.	PE4	3.32	1.134	-.378	.130	-.511	.259	4.4
	Using the community would help me finding new ways to perform my job	PE5	3.47	1.091	-.462	.130	-.422	.259	4.6
	Using the community would decrease the time needed to perform my job.	PE6	3.45	1.098	-.487	.130	-.353	.259	2.2
Personal outcome expectancy	Sharing my knowledge through the community improve my image within the community	POE1	3.14	1.171	-.118	.130	-.804	.259	4.3
	Sharing my knowledge with other members increases my sense of accomplishment	POE2	3.47	1.051	-.309	.130	-.545	.259	4.2
	When I share my knowledge, other members perceive me as a competent	POE3	3.36	1.085	-.318	.130	-.510	.259	4.2
	When I share my knowledge through the community, I believe that my queries for knowledge would be answered in the future	POE4	3.44	1.110	-.357	.130	-.652	.259	4.2
	I enjoy help others by sharing my knowledge through the community	POE5	3.55	1.048	-.525	.130	-.286	.259	4.2
	Sharing my knowledge enhances my reputation in the community	POE6	3.32	1.060	-.382	.130	-.544	.259	3.7
Knowledge self-efficacy	I am confident in my ability to provide knowledge that others in my community consider valuable	KSE1	3.87	.834	-.695	.130	.606	.259	2.9
	I have the expertise required to provide valuable knowledge for my community	KSE2	3.87	.933	-.654	.130	.401	.259	4.2
	I am confident in my ability to provide knowledge that would help the community to grow	KSE5	3.82	.843	-.849	.130	1.078	.259	4.4
	I have the required ability to answer other members' questions or inquiries, give advice or providing examples	KSE6	3.87	.776	-.844	.130	1.341	.259	3.2
	I am confident in my ability to express my knowledge in written and verbal forms	KSE7	4.01	.820	-.894	.130	1.307	.259	4.4
System self-efficacy	The level of my capability in using the community system to successfully share knowledge with other members is very high	SSE1	3.65	.952	-.268	.130	-.575	.259	4.5
	The level of my understanding about what to do in using the community system is high	SSE2	3.77	1.062	-.455	.130	-.734	.259	4.3
	The level of my confidence in using the community system is very high	SSE3	3.74	.935	-.479	.130	-.403	.259	4.3
	The level of my comfort in using the community system is very high	SSE4	3.55	.973	-.446	.130	-.192	.259	4.6
	In general, the level of my skill in using the community system for accomplishing the assigned task(s) is very high	SSE5	3.82	.941	-.528	.130	-.371	.259	4.4
Content quality	The Knowledge provided by community is correct	CQ1	3.58	.972	-.657	.130	.143	.259	4.1
	The content representation provided by community is logical and fits	CQ2	3.54	.971	-.633	.130	.154	.259	3.4
	The word and phrases in contents provided by the community are consistent	CQ3	3.39	.979	-.467	.130	-.184	.259	2.1
	The knowledge provided by the community is available at a time suitable for its use	CQ4	3.16	1.104	-.273	.130	-.644	.259	4.6
	The knowledge provided by the community is meaningful and understandable	CQ5	3.63	.927	-.589	.130	-.095	.259	4.8
	The Knowledge provided by community is important and helpful for my work	CQ6	3.58	.975	-.800	.130	.409	.259	4.2
	The knowledge classification/index in the community is clear and unambiguous	CQ7	3.65	.958	-.671	.130	.227	.259	4.1

Table: 6.2: Study constructs and measures (continued)

Construct	Variables	Code	Mean	S.D.	Skewness		Kurtosis		VIF
					Stat.	S.E.	Stat.	S.E.	
Effort expectancy	It is easy to operate the community system	EE1	3.51	1.049	-.664	.130	-.181	.259	4.2
	It is easy to learn how to use the community system	EE2	3.59	1.095	-.626	.130	-.349	.259	4.2
	My interaction with the community system is clear and understandable	EE3	3.52	1.092	-.644	.130	-.172	.259	3.2
System quality	The community system is reliable for knowledge sharing	SQ1	3.41	1.085	-.512	.130	-.230	.259	4.4
	The community system is convenient to access	SQ2	3.55	1.006	-.606	.130	-.081	.259	3.4
	The community system is flexible	SQ3	3.26	1.088	-.435	.130	-.385	.259	4.3
	The community system is well designed for its users	SQ4	3.29	1.115	-.355	.130	-.508	.259	3.8
	The community system is always available when I need it	SQ5	3.54	1.085	-.615	.130	-.184	.259	3.9
Relational capital (Trust)	Our community members are generally trustworthy	TR1	3.33	1.104	-.175	.130	-.691	.259	3.9
	Our community members have reciprocal faith in other members' intentions and behaviours	TR2	3.31	1.040	-.165	.130	-.576	.259	3.6
	Our community members have reciprocal faith in others' ability	TR3	3.43	1.076	-.229	.130	-.660	.259	2.8
	Our community members have reciprocal faith in others' behaviours to work toward community goals	TR4	3.35	1.026	-.225	.130	-.470	.259	4.1
	Our community members have reciprocal faith in others' decision toward community interests than individual interests.	TR5	3.14	1.077	-.093	.130	-.482	.259	4.4
	Our community members have relationships based on reciprocal faith	TR6	3.39	1.070	-.292	.130	-.602	.259	5.0
Social influence	People who are important to me think I should use professional online community	SI1	3.28	1.185	-.228	.130	-.839	.259	5.0
	People who influence my behaviour think I should use professional online community	SI2	3.18	1.167	-.251	.130	-.753	.259	2.8
	People whose opinions that I value prefer that I use professional online community	SI3	3.26	1.188	-.337	.130	-.782	.259	5.3
	I use this community because of the proportion of colleagues who use the professional online community	SI4	3.39	1.145	-.294	.130	-.799	.259	5.4
Use for knowledge acquisition	I often use this community to obtain knowledge	UKA1	3.70	1.037	-.626	.130	-.328	.259	3.2
	I regularly use this community to obtain knowledge	UKA2	3.59	1.066	-.552	.130	-.474	.259	5.4
	What is your frequency of using this community to obtain knowledge?	UKA3	3.58	.933	-.423	.130	-.465	.259	6.5
Use for knowledge Providing	I often use this community to share my knowledge (UKP1)	UKP1	3.24	.960	-.507	.130	-.126	.259	4.3
	I regularly use this community to share my knowledge	UKP2	3.20	1.009	-.419	.130	-.283	.259	2.5
	What is your frequency of using this community for sharing your knowledge?	UKP3	3.09	1.032	-.142	.130	-.621	.259	3.1

S.D. – Stanard deviation. Stat. – Statistics. S.E. – Standard error. VIF – Variance inflation factor

Having scanned the observed variables for assumptions, the next stage of analysis is to assess the proposed measurement model using CFA.

6.3. Measurement Model Assessment

As discussed in Chapter Four, Structural Equation Modelling (SEM) can be conceptualised as the analysis technique of two different models: the measurement model and the structural model (Shah and Goldstein, 2006). Regarding the measurement model, as argued by Hair et al. (2010), CFA enables researchers to confirm or reject a preconceived theory through "*a series of relationships that suggest how measured variables represent a latent construct that is not measured directly*" (p.693). More formally expressed, as stated by Meyers et al. (2006), CFA determines the extent to which the proposed covariance matches the observed covariance.

Thus, CFA was suggested as a more precise method to test the uni-dimensionality and validity of the measurements (Anderson and Gerbing, 1988). Furthermore, and according to Bollen (1990), using CFA in structural equation modelling, having several indicators for each factor, tends to yield a model with more reliability, greater validity, higher generaliseability and stronger tests of competing models. The adequacy of the measurement models is evaluated on the basis of criteria such as overall fit with the data and measuring the uni-dimensionality of research constructs.

6.3.1. Overall measurement model fit

Confirmatory factor analysis (CFA) with reflective indicators and first-order structure was performed. The Maximum likelihood (ML) method in AMOS 20 was used to estimate coefficients. The following figure displays the CFA results of the research measurement model. These results represent the logic measurements for the research constructs.

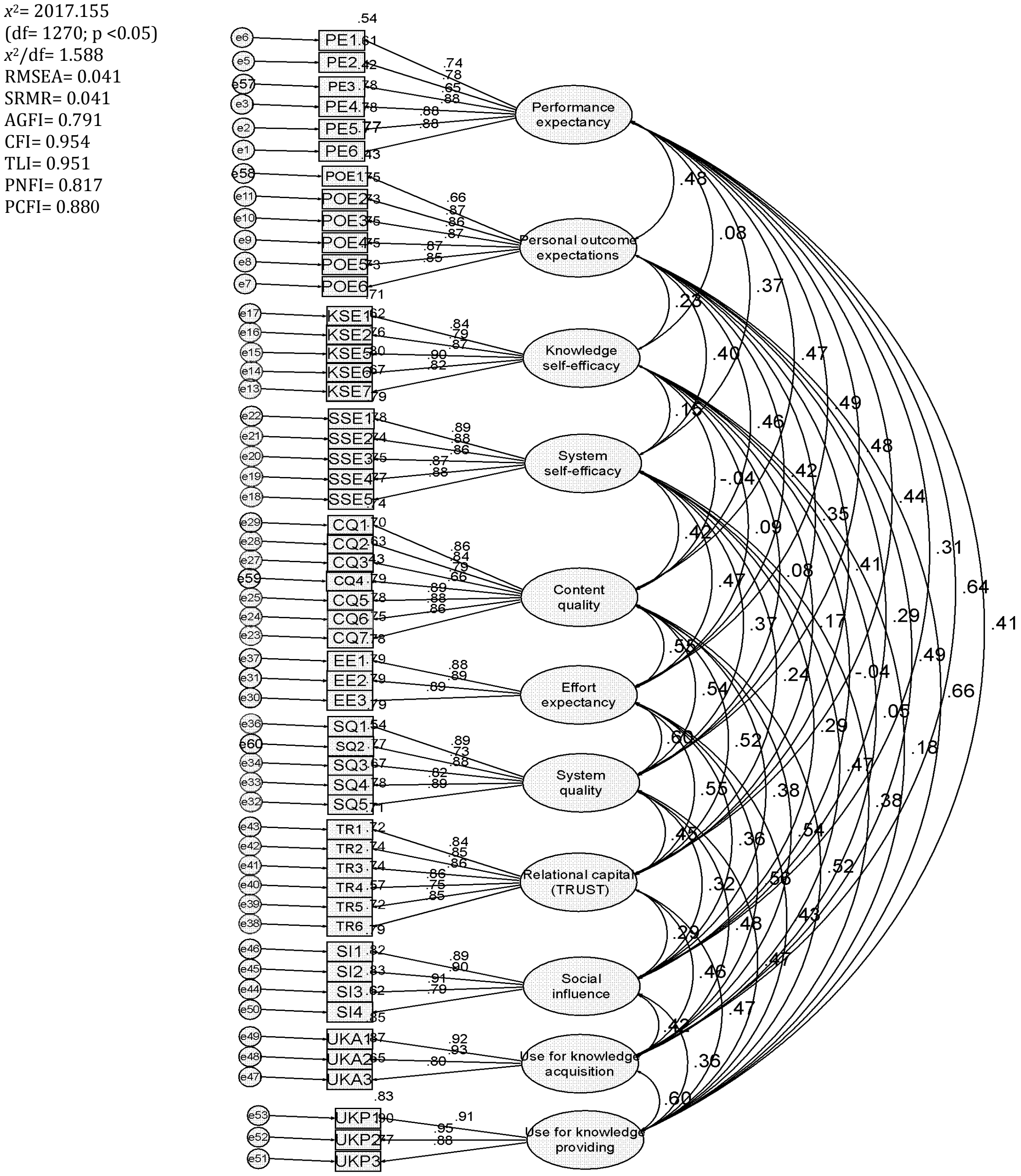


Figure 6.2: CFA results for the research model

As seen in Figure 6.2, for the model specification, all latent variables were measured by three indicators or more. CFA using IBM' AMOS v20 was employed to test and validate the measurement model. The results revealed the absence of any identification problems. The model notes degree of freedom revealed an over-identified model. Over-identified models are "*highly desirable because more than one equation is used to estimate at least some of the parameters, significantly enhancing reliability of the estimate*" (Shah and Goldstein, 2006: 155). As discussed in the previous section, all assumptions that might affect the model estimation such as missing values, outliers, normality, and multicollinearity were met and the appropriate remedies were used. Furthermore, as suggested by Byrne (2010: 83); Schumacker and Lomax (2010: 99), both 0.05 and 0.01 Critical N (CN) values were > 200 (270 and 279 respectively), which leads to the conclusion that the sample size is satisfactory and considered adequate.

The CFA results indicated that all variances are positive, thus, no identification problems were revealed. Furthermore, the results revealed that x^2 = 2017.155 with 1270 degrees of freedom and p-value= .000, which indicate that the model should be rejected. However, following the discussed recommendations of not using x^2 as a sole fit index, the other model fit values were; x^2/df= 1.588; SRMR= 0.041; AGFI= 0.791; TLI=0.951; PNFI= 0.817; PCFI= 0.880; CFI= 0.954; RMSEA= .041 with a 90% confidence interval (low= .038; hi= .044). Although these indices revealed an appropriate model fit, except for the AGFI index, the other results (e.g. squared multiple correlations, standardised residual covariances) indicated wide space for further post hoc modification to develop a better fitting and more parsimonious measurement model.

6.3.2. Model improvement

The model improvement process includes scanning the output and applying a number of criteria (see Chapter Three, Section 4.8.4.5) to achieve the better fit. In the current CFA run, all standardised regression weights (factor loadings) were greater than 0.7 except for three indicators PE3, POE1, and CQ4, which had loading values of 0.647, 0.657 and 0.657, respectively. However, regarding the squared multiple correlations (SMC), these three items showed values less than the recommended value (0.5). Respectively, they had values of 0.419, 0.431 and 0.432.

Scanning the standardised residual covariance matrix revealed that there were two indicators (CQ4 and SQ2) that had values greater than |2.58|. Furthermore, as recommended by Kenny (2011), the following table illustrates the modification indices MI or the suggested error covariances for some of the unexamined relationships in the model.

Table 6.3: Selected AMOS outputs for covariance and regression modification indices

Error covariance	MI covariance		Path	MI regression (weight value)
	Value	Par. change		
e34 < --- > eEEc	37.173	0.159	EEc --- > SQ2	42.984
			-	-
e24 < --- > e23	27.395	0.083	CQ1 --- > CQ2	7.342
			CQ2 --- > CQ1	20.060
e12 < --- > e7	26.763	0.149	POE1 --- > POE6	14.673
			POE6 --- > POE1	6.169
e42 < --- > e26	19.276	0.147	TR5 --- > CQ4	12.157
			CQ4 --- > TR5	11.756
e1 < --- > e2	15.037	0.114	PE1 --- > PE2	6.400
			PE2 --- > PE1	5.325
e39 < --- > e46	14.194	0.107	TR2 --- > SI3	4.414
			SI3 --- > TR2	-
e42 < --- > e7	11.962	0.123	TR5 --- > POE1	4.320
			POE1 --- > TR5	7.264
e1 < --- > e25	11.453	0.088	CQ3 ---> PE1	9.459
			PE1 ---> CQ3	-
e25 < --- > e3	11.515	0.106	CQ3 --- > PE3	-
			PE3 --- > CQ3	4.139

MI = Modification indices. Par. change = Parameter change

From the above Table 6.3, all error covariances accompanied by significant par. change were analysed using the regression weight. Every error covariance has two paths that measure the relationship between two variables. Based on the MI indices, the path with the higher regression weight value was a candidate for deletion.

Based on the above results and the modification criteria, nine indicators were considered problematic and candidate for deletion CQ4, POE1; PE3, SQ2; CQ2, TR5, PE1, TR2, and CQ3. For each construct, item deletion did not affect the theoretical domain and/or the measurement specification, as each construct had more than three indicators that well represented the theoretical domain.

CFA was run again to examine the model fit after deleting the problematic indicators. The following figure depicts the measurement model after refinement.

X^2= 1194.694 (df= 847; $p < 0.05$)
x^2/df= 1.411
RMSEA= 0.034
AGFI= 0.845
SRMR= 0.033
CFI= 0.975
TLI= 0.972
PNFI= 0.822
PCFI= 0.873

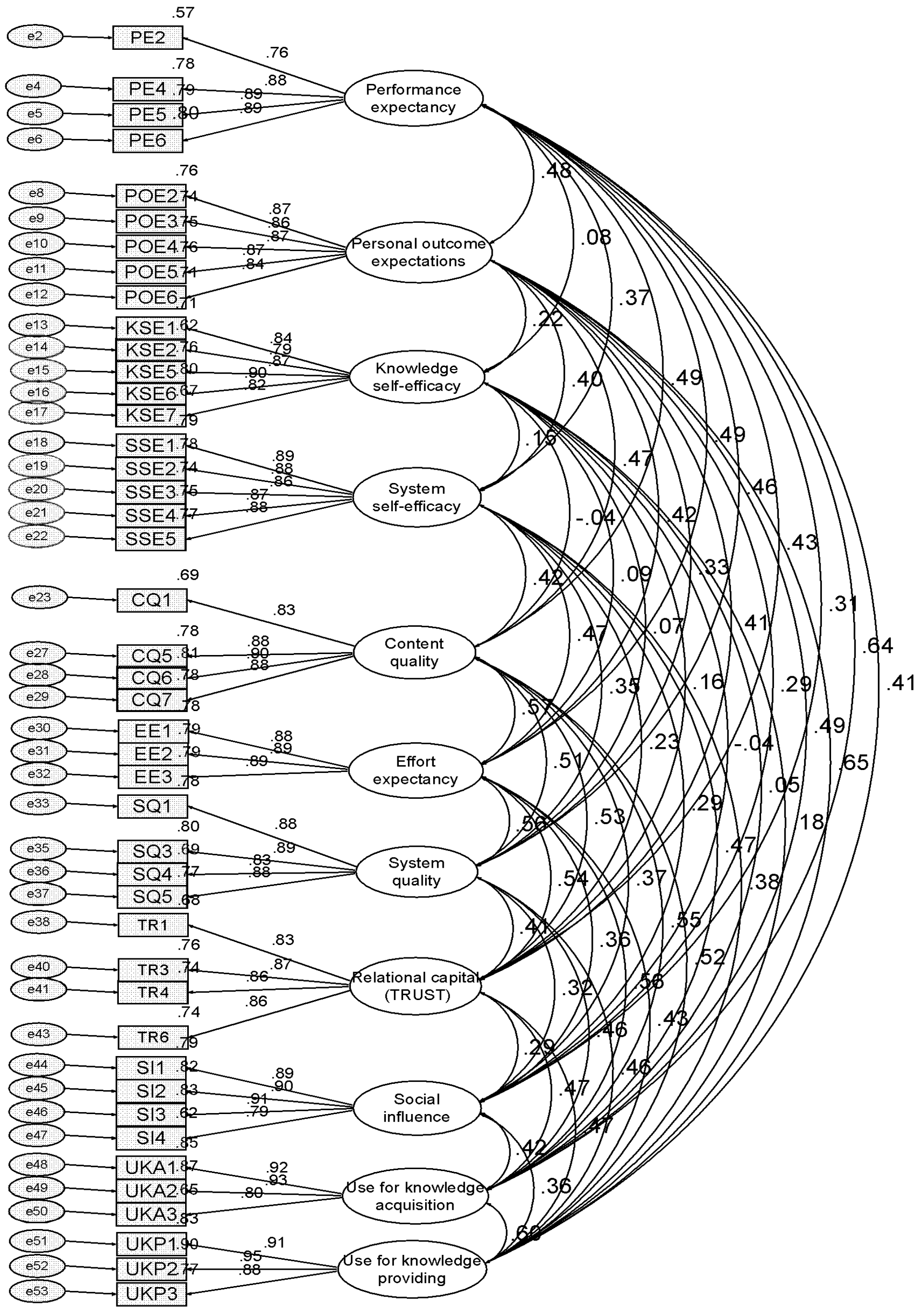


Figure 6.3: CFA results for the research model (refinement)

The CFA findings indicate that no identification problems were revealed and all results showed fully proper solutions (no negative uniquenesses, no factor loadings greater than ±1, and reasonable SEs for parameter estimates). Table 6.4 illustrates the obtained fit indices, which show a satisfactory and acceptable model fit.

Table 6.4: Measurement model results (overall model fit)

Index		Cut-off value	Overall model
x^2		> 0.05	1194.694 (df= 847; p= .000)
x^2/df		< 3	1.411
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.034 (Lo .03 ; Hi .04)
	SRMR	< 0.08	0.033
	AGFI	> 0.80	0.845
Incremental fit indices	CFI	> 0.90	0.975
	TLI	> 0.90	0.972
Parsimony fit indices	PNFI	> 0.50	0.822
	PCFI	> 0.50	0.873

After improving the measurement model and demonstrating an acceptable overall model fit, the next level of analysis is to examine measurement model fit (reliability and validity).

6.3.3. Measurement model fit's assessment

Measurement model fit can be evaluated in two ways: "*first, by assessing constructs' reliability and convergent and discriminant validity, and second, by examining the individual path (parameter) estimates*" (Shah and Goldstein, 2006: 168).

Regarding assessing the constructs' validity and reliability, as discussed in Chapter Five, the convergent validity of the constructs can be assessed by examining the average variance extracted (AVE), which attempts to measure the amount of variance that a latent variable component captured from its indicators relative to the amount due to measurement error. All AVE values, as shown in Table 6.5, are greater than the generally recognised 0.50 cutoff (Chin and Dibbern, 2010, Urbach and Ahlemann, 2010), which indicates that the majority of the variance is accounted for by the construct. In other words, every latent variable is able to explain more than half of the variance of its indicators. These results demonstrate acceptable and sufficient convergent validity at the constructs level.

Discriminant validity is assessed by examining the square root of the AVE as recommended by Fornell and Larcker (1981). The square root of the AVE for each construct should be greater than its correlation with the other constructs. The diagonal cells in Table 6.5 present the square root of the AVE for every construct. The table shows that every square root of AVE for each construct is larger than its correlations with the other constructs. This indicates that every construct (latent variable) shares more variance with its hypothetical indicators than with any other indicators. Furthermore, the discriminant validity was evaluated by using MSA (the maximum shared squared variance) and ASV (average shared squared variance). Typically, MSV and ASV should show values less than AVE to establish discriminant validity (Ghorban, 2012). The results show, as seen in the following table, that all MSV and ASV values are less than the AVE value for each construct.

Table 6.5: CR, AVE, MSV, ASV, and correlation matrix for all constructs

	CR	AVE	MSV	ASV	UKA	PE	POE	KSE	SSE	CQ	EE	SQ	TRUST	SI	UKP
UKA	0.918	0.789	0.408	0.246	0.888										
PE	0.916	0.734	0.408	0.192	0.639	0.857									
POE	0.935	0.743	0.428	0.188	0.495	0.481	0.862								
KSE	0.925	0.713	0.050	0.016	0.054	0.080	0.223	0.845							
SSE	0.942	0.766	0.225	0.135	0.469	0.370	0.399	0.146	0.875						
CQ	0.928	0.764	0.329	0.222	0.546	0.489	0.475	-0.036	0.419	0.874					
EE	0.916	0.785	0.329	0.222	0.563	0.488	0.422	0.092	0.474	0.574	0.886				
SQ	0.926	0.758	0.316	0.172	0.463	0.456	0.329	0.074	0.354	0.512	0.562	0.871			
TRUST	0.916	0.731	0.296	0.170	0.466	0.432	0.413	0.163	0.233	0.528	0.544	0.411	0.855		
SI	0.928	0.762	0.176	0.102	0.420	0.312	0.287	-0.037	0.293	0.371	0.358	0.317	0.289	0.873	
UKP	0.936	0.830	0.428	0.215	0.601	0.408	0.654	0.181	0.380	0.522	0.428	0.464	0.466	0.358	0.911

- CR – Composite (construct) Reliability. $CR = \frac{(\sum_{i=1}^{n} \lambda_i)^2}{(\sum_{i=1}^{n} \lambda_i)^2 + (\sum_{i=1}^{n} \delta_i)}$ *Where λ= factor loading, δ = st. error variance*

- RC (α) – Reliability Coefficient (Cronbach's Alpha) $\alpha = \frac{K}{K-1}\left(1 - \frac{\sum_{i=1}^{K} \sigma_{Y_i}^2}{\sigma_X^2}\right)$ *Where K = number of indicators, σ = variance*

- AVE – Average Variance Extracted. $AVE = \frac{\sum_{i=1}^{n} \lambda_i^2}{n}$ *Where n = number of construct indicators*

- MSV – Maximum Shared Variance. MSV = (the maximum squared correlation value between a construct and other constructs in a measurement model) = MAX (r^2)

- ASV – Average Shared Variance. ASV = (sum of squared correlation between all constructs/number of constructs) = ($\sum r^2/n$)

- The diagonal values (green cells) represent the square root of the average variance extracted ($\sqrt[2]{AVE}$).

- The off-diagonal values represent the correlation between the latent variables (LV).

- UKA – Using for knowledge acquisition. PE – Performance expectancy. POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

At the indicators level, the convergent validity of an individual indicator can be examined from the measurement model by determining whether the relationship between that indicator and its hypothesised construct is large and statistically significant (MacKenzie et al., 2011). The significance of the estimate (unstandardised regression weight) of a relationship between an indicator and the hypothesised can be tested with a *z*-test or *t*-test of the estimate's critical ratio. According to Bollen (1989), the degree of validity of each indicator can be assessed by examining the unique proportion of variance in the indicator accounted for by the construct. In this regard, MacKenzie et al. (2011: 314) report, "*in the typical case where each indicator is hypothesised to load on only one construct, this will be equal to the square of the indicator's completely standardised loading*". As recommended by Fornell and Larcker (1981), a value > 0.50 demonstrates an adequate level of validity. On the other hand, discriminant validity can be examined using the cross-loadings. Cross loadings are obtained by correlating the component scores of construct with the other items (Chin, 1998). Hulland (1999: 199) states that achieving acceptable discriminant validity using cross-loadings happens when the shared variance between the theoretical construct and its indicator exceeds the variance explained and shared with other latent variables in the model.

The reliability of each indicator can be assessed by examining the communalities or what is called the squared multiple correlation (SMC) for the indicator (Bollen 1989). For every indicator, a value > 0.50 is desired because it suggests that the majority of the variance in the indicator is due to the latent construct.

Table 6.6 highlights some selected outputs from the AMOS relating to evaluating each individual indicator's validity and reliability.

Table 6.6: Standardized/unstandardised regression weights, SMC, S.E., and *t*-test

Indicator		Construct	λ	SMC	Est.	S.E.	C.R.	Sig.
PE2	<---	PE	0.758	0.574	1.000			
PE4	<---	PE	0.882	0.777	1.231	0.070	17.531	***
PE5	<---	PE	0.886	0.786	1.191	0.068	17.636	***
PE6	<---	PE	0.893	0.798	1.208	0.068	17.791	***
POE2	<---	POE	0.870	0.758	1.000			
POE3	<---	POE	0.860	0.740	1.020	0.047	21.762	***
POE4	<---	POE	0.868	0.754	1.054	0.048	22.155	***
POE5	<---	POE	0.869	0.756	0.996	0.045	22.207	***
POE6	<---	POE	0.842	0.710	0.977	0.047	20.921	***
CQ1	<---	CQ	0.831	0.691	1.000			
CQ5	<---	CQ	0.883	0.780	1.013	0.049	20.814	***
CQ6	<---	CQ	0.897	0.805	1.083	0.051	21.348	***
CQ7	<---	CQ	0.884	0.782	1.048	0.050	20.846	***
EE1	<---	EE	0.883	0.779	1.000			
EE2	<---	EE	0.889	0.791	1.052	0.046	23.024	***
EE3	<---	EE	0.886	0.786	1.045	0.046	22.901	***
KSE1	<---	KSE	0.844	0.712	1.000			
KSE2	<---	KSE	0.787	0.619	1.043	0.059	17.655	***
KSE5	<---	KSE	0.874	0.764	1.047	0.050	20.884	***
KSE6	<---	KSE	0.897	0.804	0.989	0.045	21.795	***
KSE7	<---	KSE	0.816	0.666	0.951	0.051	18.681	***
SI1	<---	SI	0.888	0.788	1.000			
SI2	<---	SI	0.904	0.817	1.002	0.040	24.890	***
SI3	<---	SI	0.909	0.826	1.026	0.041	25.167	***
SI4	<---	SI	0.786	0.618	0.855	0.045	18.968	***
SQ1	<---	SQ	0.881	0.776	1.000			
SQ3	<---	SQ	0.893	0.798	1.017	0.043	23.638	***
SQ4	<---	SQ	0.832	0.692	0.971	0.047	20.638	***
SQ5	<---	SQ	0.875	0.766	0.994	0.044	22.726	***
SSE1	<---	SSE	0.888	0.789	1.000			
SSE2	<---	SSE	0.884	0.782	1.110	0.046	24.121	***
SSE3	<---	SSE	0.860	0.740	0.951	0.042	22.750	***
SSE4	<---	SSE	0.867	0.752	0.998	0.043	23.146	***
SSE5	<---	SSE	0.876	0.768	0.976	0.041	23.671	***
TR1	<---	TRUST	0.827	0.683	1.000			
TR3	<---	TRUST	0.872	0.760	1.028	0.052	19.751	***
TR4	<---	TRUST	0.858	0.736	0.965	0.050	19.299	***
TR6	<---	TRUST	0.863	0.744	1.012	0.052	19.451	***
UKA1	<---	UKA	0.923	0.852	1.000			
UKA2	<---	UKA	0.932	0.869	1.038	0.036	28.751	***
UKA3	<---	UKA	0.804	0.646	0.784	0.038	20.873	***
UKP1	<---	UKP	0.909	0.826	1.000			
UKP2	<---	UKP	0.946	0.896	1.094	0.037	29.755	***
UKP3	<---	UKP	0.877	0.768	1.037	0.042	24.967	***

λ – Factor loading (Standardized regression weight). SMC- Squired multiple correlations (communalities). Est. – Unstandardised factor loadings estimates. S.E. – Standard Error. C.R. - Critical Ratio (Est./S.E).

Based on Table 6.6, the first indicator in each construct has a fixed regression weight of 1.00 resulting in no associated standard error or critical ratio. The critical ratios associated with the other indicators are all significant at the 0.001 level. With respect to the mentioned criteria for assessing indicators' validity individually, all of them achieved a satisfactory level. The results revealed that all loadings are greater than 0.70, which means that every indicator shared the majority of its variance with the hypothesised construct. Moreover, the estimated unstandardised factor loadings, besides revealing significant values, confirmed that their estimated pattern coefficient exceeds more than 17 times (see C.R. column) the standard error, which further supports the convergent validity of the indicators under the different constructs. Finally, based on the squared multiple correlations (SMC), each indicator revealed high variance that is due to the hypothesised construct which supports the reliability at the indicator level.

6.4. Common method variance (CMV) assessment

CMV refers to "*the amount of spurious covariance shared among variables because of the common method used in collecting data*" (Malhotra et al., 2006: 1865). According to Chang et al. (2010), CMV can create unreal internal consistency that can lead to noticeable correlation among variables resulting from their common source. Previous research has discussed some sources of CMV when self-report data is used. For example, Podsakoff et al. (2003) define several common rater effects such as consistency motif – "*the propensity for respondents to try to maintain consistency in their responses to questions*"; social desirability – "*the tendency of some people to respond to items more as a result of their social acceptability than their true feelings*"; and knowledge deficiency (p.882). In addition to common rater effects, Malhotra et al. (2006) argue that other sources such as ambiguous wording and scale length can result in CMV.

Regarding the effect of CMV, there is a debate among IS scholars regarding how prevalent and significant CMV is (Bagozzi, 2011). For example, Sharma et al. (2009), based on Woszczynski and Whitman (2004)'s estimation that half of IS published in leading journals may suffer from CMV, argue that the effect of CMV is a major potential validity threat. Podsakoff et al. (2003) estimate that "*on average, the amount of variance accounted for when common method variance was present was approximately 35%, versus approximately 11% when it was not present*" (p.880). On the other hand, for example, Spector (1987) and Spector (2006), based on the reanalysis of previous published studies, found that a consideration of method effects did not seriously undermine the validity of these studies. Malhotra et al. (2006), in a study that aimed to conduct a comprehensive and systematic investigation of the impact of CMV on the survey-based IS research, concluded that CMV is not substantial, and does not present a potential validity threat to the published findings. Regardless of this debate, previous research, especially in IS, addresses the importance of assessing the magnitude and prevalence of CMV (Bagozzi, 2011).

Podsakoff et al. (2003) and Sharma et al. (2009) suggest procedural or ex-ante techniques and statistical or ex-post remedies to control and reduce the effect of CMV. The ex-ante techniques include some cautionary procedures such as improving scale items through careful construction and development of scale items (Tourangeau, 2000), protecting the anonymity of respondents and asserting the confidentiality of the questionnaire, to reduce evaluation apprehension (Podsakoff et al., 2003: 888), and to collecting data from different high-ranking informants who possess accurate knowledge and can accurately assess their cognitive states (Sharma et al., 2009: 478).

Regarding the ex-ante, this study followed several procedural techniques to minimise the effect of common method variance and personal/cultural biases. For example, together with using and adopting well-established theories, improved scale items were guaranteed through conducting three rounds of pre-tests. These pre-tests (pre-test interview, Q-sorting and a large-scale pilot study) were crucial to identify and eliminate any ambiguity and misunderstandings with the questionnaire. In general, the pre-tests, along with adopting pre-validated scales, helped in constructing and developing valid and reliable measurements (see results of the large-scale pilot study and the results of the main study). In this regard, MacKenzie et al. (2011) stressed that evaluating data by conducting pre-tests is required even with pre-validated scales. They clearly stated "*scale properties may differ cross-culturally, across demographic groups, by experience, by education level, by position within the organisation, etc.*" (p.310). Using the web-survey method, in addition, helped the researcher to use the "question mark click" to define ambiguous or unfamiliar terms, to avoid the effect of vague concepts. Moreover, to minimise evaluation apprehension and social desirability problems, respondents were assured that their identities and responses were anonymous and would never be disclosed. Data were also collected from a variety of sources. In fact, members of eight different professional online communities participated in this study (see Table 6.1). Furthermore, as Table 6.1 shows, the informants may be classified as high-ranking informants who had accurate knowledge and could accurately assess their cognitive states (64.4% had first university degree, 21.5% had a diploma/master degree, and 7.1% had a PhD or equivalent). Regardless of these procedural techniques, as discussed in Chapter Five, the instruments employed in this study were mainly developed in Western and East Asian contexts. Although this study is not a cross-cultural research and all results are supported by robust theories, one must still wonder about the possible personal/cultural biases involved in the instruments employed. Egyptian and Middle East researchers should embark on the development of instruments in this unique context, thus better understanding the characteristics of the professional' use of online communities.

Statistically, Harman's one-factor test and "unmeasured latent method factor" were used to assess the severity of CMV (Bagozzi, 2011, Malhotra et al., 2006, Sharma et al., 2009, Podsakoff et al., 2003). Harman's one-factor test was employed through two statistical techniques: EFA and CFA. According to Podsakoff et al. (2003), when EFA is used, all items are loaded into a factor analysis to examine the un-rotated factor solution. The key assumption is that "*if a substantial amount of common method variance is present, either (a) a single factor will emerge from the factor analysis or (b) one general factor will account for the majority of the covariance among measures*" (Podsakoff et al., 2003: 889). All items were loaded into a one-factor EFA model in IBM' SPSS v20, using principal components with un-rotated solution. The EFA results emerged with 11 factors with eigenvalues > 1.0 and accounted for 80.51% of the total variance. The first factor did not account for the majority of the variance (34.40%). Although these results support the absence of the threat of CMV, Podsakoff et al. (2003: 890) argue that although this test provides important indications of whether one factor accounts for all or the majority of covariances, it is likely to be affected by the number of factors and variables examined. Therefore, Podsakoff et al. (2003: 890) and Malhotra et al. (2006: 1867) recommended using CFA with Harman's one-factor as a more sophisticated test and to avoid the insensitivity of Harman's one-factor test. According to the CFA approach, all items are modelled as indicators of one factor, which presents method effects (Malhotra et al., 2006). The assumption is that, when the one factor model fits the data, then CMV is substantial and more likely to be a threat. Alternatively, if the one-factor model does not fit the data, then it can be concluded that the variables are multidimensional and CMV is more likely not to be a threat (Malhotra et al., 2006). Figure 6.4 shows the one factor CFA model.

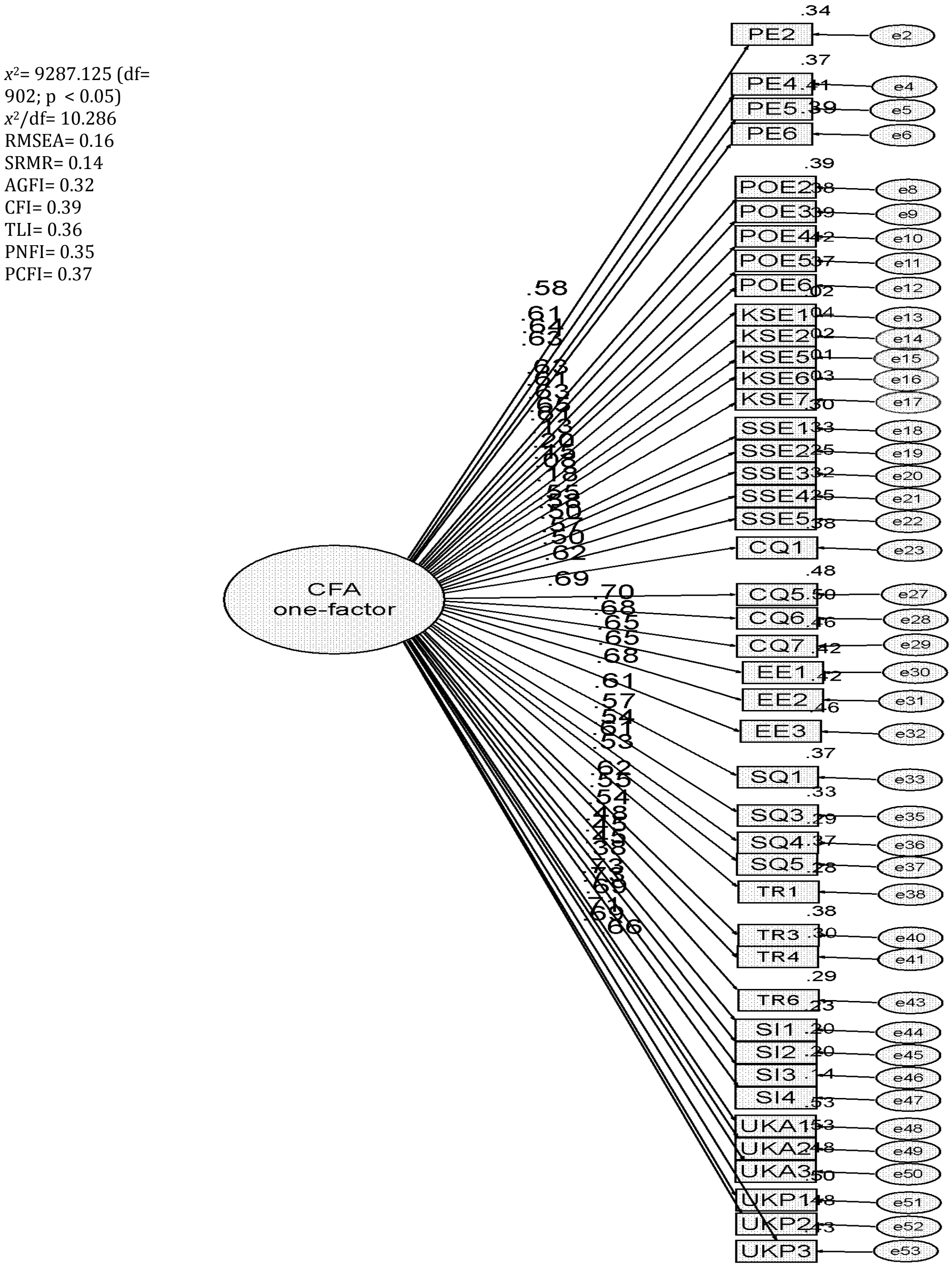


Figure 6.4: CFA one factor model (CMV assessment)

The results of CFA show that the one factor model did not fit the data, x^2/df= 10.286; RMSEA= 0.16; SRMR= 0.135; AGFI= 0.32; CFI= 0.388; TLI= 0.358; PNFI= 0.349; and PCFI= 0.370. These results further support Harman's one-factor test in that CMV is not a threat and not likely to affect the validity of tests of the current study' hypotheses.

For more robust results, as recommended by Bagozzi (2011); Podsakoff et al. (2003); and Richardson et al. (2009), the constrained "unmeasured latent method factor" was further used to assess the threat of CMV. According to this approach, all indictors, besides loading on their hypothetical constructs, load on a CFA method factor as Figure 6.5 shows. The results of the CFA method factor are then compared with the theoretical CFA measurement or structural model (Podsakoff et al., 2003). The main assumption is that, if the CFA method factor fails to show major changes (e.g. model fit, item loadings, and critical values), "*then it is concluded that the amount and extent of method variance do not pose a threat to the validity of tests of hypotheses*" (Bagozzi, 2011).

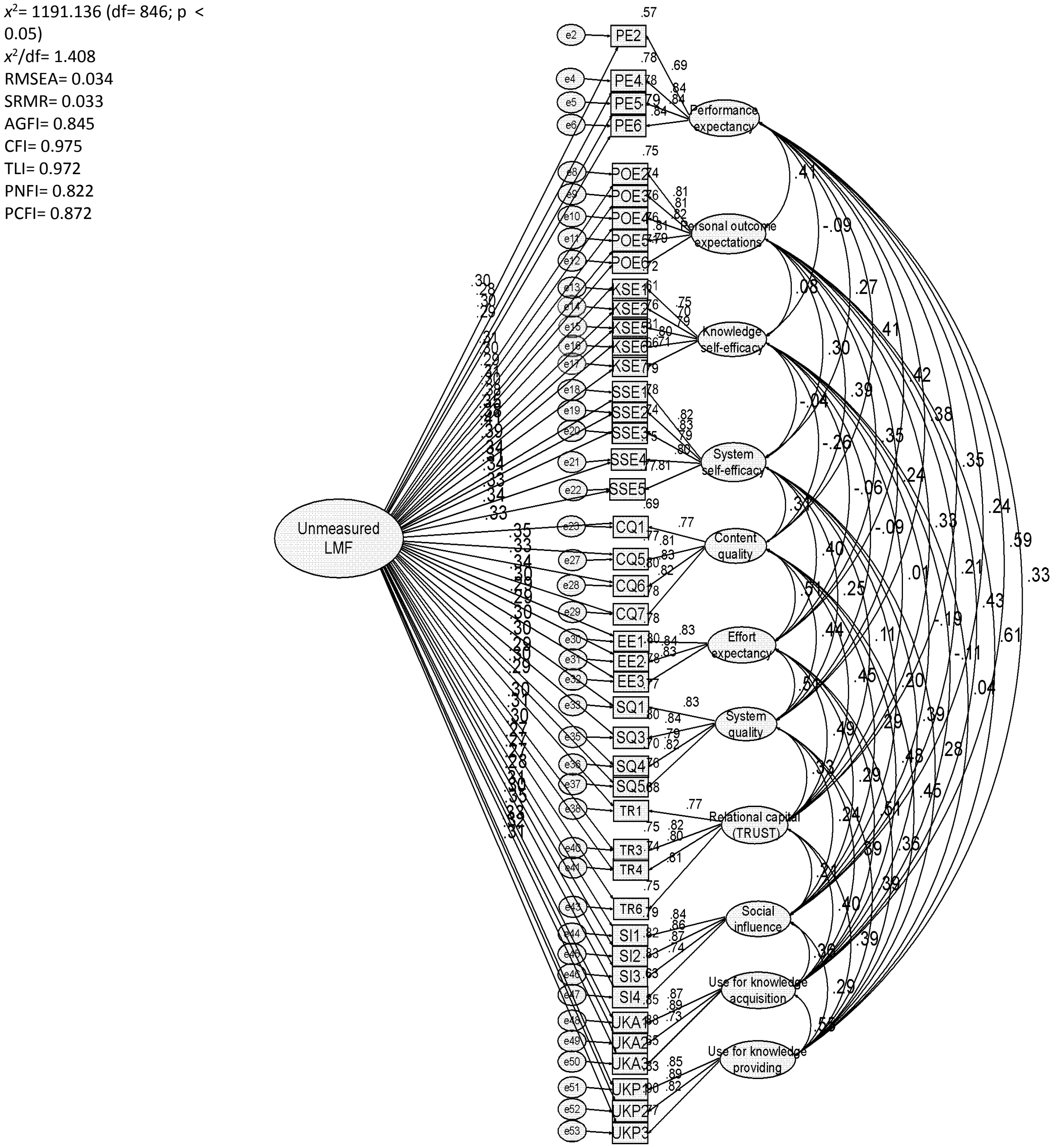


Figure 6.5: Unmeasured latent method factor (CMV assessment)

The results indicated that the unmeasured latent method factor fitted the data well. All variances and loadings were positive and no factor loading was higher than 1.0. As Figure 6.5 shows, all indicators showed high loadings on their theoretical constructs (higher than 0.7). Furthermore, like the theoretical measurement model, the CFA method factor model showed adequate and acceptable model fit, and there were no significant differences between the theoretical measurement model and the unmeasured latent method model. Chi-squire difference test ($\Delta\chi^2_{(\Delta df)}$) and ΔCFI were used to compare both models (Malhotra, 2010, Cheung and Rensvold, 2002). For $\Delta\chi^2$, the equation used can be represented as[11]:

$$\Delta x^2_{\Delta df} = x^2_{df(M1)} - x^2_{df(M2)} \qquad (1)$$

Where:

x^2 = Chi-square

df = degree of freedom $\Delta df = df\ (M1) - df\ (M2)$ (2)

M_1= Model 1; M_2= Model 2

By applying equations 1 and 2, $\Delta\chi^2$ = 1194.694 – 1191.136 = 3.558 (Δdf = 847 – 846 = 1) which was found to be insignificant at p-value = 0.05 (critical value = 3.84; df = 1). As for ΔCFI, as recommended by Cheung and Rensvold (2002), it should show a difference ≥ 0.01 to reveal significant change. Regarding this study, ΔCFI was less than 0.01 (0.975 – 0.975= 0). Based on the above results, it was indicated that the CMV is not a serious problem and is not responsible for the relationships among the research constructs.

6.5. Structural models and hypotheses testing

As discussed by Schumacker and Lomax (2010) and Shah and Goldstein (2006), having established and confirmed the reliability and validity of the measurement model, the next stage of analysis is to test the causal relationships between the research constructs (structural model). As presented in Chapter Five, SEM is a technique used to analyse multiple and interrelated relationships among the constructs for model building (Tabachnick and Fidell, 2007). Thus, this analysis aims to investigate the causal relationships between the different independent and mediating factors with the dependent variables (using for knowledge acquisition and using for knowledge provision).

As discussed in Chapter Three, the independent and mediating variables were derived from three different theoretical streams. Content quality (CQ) and system quality (SQ)

[11] Malhotra (2010: 737)

were adopted from information system literature; knowledge self-efficacy (KSE) and system self-efficacy (SSE) were developed and adopted from social cognitive theory literature; while relational capital (TRUST) was adopted from social capital theory. All these variables were integrated with the UTAUT theory to explain the adoption and use of professional online communities for knowledge sharing (using for knowledge acquisition – UKA, and using for knowledge provision - UKP).

Three structural models were developed and examined. Model one was to predict and examine the factors that influence the use of online communities for knowledge acquisition, while model two was to predict and examine the factors that influence the use of professional online communities for knowledge provision. Model three was a comprehensive model where the different factors were modelled to explain both UKA and UKP in one model. As discussed in Chapter Three, it was expected to find that UKP is influenced, together with other determinants, by UKA. In this model, all members who never used the community for knowledge acquisition and all members who never used the community for knowledge provision were excluded.

6.5.1. Model 1: Use for knowledge acquisition (UKA)

In Model 1, all members who never used the professional online community for knowledge provision were excluded. Thus, the sample size for examining Model 1 was 349. The measurement model was re-examined (after excluding three latent variables: KSE, POE, and UKP) for validity and reliability before testing the research hypotheses (structural model).

6.5.1.1. Measurement model fit and assessment of validity (Model 1; N= 349)

CFA was used to validate the measurement model. The results revealed that all variances were positive, thus, no identification problems were found. Moreover, all measurement parameters were accompanied by SMC values above the cutoff value 0.5 (ranging from 0.59 to 0.87), and all standardised regression weights (factor loadings) were above 0.7 (ranging from 0.77 to 0.93). The model fit statistics were: x^2 = 564.509 (p = .000, df = 406); x^2/df = 1.39; RMSEA= 0.033 (Lo .027; Hi .04); AGFI = 0.883; SRMR= 0.030; CFI= 0.983; TLI= 0.981; PNFI= 0.823; PCFI= 0.858. All fit statistics further revealed an acceptable and satisfactory measurement model fit. As for the measurement validity, Table 6.7 shows that all AVE values are > 0.5, which demonstrates an acceptable and sufficient convergent validity at the constructs level.

Furthermore, for each construct, the square root of the AVE (diagonal cells) is greater than the correlations (off-diagonal cells) with the other constructs, which indicates acceptable discriminant validity.

Table 6.7: CR, AVE, and correlation matrix (Model 1; N = 349)

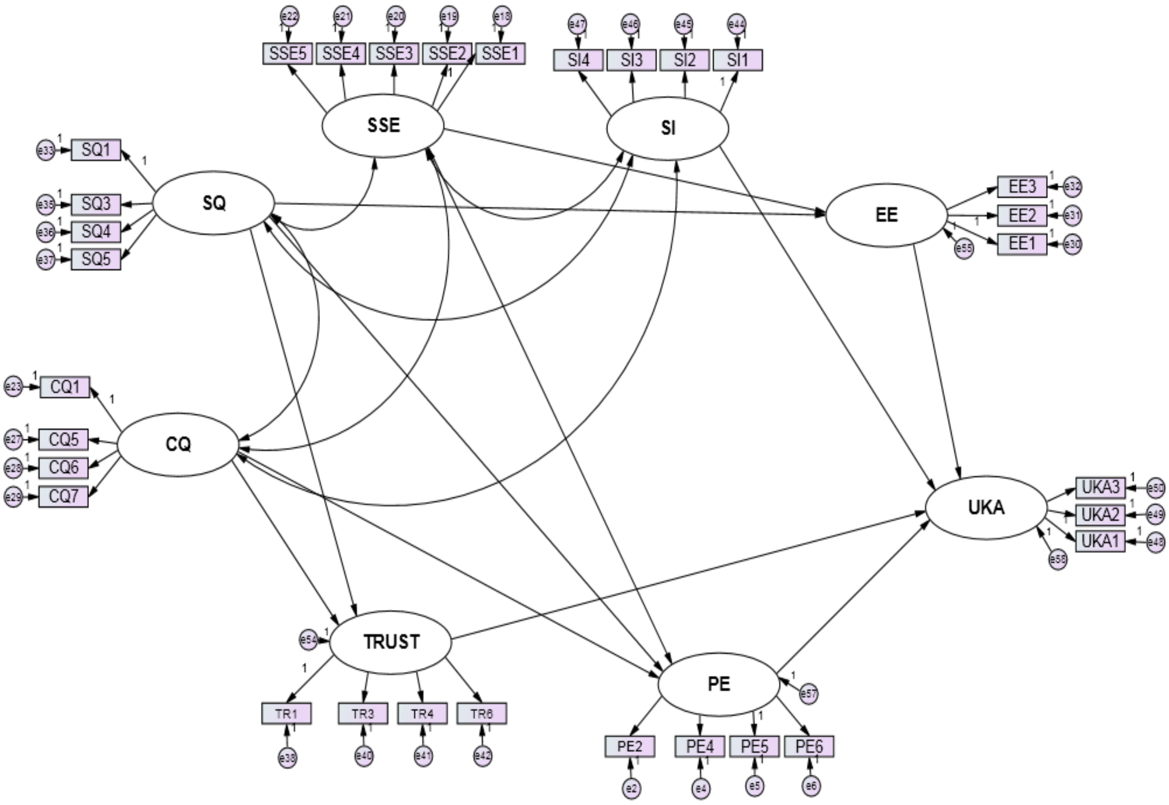
	CR	AVE	SI	PE	SSE	CQ	EE	SQ	TRUST	UKA
SI	0.926	0.759	**0.871**							
PE	0.916	0.732	0.306	**0.856**						
SSE	0.942	0.766	0.290	0.363	**0.875**					
CQ	0.928	0.764	0.363	0.483	0.415	**0.874**				
EE	0.915	0.783	0.345	0.482	0.470	0.567	**0.885**			
SQ	0.927	0.760	0.332	0.467	0.360	0.523	0.578	**0.872**		
TRUST	0.916	0.731	0.277	0.427	0.230	0.522	0.537	0.423	**0.855**	
UKA	0.915	0.783	0.403	0.637	0.468	0.539	0.553	0.487	0.454	**0.885**

6.5.1.2. The structural model (Model 1; N = 349)

The structural model consists of the regressions among seven independent and mediating latent factors: performance expectancy (PE), effort expectancy (EE), social influence (SI), system quality (SQ), content quality (CQ), system self-efficacy (SSE), and relational capital (TRUST), and the regressions between these latent factors and using professional online communities for knowledge acquisition (see Figure 6.6). The following sections discuss the main processes of SEM analysis.

a. Model specification and identification

As seen in Figure 6.6, all latent constructs (ovals) were measured by using multi-item scales (rectangles), which constitute the measurement model section; each item has its related error term (circles). A single headed arrow depicts a single relationship (hypothesis) between an exogenous latent variable and endogenous latent variable, or an endogenous variable and endogenous variable. Furthermore, as suggested by Byrne (2010: 174); Hair et al. (2010: 649); Kline (2011: 100); and Schumacker and Lomax (2010: 144), to make the estimates for the endogenous/dependent variable(s) more reliable, all exogenous variables were considered free to both vary and covary. Therefore, the inter-constructs correlations between exogenous variables were represented by curved double-headed arrows.



UKA – Using for knowledge acquisition. PE – Performance expectancy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence.

Figure 6.6: Research Model 1 specification

Conceptually, all indicators for each latent are reflective (caused by the same underlying latent variable). Based on well-developed theories and three stages of pre-tests to develop a parsimonious measurement model, the theoretical relationships hypothesised in the model represent actual relationships in the examined population (see Section 3.7 in Chapter Three, Section 5.4 in Chapter Five, and Section 6.3 in Chapter Six). As for the model specification, all latent variables were measured by three indicators or more (no latent variable has more than five indicators). Furthermore, the structural model is a recursive model since it has no reciprocal causation, no feedback loops, and no correlated error terms. Furthermore, as discussed in section 6.2, all assumptions that may affect the model estimation, such as missing values, outliers, normality, and multicollinearity were met and the appropriate remedies were used.

b. Model estimation and testing

SEM using IBM' AMOS v20 was employed to test and to evaluate the structural model. As explained earlier, all members who never used the community for knowledge provision were excluded. Consequently, the sample size used to test Model one was

349. As suggested by Byrne (2010: 83) and Schumacker and Lomax (2010: 99), both 0.05 and 0.01 Critical N (CN) values were > 200 (249 and 261 respectively), which leads us to conclude that the sample size is satisfactory and considered adequate.

The ML estimation method was employed, as discussed in section 4.8.4.3. The results revealed fully proper solutions (no negative uniquenesses, no factor correlations greater than ±1 and reasonable SEs for parameter estimates). The model notes degree of freedom revealed an over-identified model.

For the measurement model evaluation, all critical ratio (C.R.) values were greater than 1.96, which indicates that all of the parameter estimates are significantly different from zero. Furthermore, the results indicate that the model is free from negative error variances and standardised parameter estimations that exceed the absolute value |1.0|, which means that the structural model is free of problems such as outliers, under-identification, misspecification (Bollen, 1998, Byrne, 2010) or sampling problems (Anderson and Gerbing, 1988).

At the overall level, the model fit indices statistics for the first run revealed an acceptable structural model as Table 6.8 shows.

Table 6.8: Structural Model 1 fit indices (N= 349)

Index		Cut-off value	Structural Model 1 fit indices
x^2		> 0.05	651.652 (df= 417; p = .000)
x^2/df		< 3	1.563
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.040 (Lo 0.034; Hi 0.046) P-close 0.998
	SRMR	< 0.08	0.060
	AGFI	> 0.80	0.870
Incremental fit indices	CFI	> 0.90	0.975
	TLI	> 0.90	0.972
Parsimony fit indices	PNFI	> 0.50	0.837
	PCFI	> 0.50	0.874

The first measure used to test the overall model fit was x^2. The obtained x^2 value with the accompanied p-value (.000) indicate that the model does not fit the data and should be rejected. However, as discussed earlier (Section 4.8.4.4), x^2 is a function of the sample size and should not be used with large sample sizes (Hair et al., 2010, Schumacker and Lomax, 2010). However, the ratio of x^2 to the model' *df* was satisfactory (1.563) and falling far below the recommended level of 3.0 as suggested by KLINE (2004), and 5.0 as suggested by Hair et al. (2010).

The next fit measure used in this study was RMSEA. With sample size > 200 and observed variables ≥ 30, Hair et al. (2010) recommend a cutoff value for RMSEA (< 0.07). The current model shows value of 0.04 which indicates that the data fits the model well. AGFI, which is considered as an absolute fit index that adjusts the number of *df* to measure "*the relative amount of variance and covariance in S that is jointly explained by Σ*" (Byrne, 2010: 77), showed an acceptable value (0.87) which falls moderately above the recommended cutoff value (0.80) as suggested by Hair et al. (2010) and Straub et al. (2004).

CFI and TLI are incremental fit indices providing a measure of complete covariation in the data and recourse a cutoff value > 0.90 (Bentler, 1992, Hu and Bentler, 1999) to show an acceptable fit. The current model shows a value of 0.97 for both indices. These values prove an acceptable and satisfactory model fit. Although the parsimony fit indices, PNFI and PCFI, were mainly developed to compare different models through adjusting incremental fit indices, they far fall above the recommended cutoff value (0.50). Drawn from the above results, it was concluded that structural Model 1 shows good fit and, thus, could be used to explain the research hypotheses.

c. Hypotheses testing

Having demonstrated a satisfactory structural model fits, the next step was to test and examine the research hypotheses. Each path in the structural model between two latent variables, as seen in Figure 6.6, represents a specific research hypothesis. First, the squared multiple correlation SMC for the structural equations was evaluated. SMC values represent the proportion of endogenous – criterion – variables' variance that is explained by the exogenous – predictors – variables. The higher the SMC values are, the greater is the joint explanatory power of the exogenous variables. The SMC value for UKA was 0.499. Thus, it can be concluded that about 50% of the variance associated with using professional online communities for knowledge acquisition was explained by the model. Furthermore, it was found that 44% of the variance of EE was explained by SQ and SSE; 33% of the variance of PE was determined by SQ, CQ, and SSE. Finally, 31% of the variance of Trust was explained by SQ and CQ.

Hypotheses are usually examined in the form of null hypotheses H_0, where no statistical relationship exists between the examined variables based on the significance level (p-value). In other words, H_0 is either rejected or accepted based on the level of p-value of the standardised coefficient of a research parameter. This study uses three levels of significance, 0.05, 0.01, and 0.001 that indicate to acceptable significance, strong significance and high significance, respectively. Table 6.9 shows the results of the hypotheses testing for the SEM of the proposed research model.

Table 6.9: Path results and hypotheses testing (Model 1; N= 349)

Hypothesis	Path (relationship)			Standardized β	S.E	t-value	Result
H1	**PE**	**--->**	**UKA**	0.448	0.049	8.803***	Supported
H3a	**EE**	**--->**	**UKA**	0.247	0.049	5.005***	Supported
H4a	**SI**	**--->**	**UKA**	0.171	0.041	3.694***	Supported
H5a	**TRUST**	**--->**	**UKA**	0.116	0.048	2.429*	Supported
H6a	**SSE**	**--->**	**PE**	0.159	0.063	2.894**	Supported
H6c	**SSE**	**--->**	**EE**	0.307	0.055	6.078***	Supported
H8a	**SQ**	**--->**	**PE**	0.274	0.061	4.512***	Supported
H8c	**SQ**	**--->**	**EE**	0.487	0.051	9.228***	Supported
H8d	**SQ**	**--->**	**TRUST**	0.225	0.058	3.693***	Supported
H9a	**CQ**	**--->**	**PE**	0.280	0.070	4.494***	Supported
H9c	**CQ**	**--->**	**TRUST**	0.408	0.072	6.428***	Supported

(*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$).

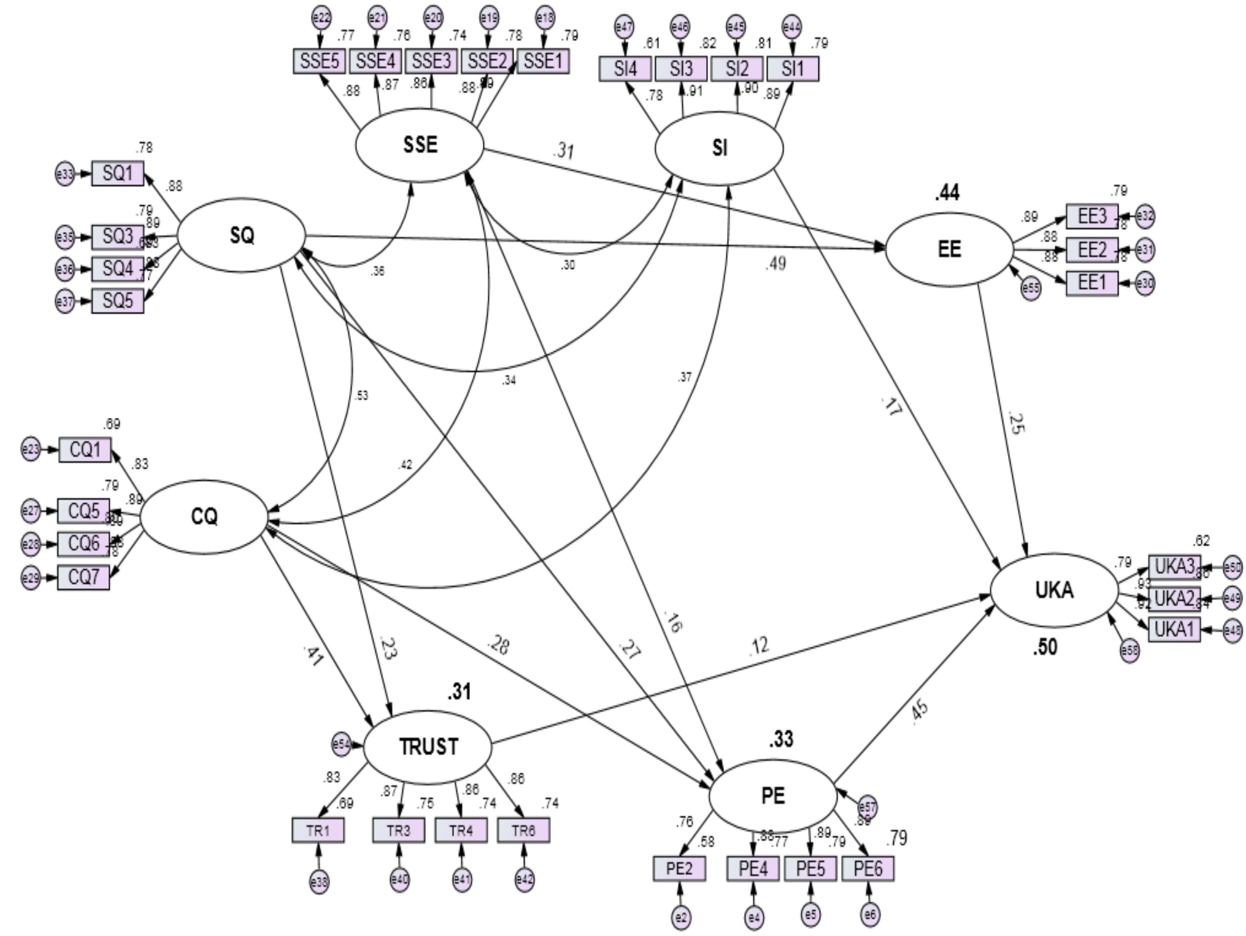
As seen in Table 6.9 and Figure 6.7, the results strongly supported the theoretical research Model 1. All hypothetical relationships in the model were significantly supported. In general, the results showed that H5a was supported at the $p < 0.05$ level and H6a was supported at the $p < 0.01$; while all other hypotheses were significantly supported at the $p < 0.001$ level. The next points discuss the main results in more detail.

*** Using for knowledge acquisition (UKA)**

All predictors of UKA showed positive and significant association. The strongest determinant of UKA was PE ($\beta = 0.45$; $p < 0.001$) followed by EE ($\beta = 0.25$; $p < 0.001$), SI ($\beta = 0.17$; $p < 0.001$), and lastly by a slightly weaker TRUST ($\beta = 0.12$; $p < 0.05$). These results support H1, H3a, H4a, and H5a.

*** Performance expectancy (PE)**

PE is found to have positive and significant paths with CQ, SQ, and SSE. CQ was the strongest determinant ($\beta = 0.28$; $p < 0.001$) followed by SQ ($\beta = 0.27$; $p < 0.001$), and finally SSE (β = 0.16; p < 0.001). Based on these results, it can be explained that H6a, H8a, and H9a are supported.



UKA – Using for knowledge acquisition. PE – Performance expectancy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- Social influence.

Figure 6.7: Validation of Model 1 (Use for knowledge acquisition)

* Effort expectancy (EE)

The research results, furthermore, proved the positive effects of SSE and SQ on EE. The path coefficient SQ → EE was found significant (β = 0.49; p < 0.001). Similarly, the path coefficient SSE → EE was found significant (β = 0.31; p < 0.001). These results support H6c and H8c.

* Relational capital trust (TRUST)

The statistical results indicated strong positive and significant confirmation for the association between CQ, SQ and Trust. The path coefficient CQ → TRUST was found significant (β = 0.41; p < 0.001) and the path coefficient SQ → TRUST was also found statistically significant (β = 0.23; p < 0.001). These results support H8d and H9c.

6.5.1.3. Mediation effects

Mediation effect or indirect effect means that the effect of the independent (exogenous) variable X_1 on the dependent (endogenous) variable Y goes through a mediator (another endogenous variable) X_2. In other words, as explained by MacKinnon et al. (2004), mediation/indirect effect occurs when the regression coefficient of the independent variable (X_1) on the dependent variable (Y) is reduced when the effects of (X_2), the mediator, are controlled for (see Figure 6.8 ii).

To illustrate the concept of mediation, regression paths are presented to depict the causal relationships (see Figure 6.8 i, ii). Path c, as seen in figure 6.8 (i), represents a direct simple regression between X_1 and Y. Figure 6.8 (ii) shows the relationship between X_1 and Y mediated by X_2. According to these mediated relationships: path (a) shows the direct effect from the independent variable X_1 to the mediating variable X_2; path (b) shows the direct effect from the mediating variable X_2 to the dependent variable Y; and finally path (c') shows the direct effect from the independent variable X_1 to the dependent variable Y. (see Figure 6.8 ii).

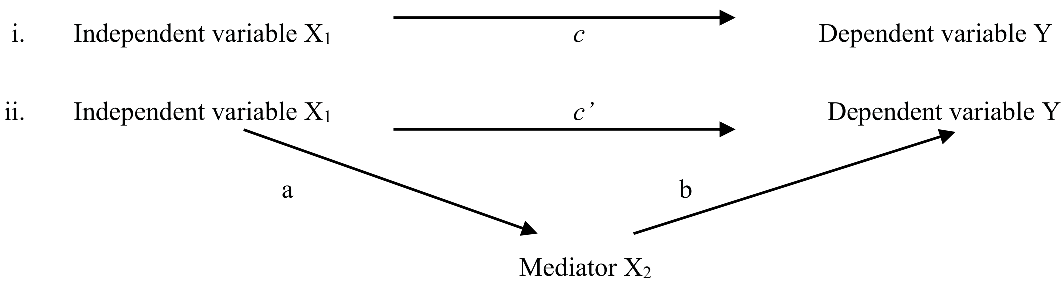


Figure 6.8 i, ii: Direct and indirect effects

To test for mediation, three regression equations should be run. Firstly, Y is regressed on X_1 to estimate the coefficient of path (c). Second, X_2 is regressed on X_1 to establish and estimate the coefficient of path (a). Third, Y is regressed on X_1 and X_2 to obtain the regression coefficient of path (c'). Based on the results of the three regression equations, full mediation is achieved when the relationship between X_1 and Y (c') controlling for X_2 (a, b) is zero or not statistically significant; while partial mediation is achieved when the relationship between X_1 and Y is reduced when controlling for X_2 (a, b) but still significant. Finally, if the relationship between X_1 and Y (c') remains statistically significant when X_2 (a, b) is included, then mediating effect is not present (Hair et al., 2010). Regardless of the simplicity of Baron and Kenny (1986) causal steps approach to test for mediation, it has been found that this approach tends to have low statistical power (MacKinnon et al., 2002). However, Baron and Kenny (1986) argued that further rigorous procedures are required to examine the magnitude of the indirect effect and its statistical significance. Thus, proving the significance of paths $X_1 \rightarrow Y$, $X_1 \rightarrow X2$, and $X_2 \rightarrow Y$ is not enough to demonstrate a mediation effect; the main key is to test for significant indirect relationship.

To examine the significance of indirect effect, the product of coefficient approaches such as Sobel (1986)'s large-sample test has been frequently used by researchers. Mainly, the product of coefficient methods assume that the sampling distribution of the indirect effect $X_1 \rightarrow X_2 \rightarrow Y$ is normal; however, the sample distribution of paths (a and b), as explained by Bollen and Stine (1990), tends to show an asymmetric pattern with nonzero skewness and relatively high kurtosis (Hayes, 2009, MacKinnon et al., 1998, Preacher and Hayes, 2008). Using simulation methods, Stone and Sobel (1990) found that samples less than 400 tend to skew positively when they examined the estimations of indirect effect distribution. Similarly, MacKinnon and Dwyer (1993) and MacKinnon et al. (2002) found the same results and agreed with Stone and Sobel (1990) that the symmetric confidence interval, which is constructed based on the assumptions of normality, tends to produce asymmetric error rates. These results, according to Shrout and Bolger (2002), tend to weaken the product of coefficient method in terms of its power to reject H_0 that a*b =0. Recently, as a result of development in statistical theory and advances in computers and software, methods such as bootstrapping have shown higher power and greater ability to control "type 1" error when used for testing direct and indirect mediation effects (e.g. Hayes, 2009, Lau and Cheung, 2012, Lockwood and MacKinnon, 1998, MacKinnon et al., 2002, MacKinnon et al., 2004, Mallinckrodt et al., 2006, Preacher and Hayes, 2008, Shrout and Bolger, 2002, Cheung and Lau, 2008).

The bootstrapping concept is to generate "*an empirical representation of the sampling distribution of the indirect effect by treating the obtained sample of size n as a representation of the population in miniature, one that is repeatedly resampled during analysis as a means of mimicking the original sampling process*" (Hayes, 2009: 7). Thus, the research sample works as a "population reservoir" used to randomly generate a large number of samples in which the probability of selecting any case "remains equal over every random sample", which means that every case has a selection probability $1/n$ over all samples (Mallinckrodt et al., 2006: 373). In more detail, as discussed by Hair et al. (2010: 22); Shrout and Bolger (2002: 426), to compute bootstrap distribution, $a*b$ is constructed by the following steps:

1. "Using the original data set as a population reservoir, create a pseudo (bootstrap) sample of *N* persons by randomly sampling observations with replacement from the data set" (p. 426).
2. For each bootstrap generated sample, *a*b* is estimated and saved.
3. Step 1 and 2 are repeated *j* times.
4. The final step is to examine the distribution of estimates along with determining the (α/2*100) and (1-α/2)*100% percentile of the distribution.

Both linear regression and structural equation modelling can be employed to test the mediation effects. The logic of direct and indirect (mediation) analyses is quite similar in both techniques. However, based on a series of simulation studies and logical arguments, Iacobucci et al. (2007), in their influential study, reported that SEM was more powerful and outperformed regression. In more detail, SEM can be considered as most preferred method for four reasons (Cheung and Lau, 2008, Lau and Cheung, 2012, Kenny et al., 1998, Preacher and Hayes, 2008): (1) SEM provides a most efficient statistical tool to test mediation with latent variables which have multi-items; in this regard, Preacher and Hayes (2008) stated that "*one of the most attractive features of SEM is that, unlike regression analysis of the type performed with SAS or SPSS, it explicitly models measurement error, allowing researchers to test hypotheses using the latent constructs rather than imperfectly measured indicators*" (p.887); (2) SEM has greater flexibility regarding model specification and estimation options, and has greater capability to conduct specific types of analysis such as multiple mediation models; (3) SEM has the ability to examine mediation with all models regardless of the degree of complexity; (4) As explained by Baron and Kenny (1986), SEM outperforms other general linear models due to its ability to include all paths and variables to be tested together without omitting or excluding any. In this context, Iacobucci (2009) discussed that fitting all paths simultaneously is "*both more parsimonious and will yield better results (e.g., more precise estimates, as indicated by smaller standard errors, and less bias, as each effect is estimated while partially out the other effects)*" (p.673).

SEM with bootstrapping 1000 and 0.95 confidence interval (Hayes, 2009, Shrout and Bolger, 2002) was used to examine direct and indirect effects. Direct effects with excluding mediators was run first to obtain direct standardised βs and their significances between the exogenous variables and the dependent variable - UKA. Then, the bootstrapping option with 0.95 confidence interval was activated to obtain β for both the direct and the indirect effects after adding the mediators. Table 6.10 shows the direct and indirect results for Model 1.

Table 6.10: Direct and indirect effects[12] (Model 1; N = 349)

Direct path	Direct effect	Indirect path (via mediator)	Direct effect (W mediator)	Indirect effect	Observation
SSE → UKA	0.26***	SSE → PE → UKA	0.19**	0.06*	Partial
SQ → UKA	0.23***	SQ → PE → UKA	0.12^{ns}	0.11**	Full
CQ → UKA	0.31***	CQ → PE → UKA	0.20**	0.12**	Partial
SSE → UKA	0.26***	SSE → EE → UKA	0.24***	0.10**	Partial
SQ → UKA	0.23***	SQ → EE→ UKA	0.22**	0.15**	Partial
SQ → UKA	0.23***	SQ → Trust→ UKA	0.24**	0.04**	Partial
CQ → UKA	0.31***	CQ → Trust → UKA	0.31**	0.08**	Partial

*p < 0.05, **p < 0.01, ***p < 0.001. Note: All values presented are standardised values.

Testing for full mediation requires that, given that the direct effect is significant prior to including the mediator, the indirect effect is significant when the direct effect with mediator is not significant. On the other hand, partial mediation is achieved when all estimated paths show a significant relationship, even if a significant reduction is noticed in the direct β when the moderator is present (Hair et al., 2010: 767).

Table 6.10 shows the direct and indirect effect estimates β to test the mediating effects of PE, EE and Trust on the relationships between the independent (exogenous) variables SSE, SQ, and CQ with the dependent variable UKA. EE was found to partially mediate the relationships between SSE and UKA ($p < 0.05$), and between SQ and UKA ($p < 0.01$). All direct (with/without the mediator) and indirect path estimates were found to be statistically significant. Similarly, Trust was found to significantly mediate the relationship between SQ and UKA, and to partially mediate that between CQ and UKA. As seen from Table 6.10, all direct and indirect paths showed significant β estimates. However, PE demonstrated partial mediation between SSE and UKA, and CQ and UKA. As for the effect of SQ on UKA through PE, it was found that the relationship between SQ and UKA was insignificant when PE is controlled for, which supports a full mediation.

[12] Bootstrapping 1000 and 0.95 confidence interval were applied.

6.5.1.4. Moderation and multi-group analysis – Model 1

A moderating effect occurs when "*a third variable or construct changes the relationship between two related variables/constructs*" (Hair et al., 2010: 770). As moderating effect includes testing the structural model estimates, its process is considered an extension of multi-group invariance analysis (Byrne, 2010, Hair et al., 2010). This study followed Hair et al. (2010); Byrne (2010) and Koufteros and Marcoulides (2006) multi-steps for testing for moderation and multi-group invariance using the AMOS program. The analysis of the data was subjected to three stages of analyses:

Stage one: The aim of this stage is to test the validity of scores related to each group's model and to what extent the measurement model and structural model have equal meanings across the examined groups. Thus, model fit statistics should be obtained first for each group before testing for multi-group invariance (Hair et al., 2010).

Stage two: In this stage of examining for moderation, as recommended by Byrne (2010) and Hair et al. (2010), the measurement weight invariances of the instrument should be examined through establishing the configural, metric (factor loadings) and scalar (factorial) invariances consequently[13]. The following levels discuss this stage in more detail.

Level one: testing for the configural or the *unconstrained model* (baseline model). The initial step in testing for multi-group invariance and moderation is to establish the configural model. The aim of the configural model is to examine whether the same observed variable is a measure of the hypothesised latent variable across the different groups. It is expected to get similar but not identical factor loadings. Therefore, the configural model is satisfied when the baseline model is invariant across the different groups (Teo et al., 2009). According to Bollen (1998), the configural (unconstrained) model, besides testing the overall model fit across groups simultaneously, serves as a base for comparing all subsequent models.

Level two: testing for metric (factor loadings) invariance. The aim of testing for metric invariance is to examine whether the loadings, for each latent variable's item, are equal across the different groups. In other words, the metric model helps to make sure that the examined groups respond to the measurement items in the same way so that a

[13] As recommended by Hair et al. (2010: 761) and Byrne (2010: 199), The other levels of the invariance test (factor covariance invariance, factor variance invariance, and error variance invariance) are overly restrictive and not required for testing for moderation.

comparison between those groups can be made in a meaningful way (Teo et al., 2009); therefore, it can be said that metric invariance focuses on the extent to which the measurement model is equivalent in terms of factor loadings across the different groups. In this model, all factor loadings are imposed (constrained) to be equal across groups, and then the model is compared with the unconstrained model (configural model) using a chi-square difference test ($\Delta\chi^2$) and (ΔCFI). If the test fails to reject the null of equality, it can be concluded that all loadings are invariant across the different groups. However, if the test rejects the null of equality, it indicates that there is (are) certain loading(s) which is (are) variant between certain two groups.

Level three: testing for the scalar (factorial) invariance. Only when the metric invariance test is reached, the test for factorial invariance can be examined. Scalar invariance means that "*the amounts of a construct (i.e. mean) have the same meaning between the different samples being considered*" (Teo et al., 2009: 1002). Thus, the main aim of scalar invariance is to compare the strength of constructs' relationships across groups. Like the metric invariance, ($\Delta\chi^2$) and (ΔCFI) are used to accept or reject the null hypothesis of equality.

Stage three: if the χ^2 difference test rejects the null hypothesis of equality – non-variance is demonstrated - between the examined groups, then a series of analyses is conducted by placing constraints on individual factors in sequence. With every constraint, the χ^2 value is compared with χ^2 values of the previous models that showed invariance results to assess the significance of change in χ^2.

Multi-group SEM can be used to test for moderation when the moderator is either non-metric or metric after transformation into a non-metric form (Hair et al., 2010: 771). Unless the moderator variable represents naturally occurring groups (e.g. gender), median-split can be used to create a categorical two-level moderator (e.g. Hair et al., 2010, Henseler and Fassott, 2010, Koufteros and Marcoulides, 2006, Germain et al., 2008, Morris et al., 2005, Qureshi and Compeau, 2009, Sun et al., 2009). As stated by Iacobucci et al. (2007), "*while moderators can be continuous variables, the predominant data scenario was premised on a categorical (two-level) moderator*" (p.150). Wilson (2010) attributes the predominant use of two-group moderators to the difficulty of using and interpreting continuous interactions with SEM. He discussed that "*implementation of CBSEM when dealing with continuous interactions is very specialized and often beyond the level of competence of all but the most advanced* *covariance modelling users*” (p.732). Hair et al. (2010) agree with Wilson that metric multi-group invariance is not recommended due to its complexity (p.771).

Following the above stages of invariance analyses, gender, age, and experience were examined for moderation using the multi-group analysis technique in AMOS v20. The measurement invariant tests for these demographic variables were conducted for both models: using for knowledge acquisition (Model 1) and using for knowledge provision (Model 2). To test for moderation and multi-group analysis, all moderators were re-coded into two groups. The median-split analysis was used to categorise age and experience moderators. The following sub-sections show the findings of moderation and invariance tests.

A. Gender impact

The data set (343[14]) was split into two gender groups: male (244) and female (99). The final structural model 1 (see Figure 6.11) was applied first to both groups separately to check if each group demonstrated model fit (Byrne, 2010). Table 6.11 shows the results for both groups.

Table 6.11: Structural model fit indices – Gender impact – (Model 1)

Index		Cut-off value	Structural model fit indices (Male: N= 244)	Structural model fit indices (Female: N= 99)
x^2		P-value > 0.05	665.755 (df = 417; p= .000)	505.171 (df = 417; p = .002)
x^2/df		< 3	1.59	1.21
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.50 (Low 0.042; High 0.056	0.046 (Low 0.030; High 0.060)
	SRMR	< 0.08	0.066	0.067
	AGFI	> 0.80	0.819	0.728
Incremental fit indices	CFI	> 0.90	0.962	0.966
	TLI	> 0.90	0.958	0.962
Parsimony fit indices	PNFI	> 0.50	0.812	0.748
	PCFI	> 0.50	0.863	0.866

As seen in Table 6.11, both samples showed an acceptable model fit, except for the female sample which showed AGFI less than the recommended cutoff value (0.80). However, as discussed in section 4.8.4.4, Gefen et al. (2011); Hair et al. (2010); Hooper et al. (2008); Kenny (2011); Hu and Bentler (1998); Shah and Goldstein (2006); and Sharma et al. (2005) reported that GFI and AGFI, as absolute fit indices, are biased and

[14] Six cases were deleted due to missing values.

sensitive to sample size. Regardless of the AGFI value, other fit statistics showed that the female model fits the data better than the male model.

Having demonstrated a satisfactory structural model fit for both gender models, the next stage of analysis was to examine both models simultaneously to obtain the baseline, measurement, and structural models. The SEM multi-group analysis technique using AMOS v20 was used to obtain these models to test for gender invariance. Table 6.12 shows the results of these models.

Table 6.12: Fit statistics for moderation test - Gender impact – (Model 1)

Model	χ^2 (df)	χ^2/df	RMSEA	CFI	TLI	$\Delta\chi^2$ (Δdf)	ΔCFI
Configural (baseline) model	1171.95 (834)	1.405	0.034	0.963	0.959	--	--
Measurement weights	1188.13 (857)	1.386	0.034	0.964	0.961	16.19 (23) ns	0.001
Structural weights	1203.01 (868)	1.386	0.034	0.964	0.961	31.07 (34) ns	0.001
Structural residuals	1224.04 (882)	1.388	0.034	0.963	0.961	52.09 (48) ns	0.000
Measurement residuals	1253.63 (913)	1.373	0.033	0.963	0.962	81.68 (79) ns	0.000

ns – non significant

Table 6.12 shows the results of five models obtained from the multi-group invariance test to examine the impact of gender on using the professional online communities for knowledge acquisition UKA. Using both data samples simultaneously, the baseline model, where all parameters of both models were estimated freely without constraints, showed an acceptable and satisfactory model fit. This result indicates that the baseline model provides support that the pattern of constrained and unconstrained parameters in Model 1 is similar for male and female samples.

Researchers used to report the χ^2 difference test ($\Delta\chi^2$) as the main test to compare the fit of nested models. However, as discussed in section 6.3, χ^2 may not discriminate between models due to its sensitivity to sample size and violations of normality assumptions (Hair et al., 2010, Hooper et al., 2008, Schumacker and Lomax, 2010). Thus, ΔCFI absolute value ±0.01 has been suggested to be used with $\Delta\chi^2$ as an evidence of invariance (Byrne, 2010, Cheung and Rensvold, 2002). In more detail, $\Delta\text{CFI} > 0.01$ means that the nested model is significantly different from the baseline model (Cheung and Rensvold, 2002), which indicates non-invariant models.

The measurement (metric) model, with all factor loadings estimations to be constrained equal across the two groups (male and female), also showed an acceptable and satisfactory model fit. Although the constraints increased the χ^2 value from 1171.95 to 1181.13 and the degree of freedom from 834 to 857, the χ^2 difference test ($\Delta\chi^2 = 16.19$; df = 23) did not show significant difference between the two models – the baseline model and nested measurement model. Moreover, the value of ΔCFI is less than 0.01, which further supports acceptance of the null hypothesis that the measurement model is invariant across both groups (male and female) and rejection of the alternative model that the measurement model is non-equivalent across both groups. Thus, the two, male and female models showed full metric invariance.

Similar to the measurement model, the structural model, where the intercepts of all indicators were constrained to be equal, showed an acceptable model fit. To test for scalar invariance, $\Delta\chi^2$ and ΔCFI showed insignificant values. Although constraining all factors' indicators to be equal across the two models increased the value of χ^2 from 1171.95 to 1203.01 and the associated degree of freedom from 834 to 868, the χ^2 difference test showed a non-significant value. Similarly, ΔCFI did not show significant difference (0.01). Thus, the factorial or scalar invariance was not supported, which means that both groups (male and female), in the overall model (see Figure 6.7), are equivalent and no significant difference was found regarding using professional online community for knowledge acquisition.

Although these results supported equivalence between males and females regarding using professional online communities for knowledge acquisition, they did not respond to the proposed hypotheses that PE, EE, and UKA are stronger for male respondents than for females. As explained by Hair et al. (2010: 772), as a researcher is looking for significant differences in pre-determined relationships to support specific hypotheses, in this case "*the researcher also should examine the path estimates in question to assess if the differences in both groups models are theoretically consistent*". Moreover, testing for every individual path can minimise the possibility of biases in the multi-group analysis among the latent variables relationships when applied to the model overall.

To test every individual relationship, first, mean and covariance structure (MACS) strategy was used to test each latent variable separately, in order to obtain the latent mean structures (Aiken et al., 1994, Little, 1997) across the two groups (Byrne, 2010). According to this analysis, using CFA with the measurement model validated in section 6.5.1.2, one of the two models (groups) was constrained (used as a reference group) and the other model's parameters were freely estimated. Then, the scalar invariance was calculated for the unconstrained sample. Following these steps, the male group model was constrained to be a reference group, and the female group model was freely estimated. Table 6.13 shows the results of latent mean structures analysis for all Model 1 latent variables.

Table 6.13: Structured mean difference - Gender impact – (Model 1)

Latent variable	Male (Reference group)	Female			
		Estimate	Standard error	t-value	P-value
PE	0	.161	.099	1.627	.104
SSE	0	.134	.103	1.303	.193
CQ	0	-.059	.099	-.594	.553
EE	0	.040	.115	.347	.728
SQ	0	.159	.119	1.337	.181
TRUST	0	.058	.114	.509	.611
SI	0	.025	.129	.192	.848
UKA	0	.194	.117	1.662	.097

As seen in Table 6.13, for all mean structures, except for CQ, all latent variables tended to be stronger for the female group sample than for the male group sample; however, these inclinations were statistically insignificant.

The second step of analysis of the individual relationships was to obtain the standardised estimates for each group and to obtain $\Delta\chi^2$ for every individual path. Thus, to look for any non-invariance relationship (path), every path was examined separately while the other paths, across the model, was freely estimated.

Table 6.14: Standardised estimates for the structural Model 1 (Gender impact)

Hypo.	Path (relationship)			Female		Male		Invariance test	
				St. β	t-value	St. β	t-value	χ^2 (*df*)	$\Delta\chi^2$ (Δ*df*)
H1	**PE**	-->	**UKA**	.555	5.342***	.665	6.250***	1176.69 (835)	4.74* (1)
H3a	**EE**	-->	**UKA**	.063	0.627 ^{ns}	.347	6.010***	1175.81 (835)	3.86* (1)
H4a	**SI**	-->	**UKA**	.152	1.666 ^{ns}	.185	3.431***	1172.19 (835)	0.24^{ns} (1)
H5a	**TRUST**	-->	**UKA**	.084	0.879 ^{ns}	.140	2.532*	1172.16 (835)	0.21^{ns} (1)
H6a	**SSE**	-->	**PE**	.175	1.570 ^{ns}	.205	3.170**	1172.24 (835)	0.29^{ns} (1)
H6c	**SSE**	-->	**EE**	.397	4.377***	.292	4.788***	1172.56 (835)	0.61^{ns} (1)
H8a	**SQ**	-->	**PE**	.309	2.704**	.259	3.542***	1171.95 (835)	0.00^{ns} (1)
H8c	**SQ**	-->	**EE**	.473	5.113***	.495	7.734***	1172.08 (835)	0.13^{ns} (1)
H8d	**SQ**	-->	**TRUST**	.372	3.423***	.141	1.891 ^{ns}	1175.26 (835)	3.31^{ns} (1)
H9a	**CQ**	-->	**PE**	.141	1.152 ^{ns}	.291	3.850***	1173.21 (835)	1.26^{ns} (1)
H9c	**CQ**	-->	**TRUST**	.306	2.769**	.475	6.025***	1172.56 (835)	0.61^{ns} (1)
Squared Multiple Correlation SMC			**PE**	0.371		0.243			
			EE	0.437		0.502			
			TRUST	0.322		0.336			
			UKA	0.546		0.436			

- (*p < 0.05, **p < 0.01, ***p < 0.001). ns: non-significant. St. β: standardised β. df: degree of freedom
- $\Delta\chi^2$ = (unconstrained χ^2 – χ^2 for each model with constrained path). Unconstrained χ^2 = 1171.95.

All hypotheses, as seen in Table 6.14, were supported for the male sample except for H8d (p = 0.059). On the other hand, for the female sample, H3a, H4a, H6a, and H9c were not supported at all p-value levels. Using $\Delta\chi^2$, two paths (PE → UKA and EE → UKA) were found significantly different between males and females. However, for the female sample, the influence of EE on UKA was found insignificant. These results support non-invariance between males and females regarding PE on using online communities for knowledge acquisition (stronger for men) which supports H10.1.a.

B. Age impact

Regarding age impact, after removing all cases with missing values regarding gender (11 cases), the data set was split into two groups: less than 35 years (198 respondents) and over 35 years (140 respondents). Firstly, structural model (1) was applied for both groups to test for model fit.

Table 6.15: Structural model fit indices - Age impact - (Model 1)

Index		Cut-off value	Structural model fit indices (< 35: N= 198)	Structural model fit indices (> 35: N= 140)
x^2		P-value > 0.05	544.529 (df = 417; p= .000)	617.316(df = 417; p= .000)
x^2/df		< 3	1.306	1.480
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.039 (Low 0.029; High 0.048	0.059 (Low 0.049; High 0.068)
	SRMR	< 0.08	0.063	0.075
	AGFI	> 0.80	0.823	0.750
Incremental fit indices	CFI	> 0.90	0.974	0.952
	TLI	> 0.90	0.971	0.946
Parsimony fit indices	PNFI	> 0.50	0.806	0.777
	PCFI	> 0.50	0.873	0.854

Both samples showed an acceptable model fit, except for the over 35 years sample, which showed AGFI (0.750) and RMSEA (0.059). However, as previously discussed, AGFI is expected to be biased and sensitive to sample size. For RMSEA, as argued by Iacobucci (2010: 96), it does not behave well and tends to over-reject true models for small sample sizes. However, Hair et al. (2010: 672) suggest that, with CFI ≥ 0.92, observed variables (M) ≥ 30; and sample size (N) < 250, a cutoff value of 0.08 is acceptable as a good fit indicator. Hu and Bentler (1999) suggested that RMSEA ≤ 0.06 is an indicator of good fit. Moreover, Jöreskog (1993) and MacCallum et al. (1996) suggested that values ≤ 0.08 is an indicator of good and acceptable model fit.

Having obtained a satisfactory structural model fit, the configural, measurement, and structural models were examined for both models simultaneously. Table 6.16 shows the results of using multi-group analysis to examine these models.

Table 6.16: Fit statistics for moderation test – Age impact - (Model 1)

Model	χ^2 (df)	χ^2/df	RMSEA	CFI	TLI	$\Delta\chi^2$ (Δdf)	ΔCFI
Configural (baseline) model	1162.13 (834)	1.393	0.034	0.964	0.960	--	--
Measurement weights	1187.20 (857)	1.385	0.034	0.964	0.960	25.06 (23) ^{ns}	0.000
Structural weights	1204.41 (868)	1.388	0.034	0.963	0.960	42.28 (34) ^{ns}	0.001
Structural residuals	1221.19 (882)	1.385	0.034	0.963	0.961	59.06 (48) ^{ns}	0.001
Measurement residuals	1273.81 (913)	1.395	0.034	0.960	0.959	111.7 (79)**	0.004

(*p < 0.05, **p < 0.01, ***p < 0.001). ns: non-significant.

From Table 6.16 and based on $\Delta\chi^2$ and ΔCFI, both nested metric and structural models did not show significant differences from the baseline line (unconstrained) model. These results supported the invariance regarding respondents' age in the overall model.

At the level of individual hypothesised relationships, the invariant latent mean test was conducted to examine whether PE was stronger for younger users than older users and whether EE was stronger for older users than younger users. The over 35 years group's parameters were constrained to work as a reference group, while the less than 35 years group's parameters were left to be freely estimated. Table 6.17 shows the results of the latent mean structure test.

Table 6.17: Structured mean difference - Age impact (Model 1)

Latent variables	More than 35 years (Reference group)	Less than 35 years		
		Estimate	Standard error	t-value
PE	0	.189	.093	2.05*
SSE	0	.176	.105	1.985*
CQ	0	.073	.101	.844
EE	0	.085	.099	.982
SQ	0	.190	.102	2.008*
TRUST	0	-.086	.097	-.598
SI	0	-.172	.101	-1.909
UKA	0	.261	.088	3.715***

(*p < 0.05, **p < 0.01, ***p < 0.001)

From Table 6.17, it can be seen that the following latent variables PE, SSE, SQ, and UKA showed significant differences. These variables showed stronger influence and more importance for respondents aged under 35 years. Thus, members who were less than 35 years old were likely to perceive these latent variables more favourably than respondents who were > 35 years.

The paths coefficients were estimated for each group to detect any differences in $\Delta\chi^2$ to support any non-invariant paths. Table 6.18 shows the estimated coefficients for both groups.

Table 6.18: Standardised estimates for the structural Model 1 (Age impact)

Hypo.	Path (relationship)			Less than 35 years		More than 35 years		Invariance test	
				St. β	t-value	St. β	t-value	χ^2 (*df*)	$\Delta\chi^2$ (Δ*df*)
H1	**PE**	-->	**UKA**	.487	6.98***	.321	4.26***	1167.71 (835)	5.58* (1)
H3a	**EE**	-->	**UKA**	.279	4.21***	.200	2.65**	1162.92 (835)	0.79^{ns} (1)
H4a	**SI**	-->	**UKA**	.189	3.06**	.185	2.61**	1162.14 (835)	0.01^{ns} (1)
H5a	**TRUST**	-->	**UKA**	- .035	-0.35 ^{ns}	.340	4.54***	1172.86 (835)	10.73** (1)
H6a	**SSE**	-->	**PE**	.188	2.57*	.158	1.76^{ns}	1162.13 (835)	0.00^{ns} (1)
H6c	**SSE**	-->	**EE**	.238	3.48***	.393	5.10***	1164.93 (835)	2.80^{ns} (1)
H8a	**SQ**	-->	**PE**	.289	3.43***	.276	3.01**	1162.17 (835)	0.04^{ns} (1)
H8c	**SQ**	-->	**EE**	.508	7.01***	.461	5.93***	1162.34 (835)	0.21^{ns} (1)
H8d	**SQ**	-->	**TRUST**	.241	2.86**	.229	2.54**	1162.14 (835)	0.01^{ns} (1)
H9a	**CQ**	-->	**PE**	.237	2.78**	.281	2.82**	1162.28 (835)	0.12^{ns} (1)
H9c	**CQ**	-->	**TRUST**	.364	4.18***	.455	4.82***	1162.32 (835)	0.19^{ns} (1)
Squired Multiple Correlation SMC			**PE**	0.319		0.337			
			EE	0.397		0.502			
			TRUST	0.287		0.367			
			UKA	0.491		0.548			

- ($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant. St. β: standardised β. df: degree of freedom
- $\Delta\chi^2$ = (unconstrained $\chi^2 - \chi^2$ for each model with constrained path). Unconstrained $\chi^2 = 1162.13$.

As seen in Table 6.18, all hypotheses were supported for both groups, except for H5a for the under 35 years sample and H6a for the above 35 years sample. These results indicate that all paths in the structural model are equivalent across the two groups of age except for hypotheses H1 and H5a. Based on these results, H11.1a was supported in that respondents' age moderates the relationship between PE and UKA. As can be noted in Table 6.18, the influence is stronger for the younger members. However, H11.2a was not supported, which means that the relationship between EE and UKA is not moderated by users' age.

C. Experience impact

Regarding experience impact, the data set was split into two groups: less experience (less than 3 years membership) and high experience (more than 3 years membership). Firstly, structural Model 1 was applied for both groups to test for model fit.

Table 6.19: Structural model fit indices – Experience impact – (Model 1)

Index		Cut-off value	Structural model fit indices (Less experience: N= 139)	Structural model fit indices (High experience: N= 204)
x^2		P-value > 0.05	589.37 (df = 417; p=.000)	574.65 (df = 417; p= .000)
x^2/df		< 3	1.413	1.378
Absolute fit indices	**RMSEA**	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.055 (Low 0.044; High 0.065	0.043 (Low 0.034; High 0.052)
	SRMR	< 0.08	0.072	0.065
	AGFI	> 0.80	0.756	0.816
Incremental fit indices	**CFI**	> 0.90	0.956	0.963
	TLI	> 0.90	0.951	0.959
Parsimony fit indices	**PNFI**	> 0.50	0.777	0.788
	PCFI	> 0.50	0.857	0.864

Table 6.19 shows that both models achieved an acceptable model fit. The next stage of analysis was to test both models simultaneously to obtain the configural, measurement, and structural models. Table 6.20 shows the results of using multi-group analysis to test both models: low experience and high experience.

Table 6.20: Fit statistics for moderation test – Experience impact - (Model 1)

Model	χ^2 (df)	χ^2/df	RMSEA	CFI	TLI	$\Delta\chi^2$ (Δdf)	ΔCFI
Configural (baseline) model	1164.29 (834)	1.396	0.034	0.960	0.955	--	--
Measurement weights	1183.12 (857)	1.381	0.033	0.960	0.957	18.83^{ns} (23)	.000
Structural weights	1255.65 (868)	1.395	0.034	0.958	0.955	91.36^{***} (34)	.002
Structural residuals	1273.36 (882)	1.444	0.036	0.952	0.950	109.07^{***} (48)	.005
Measurement residuals	1343.90 (913)	1.472	0.037	0.948	0.947	179.61^{***} (79)	.008

(*p < 0.05, **p < 0.01, ***p < 0.001). ns: non-significant.

From Table 6.20, it was found that both groups are equal (invariant) regarding the measurement model ($\Delta\chi^2$ = 18.83; df = 23; p > 0.05). However, at the next level of analysis – structural weight invariance, it was found that the experienced group is non-invariant ($\Delta\chi^2$ = 91.36; df = 34; ***p < 0.001). This result indicates that the two groups are not equal. Although $\Delta\chi^2$ test supports non-invariance groups, ΔCFI did not show significant difference between the two groups (ΔCFI < 0.01).

Next, mean and covariance structure (MACS) strategy was used to test for the latent mean structures across the two groups. The high experience group model was used as reference model; in other words, it was constrained while the low experience group model was free to vary. Table 6.21 shows the results of MACS analysis.

Table 6.21: Structured mean difference - Experience impact – (Model 1)

Latent variables	High experience	Less experience		
		Estimate	S.E.	C.R.
PE	0	-.547	.094	-5.821***
SSE	0	-.481	.095	-5.084***
CQ	0	-.678	.092	-7.389***
EE	0	-.727	.107	-6.786***
SQ	0	-.659	.109	-6.037***
TRUST	0	-.499	.105	-4.749***
SI	0	-.579	.120	-4.813***
UKA	0	-.716	.107	-6.680***

(*p < 0.05, **p < 0.01, ***p < 0.001)

As shown in Table 6.21, the "high experience" group was used as a reference group. The negative estimated values indicate that the "high experience" sample shows higher mean scores than the "less experience" group. Thus, it can be said that members with high experience perceive the different factors of using the professional online communities for knowledge acquisition higher than members with less experience.

However, as stated by Hair et al. (2010) and Byrne (2010), for locating non-equal paths, a series of $\Delta\chi^2$ tests was conducted. In this regard, one path was constrained to be equal at a time. Then, the $\Delta\chi^2$ test was used for invariance. Significant $\Delta\chi^2$ means than the two groups are not equal regarding the examined path, which supports the moderation effect of experience. The following table shows the results of the path invariance test.

Table 6.22: Standardised estimates for the structural Model 1 (Experience impact)

Hypo.	Path (relationship)			Less experience		High experience		Invariance test	
				Stand. β	t-value	Stand β	t-value	χ^2 (*df*)	$\Delta\chi^2$ (Δdf)
H1	PE	--->	UKA	.508	6.580***	.327	4.533***	1168.25 (835)	3.96* (1)
H3a	EE	--->	UKA	.307	4.141***	.243	3.324***	1164.43 (835)	0.01ns (1)
H4a	SI	--->	UKA	.237	3.431***	.054	.808ns	1168.71 (835)	4.42* (1)
H5a	TRUST	--->	UKA	-.117	-1.588ns	.282	4.025***	1173.94 (835)	9.65**(1)
H6a	SSE	--->	PE	.142	1.620ns	.233	3.040**	1164.62 (835)	-0.33ns (1)
H6c	SSE	--->	EE	.266	3.440***	.311	4.199***	1164.44 (835)	-0.15ns (1)
H8a	SQ	--->	PE	.397	4.301***	.145	1.763ns	1168.55 (835)	4.26* (1)
H8c	SQ	--->	EE	.508	6.316***	.390	5.113***	1167.59 (835)	3.3ns (1)
H8d	SQ	--->	TRUST	.313	3.414***	.124	1.553ns	1165.64 (835)	1.35ns (1)
H9a	CQ	--->	PE	.191	1.948ns	.156	1.870ns	1164.29 (835)	0.0ns (1)
H9c	CQ	--->	TRUST	.402	4.265***	.336	3.960***	1164.72 (835)	-0.43ns (1)
Squired Multiple Correlation SMC			PE	0.365		0.151			
			EE	0.424		0.304			
			TRUST	0.388		0.162			
			UKA	0.555		0.330			

- (*p < 0.05, **p < 0.01, ***p < 0.001). ns: non-significant. St. β: standardised β. df: degree of freedom
- $\Delta\chi^2$ = (unconstrained χ^2 – χ^2 for each model with constrained path). Unconstrained χ^2 = 1164.29.

This study proposed that the relationship between EE and SI, individually, with UKA is influenced by members' experience. As noted from the above table, four paths were significantly non-equal between the two groups: PE → UKA, SI → UKA, TRUST → UKA, and SQ → PE.

In summary, regarding Model 1 (UKA), these results of invariance tests support H12 at the overall level (non-invariance groups) and partially at the individual paths level, as the direct path between EE and UKA (H12.1a) was not supported.

6.5.2. Model 2: Use for knowledge provision (UKP)

In Model 2, all members who never used the professional online community for knowledge acquisition were excluded. Thus, the sample size for examining Model 2 was 330. Like Model 1, the measurement model was re-examined (after excluding PE and UKA) for validity and reliability before proceeding to test the research hypotheses (structural model).

6.5.2.1. Measurement model fit and assessment of validity (Model 2; N= 330)

Regarding examining the measurement model for validity and reliability, the results revealed that all variances were positive and no identification problems were found. All measurement parameters were accompanied by SMC values above the cutoff value of 0.5 (ranging from 0.57 to 0.86), and all standardised regression weights (factor loadings) were above 0.7 (ranging from 0.76 to 0.93). The model fit statistics were: x^2= 888.83 (p= .000; *df*= 593); x^2/df = 1.50; RMSEA= 0.039 (Lo .034; Hi .044); AGFI= 0.85; SRMR= 0.037; CFI= 0.97; TLI= 0.966; PNFI= 0.82; PCFI= 0.86. All fit statistics further revealed an acceptable and satisfactory measurement model fit.

As seen in Table 6.23, composite reliability (CR) ranged from 0.91 (for effort expectancy and trust) to 0.94 (system self-efficacy), which exceeded the recommended cutoff value to reflect satisfactory internal consistency (reliability). As for measurement validity, the following table shows that all AVE values are > 0.5, which demonstrates an acceptable and sufficient convergent validity at the constructs level. The composite reliability of all latent variables exceeded 0.80, which further supports convergent validity. Besides the significant high loading of all indicators on their predefined constructs, the square root of the AVE (diagonal cells) is greater than the correlations (off-diagonal cells) with the other constructs, which indicates acceptable discriminant validity.

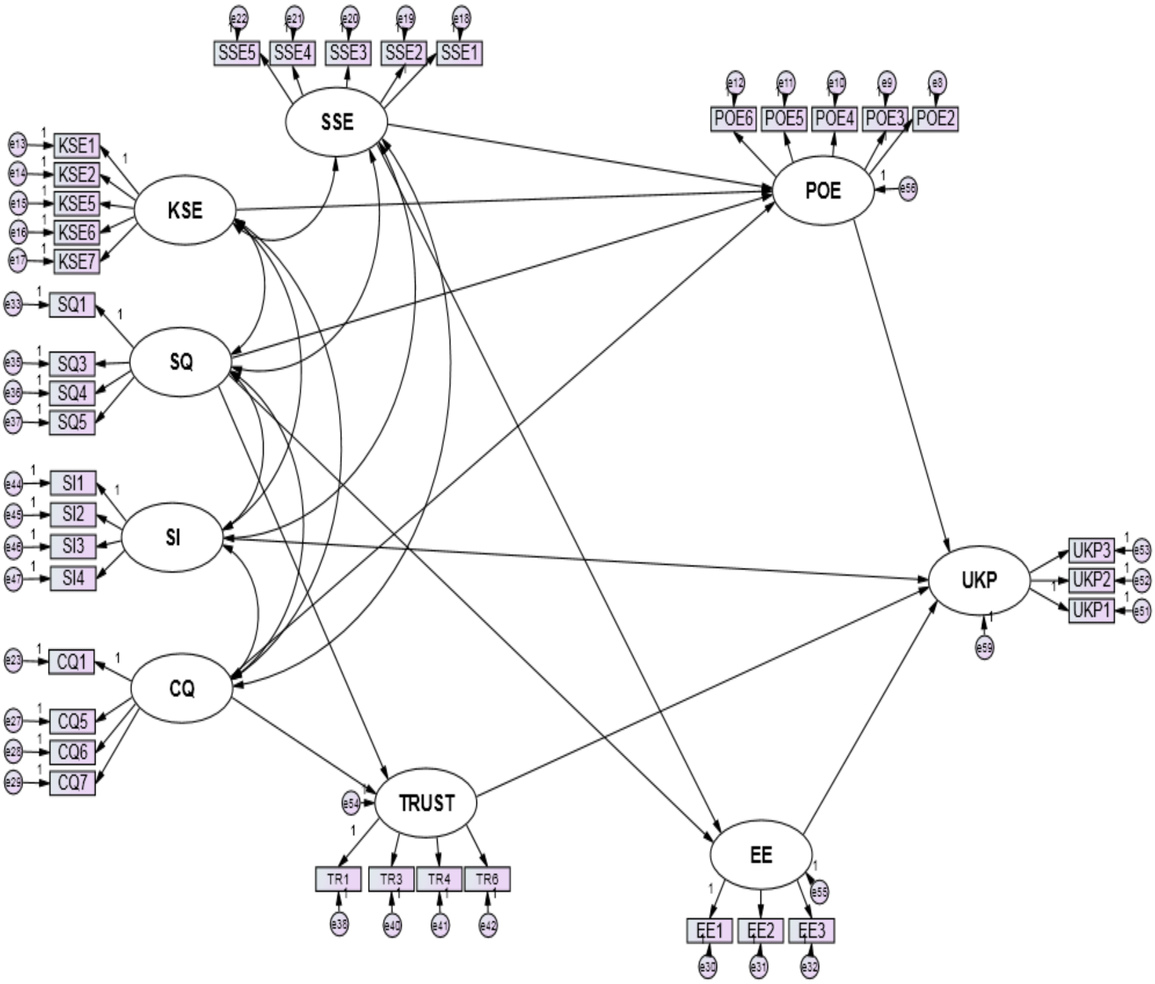
Table 6.23: CR, AVE, and correlation matrix (Model 2; N= 330)

	CR	AVE	SI	POE	KSE	SSE	CQ	EE	SQ	TRUST	UKP
SI	0.921	0.746	0.864								
POE	0.928	0.721	0.219	0.849							
KSE	0.923	0.707	-0.050	0.218	0.841						
SSE	0.937	0.747	0.249	0.367	0.130	0.864					
CQ	0.923	0.749	0.338	0.420	-0.058	0.396	0.866				
EE	0.908	0.766	0.347	0.361	0.065	0.436	0.569	0.875			
SQ	0.920	0.742	0.283	0.264	0.049	0.332	0.485	0.547	0.861		
TRUST	0.906	0.708	0.232	0.338	0.129	0.207	0.511	0.537	0.357	0.841	
UKP	0.912	0.776	0.248	0.606	0.146	0.346	0.467	0.383	0.395	0.391	0.881

Having confirmed the reliability and the validity (convergent and discriminant) of the measurement Model 2, the next section discusses the causal relationships between the research latent variables.

6.5.2.2. The structural model (Model 2; N= 330)

The structural model consists of the regressions among eight independent and mediating latent factors: personal outcome expectancy (POE), effort expectancy (EE), social influence (SI), system quality (SQ), content quality (CQ), system self-efficacy (SSE) and relational capital (TRUST), and the regressions between these latent variables and using professional online communities for knowledge provision – UKA- as seen in the Figure 6.9.



POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

Figure 6.9: Research Model (2) specification

In more detail, the following sections discuss the main processes of SEM analysis used to test Model 2.

a. Model specification and identification

As seen in the above figure, all latent constructs were measured by using multi-item scales, which constitutes the measurement model section. All latent variables were measured by three indicators or more (no latent variable has more than five indicators). All exogenous variables, which were not specified to be caused by any observed variables, were set free to both vary and covary. Furthermore, the structural model is a recursive reflective model (no reciprocal causation, no feedback loops, no formative indicators and no correlated error terms).

b. Model estimation and testing

The ML estimation method was used to estimate the model parameters. The results revealed the absence of any identification problems. The model notes degree of freedom revealed an over-identified model. As with Model 1, all C.R. values were greater than 1.96, which supports that all parameters' estimations are significantly different from zero. Furthermore, both 0.05 and 0.01 Critical N (CN) values were > 200 (223 and 231, respectively), which leads us to conclude that the sample size is satisfactory and considered adequate.

At the overall level, the model fit indices statistics for the first run showed an acceptable and satisfactory structural model as the Table 6.24 shows.

Table 6.24: Structural fit indices (Model 2; N= 330)

Index		Cut-off value	Structural model (2) fit indices
x^2		> 0.05	986.005 (df= 607; p = .000)
x^2/df		< 3	1.624
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.044 (Lo 0.039; Hi 0.048) P-close (0.985)
	SRMR	< 0.08	0.062
	AGFI	> 0.80	0.842
Incremental fit indices	CFI	> 0.90	0.962
	TLI	> 0.90	0.958
Parsimony fit indices	PNFI	> 0.50	0.826
	PCFI	> 0.50	0.876

From Table 6.24, all fit statistics revealed structural model fit. Thus, overall, it can be said that this model showed an acceptable and satisfactory fit.

c. Hypotheses testing

Firstly, the results of SMC revealed that 40.6% of UKA variation is explained by the model. Furthermore, it was found that 39.5% of EE variation is explained by SSE and SQ; 28.5% of TRUST variation is explained by CQ and SQ; and 27.9% of POE variation is explained by SSE, KSE, CQ and SQ. Table 6.25 shows the results of the hypotheses testing for model 2 (UKP; N= 330).

Table 6.25: Path results and hypotheses testing (Model 2; N= 330)

Hypothesis	Path (relationship)			Standardised β	S.E.	t-value	Result
H2	POE	--- >	UKP	0.516	0.046	9.292***	Supported
H3b	EE	--- >	UKP	0.109	0.043	2.083*	Supported
H4b	SI	--- >	UKP	0.072	0.036	1.434	Not supported
H5b	TRUST	--- >	UKP	0.165	0.044	3.147**	Supported
H6b	SSE	--- >	POE	0.198	0.064	3.359***	Supported
H6c	SSE	--- >	EE	0.288	0.058	5.402***	Supported
H7	KSE	--- >	POE	0.210	0.069	3.924***	Supported
H8b	SQ	--- >	POE	0.032	0.049	0.511	Not supported
H8c	SQ	--- >	EE	0.471	0.053	8.457***	Supported
H8d	SQ	--- >	TRUST	0.164	0.058	2.624**	Supported
H9b	CQ	--- >	POE	0.347	0.077	5.192***	Supported
H9c	CQ	--- >	TRUST	0.433	0.075	6.551***	Supported

(*p < 0.05, **p < 0.01, ***p < 0.001).

As seen in Table 6.25 and Figure 6.10, all paths in the model were supported, except for two paths (SI → UKP and SQ → POE). Specifically, the results showed that the majority of hypotheses were supported at the p < 0.001 level. The next points discuss the main results in detail.

*** Using for knowledge provision (UKP)**

It was found that POE, EE and Trust were significant predictors of UKP. POE was the strongest, as it explained approximately 51.6% of the variance in UKP (p < 0.001), followed by Trust (β = 0.17; p < 0.01). EE was the weakest, as it explained 0.11 at p < 0.05 level. Unexpectedly, there was no significant relationship between SI and UKP. These results support H2, H3b, and H5b but do not support H4b.

*** Personal outcome expectancy (POE)**

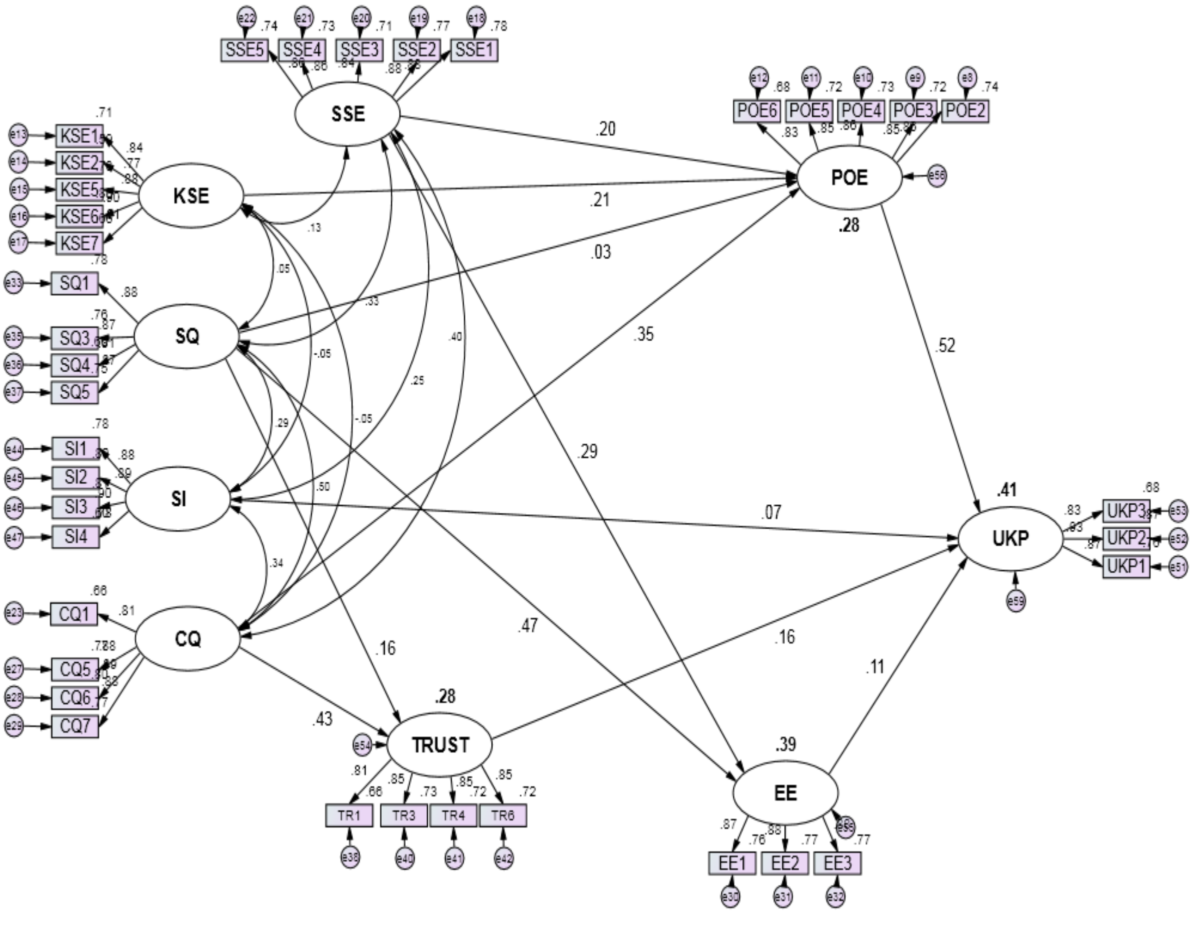
All predictors of POE showed positive and significant association, except for SQ → POE which showed a non-significant relationship. The strongest determinant of POE was CQ (β = 0.347; p < 0.001) followed by SSE (β= 0.198; p < 0.001), and lastly KSE (β = 0.210; p < 0.001). These results support H6b, H8b, and H9b but do not support H8b.

*** Effort expectancy (EE)**

EE was found to have positive and significant paths with SQ and SSE. SQ was the strongest determinant (β = 0.471; p < 0.001), while for SSE (β = 0.288; p < 0.001). Based on these results, it can be explained that H6c and H8c are supported.

*** Relational capital (Trust)**

Similar to Model 1, it was found that Trust is significantly determined by SQ and CQ. CQ was found to be the strongest predictor of Trust (β = 0.433; p < 0.001); while the SQ → Trust path was significant (β = 0.164) at p < 0.001. These results support H8d and H9c.



POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

Figure 6.10: Validation of Model 2 (Use for knowledge provision)

6.5.2.3. Mediation effects

As with Model 1, direct and indirect effects were examined for mediation. Firstly, direct effects without including mediators was run using SEM. All exogenous variables (SSE, SQ, CQ and KSE) showed significant direct relationships with the dependent variable UKP. Secondly, after including the mediators (POE, EE, and Trust), SEM with bootstrapping 1000 and confidence interval 0.95 was used to obtain β with mediation and indirect β. Table 6.26 shows the results of SEM in both runs.

Table 6.26: Direct and indirect effects** (Model 2; N = 330)**

Direct path	Direct effect	Indirect path (Via mediator)	Direct effect (W mediator)	Indirect effect	Observation
SSE → UKP	0.13**	SSE → POE → UKP	0.07 ns	0.09**	Full
KSE→ UKP	0.14**	KSE→ POE → UKP	0.05 ns	0.10**	Full
CQ → UKP	0.33**	CQ → POE → UKP	0.25 **	0.17**	Partial
SSE →UKP	0.13**	SSE → EE → UKP	0.19**	0.05*	Partial
SQ →UKP	0.18**	SQ → EE → UKP	0.24**	0.08*	Partial
SQ →UKP	0.18**	SQ → Trust → UKP	0.19**	0.03*	Partial
CQ →UKP	0.33**	CQ → Trust → UKP	0.28**	0.08**	Partial

*p < 0.05, **p < 0.01, ***p < 0.001.
**** Bootstrapping 1000 and 0.95 confidence interval were applied.

As seen in Table 6.26, POE was found to fully mediate the relationship between SSE and KSE, individually, and UKA. However, it showed partial mediation between CQ and UKA. As the relationship between SQ and POE was not significant, the path SQ→POE→UKA was excluded from the mediation test.

Regarding the mediation effect of EE, the results of SEM with bootstrapping indicated significant indirect partial effects for the path SSE→EE→UKP and path SQ→EE→UKP. Finally, it was found that Trust, also, partially mediated the relationships CQ→UKP and SQ → UKP.

6.5.2.4. Moderation and multi-group analysis – Model 2

Following the same steps conducted in Model 1, gender, age, and experience were examined for moderation affect. The following points discuss the obtained results in more detail.

A. Gender impact

The data set for Model 2 – UKP – was split into two SPSS files: males and females. As recommended by Hair et al. (2010) and Byrne (2010), both samples were examined for model fit. Table 6.27 summarises the results of both models.

Table 6.27: Structural model fit indices – Gender impact - (Model 2)

Index		Cut-off value	Structural model fit indices (Male: N= 244)	Structural model fit indices (Female: N= 99)
x^2		P-value > 0.05	921.40 (df= 607; N= 229)	828.29 (df= 607; N= 94)
x^2/df		< 3	1.518	1.365
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.048 (Low 0.041; High 0.054)	0.063 (Low 0.052; High 0.073)
	SRMR	< 0.08	0.069	0.072
	AGFI	> 0.80	0.798	0.653
Incremental fit indices	CFI	> 0.90	0.954	0.926
	TLI	> 0.90	0.949	0.919
Parsimony fit indices	PNFI	> 0.50	0.799	0.705
	PCFI	> 0.50	0.869	0.844

From Table 6.27, both samples showed an acceptable model fit, except for the female sample which showed AGFI less than the recommended cutoff value (0.80). However, it has been argued by many authors that AGFI is biased and sensitive to sample size (Gefen et al., 2011, Hu and Bentler, 1999, Shah and Goldstein, 2006). Regardless of the AGFI value, other fit statistics showed that both models fit the data satisfactorily.

The next steps of analysis were to obtain the baseline, configural, metric, and scalar models to examine for gender invariance. These models were obtained by modelling both gender models in SEM simultaneously. Table 6.28 shows the results of running the multi-group analysis technique in SEM using AMOS V20.

Table 6.28: Fit statistics for moderation test – Gender impact - (Model 2)

Model	χ^2 (df)	χ^2/df	RMSEA	CFI	TLI	$\Delta\chi^2$ (Δdf)	ΔCFI
Configural (baseline) model	1751.73 (1214)	1.443	0.037	0.945	0.940	--	--
Measurement weights	1776.78 (1242)	1.431	0.037	0.945	0.941	25.05^{ns} (28)	0.000
Structural weights	1788.76 (1254)	1.426	0.036	0.945	0.942	37.03^{ns} (40)	0.000
Structural residuals	1808.33 (1273)	1.421	0.036	0.945	0.943	56.06^{ns} (59)	0.000
Measurement residuals	1842.07 (1310)	1.406	0.036	0.946	0.945	90.34^{ns} (96)	0.001

($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant.

As seen from Table 6.28, based on $\Delta\chi^2$ and ΔCFI tests, all nested models showed insignificant differences from the baseline model, which supports the invariance between the two groups samples (male and female) regarding using professional online communities in providing knowledge, at the overall model level.

At the level of hypothesised individual relationships and to test if POE, EE and UKP are stronger for female respondents than male respondents, MACS was used first to test for the latent mean structures across the two groups. Using CFA with the measurement model validated in section 6.5.2.1, the male model was constrained and used as a reference group while the female model was freely estimated. Table 6.29 shows the results of MACS for Model 2's latent variables.

Table 6.29: Structured mean difference - Gender impact – (Model 2)

Latent variable	Male (Reference group)	Female		
		Estimate	Standard error	t-value
POE	0	.060	.113	.529
KSE	0	.108	.087	1.243
SSE	0	.132	.103	1.286
CQ	0	-.019	.097	-.200
EE	0	.104	.115	.906
SQ	0	.150	.119	1.265
TRUST	0	.039	.113	.346
SI	0	.013	.128	.102
UKA	0	.080	.094	.846

($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant.

Table 6.29 shows that all mean structures, except for CQ, tended to be stronger for the female group sample than for the male group sample; however, these differences were statistically insignificant.

The second step of analysis was to obtain the standardised estimates for every group, and examine every individual path for invariance through calculating $\Delta\chi^2$ for every individual path. Thus, to look for any non-variance relationship (path), every path was examined separately while the other paths, across the model, were freely estimated.

Table 6.30: Standardised estimates for the structural Model 2 (Gender impact)

Hypo.	Path (relationship)			Male		Female		Invariance test	
				St. β	t-value	St. β	t-value	χ^2 (*df*)	$\Delta\chi^2$ (Δdf)
H2	POE	-- >	UKP	0.547	8.174^{***}	0.438	4.241^{***}	1754.53 (1215)	2.80^{ns} (1)
H3b	EE	-- >	UKP	0.085	1.419^{ns}	0.215	1.996^{*}	1752.59 (1215)	0.86^{ns} (1)
H4b	SI	-- >	UKP	0.108	1.833^{ns}	-0.046	0.635^{ns}	1753.57 (1215)	1.84^{ns} (1)
H5b	TRUST	-- >	UKP	0.172	2.829^{**}	0.116	1.128^{ns}	1751.90 (1215)	0.17^{ns} (1)
H6b	SSE	-- >	POE	0.229	3.273^{**}	0.234	2.023^{*}	1751.85 (1215)	0.14^{ns} (1)
H6c	SSE	-- >	EE	0.251	3.816^{***}	0.424	4.688^{***}	1754.00 (1215)	2.27^{ns} (1)
H7	KSE	-- >	POE	0.183	2.906^{**}	0.299	2.896^{**}	1754.08 (1215)	2.35^{ns} (1)
H8b	SQ	-- >	POE	0.034	0.449^{ns}	0.047	0.425^{ns}	1751.75 (1215)	0.02^{ns} (1)
H8c	SQ	-- >	EE	0.473	6.844^{***}	0.486	5.286^{***}	1751.80 (1215)	0.07^{ns} (1)
H8d	SQ	-- >	TRUST	0.086	0.263^{ns}	0.322	2.836^{**}	1754.86 (1215)	3.13^{ns} (1)
H9b	CQ	-- >	POE	0.374	4.577^{***}	0.138	1.121^{ns}	1752.72 (1215)	0.99^{ns} (1)
H9c	CQ	-- >	TRUST	0.502	6.097^{***}	0.290	2.504^{**}	1753.15 (1215)	1.42^{ns} (1)
Squired multiple correlation SMC			POE	0.309		0.245			
			EE	0.370		0.529			
			TRUST	0.306		0.266			
			UKP	0.465		0.325			

- ($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant. St. β: standardised β. df: degree of freedom
- $\Delta\chi^2$ = (unconstrained $\chi^2 - \chi^2$ for each model with constrained path). Unconstrained χ^2 = 1751.73.

As seen in Table 6.30, H3b, H4b, H8b, and H8d were not supported for the male sample. On the other hand, H4b, H5b, H8b, and H9b were not supported for the female sample at all p-value levels. The $\Delta\chi^2$ test revealed that all paths are equivalent and there are no significant differences between males and females regarding using professional online communities for knowledge provision.

These results further supported the equality between males and females regarding using online communities for knowledge provision. Consequently, it can be concluded that the moderating effect of gender (H10.1b and H10.2b) was not supported for Model 2.

B. Age impact

Regarding age impact, after deleting 12 cases due to missing values, the data set was split into two groups: less than 35 years (186 respondents) and over 35 years (132 respondents). Firstly, structural Model 2 was applied for both groups to test for model fit.

Table 6.31: Structural model fit indices - Age impact – (Model 2)

Index		Cut-off value	Structural model fit indices (< 35: N= 186)	Structural model fit indices (> 35: N= 132)
x^2		P-value > 0.05	904.867 (df= 607)	890.68 (df= 607)
x^2/df		< 3	1.491	1.466
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.052 (Low 0.044; High 0.058)	0.060 (Low 0.051; High 0.068)
	SRMR	< 0.08	0.065	0.085
	AGFI	> 0.80	0.767	0.710
Incremental fit indices	CFI	> 0.90	0.945	0.933
	TLI	> 0.90	0.940	0.926
Parsimony fit indices	PNFI	> 0.50	0.776	0.745
	PCFI	> 0.50	0.861	0.850

Both samples showed an acceptable model fit, except for the AGFI index, which showed values less than the recommended cutoff value (0.80). As previously discussed, AGFI is expected to be biased and sensitive to sample size. However, the other fit statistics showed an acceptable and satisfactory model fit for both models.

As recommended by Koufteros and Marcoulides (2006), Hair et al. (2010) and Byrne (2010), the next step of examining for multi-group invariance is to obtain the baseline (unconstrained), metric, scalar models. Using AMOS multi-group invariance analysis, Table 6.32 shows the baseline model and the required nested models to examine age invariance for Model 2.

Table 6.32: Fit statistics for moderation test – Age impact - (Model 2)

Model	χ^2 (df)	χ^2/df	RMSEA	CFI	TLI	$\Delta\chi^2$ (Δdf)	ΔCFI
Configural (baseline) model	1795.26 (1214)	1.479	0.039	0.940	0.934	--	--
Measurement weights	1826.43 (1242)	1.471	0.039	0.939	0.935	31.17^{ns} (28)	0.001
Structural weights	1845.72 (1254)	1.472	0.039	0.939	0.935	50.46^{ns} (40)	0.001
Structural residuals	1872.77 (1269)	1.472	0.039	0.938	0.935	77.52^{ns} (59)	0.002
Measurement residuals	1949.27 (1310)	1.488	0.039	0.934	0.932	154.01^{***}(96)	0.006

($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant.

In the light of the results of the above table and based on the significance of differences, both nested models (measurement and structural) did not show significant differences from the baseline model. Thus, it can be concluded that both age samples are equivalent regarding using professional online communities at the overall model level.

As suggested by Hair et al. (2010) and Byrne (2010), invariance test still needs to be examined at the level of individual hypothesised relationships. Therefore, MACS was conducted first to test for the latent mean structure across the two age groups and further testing for invariance. The > 35 years group was used as a reference group, and thus it was constrained while the other group (< 35 years) was left free to vary. The results of MACS strategy are shown in Table 6.33.

Table 6.33: Structured mean difference - Age impact – (Model 2)

Latent variables	> 35 years (Reference group)	< 35 years		
		Estimate	Standard error	t-value
POE	0	.000	.105	-.001
KSE	0	-.265	.080	-3.326***
SSE	0	.163	.094	1.730
CQ	0	.063	.091	.693
EE	0	-.006	.106	-.055
SQ	0	.050	.111	.448
TRUST	0	-.075	.105	-.714
SI	0	.090	.119	.760
UKP	0	.072	.087	.825

($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant.

From Table 6.33, it can be seen that members who are > 35 years old tend to be stronger regarding KSE, which showed significant t-value (3.326; $p < 0.001$). This age group was also inclined to be stronger regarding EE and Trust; however, the associated t-values indicate that these differences are not significant. On the other hand, the < 35 years old group tended to be stronger and perceive CQ, SQ, SI and UKP more favourably than other latent variables. However, these differences were found to be insignificant at all p-values.

Secondly, the path coefficients were estimated for both groups to detect any differences. Table 6.34 shows the estimated coefficients for both age groups.

Table 6.34: Standardised estimates for the structural Model 2 (Age impact)

Hypo	Path (relationship)			< 35 years		> 35 years		Invariance test	
				St. β	t-value	St. β	t-value	χ^2 (*df*)	$\Delta\chi^2$ (Δ*df*)
H2	**POE**	-- >	**UKP**	0.614	8.403^{***}	0.324	3.731^{***}	1802.62 (1215)	7.36^{**} (1)
H3b	**EE**	-- >	**UKP**	0.086	1.306^{ns}	0.235	2.704^{**}	1796.56 (1215)	1.30^{ns} (1)
H4b	**SI**	-- >	**UKP**	0.119	1.859^{ns}	0.023	0.771^{ns}	1796.03 (1215)	0.77^{ns} (1)
H5b	**TRUST**	-- >	**UKP**	0.056	0.853^{ns}	0.295	3.450^{***}	1798.47 (1215)	3.21^{ns} (1)
H6b	**SSE**	-- >	**POE**	0.157	1.941^{ns}	0.291	3.263^{**}	1796.74 (1215)	1.48^{ns} (1)
H6c	**SSE**	-- >	**EE**	0.201	2.824^{**}	0.378	4.550^{***}	1797.85 (1215)	2.59^{ns} (1)
H7	**KSE**	-- >	**POE**	0.156	2.110^{*}	0.297	3.676^{***}	1799.58 (1215)	4.32^{*} (1)
H8b	**SQ**	-- >	**POE**	0.053	0.599^{ns}	0.017	0.192^{ns}	1795.33 (1215)	0.07^{ns} (1)
H8c	**SQ**	-- >	**EE**	0.526	6.945^{***}	0.427	5.091^{***}	1796.07 (1215)	0.81^{ns} (1)
H8d	**SQ**	-- >	**TRUST**	0.220	2.525^{*}	0.118	1.271^{ns}	1795.68 (1215)	$o.42^{ns}$ (1)
H9b	**CQ**	-- >	**POE**	0.285	3.918^{***}	0.371	3.832^{***}	1795.35 (1215)	0.09^{ns} (1)
H9c	**CQ**	-- >	**TRUST**	0.357	3.049^{**}	0.507	5.145^{***}	1795.92 (1215)	0.66^{ns} (1)
Squired Multiple Correlation SMC			**POE**	0.190		0.426			
			EE	0.382		0.441			
			TRUST	0.258		0.329			
			UKP	0.466		0.395			

- ($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant. St. β: standardised β. df: degree of freedom
- $\Delta\chi^2$ = (unconstrained $\chi^2 - \chi^2$ for each model with constrained path). Unconstrained χ^2 = 1795.26.

Consistent with the main Model 2, the paths SI → UKP and SQ → POE did not show significant relationships for both groups. However, for members < 35 years old, it was found that H3b, H5b, and H6b were not supported; while H8d was not supported for the > 35 years group. These results indicate that some paths in the structural model are not equivalent across the two groups.

Taken together, and based on the above findings, it can be concluded that H11.1b was supported as the relationship between POE and UKP was found to be stronger for members < 35 years. However, H11.2b were not supported for Model 2.

C. Experience impact

As with Model 1, the data set was split into two groups, less experience (less than three years membership) and high experience (more than three years membership). As recommended, the structural Model 2 was first applied to both samples to obtain model fit statistics.

The results shown in Table 6.35 indicate an acceptable and satisfactory model fit statistics, except for AGFI. However, as previously discussed, AGFI tends to be affected by and biased to sample size.

Table 6.35: Structural model fit indices – Experience impact – (Model 2)

Index		Cut-off value	Structural model fit indices (Less experience: N= 123)	Structural model fit indices (High experience: N= 202)
x^2		P-value > 0.05	896.23 (df= 607; N= 123)	912.85 (df= 607; N= 202)
x^2/df		< 3	1.476	1.504
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.062 (Low 0.054; High 0.071)	0.050 (Low 0.043; High 0.057)
	SRMR	< 0.08	0.077	0.068
	AGFI	> 0.80	0.700	0.773
Incremental fit indices	CFI	> 0.90	0.927	0.941
	TLI	> 0.90	0.920	0.935
Parsimony fit indices	PNFI	> 0.50	0.735	0.769
	PCFI	> 0.50	0.845	0.857

The next stage after having an acceptable model fit is to examine both models simultaneously for the baseline, measurement, and structural models. Using multi-group analysis in AMOS, the results are shown in Table 6.36.

Table 6.36: Fit statistics for moderation test – Experience impact - (Model 2)

Model	χ^2 (df)	χ^2/df	RMSEA	CFI	TLI	$\Delta\chi^2$ (Δdf)	ΔCFI
Configural (baseline) model	1809.76 (1214)	1.491	0.039	0.935	0.928	--	--
Measurement weights	1835.89 (1242)	1.478	0.038	0.935	0.930	26.13^{ns} (28)	0.00
Structural weights	1857.37 (1254)	1.481	0.039	0.934	0.930	47.61^{ns} (40)	0.001
Structural residuals	1913.34 (1273)	1.503	0.039	0.930	0.927	92.49^{**} (55)	0.005
Measurement residuals	2004.67 (1310)	1.530	0.041	0.924	0.923	194.90^{***}(96)	0.011

(*p < 0.05, **p < 0.01, ***p < 0.001). ns: non-significant.

As previously discussed, only measurement weights (metric model) and structural weights (scalar model) are examined for the purpose of invariance investigation (Hair et al., 2010, Byrne, 2010). Thus, the structural residuals and the measurement residuals are more stringent than required (Byrne, 2010) and beyond the interest of this study.

The results indicate that the nested models – measurement and structural – were non significantly different from the baseline – unconstrained – model. Thus, based on $\Delta\chi^2$ and ΔCFI, it can be concluded that, at the overall models level, both age groups are invariant.

At every individual path, the MACS was employed to test for the latent mean structures across both experience groups. The high experience group model was constrained and used as a reference group; while the low experience group model was freely estimated. Table 6.37 shows the results of MACS.

Table 6.37: Structured mean difference - Experience impact – (Model 2)

Latent variables	High experience (Reference group)	Less experience		
		Estimate	Standard error	t-value
POE	0	-.598	.102	-5.891^{***}
KSE	0	-.170	.081	-2.109^{*}
SSE	0	-.408	.093	-4.363^{***}
CQ	0	-.605	.087	-6.954^{***}
EE	0	-.631	.103	-6.138^{***}
SQ	0	-.558	.106	-5.248^{***}
TRUST	0	-.429	.104	-4.122^{***}
SI	0	-.501	.117	-4.277^{***}
UKP	0	-.534	.084	-6.347^{***}

($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant.

The results, as seen in Table 6.37, showed that the mean scores were higher for the high experience group than they were for the less experience group. The critical values (t-values) showed significant differences for all latent variables. Thus, it can be concluded that members who have higher experience differ significantly from members who have lower experience.

Secondly, the paths estimations were estimated for both groups to detect any differences. Table 6.38 shows the estimated coefficient for each group individually.

Table 6.38: Standardised estimates for the structural Model 2 (Experience impact)

Hypo	Path (relationship)			Less experience		High experience		Invariance test	
				St. β	t-value	St. β	t-value	χ^2 (*df*)	$\Delta\chi^2$ (Δ*df*)
H2	**POE**	--- >	**UKP**	0.616	6.913^{***}	0.413	5.500^{***}	1812.03 (1215)	2.27^{ns} (1)
H3b	**EE**	--- >	**UKP**	0.133	1.654^{ns}	0.094	1.304^{ns}	1809.78 (1215)	0.02^{ns} (1)
H4b	**SI**	--- >	**UKP**	0.117	1.517^{ns}	-0.026	-0.378^{ns}	1811.51 (1215)	1.75^{ns} (1)
H5b	**TRUST**	--- >	**UKP**	-0.006	-0.073^{ns}	0.249	3.461^{***}	1813.31 (1215)	3.55^{ns} (1)
H6b	**SSE**	--- >	**POE**	0.150	1.580^{ns}	0.254	3.238^{***}	1810.17 (1215)	0.24^{ns} (1)
H6c	**SSE**	--- >	**EE**	0.245	2.845^{**}	0.311	4.205^{***}	1809.78 (1215)	0.02^{ns} (1)
H7	**KSE**	--- >	**POE**	0.301	3.461^{***}	0.175	2.342^{*}	1811.07 (1215)	1.31^{ns} (1)
H8b	**SQ**	--- >	**POE**	0.072	0.753^{ns}	-0.055	-0.680^{ns}	1810.78 (1215)	1.02^{ns} (1)
H8c	**SQ**	--- >	**EE**	0.481	5.401^{***}	0.391	5.120^{***}	1810.72 (1215)	0.96^{ns} (1)
H8d	**SQ**	--- >	**TRUST**	0.231	2.293^{*}	0.086	1.105^{ns}	1810.43 (1215)	0.67^{ns} (1)
H9b	**CQ**	--- >	**POE**	0.457	4.021^{***}	0.096	1.167^{ns}	1814.67 (1215)	4.91^{*} (1)
H9c	**CQ**	--- >	**TRUST**	0.416	3.959^{***}	0.395	4.635^{***}	1810.72 (1215)	0.96^{ns} (1)
Squired Multiple Correlation SMC			**POE**	0.123		0.369			
			EE	0.299		0.374			
			TRUST	0.188		0.323			
			UKP	0.266		0.485			

- ($^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$). ns: non-significant. St. β: standardised β. df: degree of freedom
- $\Delta\chi^2$ = (unconstrained $\chi^2 - \chi^2$ for each model with constrained path). Unconstrained χ^2 = 1809.76.

As seen in Table 6.38, H4b and H8b were not supported for both models. Moreover, the estimated coefficient and the associated critical value indicated that H3b was insignificant for both groups. Regardless, the results indicate that two paths were not significant for the less experience group (H5b and H6b); while, on the other hand, two different paths were not significant for the high experience group (H8d and H9b). The results also indicate that the less experience group is more influenced by CQ to perceive the personal benefits (POE) of providing their knowledge. All other paths were found equal between the two experience groups.

In summary, the structural path coefficients for Model 2 did not show significant difference between the high experience group and the less experience group. Thus, the hypothesised moderating effects of experience (H12.1b and H12.2b) were not supported for Model 2.

6.5.3. Model 3: Use for knowledge acquisition and use for knowledge provision

In Model 3, all members who neither used the professional online community for knowledge acquisition nor used it for knowledge provision were excluded. Thus, the sample size for examining Model 3 was 327. The measurement model was re-examined for validity and reliability before testing the research hypotheses (structural model).

6.5.3.1. Measurement model fit and assessment of validity (Model 3; N= 327)

The results of CFA revealed that all variances are positive and no identification problems were found. The measurement model fit statistics were: x^2= 1209.135 (p= .000, *df*= 847); x^2/df = 1.428; RMSEA= 0.036 (Lo .031; Hi .041); AGFI= 0.834; SRMR= 0.036; CFI= 0.969; TLI= 0.965; PNFI= 0.810; PCFI= 0.868. The overall fit indices showed an acceptable and satisfactory measurement model fit. Furthermore, all measurement parameters were accompanied by SMC values above the cutoff value of 0.50 (ranging from 0.55 to 0.86), and all standardised regression weights (factor loadings) were above 0.7 (ranging from 0.74 to 0.92).

For the construct validity, the following table shows that all AVE values are above 0.5, which indicates an acceptable and sufficient convergent validity at the constructs level. Regarding discriminant validity, for each construct, the square root of the AVE (diagonal cells) is greater than the correlations (off-diagonal cells) with the other constructs, which indicates acceptable discriminant validity.

Table 6.39: CR, AVE, and correlation matrix (Model 3; N= 327)

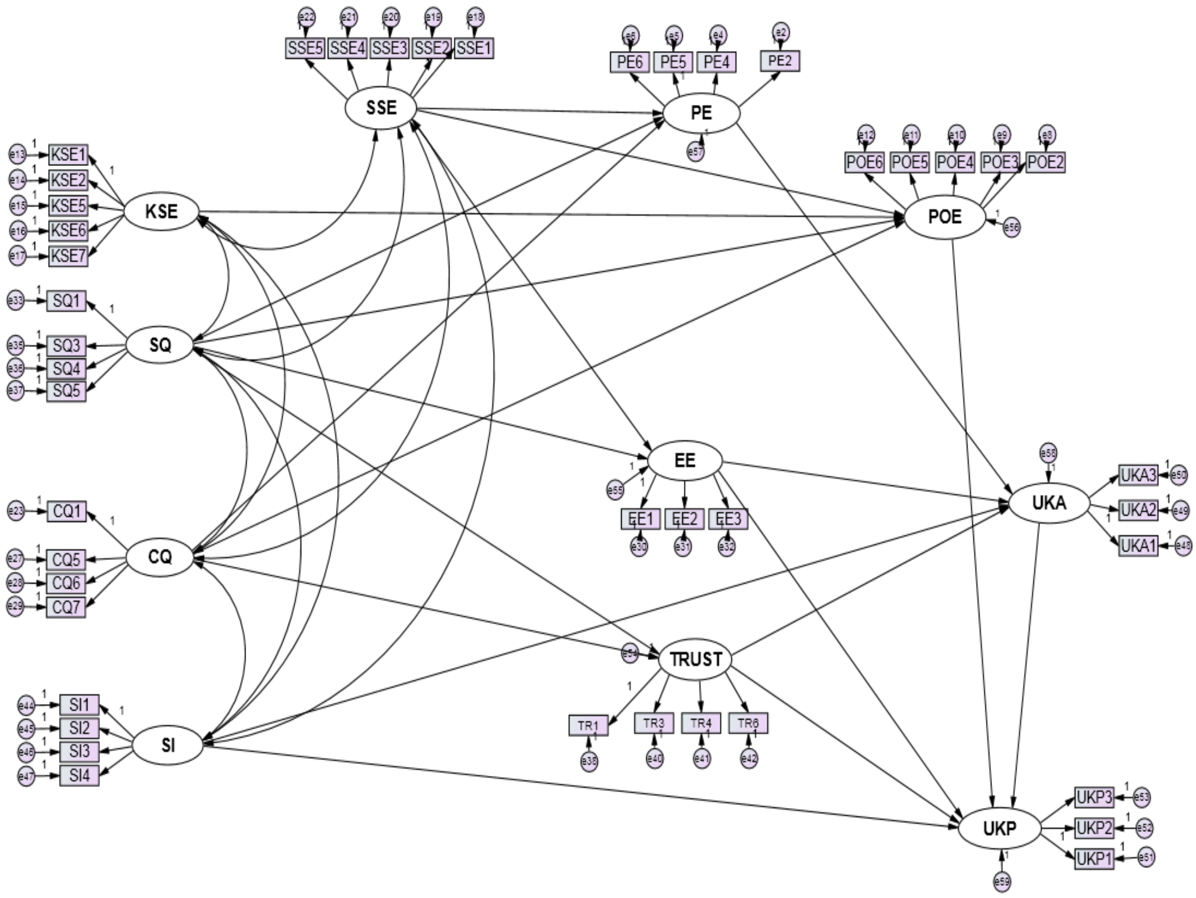
	CR	AVE	UKA	PE	POE	KSE	SSE	CQ	EE	SQ	TRUST	SI	UKP
UKA	0.909	0.771	**0.878**										
PE	0.907	0.709	0.617	**0.842**									
POE	0.927	0.719	0.428	0.450	**0.848**								
KSE	0.923	0.707	0.032	0.083	0.221	**0.841**							
SSE	0.936	0.746	0.444	0.350	0.376	0.141	**0.864**						
CQ	0.922	0.747	0.498	0.449	0.420	-0.048	0.390	**0.864**					
EE	0.906	0.763	0.527	0.474	0.357	0.077	0.430	0.561	**0.873**				
SQ	0.921	0.744	0.450	0.461	0.273	0.046	0.338	0.497	0.564	**0.862**			
TRUST	0.906	0.707	0.414	0.386	0.330	0.140	0.203	0.503	0.528	0.371	**0.841**		
SI	0.920	0.742	0.330	0.259	0.206	-0.042	0.244	0.326	0.329	0.299	0.215	**0.861**	
UKP	0.912	0.777	0.538	0.375	0.604	0.144	0.352	0.473	0.384	0.401	0.391	0.243	**0.881**

6.5.3.2. The structural model (Model 3; N= 327)

The structural model consists of the regressions among the eight independent and mediating latent factors: system quality (SQ), content quality (CQ), system self-efficacy (SSE), knowledge self-efficacy (KSE), relational capital (TRUST), effort expectancy (EE), performance expectancy (PE), personal outcome expectancy (POE) and social influence (SI), and the regressions between these latent factors and using professional online communities for knowledge sharing: UKA and UKP (see research framework and hypotheses in Section 3.7). The following sections discuss the main processes of SEM analysis (Schumacker and Lomax, 2010).

a. Model specification and identification

All latent variables were measured by using multi-item scales, which constitute the measurement model section; each item has its related error term as shown in Figure 6.11.



UKA – Using for knowledge acquisition. PE – Performance expectancy. POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

Figure 6.11: Model 3 specification

Conceptually, all indicators for each latent variable are reflective. All latent variables were measured by three indicators or more. As seen in Figure 6.11, the structural model is a recursive model since it has no reciprocal causation, no feedback loops, and no correlated error terms. Furthermore, as discussed in section 6.2, all assumptions that might affect the model estimation such as missing values, outliers, normality, and multicollinearity were met and the appropriate remedies were used.

b. Model estimation and testing

SEM using IBM' AMOS v20 was employed to test and to evaluate the structural model. As discussed above, all members who never used the community for either knowledge acquisition or knowledge provision were excluded. Consequently, the sample size used to test model one was 327. As suggested by Byrne (2010: 83); Schumacker and Lomax (2010: 99), both 0.05 and 0.01 Critical N (CN) values were > 200 (229 and 237 respectively), which leads us to conclude that the sample size is satisfactory and considered adequate. Using the ML estimation method, the findings revealed the absence of any identification problems. The model notes degree of freedom revealed an over-identified model.

For the measurement model evaluation, all critical ratio values are greater than 1.96, which indicates that all of the parameter estimates are significantly different from zero. Furthermore, the results indicate that the model is free from negative error variances and standardised parameter estimations that exceed the absolute value |1.0|, which means that the model is free of problems such as outliers (Bollen 1987), under-identification (Boomsma and Hoogland, 2001), misspecification (Bollen, 1989, Byrne, 2010) or sampling problems (Boomsma, 1983, Anderson and Gerbing, 1988).

At the overall level, the model fit indices statistics for the first run revealed an acceptable structural model as the Table 6.40 shows.

Table 6.40: Structural Model 3 fit indices (N= 327)

Index		**Cut-off value**	**Structural Model 3 fit indices**
x^2		> 0.05	1342.391 (df= 872; p = .000)
x^2/df		< 3	1.539
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.041 (Lo 0.036; Hi 0.045)
	SRMR	< 0.08	0.065
	AGFI	> 0.80	0.823
Incremental fit indices	CFI	> 0.90	0.960
	TLI	> 0.90	0.956
Parsimony fit indices	PNFI	> 0.50	0.824
	PCFI	> 0.50	0.885

The first measure used to test the overall model fit was x^2. The obtained x^2 value with the accompanied p-value (.000) indicated that the model does not fit the data and should be rejected. However, as discussed above, x^2 is a function of the sample size and should not be used with large sample sizes (Hair et al., 2010, Schumacker and Lomax, 2010). However, the ratio of x^2 to the model's *df* was satisfactory (1.539) and falling below the recommended level of 3.0 as suggested by Kline (2004), and 5.0 as suggested by Hair et al. (2010).

The next fit measure used in this study was RMSEA. With sample size > 250 and observed variables ≥ 30, Hair et al. (2010) recommend a cutoff value for RMSEA (< 0.07). The current model shows a value of 0.041 which indicates that the data fits the model well. AGFI, which is considered as an absolute fit index that adjusts the number of *df* to measure "*the relative amount of variance and covariance in S that is jointly explained by Σ*" (Byrne, 2010: 77), showed an acceptable value (0.82) which falls slightly above the recommended cutoff value (0.80) as suggested by Hair et al. (2010), Straub et al. (2004).

CFI and TLI are incremental fit indices providing a measure of complete covariation in the data and require a cutoff value > 0.90 (Bentler, 1992, Hu and Bentler, 1999) to show an acceptable fit. The current model shows a value of 0.94 for both indices. These values prove an acceptable and satisfactory model fit. Although the parsimony fit indices, PNFI and PCFI, were mainly developed to compare different models through adjusting incremental fit indices, they fall far above the recommended cutoff value (0.50). Thus, it was concluded that structural Model 3 shows good fit and, thus, could be used to explain the research hypotheses.

c. Hypotheses testing

After demonstrating a satisfactory structural model fit, the next step is to test and examine the research hypotheses. Each path in the structural model between two latent variables, as seen in Figure 6.12, represents a specific research hypothesis. First, the squared multiple correlation SMC for the structural equations was evaluated. SMC values represent the proportion of endogenous – criterion – variables' variance that is explained by the exogenous – predictors – variables. The higher the SMC values are, the greater is the joint explanatory power of the exogenous variables. The SMC values for UKA and UKP were 0.45 and 0.44, respectively. Thus, it can be explained that 45% of the variance associated with using professional online communities for knowledge acquisition was explained by PE, Trust, EE and SI. For using professional online communities for providing knowledge UKP, it was found that approximately 44% of the variance associated with UKP was determined by Trust, POE and UKA. Furthermore, it was found that 32% of the variance of PE was explained by SQ, CQ and SSE; while 28% of the variance of POE was determined by SQ, CQ, SSE and KSE. Finally, 41% of the variance of effort expectancy was explained by SSE and SQ; while 28% of the variance of Trust was explained by SQ and CQ.

Table 6.41: Path results and hypotheses testing (Model 3; N= 327)

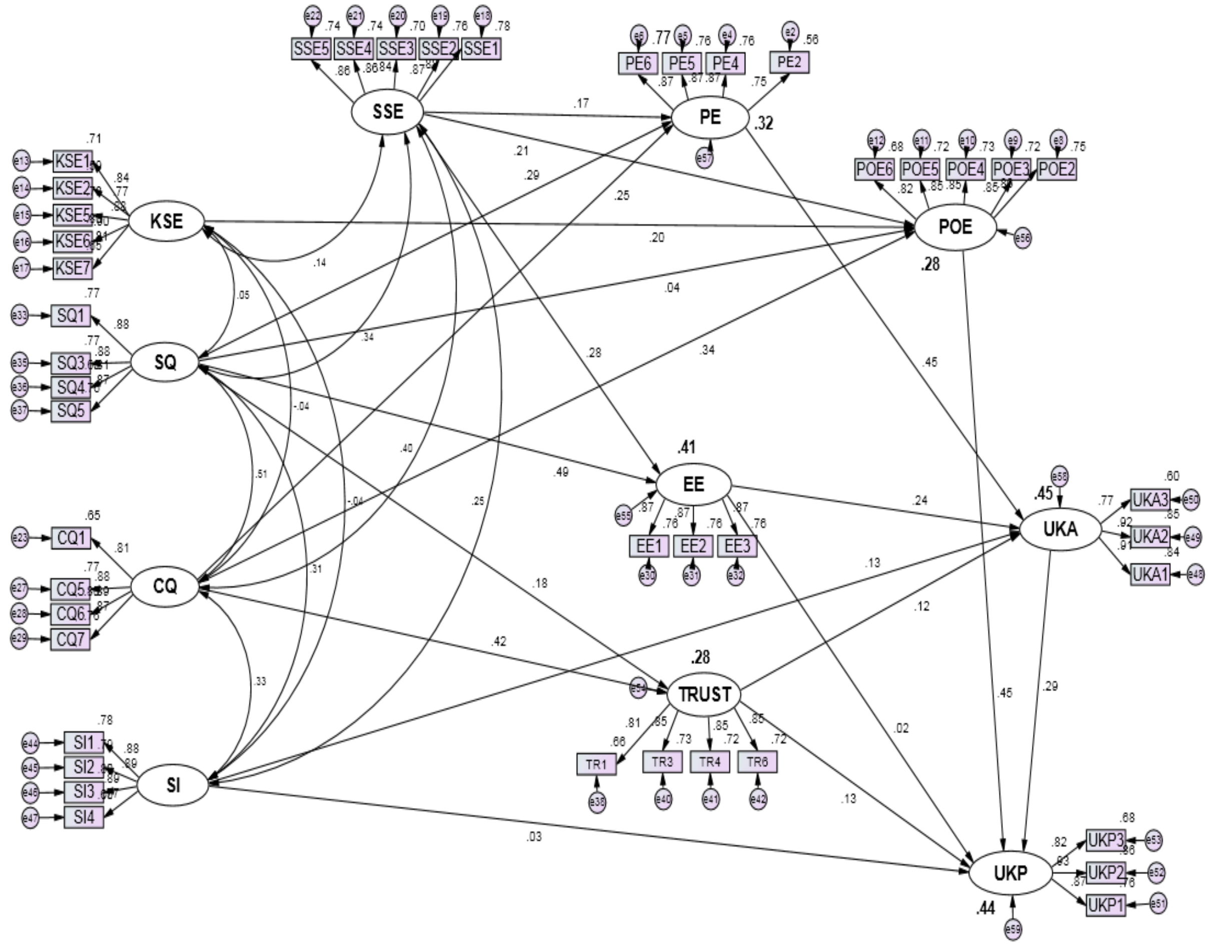
Hypothesis	Path (relationship)			Standardized β	S.E	t-value	Result
H1	PE	--->	UKA	0.454	0.054	8.311***	Supported
H2	POE	--->	UKP	0.453	0.044	8.397***	Supported
H3a	EE	--->	UKA	0.238	0.052	4.518***	Supported
H3b	EE	--->	UKP	0.016	0.044	0.292	Not supported
H4a	SI	--->	UKA	0.128	0.041	2.609*	Supported
H4b	SI	--->	UKP	0.033	0.034	0.655	Not supported
H5a	TRUST	--->	UKA	0.117	0.053	2.306*	Supported
H5b	TRUST	--->	UKP	0.127	0.045	2.413*	Supported
H6a	SSE	--->	PE	0.171	0.058	2.989**	Supported
H6b	SSE	--->	POE	0.207	0.056	3.505***	Supported
H6c	SSE	--->	EE	0.278	0.054	5.226***	Supported
H7	KSE	--->	POE	0.205	0.068	3.824***	Supported
H8a	SQ	--->	PE	0.291	0.052	4.616***	Supported
H8b	SQ	--->	POE	0.040	0.060	0.636	Not supported
H8c	SQ	--->	EE	0.592	0.051	8.806***	Supported
H8d	SQ	--->	TRUST	0.182	0.049	2.875**	Supported
H9a	CQ	--->	PE	0.250	0.064	3.859***	Supported
H9b	CQ	--->	POE	0.340	0.064	5.060***	Supported
H9c	CQ	--->	TRUST	0.417	0.066	6.240***	Supported
H13	UKA	--->	UKP	0.287	0.048	4.919***	Supported

(*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$).

According to the proposed theoretical model, there are twenty hypotheses to represent the proposed relationships among the research latent variables. Table 6.41 shows the parameter estimates with the accompanying significance level. The test statistics used was the C.R. (t-value), which indicates whether the parameter estimate is significant from zero (Byrne, 2010). As seen in Table 6.41 and Figure 6.7, the results indicate that all relationships (path estimates) were statistically significant, except for H3b, H4b, and H8b.

*** Using for knowledge acquisition (UKA)**

The study's results support the hypotheses that UKA is directly influenced by PE, EE, SI and Trust. In more detail, these relationships were tested by examining the path coefficients. The path coefficients were found positive (β = 0.45; 0.24; 0.13; 0.12 respectively) and significant (t-value = 8.092**; 4.565***; 2.618***; 2.452** respectively). Thus, hypotheses H1, H3a, H4a, and H5a were supported.



UKA – Using for knowledge acquisition. PE – Performance expectancy. POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

Figure 6.12: Validation of Model 3

*** Using for knowledge provision (UKP)**

UKP was found to be influenced by POE, Trust, and UKA. The path coefficient from POE to UKP was found positive and significant (β = 0.45; $p < 0.001$); thus hypothesis H2 was supported. In a similar manner, hypothesis H5b was supported, as UKP was found to be influenced by Trust (β = 0.13; $p < 0.05$). As discussed above, this study proposed a significant and positive impact for UKA on UKP. The path coefficient value indicates a strong confirmation of a significant and positive relationship between UKA and UKP (β = 0.29; $p < 0.001$) which supports H10. However, the results revealed no significant relationship between EE → UKP (H3b), and SI → UKP (H4b).

*** Performance expectancy (PE)**

The results indicated that PE is significantly influenced by SSE, SQ and CQ. The standardised coefficients for the three relationships were positive and significant: SSE → PE ($\beta = 0.17$; $p < 0.001$); SQ → PE ($\beta = 0.29$; $p < 0.001$); and CQ→PE ($\beta = 0.25$; $p < 0.001$). These results support H6a, H8a, and H9a.

*** Personal outcome expectancies (POE)**

The results indicated that POE was significantly influenced by SSE, and KSE and CQ, while was not influenced by SQ. The coefficient values for the three relationships were positive and significant: SSE → POE ($\beta = 0.21$; $p < 0.001$); KSE → POE ($\beta = 0.20$; $p < 0.001$); and CQ → POE ($\beta = 0.34$; $p < 0.001$). These results support H6b, H7, and H9b. However, contrary to expectations, the results did not support a significant relationship between SQ and POE ($\beta = 0.04$; $p > 0.05$) which indicates that H8b is not supported.

*** Effort expectancy (EE)**

The results, moreover, proved a positive effect of SSE and SQ on EE. The path coefficient SSE → EE was found significant ($\beta = 0.28$; $p < 0.001$). Similarly, the path coefficient SQ → EE was significant ($\beta = 0.49$; $p < 0.001$). These results support H6c and H8c.

*** Relational capital (Trust)**

According to the theoretical foundation, this study proposed that SQ and CQ are significant predictors of TRUST. The statistical results indicate strong positive and significant confirmation of these relationships. The path coefficient SQ → TRUST was statistically significant ($\beta = 0.18$; $p < 0.001$), and the path coefficient CQ → TRUST was also significant ($\beta = 0.42$; $p < 0.001$). These results support H8d and H9c.

6.6. Alternative models

Each proposed model, in the current study, represents one combination of expected relationships among the latent variables (constructs) that have been investigated. The underlying theoretical foundations for these models have been presented and discussed in detail in Chapters Two and Three. However, a number of research scholars have recommended that alternative models should be developed and compared to the original hypothesised model(s) (Anderson and Gerbing, 1988, Edwards and Bagozzi, 2000, Bollen and Long, 1993). An alternative model depicts "*the relationships between the construct and measures as spurious, due to the influence of one or more common* *causes*” (Edwards and Bagozzi, 2000: 165). In a SEM theorised model, the proposed model should be compared with the alternative model using the nested modelling test, thereby assessing the need for different paths (Anderson and Gerbing, 1988). As discussed earlier in Chapter Four, modification indices and specification search can be used to revise and develop alternative (nested) models through altering one or more structural relationships, for example adding or deleting paths. However, as stated by Hair et al. (2010) and Shah and Goldstein (2006), structural modifications and the addition of new paths “*must have strong theoretical as well as empirical support*” (Hair et al., 2010: 747).

A review of the modification indices (regression weights), resulting from the assessment of the three theorised models, suggests that an additional structural path from effort efficacy (EE) to relational capital (Trust) should be added. Inclusion of this structural path is supported by the results of a study by Gefen et al. (2003a), which reported a positive and significant relationship between perceived ease of use and trust in e-vendors. Furthermore, as discussed earlier in Chapter Three, a number of researchers operationalised ease of use as a key dimension of system quality (e.g. Bharati and Chaudhury, 2004, Wang and Liao, 2008). The link between system quality and trust was rationalised in detail in Chapter Three. Thus, a new path (EE → Trust) was added to every theoretical model. These alternative models and the corresponding SEM findings are discussed in the following sub-sections.

6.6.1. Alternative Model 1

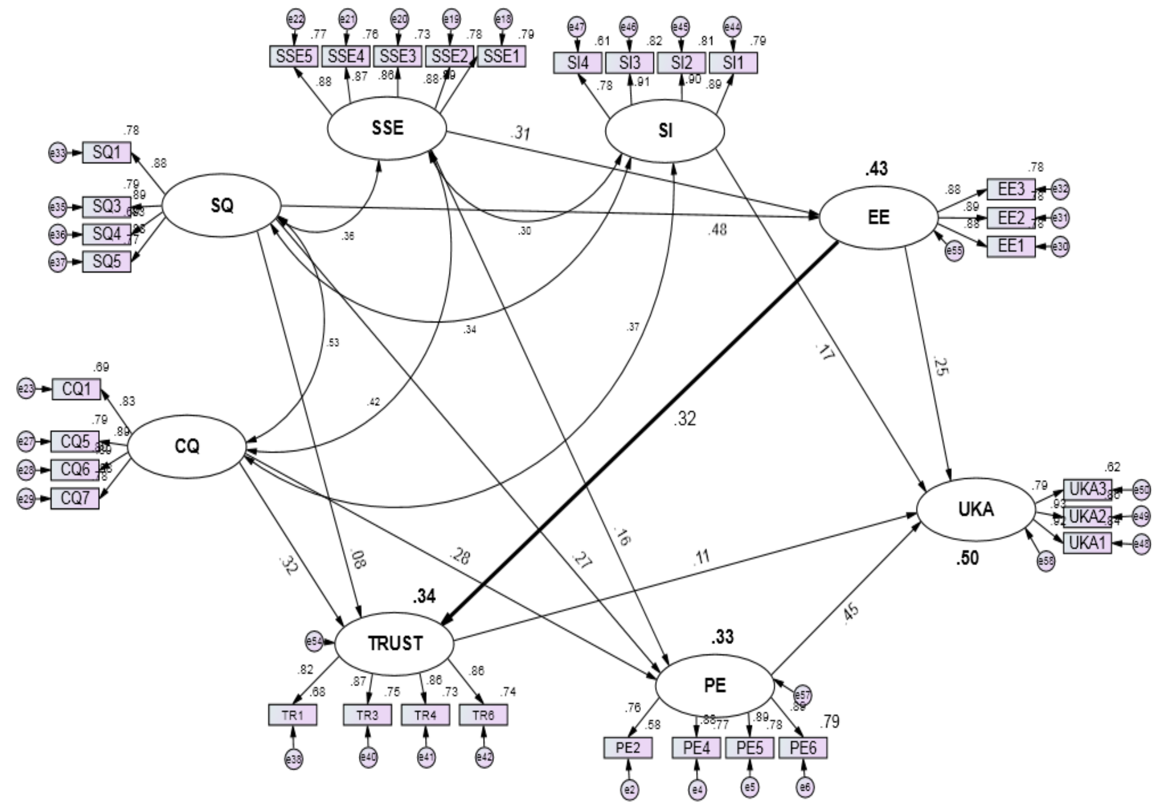
Model 1 was developed to examine the factors that influence using professional online communities for knowledge acquisition UKA. As figure 6.6 (Section 6.5.1.2) illustrates, seven factors were found to explain about 50% of the variance of UKA. All paths showed significant and positive relationships. However, Based on the specification search, effort efficacy was found to be an antecedent of trust.

Having added the new path, SEM using AMOS v20 was run to obtain fit statistics and estimates. The findings of SEM revealed a satisfactory model fit. Table 6.42 compares the GOF statistics for Model 1 and the nested (alternative) Model 1.

Table 6.42: Model 1 and alternative Model 1 fit indices (N= 349)

Index		Cut-off value	Model 1	Alternative Model 1 (EE → Trust)
x^2		> 0.05	651.652 (df= 417; p = .000)	630.202 (df= 416; p= .000)
x^2/df		< 3	1.563	1.515
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.040 (Lo 0.034; Hi 0.046) P-close 0.998	0.038 (Lo 0.032; Hi 0.044) P-close 0.999
	SRMR	< 0.08	0.060	0.054
	AGFI	> 0.80	0.870	0.875
Incremental fit indices	CFI	> 0.90	0.975	0.977
	TLI	> 0.90	0.972	0.974
Parsimony fit indices	PNFI	> 0.50	0.837	0.837
	PCFI	> 0.50	0.874	0.874

For the alternative Model 1, as seen in Table 6.42, all GOF statistics showed satisfactory and acceptable fit, except for PNFI and PCFI that showed same fit for both models. However, as recommended by researchers (Anderson and Gerbing, 1988, Cheung and Rensvold, 2002, Malhotra, 2010), when models are nested, $\Delta\chi^2$ and ΔCFI can be used to compare the competing models. For $\Delta\chi^2$, the equation used may be presented as: $\Delta\chi^2 = \chi^2_{\text{df (M1)}} - \chi^2_{\text{df (M2)}}$ (Malhotra, 2010: 737). By applying this equation, it was found that $\Delta\chi^2$ (21.450; Δ *df* = 1) was larger than the tabulated value of χ^2 (10.83; p < 0.001), indicating that the alternative Model 1 showed better fit. As for ΔCFI, it was found to be less than 0.01 (0.977 – 0.975 = 0.002), indicating insignificant difference between the original Model 1 and the alternative Model 1.



UKA – Using for knowledge acquisition. PE – Performance expectancy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence.

Figure 6.13: Validation of alternative Model 1 (N= 349)

In terms of the variance explained, the squared multiple correlation SMC (i.e., R^2) reveals that 50.1% of variance of UKA was counted for the alternative Model 1 indicating insignificant difference between both models regarding variance explained in using professional online communities for knowledge acquisition. This insignificant difference indicates that the structural Model 1 performs perfectly in predicting use of professional online communities for knowledge acquisition. Furthermore, as seen in the Figure 6.13, SMC for the relational capital – Trust – is 34% indicating slightly higher variance compared to the original model (31%). However, re-estimation of all relationships resulted in significant paths, except for the path SQ →Trust. In other words, all theoretical hypotheses in the alternative Model 1 were supported, except H8d. Table 6.43 presents the results of hypotheses testing after adding a new path relationship (EE →Trust).

Table 6.43: Path results (original Model 1 vs. alternative Model 1; N= 349)

Hypothesis	Path (relationship)			Original Model 1 estimates		Alternative Model 1 estimates	
				St. β	t-value	St. B	t-value
H1	**PE**	--->	**UKA**	0.448	8.803***	0.449	8.963***
H3a	**EE**	--->	**UKA**	0.247	5.005***	0.246	4.585***
H4a	**SI**	--->	**UKA**	0.171	3.694***	0.172	3.743***
H5a	**TRUST**	--->	**UKA**	0.116	2.429*	0.106	2.039*
H6a	**SSE**	--->	**PE**	0.159	2.894**	0.161	2.930**
H6c	**SSE**	--->	**EE**	0.307	6.078***	0.305	6.033***
H8a	**SQ**	--->	**PE**	0.274	4.512***	0.273	4.485***
H8c	**SQ**	--->	**EE**	0.487	9.228***	0.483	9.137***
H8d	**SQ**	--->	**TRUST**	0.225	3.693***	0.085	1.211 ns
H9a	**CQ**	--->	**PE**	0.280	4.494***	0.279	4.429***
H9c	**CQ**	--->	**TRUST**	0.408	6.428***	0.315	5.136***
New path	**EE**	--->	**TRUST**	--	--	0.316	4.858***

(*p < 0.05, **p < 0.01, ***p < 0.001, ns = non significant).

As seen in Table 6.43, as a result of adding the new path EE → Trust, only two of the path estimates from Model 1 showed some changes as expected. The path estimate SQ→Trust (β = 0.08; p > 0.05) is no longer significant, and the path estimate CQ → Trust remains significant but is considerably smaller than in the original model.

Similarly to the original Model 1, Trust was found to partially mediate the relationship between CQ, EE and UKA. Both direct effects, with and without, and indirect effect showed significant estimates. Furthermore, the SEM multi-group analysis technique was used to obtain the baseline, measurement (metric) and structural (scalar) models to test for moderation. Table 6.44 shows the results of these models for all the proposed moderators.

Table 6.44: Fit statistics for moderation tests (Alternative Model 1)

Moderators	Models	χ^2 (df)	χ^2/df	RMSEA	CFI	TLI	$\Delta\chi^2$ (df)	ΔCFI
Gender impact	Unconstrained (baseline model)	1151.35 (832)	1.38	0.034	0.965	0.963	--	--
	Measurement weights (metric model)	1167.66 (855)	1.37	0.033	0.966	0.963	16.31 (23) ^{ns}	0.000
	Structural weights (scalar model)	1182.64 (867)	1.36	0.033	0.966	0.963	31.29 (35) ^{ns}	0.000
Age impact	Unconstrained (baseline model)	1139.51 (832)	1.37	0.033	0.966	0.962	--	--
	Measurement weights (metric model)	1164.52 (855)	1.36	0.033	0.966	0.963	25.01 (23) ^{ns}	0.001
	Structural weights (scalar model)	1181.97 (867)	1.36	0.033	0.965	0.963	42.46 (35) ^{ns}	0.001
Experience impact	Unconstrained (baseline model)	1141.29 (832)	1.37	0.033	0.962	0.958	--	--
	Measurement weights (metric model)	1160.24 (855)	1.36	0.032	0.963	0.960	18.95 (23) ^{ns}	0.002
	Structural weights (scalar model)	1231.74 (867)	1.37	0.033	0.961	0.958	90.45 (35)***	0.000

(*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$). ns: non-significant.

Table 6.44 shows, gender and age showed insignificant differences ($\Delta\chi^2$) for the metric and scalar nested models. As for experience, the findings indicate that only the scalar model showed significant difference between the two experience groups. Thus and based on these results and at the overall invariance level, both models (alternative Model 1 and original Model 1) showed similar results in terms of the effect of gender, age and experience on using professional online communities for knowledge acquisition.

6.6.2. Alternative Model 2

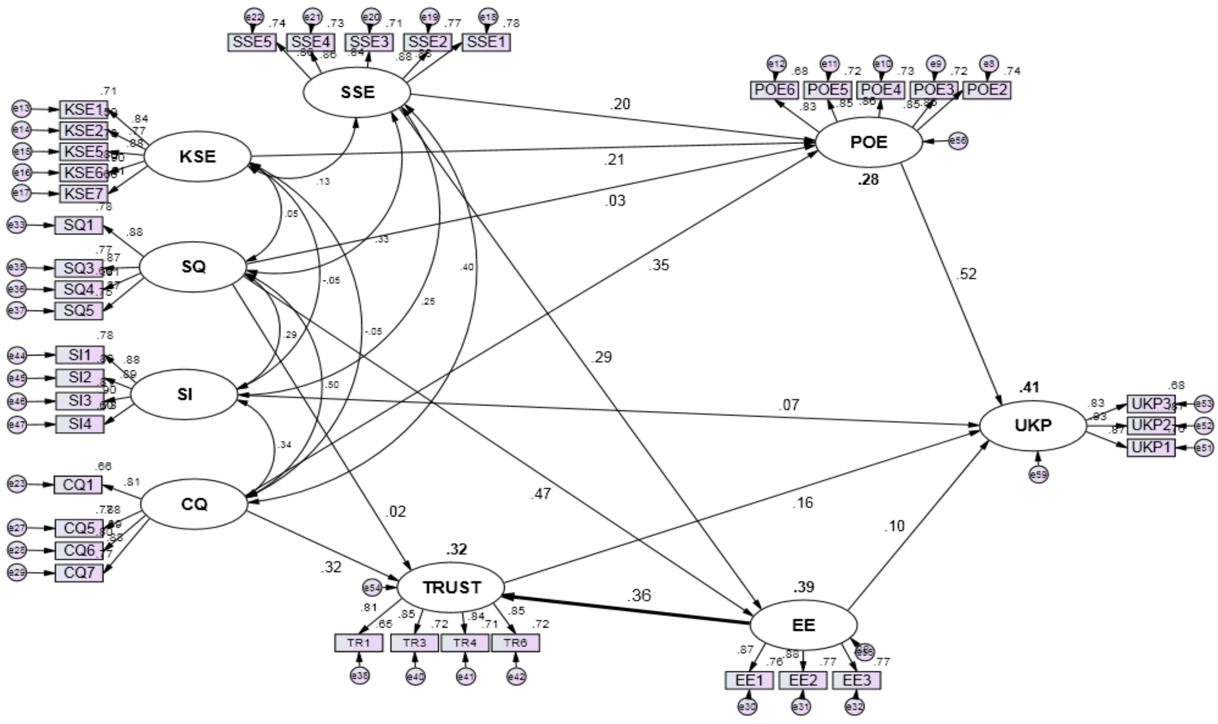
Model 2 was developed to examine the factors that influence using professional online communities for knowledge provision UKP. Eight factors were found to explain 41% of the variance of UKP. All paths, except for two paths SI → UKP and SQ → POE, showed significant and positive relationships. However, Based on the specification search together with theoretical basis, effort efficacy was suggested to be a predictor of trust. Thus, a new path was added to Model 2 (EE → Trust).

SEM using AMOS v20 was run to obtain fit statistics and estimates for the alternative Model 2. The findings of SEM revealed a satisfactory model fit. Table 6.45 compares the GOF statistics for Model 2 and the alternative Model 2.

Table 6.45: Model 2 and alternative Model 2 fit indices (N= 330)

Index		Cut-off value	Model 2	Alternative Model 2 (EE → Trust)
x^2		> 0.05	986.005 (df=607; p= .000)	960.539 (df= 606; p= .000)
x^2/df		< 3	1.624	1.858
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.044 (Lo 0.039; Hi 0.048) P-close 0.985	0.042 (Lo 0.037; Hi 0.047) P-close 0.996
	SRMR	< 0.08	0.061	0.057
	AGFI	> 0.80	0.842	0.846
Incremental fit indices	CFI	> 0.90	0.962	0.964
	TLI	> 0.90	0.958	0.961
Parsimony fit indices	PNFI	> 0.50	0.826	0.827
	PCFI	> 0.50	0.876	0.877

For the alternative Model 2, as the above table shows, all GOF statistics demonstrated better fit. It was found that $\Delta\chi^2$ (25.466; Δ *df* = 1) was larger than the tabulated value of χ^2 (10.83; $p < 0.001$) indicating that the alternative Model 1 showed significant better fit. In terms of ΔCFI, it showed equivalent comparative fit (0.974 – 0.962 = 0.002), indicating that the difference between the original Model 2 and the alternative Model 2 was insignificant.



POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

Figure 6.14: Validation of alternative Model 2 (N= 330)

As SMC values (bold numbers) show in the Figure 6.14, 41% of variance of UKA was counted for the alternative Model 1 indicating insignificant difference between this model and the original model (41%). This insignificant difference indicates that the structural Model 2 performs perfectly in predicting use of professional online communities for knowledge provision. Furthermore, as seen in Figure 6.14, SMC for the relational capital – Trust – is 32% indicating slightly higher variance compared to the original model (28%). However, re-estimation of all relationships resulted in significant paths, except for the path SQ →Trust. In other words, all theoretical hypotheses in the alternative Model 2 were supported except for H8d. Table 6.46 presents the results of hypotheses testing after adding a new path relationship (EE → Trust).

Table 6.46: Path results (Model 2 vs. Alternative Model 2; N= 330)

Hypothesis	Path (relationship)			Model 2		Alternative Model 2 EE → Trust	
				St. β	t-value	St. β	t-value
H2	POE	--- >	UKP	0.516	9.292***	0.517	9.392***
H3b	EE	--- >	UKP	0.109	2.083*	0.104	1.803^{ns}
H4b	SI	--- >	UKP	0.072	1.434 ^{ns}	0.073	1.475^{ns}
H5b	TRUST	--- >	UKP	0.165	3.147**	0.156	2.693**
H6b	SSE	--- >	POE	0.198	3.359***	0.199	3.384***
H6c	SSE	--- >	EE	0.288	5.402***	0.286	5.347***
H7	KSE	--- >	POE	0.210	3.924***	0.21	3.931***
H8b	SQ	--- >	POE	0.032	0.511 ^{ns}	0.031	0.497^{ns}
H8c	SQ	--- >	EE	0.471	8.457***	0.467	8.383***
H8d	SQ	--- >	TRUST	0.164	2.624**	0.015	0.212^{ns}
H9b	CQ	--- >	POE	0.347	5.192***	0.346	5.18***
H9c	CQ	--- >	TRUST	0.433	6.551***	0.321	5.075***
New path	EE	--- >	Trust			0.359	5.307***

(*p < 0.05, **p < 0.01, ***p < 0.001, ns – non-significant)

As seen in the Table 6.46, as a result of adding the new path EE → Trust, similarly to Model 1, the path estimate of SQ → Trust (β = 0.02; p > 0.05) is no longer significant. However, the path estimate CQ→Trust remains significant but is slightly smaller than in the original Model 2.

Trust was found to partially mediate the relationship between CQ, EE and UKA. Both direct effects, with and without including the mediating variable, and indirect effect showed significant estimates. Furthermore, the SEM multi-group analysis technique was used to obtain the baseline, measurement and structural models to test for moderation. Table 6.47 shows the results of these models for all the proposed moderators.

Table 6.47: Fit statistics for moderation tests (Alternative Model 2)

Moderators	Models	χ^2 (df)	χ^2/df	RMSEA	CFI	TLI	$\Delta\chi^2$ (df)	ΔCFI
Gender impact	Unconstrained (baseline model)	1727.99 (1212)	1.426	0.036	0.947	0.942	--	--
	Measurement weights (metric model)	1753.18 (1240)	1.414	0.036	0.948	0.944	25.19 (28) ^{ns}	0.001
	Structural weights (scalar model)	1765.47 (1253)	1.409	0.036	0.948	0.944	37.48 (41) ^{ns}	0.001
Age impact	Unconstrained (baseline model)	1767.71 (1212)	1.459	0.038	0.942	0.937	--	--
	Measurement weights (metric model)	1798.80 (1240)	1.451	0.038	0.942	0.938	31.09 (28) ^{ns}	0.000
	Structural weights (scalar model)	1819.25 (1253)	1.452	0.038	0.941	0.937	51.54 (41) ^{ns}	0.001
Experience impact	Unconstrained (baseline model)	1783.16 (1212)	1.471	0.038	0.937	0.931	--	--
	Measurement weights (metric model)	1809.57 (1240)	1.459	0.038	0.938	0.933	26.41 (28) ^{ns}	0.001
	Structural weights (scalar model)	1831.08 (1253)	1.461	0.038	0.937	0.933	47.92 (41) ^{ns}	0.000

(*p < 0.05, **p < 0.01, ***p < 0.001). ns: non-significant.

Based on the results of Table 6.47, at the overall invariance level, gender, age and experience showed insignificant differences ($\Delta\chi^2$) for the metric and scalar nested models. These results are similar to the results of the original Model 2. Thus and based on these results, both models (alternative Model 2 and original Model 2) showed similar results in terms of the effect of gender, age and experience on using professional online communities for knowledge provision at the overall level.

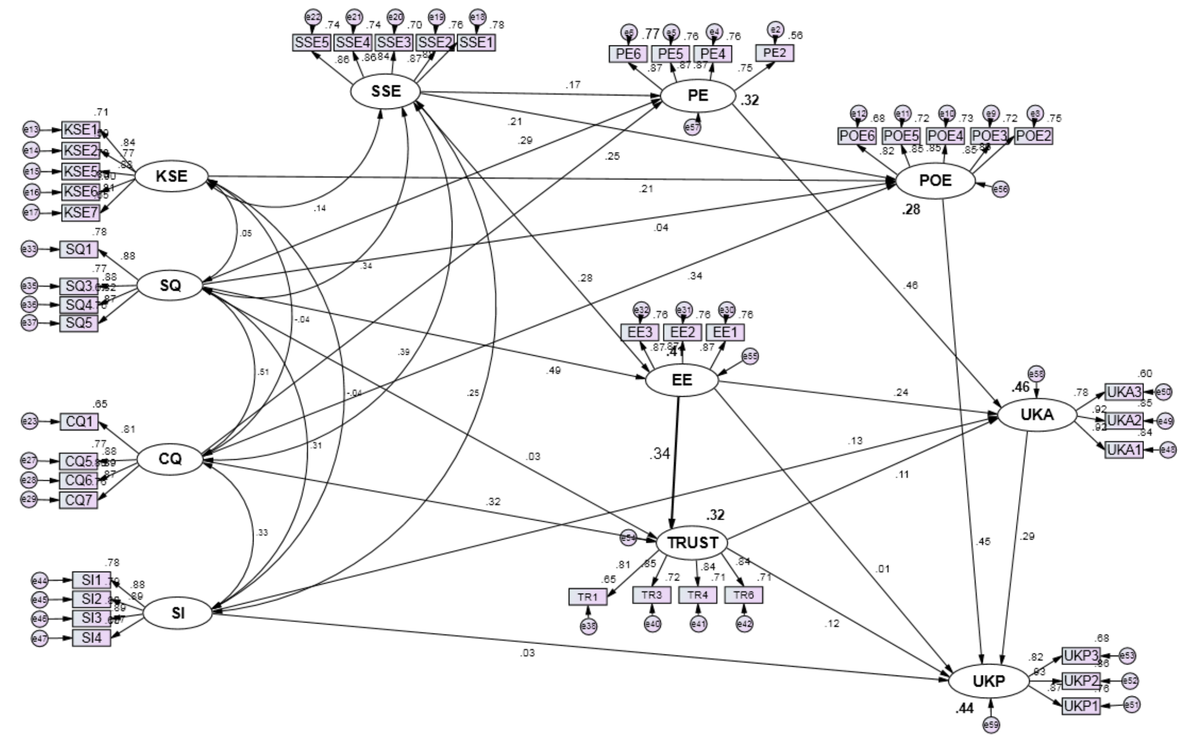
6.6.3. Alternative Model 3

Model three is a comprehensive model where all factors were modelled to explain both UKA and UKP in one model. Nine factors were found to explain 45% of the variance of UKA, which, in turn, together with these factors explained 44% of the variance of UKP. All paths, except for three paths EE → UKP, SI → UKP and SQ → POE, showed significant and positive relationships. However, Based on the specification search together with theoretical basis, effort efficacy was suggested to be a predictor of trust. Thus, a new path was added to Model 3 (EE → Trust). Table 6.48 compares the GOF statistics for the original Model 3 with the GOF of the alternative Model 3.

Table 6.48: Model 3 and alternative Model 3 fit indices (N= 327)

Index		Cut-off value	Model 3	Alternative Model 3 EE → Trust
x^2		> 0.05	1342.391 (df= 872; p = .000)	1319.941 (871; p = .000)
x^2/df		< 3	1.539	1.515
Absolute fit indices	RMSEA	< 0.05 (good); 0.05-0.08 (moderate) 0.08-0.1 (poor) > 0.1 (bad)	0.041 (Lo 0.036; Hi 0.045)	0.040 (Lo 0.035; Hi 0.044)
	SRMR	< 0.08	0.065	0.062
	AGFI	> 0.80	0.823	0.827
Incremental fit indices	CFI	> 0.90	0.960	0.962
	TLI	> 0.90	0.956	0.958
Parsimony fit indices	PNFI	> 0.50	0.824	0.825
	PCFI	> 0.50	0.885	0.885

Regarding the alternative Model 3, as seen in Table 6.48, all GOF statistics demonstrated satisfactory model fit. $\Delta\chi^2$ and ΔCFI were used to compare both models. It was found that $\Delta\chi^2$ (22.45; Δ *df* = 1) was larger than the tabulated value of χ^2 (10.83; p < 0.001), indicating that the alternative Model 3 showed significant better fit. However, ΔCFI showed insignificant difference between the examined models (0.962 – 0.960 = 0.002).



UKA – Using for knowledge acquisition. PE – Performance expectancy. POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence. UKP- Use for knowledge provision.

Figure 6.15: Validation of alternative Model 3 (N= 327)

As for the variance, SMCs reveal that 46% of the variance of UKA and 44% of the variance of UKP were counted for the alternative Model 3 indicating insignificant difference between both models regarding variance in using professional online communities for both knowledge acquisition and knowledge provision. This insignificant difference indicates that the original structural Model 3 does a perfect job in predicting use of professional online communities for both usage behaviours. Furthermore, SMCs for all other endogenous variables did not show significant change except for the Trust variable. SQ and CQ together with the new added predictor EE explained 34% of the variance of Trust indicating slightly higher variance compared to the original model (28%). Re-estimation of all theoretical hypotheses in the alternative Model 3 showed similar behaviour except for the relationships Trust → UKA, and SQ → Trust, which showed insignificant path as a result of adding EE as a predictor of Trust. Table 6.49 presents the results of hypotheses testing after adding a new path (EE →Trust).

Table 6.49: Path results (Model 3 vs. Alternative Model 3; N= 327)

Hypothesis	Path (relationship)			Model 3		Alternative Model 3 EE → Trust	
				St. β	t-value	St. β	t-value
H1	PE	--->	UKA	0.454	8.311***	0.455	8.465***
H2	POE	--->	UKP	0.453	8.397***	0.454	8.468***
H3a	EE	--->	UKA	0.238	4.518***	0.237	4.116***
H3b	EE	--->	UKP	0.016	0.292^{ns}	0.011	0.185^{ns}
H4a	SI	--->	UKA	0.128	2.609*	0.129	2.649**
H4b	SI	--->	UKP	0.033	0.655 ^{ns}	0.034	0.672 ^{ns}
H5a	TRUST	--->	UKA	0.117	2.306*	0.106	1.909^{ns}
H5b	TRUST	--->	UKP	0.127	2.413*	0.124	2.154*
H6a	SSE	--->	PE	0.171	2.989**	0.173	3.019**
H6b	SSE	--->	POE	0.207	3.505***	0.208	3.528***
H6c	SSE	--->	EE	0.278	5.226***	0.276	5.181***
H7	KSE	--->	POE	0.205	3.824***	0.205	3.831***
H8a	SQ	--->	PE	0.291	4.616***	0.289	4.591***
H8b	SQ	--->	POE	0.04	0.636 ^{ns}	0.039	0.62 ^{ns}
H8c	SQ	--->	EE	0.592	8.806***	0.488	8.732***
H8d	SQ	--->	TRUST	0.182	2.875**	0.03	0.416^{ns}
H9a	CQ	--->	PE	0.25	3.859***	0.248	3.839***
H9b	CQ	--->	POE	0.34	5.060***	0.339	5.051***
H9c	CQ	--->	TRUST	0.417	6.240***	0.317	4.933***
H13	UKA	--->	UKP	0.287	4.919***	0.29	4.973***
New path	EE	--->	Trust	--	--	0.343	4.959***

(*p < 0.05, **p < 0.01, ***p < 0.001). ns: non-significant.

For original and alternative models, a good fit does not mean that the proposed structural model was best explained by the research data (Hair et al., 2010, Malhotra, 2010, Schumacker and Lomax, 2010). $\Delta\chi^2$ statistics is not the only factor that can be used to choose the best models that can explain the use of professional online communities for knowledge sharing. Besides drawing on strong theoretical support, other criteria such as the ability to capture most of the hypothetical relationships with stronger coefficient values (Wang and Fesenmaier, 2004, Cheung, 2008, Ham et al., 2012), complexity (including fewer paths) and/or parsimony, as measured by the PNFI index (Hair et al., 2010, Morgan, 1998, Schumacker and Lomax, 2010), and demonstrating better explanatory power (Morgan, 1998, Mulaik et al., 1989, Wang and Fesenmaier, 2004), can be used to compare two or more competing models. In this regard, ΔCFI, SMC (R^2), PNFI, paths' estimations, and PCFI did not show significant differences between the alternative models and the original models. However, in the current study, it is theoretically acceptable that effort expectancy has an influence on professional online community use whether this influence is directly or indirectly through trust. As discussed above, many studies operationalised ease of use (effort expectancy) as a key dimension of system quality (e.g. Lin and Lee, 2006, Wu and Wang, 2006, Wang, 2008). Hence, a positive relationship can be theorised between effort expectancy and trust, which, in turn, decreases the relationship between system quality and trust.

6.7. Summary

This chapter presented the results of confirmatory factor analysis (CFA), structural equation modelling (SEM) and multi-group analysis. CFA was used to evaluate and validate the research instrument. The results indicated that the employed measures were appropriate for the population investigated and all theoretical measurement models showed satisfactory and acceptable reliability, discriminant validity and convergent validity. In addition, SEM validated the proposed research models. SEM multi-group analysis, furthermore, was used to investigate the moderator impacts of gender, age and experience on use of professional online communities for knowledge acquisition and use for knowledge provision. Finally, three alternative models were developed and their findings were discussed. The next chapter will interpret and discuss the findings of CFA and SEM in more detail.

Chapter Seven: Discussion of research findings

7.1. Introduction

As noted earlier in Chapter One, one of the aims of this research was to evaluate the original UTAUT model in the context of professional online communities, besides incorporating and validating some key variables that are expected to be particularly relevant to using this type of community to share knowledge (acquisition and provision) among professionals online communities' members. Integrating and incorporating these individual (personal outcome expectancy, system/knowledge self-efficacy and interpersonal trust) and contextual (system quality and content quality) beliefs can produce an integral comprehensive set of beliefs that have the ability to capture the factors motivating professionals to use online communities for knowledge acquisition and knowledge provision. In order to achieve these aims, three models were developed. Model one was developed to predict and examine the factors that influence using online communities for knowledge acquisition, while Model two aimed to predict and examine the factors that influence using professional online communities for knowledge provision. All members who did not use the community for knowledge acquisition were excluded from Model one and, similarly, all members who did not use the community for knowledge provision were excluded from Model two. Model three was a comprehensive model in which the different factors were modelled to explain both UKA and UKP in one model. As discussed in Chapter Three, it was expected to find that UKP is influenced, together with other determinants, by UKA. In this model, all members who never used the community for knowledge acquisition and all members who never used the community for knowledge provision were excluded.

The discussion will be organised around the findings of the research hypotheses. Thus, the first part is dedicated to discussing the validation of the research hypotheses. The research findings are reviewed alongside the previous work in the field of information system research. The results presented in previous chapters were in a format related to two main objectives of the research. Firstly, this study explored factors that influence using professional online communities for knowledge acquisition and explored factors that influence using online communities for knowledge provision. Secondly, it investigated the interaction effects (moderation) and their influence on the relationships in the research models.

7.2. Validation of the research hypotheses

This section introduces and discusses the results presented in Chapter Six with respect to the proposed research hypotheses, aims, and questions. As discussed in Chapter One, there is a scarcity of theoretically-grounded research that compares the two types of usage behaviours to understand how both usage behaviours can be simultaneously promoted. Thus motivated, this research aimed to develop three theoretical models based on the integration of well-established theories with the UTAUT perspective to investigate both use of professional online communities for knowledge acquisition and use of professional online communities to provide knowledge, so that comparison between the two activities could be made. Other aims such as exploring the level of using professional online communities for knowledge sharing (use for knowledge acquisition and use for knowledge provision) among professionals, and the members' demographic influences are also discussed in this section.

7.2.1. Performance Expectancy PE

According to this study, performance expectancy (PE) is defined as the degree to which a professional online community's member believes that using the community for acquiring knowledge would enhance his or her job performance. In this study, the specification of performance expectancy resulted in four manifested indicators, namely using the community would: increase the output of my job; help me reduce errors at work; help me find new ways to perform my job and finally, reduce the time needed to perform my job. The hypothesised relationships between PE and its antecedents and consequences are discussed below.

7.2.1.1. PE and use for knowledge acquisition UKA (H1)

Consistent with previous research, the research results strongly supported H1, which proposed that performance expectancy (PE) positively predicts professional online communities' use for knowledge acquisition (UKA). The influence of performance expectancy (PE) on community use for knowledge acquisition (UKA) was strongly significant in both Models 1 and 3 (β=0.45, $P < 0.001$; and β=0.45, $P < 0.001$, respectively). These results along with the mean scores definitely reflect the benefits obtained from using professional online communities for knowledge acquisition and are strongly consistent with previous research findings that indicated a significant relationship between perceived usefulness and system use behaviour (Burton-Jones and Hubona, 2006, Igbaria et al., 1995, Igbaria and Iivari, 1995, Karahanna et al., 2006).

As seen from these results and consistent with the pretest stages, performance expectancy turned out to be the strongest predictor of joining and using professional online communities for knowledge acquisition. Increasing the output of a job, reducing errors at work, finding new ways to perform a job, and decreasing the time needed to perform a job were the main drivers as well as the unique benefits that members attained from using these communities for knowledge acquisition. Based on this result, it can be concluded that performance expectancy is a main motivator of use of professional online communities for knowledge acquisition.

7.2.1.2. The mediating effect of PE (H6a, H8a, and H9a)

Further, in order to gain enriching insights into the process of using the professional online communities for knowledge acquisition, PE was hypothesised to be explained by three antecedents, namely system self-efficacy SSE, system quality SQ, and content quality CQ. At the overall level, the mediating role of PE was fully supported, as all the external antecedents (SSE, SQ and CQ) showed significant relationships with PE. The following discusses the mediating effect of PE in more detail.

System self-efficacy SSE was measured using five indicators that reflected users' capability, understanding, confidence, comfort and skills in using the community system for accomplishing tasks related to knowledge sharing (acquisition and provision). The results of SEM in Model 1 and Model 3 supported the association between SSE and PE (β=0.16, $P < 0.01$; and β=0.17, $P < 0.001$, respectively). Consequently, hypothesis H6a (SSE → PE) was statistically supported in both models. These findings are consistent with Compeau et al. (1999), who found that computer self-efficacy was a significant predictor of outcome expectations (performance). Furthermore, Johnson and George (2000) reported similar findings by demonstrating that computer self-efficacy significantly influenced employees' work performance.

System quality SQ was manifested in four dimensions: system reliability, flexibility, availability and design. As hypothesised in H8a, a strong and positive relationship was demonstrated between system quality and performance expectancy in Model 1 and Model 3 (β=0.27, $P < 0.001$; and β=0.29, $P < 0.001$, respectively). These findings are consistent with prior research (Hsieh et al., 2010, Kang et al., 2008, Seddon and Kiew, 1996). For example, Kang et al. (2008) found that perceived usefulness is a significant mediator between system quality and the intention to use a hotel front office system. They reached the same results when perceived usefulness mediated the relationship between system quality and actual use behaviour.

For content quality CQ, four indicators were used to measure this construct, namely knowledge correctness, meaningfulness and understandability, importance and helpfulness for work and clearness. Content quality was also shown to be a significant and positive predictor of performance expectancy in Model 1 and Model 3 (β=0.28, $p < 0.001$; and β=0.25, $p < 0.001$, respectively). Such findings were expected from the previous research based on information success models and technology acceptance models. For example, Seddon and Kiew (1996) found that information quality, together with system quality and the importance of the system, was a significant determinant of perceived usefulness and user satisfaction. Similarly, the results support Lin (2007a) conjecture that information quality is an important predictor of the perceived usefulness of online communities. Thus, based on previous research and the study findings, H9a was supported.

In this study and based on the revealed findings, performance expectancy, which was found to be the strongest predictor of using the professional online communities for knowledge acquisition, was determined by three external factors: SSE, SQ and CQ. These three factors together explained 33% of the variance in performance expectancy in Model 1, while they explained 32% in Model 3. CQ was found to be the strongest predictor of PE followed by SQ. However, SSE was found to be the weakest among the three predictors. This weakness may be attributed to the participants' high experience in using the Internet.

A mediation test was performed to examine the mediating role of PE. The empirical results suggested that PE was a full mediator between SQ and UKA. In this respect, the influence of the professional online community's system quality on use for knowledge acquisition is fully mediated by members' perception of the benefits they gain from using the community for seeking and acquiring knowledge. These results strongly support Wixom and Todd (2005) that object-based beliefs (system quality and information quality) should not explain system usage/intentions directly. On the other hand, PE was found to partially mediate the relationship between SSE → UKA; and CQ→UKA. Although the direct standardised coefficients were reduced significantly when PE mediated the relationship between these external factors - SSE and CQ - and UKA, the findings supported the partial mediation of PE. PE was found to be a stronger mediator between CQ and UKA rather than between SSE and UKA. Furthermore, in this study, the results indicated that CQ showed the largest effect on UKA through PE.

These findings suggest that, based on the perception of professionals who used the community for knowledge acquisition, the existence and endurance of a reliable and appropriately designed system, along with correct, useful, important, and understandable knowledge are the main drivers of expecting better performance, which, in turn, was found to be the main determinant of using a professional online community for knowledge acquisition. Thus, consistent with previous research, the more that community's users perceive high content and system quality, the more likely they are to perceive that using the community for knowledge acquisition contributes to better work performance.

7.2.2. Personal outcome expectancy POE

Similarly, the results supported the significant relationship between personal outcome expectancy and using for knowledge provision (H2). Personal outcome expectancy was defined as the degree to which a professional online community's member believes that using the community for providing his/her knowledge would produce desirable potential consequences to him/her. Personal outcome expectancy was developed and manifested in five observed variables, namely, using the community system for providing knowledge would produce for the provider: a sense of accomplishment, a feeling of competency, reciprocity, enjoyment and reputation. The following sub-sections represent the hypothesised relationships between POE and its predictors and consequences.

7.2.2.1. POE and use for knowledge provision (H2)

Consistent with well-established models such as the social cognition theory SCT and the social exchange theory SET, the influence of personal outcome expectancy on using the community for knowledge provision was strongly accepted for both Models 2 and 3 (β=0.52, $P < 0.001$; and β=0.45, $P < 0.001$, respectively). In fact, among the four hypothesised predictors of UKP, POE was the largest in both models. These findings are supported by prior research which has found that the perceived benefits play an important role in motivating individuals to share their knowledge. Kankanhalli et al. (2005) found that the perceived benefits and costs play an important role in motivating employees to use organisational electronic knowledge repositories to share their knowledge. Among a number of motivators, they reported that enjoyment in helping others explained the majority of use of electronic knowledge repositories for knowledge contribution. Furthermore, He and Wei (2009) found that enjoyment in helping others, among several other factors, was a significant determinant of employees' contribution beliefs. Wasko and Faraj (2005) demonstrated that reputation was able to explain both dependent variables, helpfulness of contribution and volume of contribution. The anticipated reciprocal relationship was found to be a significant predictor of the employees' intention to share their knowledge throughout their attitudes (Bock et al., 2005). From these results it can be concluded that community members were individually motivated to use the community for sharing their knowledge.

7.2.2.2. The mediating effect of POE (H6b, H7, H8b and H9b)

To gain enriching insights into the process of using the professional online communities for knowledge provision, POE was hypothesised to be explained by four antecedents, namely system self-efficacy SSE, knowledge self-efficacy KSE, system quality SQ and content quality CQ. At the overall level, the mediating role of POE was supported except for the relationship between SQ and POE. Specifically, SSE, KSE and CQ showed significant relationships with POE. The following presents the mediating effect of POE in more detail.

Regarding system self-efficacy SSE, the path coefficient revealed that SSE is a significant predictor of POE in both Models 2 and 3 (β=0.20, $P < 0.001$; and β=0.21, $P < 0.001$, respectively). These findings supported H6b. All things being equal, the positive significant relationship between SSE and POE is supported by the social cognitive theory (Bandura, 1997, Bandura and Cervone, 1986), and Compeau et al. (1999)'s findings. Furthermore, Reid and Levy (2008) statistically demonstrated that computer self-efficacy had a significant impact on participants' attitude toward computer use via perceived usefulness.

As for knowledge self-efficacy KSE, in the context of this study, KSE refers to a member's belief in his/her own ability to contribute knowledge in the professional online community. KSE was manifested in five developed items, namely, the confidence in own ability to provide valuable knowledge, having the required expertise to provide valuable knowledge, the confidence in own ability to provide knowledge that would help the community to grow, having the required ability to answer members' questions and inquiries and finally, the confidence in own ability to express knowledge in written and verbal forms. These items showed an acceptable and satisfactory validity and reliability.

In general, the role of self-efficacy in information systems use behaviour has been validated in previous studies, especially for computer usage (Compeau et al., 1999, Compeau and Higgins, 1995b). Through extending the notion of self-efficacy to professional online communities, it is expected that self-efficacy will enhance use of the professional community for knowledge provision via personal outcome expectancy. This significant result confirms the conclusions found in prior studies, that knowledge self-efficacy matters in knowledge sharing behaviour. As hypothesised in H7, KSE was found to have a positive, significant influence on POE in both Models 2 and 3 ($\beta=0.21$, $P < 0.001$; and $\beta=0.21$, $P < 0.001$, respectively). The literature indicates that the relationship between KSE and the attitudes/intentions to share knowledge has been documented by researchers e.g. (Chen et al., 2009, Cho et al., 2010, Jin et al., 2012, Lin, 2008, Lou et al., 2013); however, to the best of the researcher's knowledge, no previous study has examined the relationship between knowledge self-efficacy and knowledge provision behaviour via an individual's outcome expectancy. Nevertheless, the significant relationship between KSE and POE is strongly consistent with Bandura (1997), Bandura et al. (1996), (Bandura, 1986)'s proposition that self-efficacy perceptions influence individuals' outcome expectations. Compeau et al. (1999) found that computer self-efficacy significantly influenced outcome expectations (chance of obtaining a promotion, chance of getting a raise and being seen as higher in status by peers).

With respect to content quality CQ, as hypothesised in H9b, a strong and positive relationship was demonstrated between content quality and personal outcome expectancy in Models 2 and 3 ($\beta = 0.35$, $P < 0.001$; and $\beta = 0.34$, $P < 0.001$, respectively). Such findings were expected from the previous research based on information success models and technology acceptance models. For example, Seddon (1997), in his revised IS model, proposed that perceived usefulness (performance) along with user satisfaction (general perceptual measures of net benefits of IS use) are determined by system quality and information quality. Empirically, Seddon and Kiew (1996) supported the revised model by demonstrating that information quality was a significant determinant of the perceived usefulness (performance) of using departmental accounting systems. Similarly, the results support Wang and Liao (2008)'s conjecture of information quality as an important predictor of the perceived value of using e-commerce systems. Thus, based on previous research and the study findings, H9b was supported.

With regard to system quality SQ, contrary to expectation, SQ had no direct influence on POE in both Models 2 and 3 ($\beta=0.03$, $P > 0.05$; and $\beta=0.04$, $P > 0.05$, respectively).

Thus, hypothesis H8b was not supported. These findings mean that for members who provide knowledge, the community system may be important but not sufficiently so to provide, or to be perceived to provide, benefits. However, despite the growing tendency to emphasise the important role of system quality in IS success models, our findings are consistent with a number of prior management information system MIS research (e.g. Floropoulos et al., 2010, Gupta and Kim, 2004, Wang and Liao, 2008, Chen, 2007, Choi et al., 2008). For example, Choi et al. (2008) found that KMS quality had insignificant effect on employees' intention to share their knowledge. Wang and Liao (2008) did not find a significant relationship between system quality and the perceived net benefits of e-Government public use. Gupta and Kim (2004) found a non-significant relationship between system quality and members' attitude toward virtual communities. In his longitudinal study, Chen (2007) did not find a significant relationship between system quality disconfirmation and website use satisfaction.

However, there are two possible reasons for this lack of support. First, the results indicate that members who used the community to provide knowledge had high scores on system self-efficacy and high experience with the Internet and community system. Thus, this insignificant relationship is probably because of their familiarity with the system, which might lead to less concern about the quality of the community system. Second, system quality as a technology characteristic may not be sufficient to influence the perceived usefulness of using the community to provide knowledge. Based on the holistic view (the interaction between social factors and technical factors), POE is more influenced, as discussed above, by the quality of provided knowledge, the quality of relations with the other members (e.g. trust), and members' ability to deal with the system and to create knowledge (self-efficacy).

As discussed earlier, personal outcome expectancy, which was found to be the strongest predictor of using the professional online communities for knowledge provision, apart from the insignificant system quality, was determined by three external factors: KSE, SSE, and CQ. These three factors together, in Model 2, explained 28% of the variance in personal outcome expectancy and the same percentage of variance in Model 3. CQ was found to be the strongest predictor of POE, followed by KSE. However, SSE was found to be the weakest among the three significant predictors. As discussed above, this low effect of SSE may be attributed to the participants' high experience in using the Internet and their high skills in using the community system.

The mediation test was used to examine the mediating role of POE. The empirical results suggested that POE fully mediated the relationship between SSE and UKP, and the relationship between KSE and UKP as well. In this regard, the influence of system self-efficacy on using the professional online community for knowledge provision is fully mediated by members' perception of the benefits they gain from using the community for contributing knowledge. Furthermore, the influence of knowledge self-efficacy on using the community for knowledge provision is fully mediated by personal outcome expectancy (e.g. reputation, sense of accomplishment and expectations of reciprocity). On the other hand, POE was found to partially mediate the relationship between CQ → UKP. Although the direct standardised coefficients were lower when POE mediated the relationship between CQ and UKP, the findings strongly supported the partial mediation of POE. Furthermore, the results indicated that CQ showed the largest effect on UKP through POE.

Thus, the findings of this study highlight and suggest that, based on the perception of professionals who use the community for knowledge provision, the ability to provide correct, useful, important and understandable knowledge, along with the capability to use the community's system are the main drivers of expecting favourable outcomes (e.g. feeling of competency, enjoyment and reputation), which, in turn, were found to be the strongest determinants of using a professional online community for knowledge provision. Thus, consistent with the Social Exchange Theory and the Social Cognitive Theory, the more community's members, who contribute knowledge, perceive that contributing useful, correct and important knowledge and possessing the capability to use the community system to contribute that knowledge, the more likely they are to perceive that using professional online communities for sharing their knowledge results in favourable personal outcomes.

7.2.3. Effort Expectancy EE

Effort expectancy (EE), which represents ease of use in TAM1 and TAM2, is grounded in the UTAUT model as a technology core determinant of use intention. Aligned with the previous research in technology use and acceptance, EE has been defined as the degree to which a community's member believes that using the community system for sharing knowledge (acquisition and provision) is free of effort. This variable was measured by a member's perception of the ease with which he/she can operate, use and become skilful at using the community's system. The hypothesised relationships between EE and the other variables will be presented in the following sub-sections.

7.2.3.1. Effort expectancy and UKA (H3a)

The link between effort expectancy and using the community for knowledge acquisition (H3a) was significant and supported by the research findings in Models 1 and 3 (β=0.25, $P < 0.001$; and β=0.24, $P < 0.001$ respectively). These findings are in strong support of the UTAUT theory and prior research. For example, Im et al. (2011) found a significant relationship between effort expectancy and Internet banking usage in a cultural comparison study between Korea and the USA. Chang et al. (2007) reported a significant relationship between effort expectancy and users' intention to use decision support systems. Neufeld et al. (2007), as predicted by the UTAUT model, demonstrated a significant influence of effort expectancy on the intention to use IT. In their UTAUT extension study, Venkatesh et al. (2012) found that effort expectancy significantly affected consumers' intentions to use and accept mobile Internet.

7.2.3.2. Effort expectancy and UKP (H3b)

The relationship between effort expectancy and using the community for knowledge provision (H2b) was partially supported. While a small but significant relationship was revealed in Model 2 (β=0.11, $P < 0.05$), a non-significant relationship was found in Model 3 (β=0.02, $P > 0.05$).

Although effort expectancy is grounded as a significant antecedent of technology use intention in the UTAUT model (Venkatesh et al., 2003, Venkatesh et al., 2012, Venkatesh et al., 2011), previous research revealed mixed results. As discussed in the previous point, many studies have demonstrated a statistically significant relationship between EE/EOU and the behavioural intention to use and adopt technology. However, on the other hand, a number of studies did not demonstrate a significant relationship between effort expectancy/ease of use and system use (Burton-Jones and Hubona, 2006, Igbaria and Iivari, 1995, Karahanna et al., 2006, Zhou et al., 2010b).

Regarding this study, based on Van Deursen and Van Dijk (2011), using professional online communities for looking for knowledge and information is concluded to be somewhat harder than using them for providing information and knowledge. They have defined three different skills: instrumental or operational skills (how to operate or manipulate technology); structural skills (to find out how information or knowledge is contained); and strategic skills (the ability to process, find and evaluate contained knowledge and information). Although both usage behaviours (use for knowledge acquisition and use for knowledge provision) require the possession of instrumental or operational skills, structural and strategic skills are more important when using professional online communities for knowledge acquisition. Thus, the insignificant relationship between effort expectancy and use for knowledge provision in Model 3 can be attributed to combining both usage behaviours in one model. For members who use the professional online community for acquisition and provision, effort expectancy regarding knowledge provision is insignificant. Having the required skills to search and look for knowledge weakened the perceived effort expectancy required for providing knowledge.

7.2.3.3. The mediating effect of EE (H6c and H8c)

Understanding the antecedents of effort expectancy is useful from a theoretical standpoint because of its important role in determining using and accepting the community system. EE is hypothesised to be explained by two variables, namely system self-efficacy SSE and system quality SQ. At the overall level, the mediating role of EE was supported. The following discusses the mediating effect of PE in more detail.

Regarding system self-efficacy SSE, as posited in H6c, a strong and positive relationship was demonstrated between SSE and effort expectancy EE in the three research models 1, 2 and 3 (β=0.31, $P < 0.001$; β=0.29, $P < 0.001$; and β=0.28, $P < 0.001$, respectively). These findings supported H6c in that a higher level of community system self-efficacy leads to a lower level of effort expectancy. Agarwal and Karahanna (2000) and Venkatesh and Bala (2008) reported similar findings by confirming a significant relationship between computer self-efficacy and ease of use.

Regarding system quality SQ, as proposed in the three theoretical models, EE is expected to be determined by the perception of system quality. The positive and significant results of H8c demonstrated that the community system flexibility, reliability, suitable design and accessibility are strong determinants of less effort expectancy in Models 1, 2, and 3 (β=0.49, $P < 0.001$; β=0.47, $P < 0.001$; and β=0.49, $P < 0.001$, respectively). These findings, together with the discriminant validity of all examined measurement models, provide strong support for the view that system quality and effort expectancy/ease of use are two different but related constructs. Moreover, these findings are consistent with Ahn et al. (2007); Nov and Ye (2008); and Wixom and Todd (2005), who suggested that system quality is a main determinant of ease of use.

Direct and indirect effects were calculated to test the mediating role of EE. The empirical results suggested that EE partially mediated the relationship between SSE and UKA/UKP and also the relationship between and SQ and UKA/UKP. In this regard, the influence of community system self-efficacy on using the professional online community for knowledge provision was found to be partially mediated by members' perception of the effort required to use the community for knowledge acquisition. Furthermore, the influence of knowledge self-efficacy on using the community for knowledge provision was also partially mediated by effort expectancy. For all models, the findings indicated that SQ showed the largest indirect effect on UKA/UKP through EE.

These results suggested that system self-efficacy and system quality exerted significant and positive influence on using professional online communities for knowledge acquisition and knowledge provision via the perception of EE. Thus, consistent with previous empirical research, the more a community's users perceive high system quality and strong belief in their ability to use the community system to share their knowledge, the more likely they are to perceive that using the community is effortless (ease of use).

7.2.4. Social Influence SI

As with the above variables, social influence is grounded in the UTAUT model as a technology core determinant of use intention. This variable, in relation to this study, is defined as the degree to which an individual perceives that other influential people believe he/she should use the professional online community for either knowledge acquisition or knowledge provision. Similar to effort expectancy, Venkatesh et al. (2003) developed the social influence construct to represent subjective norm (the Theory of Reasoned Action and the Theory of Planned Behaviour), social factors (Model of PC Utilisation), and image (Innovation Diffusion Theory). Social influence was operationalised by the perceptions of how influential people, such as friends, colleagues and relatives, affect members' use of the professional online community.

7.2.4.1. Social influence and UKA (H4a)

The relationship between social influence and using community for knowledge acquisition (H4a) was found to be statistically significant in both Models 1 and 3 ($\beta=0.17$, $P < 0.001$; and $\beta=0.13$, $P < 0.01$, respectively). Prior research reported significant relationships between social influence and technology use intention (Amin, 2008, Barnes and Vidgen, 2012, Venkatesh, 2000, Venkatesh et al., 2003, Gupta, 2008), use and adoption behaviour (Karahanna et al., 2006), and perceived usefulness (Abbasi et al., 2011, Yu, 2012).

7.2.4.2. Social influence and UKP (H4b)

Unexpectedly, the relationship between social influence and using community for knowledge provision (H4b) was unsupported in both Models 2 and 3 (β=0.07, P > 0.03; and β=0.03, P > 0.05, respectively).

Similarly to effort expectancy, controversial and mixed results were revealed by previous research regarding the relationship between social influence and technology use. Although, as discussed in the previous point, many empirical studies have supported the influence of SI on use intentions/behaviour, many studies, on the other hand, demonstrated an insignificant relationship between the two variables (Davis et al., 1989, Karahanna et al., 1999, Nistor et al., 2012, Venkatesh et al., 2011). For example, Davis et al. (1989) did not find a significant relationship between social norms and intention to use. (Chan et al., 2010) reported an insignificant relationship between social influence and system user satisfaction. Nistor et al. (2012) found that social influence showed insignificant influence on users' intention to use education technology.

Perhaps not surprisingly, these mixed results and the prior research findings indicate that the use of professional online communities for knowledge acquisition, besides being affected by members' own beliefs and their expectations regarding performance and effort, is affected by, for example, friends' and colleagues' advice and opinions. However, the use for knowledge provision was concluded to be a more personal and individual issue that may not be explained by social influence. Venkatesh et al. (2003) suggested that use behaviour, especially after a period of use in voluntary contexts, depends on the system user's beliefs rather than on peoples' advice and opinions. In the light of this suggestion, the weak effect of social influence on use for knowledge provision can be explained by the fact that a professional online community's characteristics, such as voluntary usage and experience, might imply that members' expectancy about the benefits they will gain dominate the decision to use the community for knowledge provision. This conclusion is supported by the strong influence of the "personal outcome expectancy" construct on use for knowledge provision (β= 0.52, p < 0.001).

From a knowledge sharing standpoint, one of the main reasons that affects individuals' desire to share their knowledge is considering knowledge as a source of power and superiority. Therefore, as explained in Chapter Two, donating this power was found to be more affected by individual and personal factors such as enjoyment in helping others, reciprocity and a feeling of competency (Kankanhalli et al., 2005, Huang, 2009) rather than social factors.

7.2.5. Relational capital (Trust)

Trust is considered as one of the key factors that form the basis of interaction in offline and online societies. Generally, as stated by He et al. (2009), trust is an important enabling factor in almost any type of social interaction. Professional online communities represent social exchange relations and systems that widely require and are built on trust. The relational dimension of social capital - trust - is conceptualised as the nature and the quality of the relationships that exist among individuals, and how these relationships influence their behaviour. In this study, the relational capital – trust – was manifested in four aspects, namely trustworthiness, reciprocal faith in others' ability, reciprocal faith in others' behaviour and benevolence. Trust was hypothesised as a mediating variable between system quality and content quality as predictors, and using the community for knowledge acquisition and provision, as consequences.

7.2.5.1. Trust and UKA (H5a)

As expected and consistent with prior research findings, trust was found to be a significant predictor of using a professional community for knowledge acquisition (H5a) and using it for knowledge provision (H5b). The results of SEM revealed that trust is a significant determinant of using a community for knowledge acquisition in both Models 1 and 3 (β=0.12, $P < 0.05$; and β=0.12, $P < 0.05$, respectively). These results are in line with recent organisational research. Gefen et al. (2003a), for example, found that trust was a significant predictor of intention to use online shopping. Ridings et al. (2002) revealed that trust in others' ability and trust in their benevolence/integrity showed significant influence on desire to give information. Regardless of the small significant relationships, the findings of this study suggest that the relational capital - trust - plays an important role in explaining the use of professional online communities for knowledge acquisition. Regarding knowledge sharing behaviour, trust can eliminate the barriers and facilitate the process of knowledge sharing. Furthermore, these findings suggest that knowledge sharing among professionals in Egypt is not only individually oriented, but is also a socially derived behaviour.

7.2.5.2. Trust and UKP (H5b)

The relationship between Trust and using the professional online communities for knowledge provision was found to be significant in both Models 2 and 3 (β=0.17, $P < 0.01$; and β=0.13, $P < 0.05$, respectively). These findings are consistent with a number of previous research results. For example, Lee and Choi (2003) reported that trust was a significant determinant of the knowledge creation process (socialisation, externalisation, combination and internalisation). Huang et al. (2011) reported that cognitive based trust showed significant influence on employees' intention to share tacit and explicit knowledge.

7.2.5.3. The mediating effect of trust (H8d and H9c)

Relational capital – Trust – was hypothesised to be explained by two predictors: system quality and content quality. *Regarding system quality SQ,* the path coefficients, in Models 1, 2 and 3, revealed that system quality was a significant predictor of trust (β=0.23, $p < 0.001$; β=0.16, $p < 0.01$; and β=0.18, $p < 0.001$, respectively). These findings strongly supported H8d, in that system quality is an important predictor of members' trusting beliefs in the context of professional online communities. This positive relationship supports the results of Liang and Chen (2009), Vance et al. (2008), and Wang and Emurian (2005).

As for content quality CQ, the obtained coefficients verified the hypothesised relationship between content quality and relational capital – Trust – in the three models. The findings showed that content quality was a strong and significant driver of trust (β=0.41, $p < 0.001$; β=0.43, $p < 0.001$; and β=0.42, $p < 0.001$, respectively). These findings, besides supporting H9c, are consistent with Nicolaou and McKnight (2006) who reported that trusting beliefs in the context of inter-organisational data exchange was significantly influenced by perceived information quality (control transparency and outcome feedback).

SEM was used to examine the mediating role of relational capital - Trust. In Model 1, the findings suggested that trust partially mediated the relationship between SQ and UKA, and the relationship between CQ and UKA as well. In this respect, the impact of system quality and content quality on using the professional online communities for knowledge acquisition was found to be mediated by trust. In a similar manner, in Model

2, the findings demonstrated that trust partially mediated the relationship between SQ and UKP, and the relationship between CQ and UKP. Thus, it can be concluded that the influence of system quality and content quality on using the professional online communities for knowledge provision was found to be partially mediated by trusting beliefs.

Finally, although system quality and content quality were verified as important variables, they did not play an equal role in contributing to relational capital – Trust. Specifically, content quality had the largest influence on community use via relational capital (Trust) in the three models. However, the findings suggest that, based on the perception of professional online communities' members, the existence and endurance of a reliable and appropriately designed system, along with correct, useful, important and understandable knowledge, are main determinants of professional online communities trust-belief, which, in turn, was found to be a significant predictor of using a professional online community for knowledge sharing (acquisition/provision). Thus, it can be concluded that the more the community's users perceive high content and system quality, the more likely they are to trust each other and, consequently, share their knowledge.

7.2.6. Moderation effects (H10, H11, and H12)

In this section, the moderators' impacts will be discussed. This study proposed that some control variables such as age, gender and experience can influence some relationships in the hypothesised models. The following sub-sections will discuss the influence of these variables in Models 1 and 2.

7.2.6.1. Gender impact (H10)

The invariance test, using multi-group analysis, for both Models 1 and 2 revealed that gender groups are invariant at the overall level. Based on the obtained measurement weights and the obtained structural weights, the metric and scalar nested models indicated that gender is not a moderator of the use of professional online communities for both knowledge acquisition and knowledge provision, which demonstrates that both models are consistent regarding the influence of members' gender.

For Model 1 (UKA) and for every individual latent variable, although all latent mean structures, except CQ, tended to be stronger for the female sample, t-value indicated that this difference was insignificant. Thus, gender was not found to have latent mean non-invariance for all latent variables. However, the findings of $\Delta\chi^2$ indicated that the male and female groups are non-invariant in only two relational paths (PE → UKA and EE → UKA). The standardised coefficients (regression weights) confirmed that PE is stronger for the male sample than the female sample, while EE did not show a more significant influence for the female sample than for the male sample. These findings supported H10.1a and are consistent with recent research findings (Venkatesh et al., 2003, Venkatesh et al., 2012, Wu et al., 2012).

For Model 2 (UKP) and for every individual latent variable, all latent means structures indicated that male and female groups were equal. Thus, gender was not found to have latent mean non-invariance for all latent variables in Model 2. Although the standardised estimates indicated that PE is stronger for the male group and EE is stronger for the female group, $\Delta\chi^2$ test revealed that all causal paths are equal between the two gender groups. Thus, for Model 2, H10.1b and H10.2b were not supported.

There are three possible reasons for the non-significant influence of gender. Firstly, in the light of recent research results (Venkatesh et al., 2003, Venkatesh et al., 2012) and the fact that the targeted respondents of the current research were actual members of online communities and considered to be computer and Internet savvy, the non-significant mediating role of respondents' gender further confirms the concept that under non-mandatory conditions and with increased experience, gender difference tends to fade away. Secondly, it is possible that the moderating effect of gender was not detectable in these relationships because females constituted only 29% of the research sample. Finally, these findings might be attributed to the fact that all respondents (male and female) who participated in the current research and tended to provide their knowledge were professionals and had quite a similar educational background.

7.2.6.2. Age impact (H11)

Members' age constituted another moderating variable that was theorised to influence the relationship between PE/POE → UKA/UKP, and the relationship between EE → UKA/UKP. At the overall model level, the invariance multi-group analysis revealed that usage models are equivalent at all examined samples. Therefore, age was not found to be a significant moderator of use of professional online communities for both use behaviours (UKA and UKP).

For Model 1 (UKA) and for every latent variable and causal relationship, the latent structure means demonstrated that members < 35 years old showed more significant mean scores than members > 35 years old for four constructs (PE, SSE, SQ and UKA).

In the light of the hypothesised relationships, these findings indicated that PE is rated higher by the younger communities' members. The findings of $\Delta\chi^2$ indicated that the younger and older groups are non-invariant in only two relational paths (PE --> UKA and Trust --> UKA). Standardised coefficients (regression weights) confirmed that the influence of Trust on UKA is stronger for the older group than the younger group; however, the influence of PE on UKA is stronger for the younger group than the older group. Hence, at the level of individual causal relationship, age was not found to be a moderator between EE and UKA.

Regarding Model 2 (UKP), the findings of the latent mean analysis, which is reported in Table 6.33, revealed that both age groups are invariant and showed insignificant differences for the model constructs, except for knowledge self-efficacy KSE, which showed that the older sample (> 35 years) rated this construct higher than the younger sample (< 35 years). For the causal relationships, the findings of $\Delta\chi^2$ indicated that only two paths were significantly non-invariant (POE --> UKP and SSE --> UKP). The influence of POE on UKP was found to be stronger for the younger sample, which supported H11.1b. The influence of SSE on UKP was found to be stronger for the older sample. However, the latent mean analysis and $\Delta\chi^2$ results indicated that age was not a significant moderator between EE and UKP. Thus, H11.2b was not supported.

Considering all the results of age impact, the influence of age on the relationship between PE and UKA and between POE and UKP is supported by previous research (Venkatesh et al., 2003, Venkatesh et al., 2012, Wu et al., 2012). Wu et al. (2012), for example, found that respondents' age was a significant moderating variable between performance expectancy and intention to use IPass technology. Venkatesh et al. (2012) found that the influence of performance expectancy on customers' intention to use mobile Internet technology was significantly mediated by customers' age. However, contrary to expectations, age was not found to be a significant moderating variable between effort expectancy and use of a professional online community for both knowledge acquisition and use for knowledge provision. Yu (2012), Shibl et al. (2012) did not find a significant moderation influence of age on the relationship between effort expectancy and intention to use and adopt technology. None of them commented on their results. However, one of the possible reasons for these results is that the majority of respondents were under 40 years old (83%), 91% had over 5 years experience with the Internet and 87% had been members for more than one year. Morris and Venkatesh (2000) mentioned that, for the long-term usage decision, the influence of age on the intention to use diminishes with time. Venkatesh et al. (2003) reported that the influence of effort expectancy on the intention to use technology is mediated by users' age; however, they reported that the mediating effect was controlled for users' limited experience. Therefore, one explanation of the non-significant mediating effect of age between effort expectancy and professional community use for knowledge sharing is members' experience of using the Internet and the community system, in addition to other characteristics such as education and profession.

7.2.6.3. Experience impact (H12)

Lastly, in terms of members' experience of using professional online communities and at the overall model level, the invariance multi-group analysis revealed that Model 1 - UKA - is non-invariant for both experience groups. The regression weights showed that the causal relationships were significantly non-equivalent. However, for Model 2 - UKP, the regression weights revealed invariant groups at the baseline and nested models.

Regarding using the professional online community for knowledge acquisition (Model 1) and for every latent variable and causal relationship, the latent structure means demonstrated that members who had experience > 3 years showed mean scores higher than members who had experience < 3 years. The findings of $\Delta\chi^2$ indicated that the less experienced group and the more experienced group are non-invariant in only four relational paths (PE --> UKA; SI --> UKA; Trust --> UKA; and SQ --> UKA). Standardised coefficients (regression weights) confirmed that, except for the causal relationships between Trust and UKA, all causal relationships were stronger for the less experienced group than the higher experienced group. Hence, at the individual causal relationship, these findings support H12.2a in that the effect of social influence (SI) on the community use for knowledge acquisition will be greater for less experienced members. However, experience was not found to be a significant moderator between EE and UKA. Thus, H12.1a was not supported.

Regarding Model 2 (UKP), the findings of the latent structure mean analysis, which is reported in Table 6.37, revealed that both experience groups are non-invariant and showed significant differences for all model constructs. The findings indicated that the high experience group showed mean scores higher than the less experience group. However, for the causal relationships, the findings of $\Delta\chi^2$ indicated that only one path was significantly non-invariant (CQ --> POE). The influence of CQ on POE was found to be stronger for the less experience sample. Although the influence of SI on UKA tends to fade away as members' experience increases (less experience: β = 0.117; high experience: β = -0.03), the invariance test showed equal groups. Moreover, the influence of EE on UKP was found to be insignificant and equal groups was revealed. Thus, H12.1b and H12.2b were not supported.

The above results are supported by Karahanna et al. (1999: 199). They reported a significant relationship between subjective norms and behavioural intentions to adopt new technology. However, after adoption, they found that the relationship between subjective norms and behavioural intentions to continue using was insignificant. Moreover, Taylor and Todd (1995: 567) concluded that inexperienced systems users place different weights on the drivers of their behavioural intention and actual usage. In particular, the inexperienced users place higher weights on the perceived usefulness and place less weight on control factors. The findings of this study provide strong support for these conclusions. The multi-group analysis test revealed that the less experience group, in both models, significantly weighted the perceived benefits of using the professional online communities higher than the other determinants of use. Consequently, the insignificant influence of experience on the relationship between social influence and using the community for knowledge provision can be attributed to the strong influence of perceived usefulness on their decision to use the community.

7.2.7. Use for knowledge acquisition and use for knowledge provision (H13)

As highlighted in Chapter Three, this research proposed that using the community for knowledge acquisition UKA at a higher level will lead to a greater level of using the community for knowledge provision UKP. The findings of Model 3 supported the association between UKA and UKP (β=0.28, $P < 0.001$). Thus, H13 was supported. These findings are strongly consistent with previous research (Hooff and Huysman, 2009, Hooff and Ridder, 2004, Watson and Hewett, 2006). Hooff and Ridder (2004), for example, found that knowledge collecting behaviour was a main driver of knowledge provision behaviour. These findings also supported Watson and Hewett (2006)'s conclusion that benefiting from reusing knowledge from a company's knowledge management system is a key determinant of using the system for knowledge contribution.

7.2.8. Use for knowledge acquisition vs. use for knowledge provision

For the hypotheses that have a direct relationship with both usage behaviours: use for knowledge acquisition and use for knowledge provision, the findings illustrated that the perceived benefits of using the professional online communities (PE and POE) were the strongest predictors of usage. Similarly, regardless of its weak influence, trust was found to be a significant predictor of using the professional online communities. However, for members who provided knowledge, trust was found to have a stronger influence than perceived trust on knowledge acquisition. On the other hand, for members who used the community for knowledge acquisition, effort expectancy and social influence were found to have significant effect, in contrast to members who use the community for knowledge provision. The insignificant relationship between social influence and effort expectancy, individually, with use for knowledge provision was explained and discussed above.

Regarding the hypotheses common to both usage behaviours models (H6c, H8c, H8d, and H9c), instead of looking at the numerical values of the relationships' coefficients, t-test for different groups was used as suggested by Wynne Chin (Keil et al., 2000). The following procedure was applied to examine the path coefficient differences between the two research professional community usage models:

$$S_{pooled} = \sqrt{\{(\frac{(N_1-1)}{(N_1+N_2-2)})\,X\,SE_1^2 + (\frac{(N_2-1)}{(N_1+N_2-2)})\,X\,SE_2^2)\}} \tag{3}$$

$$t\text{-value} = \frac{(PC_1 - PC_2)}{(S_{pooled}\,X\,\sqrt{\frac{1}{N_1}+\frac{1}{N_2}})} \tag{4}$$

Where:

Spooled = pooled estimator for the variance.
t = t-statistic with (N_1 + N_2 -2) degrees of freedom.
N_1 = sample size of group1; N_2= Sample size of group2
SE_1 = path's standard error of group1; SE_1 = path's standard error of group2
PC_1 = group1's path coefficient; PC_2 = group2's path coefficient

Table 7.1 presents the results of applying the above formulae to test the differences between Model 1 and Model 2 in terms of the common relationships:

Table 7.1: t-test for path coefficient differences between UKA and UKP

Hypothesis (Path)	Path coefficient (standard error)		Pooled estimator	t -value (df)
	Model 1 (UKA) N= 349	Model 2 (UKP) N=330		
H6c (SSE → EE)	0.307 (0.055)	0.288 (0.058)	0.056	6.044*** (677)
H8c (SQ → EE)	0.487 (0.051)	0.471 (0.053)	0.051	5.525*** (677)
H8d (SQ→Trust)	0.225 (0.058)	0.164 (0.058)	0.057	28.227*** (677)
H9c (CQ→Trust)	0.408 (0.072)	0.433 (0.075)	0.072	- 6.114*** (677)

(*p < 0.05, **p < 0.01, ***p < 0.001, ns non-significant)

The findings, as illustrated in tables 7.1 and Appendix D[15], show significant differences for both usage behaviours. For effort expectancy, system quality tended to have stronger influence than system self-efficacy in all models. However, the influence of system self-efficacy and system quality on effort expectancy tended to be statistically more important for using the community for knowledge acquisition UKA than using the community for knowledge provision UKP. Thus, it can be concluded that professional online communities' members place higher importance on system quality and system self-efficacy when using the community for knowledge acquisition compared to using the community for knowledge provision. As discussed earlier, using professional online communities for knowledge acquisition is considerably harder than using it for providing knowledge. However, the findings indicate that the more a community's members perceive high system quality and believe in their abilities to use the community system to acquire knowledge, the more likely they are to perceive that using the community for knowledge acquisition is free of effort.

For trust, content quality seemed to have a clearly stronger influence than system quality in all models. Statistically, content quality in Model 2, use for knowledge provision, showed a stronger and significant effect on trust than Model 1, while system quality was found to be stronger in predicting trust in the use for knowledge acquisition model. Hence, it can be concluded that a community's members place higher importance on content quality when using the community for knowledge provision compared to using the community for knowledge acquisition. These findings are supported by Cabrera et al. (2006). They posit that if knowledge providers feel that the content is exceptional, they may contribute to build a personal image of expertise.

The resultant coefficient of determination R^2 for use for knowledge acquisition model is

[15] Appendix D summarises the study findings with a comparison to previous research.

0.50, while the R^2 for the model of use for knowledge provision is 0.41. All values indicate acceptable statistical explanatory power for both models.

Finally, Table 8.2 summarises the link between research questions, constructs manifestations, findings and research implications.

Table 7.2: The link between research questions, research findings and research implications

Research questions	Predictor specification	Findings	Implications
Q1: What influence does performance expectancy have on using the community for knowledge acquisition among professional online community members?	Using the community for knowledge acquisition would increase the output of a job, reduce errors at work, help in finding new ways to perform a job, and decrease the time needed to perform a job	Performance expectancy was found to be significant determinant of the use of professional online communities for knowledge acquisition.	Performance expectancy turned out to be the strongest predictor of joining and using professional online communities for knowledge acquisition. Based on this result, it can be concluded that performance expectancy is a main motivator of use of professional online communities for knowledge acquisition.
Q2: What influence does personal outcome expectancy have on using the community for knowledge provision among professional online community members?	Using the community for knowledge provision would produce for the provider: a sense of accomplishment, a feeling of competency, reciprocity, enjoyment and reputation.	Personal outcome expectancy was found to be a significant predicator of the use of professional online communities for knowledge provision.	Consistent with well-established models such as the social cognition theory and the social exchange theory SET, the influence of personal outcome expectancy on using the community for knowledge provision was strongly accepted for both Models 2 and 3. In fact, among the four hypothesised predictors of the use for knowledge provision, personal outcome expectancy was the largest in both models.
Q3: What influence does effort expectancy have on using the community for knowledge acquisition/providing among professional online community members?	Effort expectancy was measured by a member's perception of the ease with which he/she can operate, use and become skilful at using the community's system.	The link between effort expectancy and using the community for knowledge acquisition was significant and supported by the research findings in Models 1 and 3. However, the relationship between effort expectancy and using the community for knowledge provision was partially supported. While a small but significant relationship was revealed in Model, a non-significant relationship was found in Model 3.	The insignificant relationship between effort expectancy and use for knowledge provision in Model 3 can be attributed to combining both usage behaviours in one model. For members who use the professional online community for acquisition and provision, effort expectancy regarding knowledge provision is insignificant. Having the required skills to search and look for knowledge weakened the perceived effort expectancy required for providing knowledge.
Q4: What influence does social influence have on using the community for knowledge acquisition and use for knowledge provision among professional online community members?	Social influence was operationalised by the perceptions of how influential people, such as friends, colleagues and relatives, affect members' use of the professional online community for knowledge acquisition/provision.	The relationship between social influence and using community for knowledge acquisition was found to be statistically significant in both Models 1 and 3. However, unexpectedly, the relationship between social influence and using community for knowledge provision was unsupported in both Models 2 and 3.	These mixed results indicate that the use of professional online communities for knowledge acquisition is affected by, for example, friends' and colleagues' advice and opinions. However, the use for knowledge provision was concluded to be a more personal and individual issue that may not be explained by social influence.

Research questions	Predictor specification	Findings	Implications
Q5: What influence does relational capital (trust) have on use of the community for knowledge provision and use for knowledge acquisition among professional online community members?	The relational capital – trust – was manifested in four aspects, namely trustworthiness, reciprocal faith in others' ability, reciprocal faith in others' behaviour and benevolence.	Trust was found to be a significant predictor of using a professional community for knowledge acquisition and using it for knowledge provision.	The findings of this study suggest that the relational capital - trust - plays an important role in explaining the use of professional online communities for knowledge sharing. Regarding knowledge sharing behaviour, trust can eliminate the barriers and facilitate the process of knowledge sharing. Furthermore, these findings suggest that using online communities for knowledge sharing is not only individually oriented, but is also a socially derived behaviour.
Q6: What influence does system self-efficacy have on performance expectancy, personal outcome expectancy, and effort expectancy among professional online community members?	System self-efficacy was measured using five indicators that reflected users' capability, understanding, confidence, comfort and skills in using the community system for accomplishing tasks related to knowledge sharing	System self-efficacy showed positive and significant influence on performance expectancy, personal outcome expectancy and effort expectancy.	The influence of system self-efficacy on effort expectancy tended to be statistically more important for using the community for knowledge acquisition than using the community for knowledge provision. Thus, it can be concluded that professional online communities' members place higher importance on system self-efficacy when using the community for knowledge acquisition compared to using the community for knowledge provision. As discussed earlier, using professional online communities for knowledge acquisition is considerably harder than using it for providing knowledge. However, the findings indicate that the more a community's members perceive high believe in their abilities to use the community system to acquire knowledge, the more likely they are to perceive that using the community for knowledge acquisition is free of effort.
Q7: What influence does knowledge self-efficacy have on personal outcome expectancy of knowledge provision among professional online community members?	Knowledge self-efficacy was manifested in five developed items, namely, the confidence to provide valuable knowledge, having the required expertise to provide knowledge that would help the community to grow, to answer members' questions and finally, the confidence to express knowledge in written and verbal forms.	Knowledge self-efficacy was found to have a positive, significant influence on personal outcome expectancy in both Models 2 and 3	The findings of this study highlight and suggest that, based on the perception of professionals who use the community for knowledge provision, the ability to provide correct, useful, important and understandable knowledge is a main driver of expecting favourable outcomes (e.g. feeling of competency, enjoyment and reputation), which, in turn, were found to be the strongest determinants of using a professional online community for knowledge provision.

Research questions	Predictor specification	Findings	Implications
Q8: What influence does the system quality have on performance expectancy, personal outcome expectancy, and the relational capital among professional online community members?	System quality was manifested in four dimensions: system reliability, flexibility, availability and design.	System quality was found to be a significant determinant of performance expectancy and trust in all models. However, it did show significant influence on personal outcome expectancy in Models 2 and 3 (use for knowledge provision).	The influence of system quality on effort expectancy and trust tended to be statistically more important for using the community for knowledge acquisition than using the community for knowledge provision. Therefore, it can be concluded that professional online communities' members place higher importance on system quality when using the community for knowledge acquisition compared to using the community for knowledge provision. As discussed earlier, using professional online communities for knowledge acquisition is considerably harder than using it for providing knowledge.
Q9: What influence does the content quality have on performance expectancy, personal outcome expectancy, and the relational capital among professional online community members?	Four indicators were used to measure this construct, namely knowledge correctness, meaningfulness and understandability, importance and helpfulness for work and clearness.	Content quality was found to be significant predictor of performance expectancy in Models 1 and 3, personal outcome expectancy in Models 2 and 3, and relational capital trust in all models.	The findings of this study highlight and suggest that, based on the perception of professionals who use the community for knowledge provision, the ability to provide correct, useful, important and understandable knowledge is a main driver of expecting favourable outcomes, which, in turn, were found to be the strongest determinants of using a professional online community for knowledge provision. Content quality seemed to have a clearly stronger influence than system quality in all models. Statistically, content quality in Model 2, use for knowledge provision, showed a stronger and significant effect on trust than Model 1.

7.4. Summary

This chapter interpreted and discussed the different results of the proposed research models in order to deepen our understanding of the factors that motivate professionals to adopt and use professional online communities to share their knowledge. Three theoretical models were tested and validated. The discussed findings showed that the use of professional online communities was explained by a rich set of variables that were derived from well-established theories. In general, this study identified five external factors (content quality, system quality, system self-efficacy, knowledge self-efficacy and relational capital - trust) that were expected, based on theoretical and empirical foundations, to be relevant for the context of the current research. The findings confirmed the importance of these factors in explaining three core technology use beliefs in the UTAUT model (performance expectancy/personal outcome expectancy, effort expectancy and social influence), which, in turn, influence use of online communities for knowledge acquisition and use for knowledge provision.

The results of this study add to knowledge by demonstrating that content quality, system quality, and members' belief in their abilities to use the community system facilitate the transformation of professional online communities resources to performance and personal benefits and, consequently, encourage members to use the community for sharing their knowledge. Additionally, the findings revealed that professional online community members who perceived high content and system quality were more likely to show a higher degree of relational capital (trust). Hence, this study illustrates that these exogenous factors can provide a holistic understanding and should be integrated in the UTAUT model.

Furthermore, based on the integration of four different theories along with empirical previous research, this study theorised two sets of beliefs and examined their influence on the use of professional online communities for knowledge sharing. Statistically, this study contributes to knowledge by demonstrating that community users place different importance on system quality, system self-efficacy, content quality and relational capital. On the one hand, members were found to place higher importance on system quality, system self-efficacy and relational capital when they use the community for knowledge acquisition, whereas, on the other hand, they were found to place higher importance on content quality when they use the community to provide their knowledge. Thus, through validating three theoretical models, this research extended the generic UTAUT theory to explain two different kinds of usage behaviours in professional online communities. By doing so, this research has made a notable contribution to the body of knowledge as it provides an in-depth understanding of two distinct but related usage behaviours. The next chapter will discuss in detail the research contributions, implications, and limitations and future research suggestions.

Chapter Eight: Conclusion and limitations

8.1. Introduction

The chapter that follows puts up the foregoing discussions to present the contributions to research and the implications for practice. Theoretical and methodological contributions to professional online communities' researchers and implications for professional online communities' managers and providers will be presented. Next, research limitations and future research are discussed in detail.

8.2. Overview of the research aims and conclusions

This study aimed to advance empirical research in the realm of the use of professional online communities for knowledge acquisition and use for knowledge provision. Use of these communities is likely to be influenced not only by technological factors but also by cognitive and relational factors. Hence, drawing upon theoretical and empirical foundations and contextually relevant previous research, three theoretical frameworks were applied, in which relational factors (trust), individual factors (knowledge/system self-efficacy), and technological factors (system quality and content quality) were integrated together with the Unified Theory of Acceptance and Use of Technology (UTAUT) to examine the use of professional online communities to acquire/provide knowledge among professionals. More specifically, this research aims to: 1) explore the level of use of professional online communities for knowledge sharing; 2) extend the UTAUT model to explain professional online communities' usage for knowledge acquisition/provision; 3) examine the role of trust, online system self-efficacy, and the online system characteristics in explaining professional online communities' usage for knowledge acquisition/provision, and examine whether these factors integrated, with the UTAUT Model, can discriminate between usage for knowledge provision and usage for acquisition and finally, to conclude some theoretical and practical implications from the research findings that may help in understanding the adoption of professional online communities in non-Western cultures and thus, advance the use of this kind of community. To test these theoretical models, an online web-survey was administered to 367 members of eight professional online communities in Egypt.

Employing CB-SEM, the results of this study confirmed that online communities have emerged as an essential channel to facilitate knowledge sharing (acquisition and provision). For the variables that were hypothesised to have direct influence on both usage behaviours: use for knowledge acquisition and use for knowledge provision, the findings revealed that performance expectancy, personal outcome expectancy and effort expectancy showed direct effects on the use of professional online communities for knowledge acquisition/provision. In fact, the findings confirmed that performance expectancy and personal outcome expectancy (e.g. feeling of competency, reciprocity, enjoyment and reputation) were found to be the strongest determinants of professional online community use. However, the findings suggest that social influence has direct impact on the use for knowledge acquisition, while it did not have a direct influence on the use for knowledge provision.

Relational capital - trust - was found to be a significant predictor of usage behaviour. However, for members who use the community for knowledge provision (Model 2), trust was found to have a stronger influence than was perceived trust in using the community for knowledge acquisition (Model 1). On the other hand, for members who used the community for knowledge acquisition, effort expectancy and social influence revealed significant effect, in contrast to members who use the community for knowledge provision. Thirdly, regarding the hypotheses common to both use behaviours, the findings demonstrated some significant differences for both models. Content quality, for example, seemed to have a clearly stronger influence on trust than system quality in all models. Content quality in Model 2 showed stronger effect on trust than in Model 1, while system quality was found to be a stronger predictor of trust in the use for knowledge acquisition. For effort expectancy, system quality tended to have a stronger influence than system self-efficacy in all models; however, the influence of system quality on effort expectancy tended to be more important when online communities are used for knowledge acquisition.

As for moderating effects, users' gender was found to be a significant moderator between performance expectancy and use for knowledge acquisition (stronger for men), while it was not found to be a significant moderator for the hypothesised relationships in Model 2. The influences of performance expectancy and personal outcomes expectancy on use for knowledge acquisition and use for knowledge provision were found to be moderated by users' age (stronger for younger users), while the relationship between performance expectancy and use for knowledge acquisition was found to be influenced by users' experience (stronger for less experienced users).

8.3. Theoretical and methodological contribution

The findings of this study have several implications for researchers in the areas of professional online communities and knowledge sharing. The contributions of this research can be grouped into two categories: theoretical contributions and methodological contributions.

8.3.1. Theoretical contribution

The current study has endeavoured to make several contributions to the body of knowledge in technology use and knowledge sharing literature. It has also provided three testable models that integrate social cognitive, system characteristics and relational capital with the UTAUT model in the use of professional online communities for knowledge sharing (acquisition and provision). The integration of these theories helps in exploring different potential motivations through different theoretical lenses that can help in better understanding the use of professional online communities. In general, this research provides a theoretical foundation and empirical support for understanding and explaining the determinants of the use of professional online communities. Particularly, this research contributes to knowledge by identifying some salient individual, social and technological factors crucial to motivate and support professionals to use this type of community for knowledge acquisition/provision. Thus, the results of this study can provide a rich basis for further theory development in this area. In more detail, the theoretical contributions of the findings of this study are fourfold.

8.3.1.1. Generalisability and external validity

The UTAUT model is still new and its explanatory and predictive power have not been fully demonstrated (e.g. Barnes and Vidgen, 2012, Straub, 2009, Venkatesh et al., 2012). Straub (2009), for example, recommends that additional research is needed to further validate and understand how it works outside organisational contexts and across a variety of technologies. To the researcher's best knowledge, this study is the first that has tried to integrate different streams with the UTAUT model to examine using professional online communities for knowledge sharing. Thus, one of the main theoretical and empirical contributions of this study is to modify and extend the UTAUT model for voluntary use of professional online communities for knowledge sharing. By doing so, the generalisability (external validity) of the UTUAT model will be extended from organisational settings to voluntary non-organisational context.

Additionally, this study extends the UTAUT model by not only identifying and integrating key theoretical factors from other theories or models but also re-tailoring and altering existing technology core factors to reflect and to fit a specific context (Alvesson and Kärreman, 2007). Performance expectancy, one of the main drivers of technology acceptance, was replaced by personal outcome expectancy to capture members' personal outcomes of using the community to provide knowledge. Personal outcome expectancy was defined as the degree to which a community member believes that using the community for knowledge provision would produce preferable potential consequences. Based on an intensive literature review, this construct was measured by five developed variables to capture members' personal expectancies of using the professional community to share their knowledge: sense of accomplishment, feeling of competency, reciprocity, enjoyment of helping others and reputation. Thus, by revising the UTAUT model through replacing performance expectancy with personal outcome expectancy to make it more consistent with using professional online communities for knowledge provision, this research contributes to knowledge by demonstrating the generalisability of the UTAUT theory to a different context, which is an important step towards advancing a theory.

8.3.1.2. Integration and comprehensiveness

As highlighted in Chapter One, one of the common critiques is the lack of a comprehensive model that can explain why professionals use online communities for knowledge sharing. Especially in a complex phenomenon such as knowledge management, studies that rely on a single theoretical perspective cannot capture the knowledge sharing process between knowledge providers and knowledge seekers (Quigley et al., 2007, Watson and Hewett, 2006). To the best of the researcher's knowledge, this is one of the first rigorous studies that tried to expand our knowledge of using these communities by introducing and adopting a multi-theoretical approach and, therefore, this study contributes, unlike previous studies (see Appendix B), to the establishment of a more comprehensive and integrated model of using these communities for knowledge sharing.

Furthermore, the majority of prior research has tended to equate the concept of online community use behaviour with only use for knowledge contribution (Kankanhalli et al., 2005, Chiu et al., 2006) and consequently ignores the importance of use for knowledge acquisition. However, the current research considered them as two important but distinct behaviours and clarified the effect of a number of motivators on both of them separately and then simultaneously. Further insights can be noticed from separately and simultaneously validating and examining theoretical models for understanding use for knowledge acquisition and use for knowledge provision. The path coefficients, supported by t-test for different groups, indicated that the same predictors of the two models showed different influences on usage behaviour, and the explanatory power was significantly different (50% for use for knowledge acquisition and 41% for use for knowledge provision). By developing a comprehensive model that includes both usage behaviours, this study contributes to knowledge by illustrating that the monolithic view of general usage or use for provision only cannot tell the whole story. Thus, this study sheds more light not only about how community members can provide and contribute their knowledge but also how they can acquire knowledge and gain performance benefits from the community.

8.3.1.3. The mediating role of the main drivers of community use

Venkatesh and Bala (2008), in their technology acceptance research agenda, clearly stated "*We urge IS researchers to examine the influence of design characteristics on user acceptance, particularly on the determinants of perceived usefulness and perceived ease of use*" (p.294). In response to the call, this study enriches and provides valuable insights to our understanding of the factors that shape members' expectancy regarding effort and outcomes of using the community for sharing knowledge. System quality, content quality, system self-efficacy and knowledge self-efficacy were validated and found to be influential predictors of using professional online communities for knowledge acquisition/provision. Therefore, drawn from the results of the present research, effort expectancy was found to be positively predicted by system self-efficacy and system quality. Performance expectancy was found to be positively predicted by system self-efficacy, system quality and content quality; whereas personal outcome expectancy was found to be determined by system self-efficacy, knowledge self-efficacy and content quality. Interestingly, this study found that the community system characteristics – system quality and content quality – differ significantly in their influences on performance/personal outcome expectancy according to the kind of usage.

To the best of the researcher's knowledge, this study is the first to examine the mediating role of personal outcome expectancy between knowledge/system self-efficacy and system use. As such, this study contributes to knowledge by confirming that system self-efficacy, knowledge self-efficacy, content quality and system quality are important determinants of effort expectancy and performance/personal outcome expectancy. Moreover, the findings of this study confirm that system quality and effort expectancy are complementary yet distinct latent variables (Nelson et al., 2005) and that effort expectancy mediated the influence of system quality on professional community use for knowledge acquisition/provision.

8.3.1.4. Community system characteristics and relational capital (trust)

Particularly in marketing, few researchers have studied the relationship between "website quality and website usability" and some social and behavioural aspects such as customer trust and commitment (Flavian et al., 2006, Wells et al., 2011). In the field of knowledge management and information success, the technological elements have mostly been studied as determinants of, for example, user satisfaction, usage and satisfaction. However, the association between these technological aspects and the direct and indirect effects on the professional online community use, especially in voluntary systems such as professional online communities, have not been studied before. Relational capital (trust), in the context of this study, is introduced as an intervening variable, which mediates the influence of system quality and content quality on the use of professional online communities for knowledge acquisition/provision. The findings of this study revealed that community members who perceive high content and system quality are more likely to show a higher degree of relational capital (trust) when they share their knowledge. To the best of the researcher's knowledge, this study is the first to examine the mediating role of social capital – trust – between the technological aspects (system quality and content quality) and using professional online communities for knowledge sharing.

8.3.2. Methodological contribution

Using pre-validated scales is strongly supported by MIS researchers (Chan et al., 2010, Leidner and Jarvenpaa, 1995, MacKenzie et al., 2011, Straub, 1989, Venkatesh et al., 2011); therefore, an intensive literature review was conducted to develop and to adopt pre-validated measures, which were then modified to fit the contextual definitions of this study. Additionally, as the adopted constructs were applied for the first time in Egypt in the context of professional online communities, one of the main challenges for this research was to ensure that the appropriate measures that manifest the constructs of this study were employed. Methodology scholars agree that findings obtained from poor measures, regardless of their significance, do not make sense. Thus, as recommended by Boudreau et al. (2001); MacKenzie et al. (2011); and Moore and Benbasat (1991), this study used three rounds of pretests: pretest structured interviews, Q-sorting technique and a large-scale pilot study (193 participants) to validate the different variables. Besides the findings of the main study, all rounds revealed highly reliable and valid measurements.

Most previous studies that examined online communities used either student samples (e.g. Bagozzi and Dholakia, 2002, Chen et al., 2009, Lin, 2008, Lu and Yang, 2011, Pentina et al., 2008) and/or one single community as a research population (e.g. Chiu et al., 2006, Gupta and Kim, 2004, Wasko and Faraj, 2005, Wu and Tsang, 2008). This research used data collected from eight different professional online communities, which, notwithstanding the research limitations, helps the generalisability of the research findings. Additionally, the majority of prior research that adopted the UTAUT model used variance statistical techniques (PLS specifically); however, this study used the covariance-based structural equation modelling (CB-SEM) statistical technique. Furthermore, this study employed measurement invariance and structural invariance tests in SEM, which are advanced statistical techniques that have been recently promoted and recommended by researchers to test for covariance multi-groups invariance and moderation. This technique allowed the researcher to test for moderation and validate the research models across the different groups.

8.4. Practical implications

Regarding the practical implications for managers and providers, this study derives its significance from the importance of professional online communities and its value for organisations and individuals in the short and long-terms. Many organisations have recognised the importance of professional online communities as useful systems for knowledge management; thus they have acknowledged the importance of establishing and developing online communities to meet their objectives and their business needs (Chen, 2007). Kaniki and Mphahlele (2002) emphasise and argue that "*in order to deal with these complex problems, to facilitate development, and manage change, "modern"* *communities and individuals require complex solutions by borrowing, adapting and sharing ideas and practices from different sources including traditional and scientific communities…. It has become increasingly clear, at least to some, that data, information and particularly knowledge, if appropriately distributed, shared and utilised can enhance productivity and indeed development*" (p.2). Likewise, the World Bank highlights the role of knowledge sharing and its benefits for developing countries; therefore, it reports that the importance of knowledge management systems for these countries to empower themselves and to succeed in the knowledge-based economies cannot be underestimated (Al-Alawi et al., 2007). Thus, and based on the above discussion, this study is practically significant in at least three ways.

8.3.1 Importance of professional online communities

The main driver of using professional online communities is to enhance the efficient use of already developed and tested knowledge (Dudezert et al., 2006), especially in knowledge-intensive professions. Using already utilised and tested knowledge improves efficiency and reduces the cost of money and time (Katzy and Ma, 2002). Moreover, these communities, as mentioned by Henschel (2001), might reduce the learning curve. As discussed earlier, Seddon (1997), Seddon and Kiew (1996) explained that using an information system is not a definite indicator of system success but rather it is the expected or perceived benefits from using the system that can be used to measure its success. They argued that the main motivator to use a system is the expected benefits and its ability to satisfy their needs. The findings of the current research indicated that the use of professional online communities positively influence members' work performance. Content quality was found to be the strongest determinant of healthy relationships (trust), personal outcome expectancy and performance expectancy. Thus, the finding suggests that professional communities' managers should encourage community members to provide correct, consistent, understandable and valuable knowledge that can help in promoting the community and enhance knowledge collectors' levels of usefulness (performance expectancy).

8.3.2 Community system design

A good professional online community should not only provide high-quality content but should also be a user-friendly community. Especially for knowledge acquisition, the findings suggest that community managers and designers should pay significant attention to the design of the community system. Reliable, flexible, available and well-designed community systems were found to determine performance and personal outcome expectancies of using the community, effort needed to use the community and social relationships. Thus, the community's managers should consider different design and implementation strategies not only for motivating current members to effectively share their information and knowledge but also for attracting new members who might refuse to use the community because of poor quality. Equally important, the community's managers should reconsider the system design periodically as members' perceptions are not constant and evolve over time.

8.3.3 Two sets of beliefs and two usage behaviours

The findings of this study can improve managers' understanding of use behaviour and its antecedents, which are considered the cornerstone of any knowledge management success. Skyrme (2002) argues that perceiving knowledge as a power is not the main reason for a lack of knowledge sharing. McDermott and O'Dell (2001) emphasise that instead of just encouraging individuals to share knowledge, the most important step is to identify the affective factors involved in knowledge-sharing behaviour. Thus, adding value to the practitioners and administrators of online professional communities requires carefully identifying and examining the underlying determinants and antecedents which contribute more than others to use for knowledge sharing activities. Therefore, this study aimed to inform professional and organisational-sponsored online community administrators of the most important factors required for sustaining effective use for knowledge sharing. To fulfil this aim, the research findings suggest that the strongest driver of use in the context of professional online communities was the expected outcomes of providing and contributing knowledge. In sum, the results indicated that communities' managers should pay more attention to knowledge providers by establishing appropriate mechanisms to compensate their donations and efforts. For example, adopting reward systems and enhancing intrinsic motivators would be useful. On the other hand, the findings indicated that members who use the community for knowledge acquisition placed higher importance on effort expectancy and social influence as compared to members who use the community for knowledge provision. Thus, features and functions that can make the community easier to use for knowledge acquisition should be communicated to members who use the community for that purpose.

In sum, many organisations are currently taking strong steps in establishing their own online communities due to the expected value (Gupta, 2008). By utilising the findings of this study, knowledge management and professional online communities' managers will have a complete picture of knowledge dynamics within professional online communities, not only for knowledge provision use, but also for knowledge acquisition use.

8.5. Limitations and future research

This research tried to develop three theoretical models that can better explain the use of professional online communities for knowledge sharing. The scope of this research may be described from three aspects. First, the investigated usage behaviour is the use of professional communities for knowledge sharing (provision and acquisition). Second, the study investigated actual and active members. Third, the investigation of usage is limited to the Egyptian professional online communities.

This research may suffer from several limitations that generally relate to measurement and survey. ***Firstly,*** one of the major limitations of this study is findings generalisation. The sampling frame of this study was constituted from users of Egyptian professional online communities where mutual learning among the communities' members is the main aim; thus, the study findings may not be generalisable to other types of online communities, such as social and commercial online communities, and may not be applicable to other cultures. New research in other distinctive communities and cultural settings can deepen our knowledge about the factors that influence use of these types of community. Moreover, future research may provide rich insight by conducting cross-cultural study and/or exploring the influence of some cultural factors on the use of global professional online communities.

Secondly, although the current study targeted actual community's members in non-mandatory environment, use of the community for knowledge sharing behaviour (provision and acquisition) was measured by self-reported measures. In a controlled environment, such as professional online communities, the actual use behaviour can be captured by other means of observation (electronically for example) that would increase the possibility of generalising the obtained findings. However, the required resources for utilising this option were not available. Although some research scholars argued that self-reported use measures tend to be biased (Straub et al., 1995), others suggested that self-reported measures correlate well with actual use measures (Taylor and Todd, 1995). In their meta-analysis study (Part 1), Yousafzai et al. (2007) found that 43% of the technology acceptance studies measured the intention to use, 47% measured self-reported use and only 9% measured actual use.

Thirdly, this study, besides using self-reported scales, employed a cross-sectional design. As discussed by Straub and Burton-Jones (2007), respondents may tend to inflate their responses or may provide biased responses because of social desirability and/or evaluation apprehension. However, as discussed in Chapter Six, some procedural or ex-ante techniques and statistical or ex-post remedies were undertaken to control and reduce the effect of common method variance CMV. For example, this study used three rounds of pretests (pretest interview, Q-sorting and a large-scale pilot study), which were crucial to identifying and eliminating any ambiguities and misunderstanding with the questionnaire. In general, the pretests, along with adopting pre-validated scales, helped in constructing and developing valid and reliable measures. Although the research informants can be classified as high-ranking informants who have accurate knowledge and can accurately assess their cognitive states, confidentiality, anonymity, and collecting data from different professional online communities were applied to minimise the problems of evaluation apprehension and social desirability. Statistically, EFA, CFA and "unmeasured latent method factor" were used to assess the severity of CMV. All demonstrated that the CMV is not a serious problem and was not responsible for the relationships among the research constructs. Nevertheless, despite all the methodological and procedural care given to minimise the severity of CMV, the findings of this study should be interpreted cautiously and further studies may be needed to further confirm the constructs' validity and reliability. Therefore, for future research, it would be recommended to develop and apply objective measures, especially for measuring the dependent variables. Additionally, because of the cross-sectional nature of the current study, causality cannot be inferred based on the study findings. Any statements and/or conclusions about the causal relationships were based on a theoretical foundation rather than the empirical evidence of the study.

Fourthly, another limitation is related to the research sample units. The sample units were constituted from only active participants; however, members who have stopped participating or are no longer active participants may have different perceptions regarding the research variables. Thus, future research may seek an appropriate method to approach and solicit the perceptions of non-active users.

Finally, the UTAUT model was created to explain organisational adoption, and used for information technologies. The motivation for adopting and using the professional online communities' technology could be related to different variables (e.g. social networks, culture, personality, evaluation apprehension and social costs). Although salient factors were integrated into the UTAUT model based on theoretical and empirical foundations and contextual relevance, integrating other factors or other theories may extend our understanding of how these factors, independently and/or interactively, explain professional online community usage. Thus, future research may contribute to knowledge by accounting for the unexplained variance in the research models by extending and integrating (or substituting) other factors that may increase the explanatory power.

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Appendixes

Appendix A: Summary of knowledge sharing previous studies

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
Kim and Lee (2006)	This study aimed to investigate the effect of organisational, cultural, and technological factors on the knowledge sharing in the public sector.	- Paper-based survey. - 322 valid questionnaires. - EFA and regression	- Organisational culture Vision and goals Trust among employees Social networks - Organisational structure Centralisation Formalisation Performance reward system - Information technologies IT application use End-user focus - Employee knowledge-sharing capabilities.	- Social networks, centralization, employee usage of IT, and performance-based reward systems significantly influenced the employees' knowledge sharing capabilities in both sectors.	- Trust among employees
Tohidinia and Mosakhani (2010)	Based on the Theory of Planed Behaviour (TPB), this research aimed to evaluate the impact of different individual and organisational factors on knowledge donation and collection in the Iranian oil industry.	- Paper-based survey - 502 valid questionnaire - CFA and SEM	- Anticipated reciprocal relationships - Perceived self-efficacy - Expected extrinsic rewards - Organisational climate - Attitudes toward KS - Perceived behavioural control - Level of ICT usage - Intention to share knowledge.	- Perceived self-efficacy and anticipated reciprocal relationships positively influenced the attitude towards KS. - Organisational climate had a positive influence on the subjective norm. In addition, the level of information and communication technology usage showed a positive influence on knowledge sharing. - In general, there were significant relationships between the TPB variables. - The expected extrinsic rewards did not show significant relationships with this variable.	Self-efficacy
Hooff and Ridder (2004)	This study worked out to explore the factors that support/hinder knowledge sharing behaviour in the organisational settings	- Paper-based survey - 417 valid questionnaire - SEM	- Communication climate - CMC use - Commitment - Knowledge donating - Knowledge collecting	- Commitment to the organisation which is influenced by CMC use positively influences knowledge donating. - Communication climate has an effect on knowledge donating, collecting, and commitment.	- Knowledge donating - Knowledge collecting

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
Issa and Haddad (2008)	This study was carried to explore the role of culture, IT, and trust in motivating employees in sharing their knowledge in companies that have KM systems.	- Paper-based survey - 29 of construction organizations' mangers. - Descriptive statistics and regression.	- Culture factors Sociability Solidarity Power distance - IT factors Infrastructure Availability Codification - Communication factors Trust Face-to-face interaction Repute and altruism - Organizational support factors Management support and rewards - Knowledge sharing - Performance	- Proper organisational culture found to enhance mutual trust. - IT assists employees to share their knowledge but not motivate them in sharing knowledge. - Some kinds of knowledge are not able to be shared by using IT.	
Kankanhalli et al. (2005)	This study aims, based on the Social Exchange Theory, to explain the factors that influence knowledge contribution in the EKR repositories.	Paper based survey in the public sector organizations. 150 valid questionnaires EFA and moderate regression analysis	Costs: Loss of knowledge power Codification efforts Extrinsic benefits Organisational rewards Image Reciprocity Intrinsic benefits Knowledge self-efficacy Enjoy helping others	-Knowledge self-efficacy and enjoying helping others influenced positively EKR use to contribute knowledge. -Extrinsic benefits (reciprocity and organisational incentives) showed significant influence on EKR use.	- Knowledge self-efficacy - Knowledge contribution - Intrinsic benefits
Lu et al. (2006)	This study aims to explore knowledge sharing in public administration in China and the role of personal and individual factors.	Paper-based survey 208 part time students (study 1) and 262 part-time students (study 2) SEM	Organizational support Co-workers collegiality Greed Self-efficacy IT utilisation (study 2) Knowledge sharing (tacit and explicit)	- Greed was found to reduce he behaviour of knowledge sharing, while self-efficacy influenced knowledge sharing positively. - Peer collegiality had an indirect effect on KS by decreasing greediness and increasing self-efficacy. - Organisational support influenced utilisation of information technology, which in turn promoted knowledge sharing.	Self-efficacy
Kang et al. (2008)	The purpose of this article is to examine the mediation of knowledge sharing behaviour between some organisational and individual factors	-Paper based survey. - 323 public employees in South Korea. - EFA and path analysis.	Organisational dimension: Organisational culture Organisational structure Support from top management	- Knowledge sharing was found to be positively influenced by training, reward systems, management support, and individual's openness to communicate.	

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
	and individual performance.		Individual dimension: Openness in communication Cooperative relationships Knowledge dimension: Clarity of knowledge Usefulness of knowledge Knowledge sharing Work performance	- Employees work performance was found to be influenced by knowledge sharing behaviour. -Perceived mutual trust between the employees participated in knowledge sharing affected both knowledge sharing and employees' work performance. -Individual work performance found to be influenced by the effective use of knowledge sharing.	
Wolfe and Loraas (2008)	This study aims to fulfil two objectives. The first objective is to study the influence of non-monetary incentives on knowledge sharing, and the second was to examine the interaction of the non-monetary incentives with peer environment and the influence on knowledge sharing.	Two laboratory experiments 165 MBA students.	Incentives Nonmonetary recognition Personality Peer behaviour Knowledge sharing	-Regardless the incentives' type, it must be perceived as enough incentives to promote knowledge sharing. -Nonmonetary incentives are not as equal as monetary incentives in promoting knowledge sharing.	
Willem and Buelens (2007)	This study aimed to find out "how classic organisational structure dimensions should be altered to be more adapted to organisational knowledge sharing" (p. 151)	Paper-based survey in one energy company. 408 valid questionnaires. Regression analysis.	Inter-unit cooperative episodes Knowledge sharing Organizational structure dimensions: Centralization Formalization Decentralization Informal coordination	-The expected relationships (the negative effect of centralization or the positive effect of lower formalization) were not found to influence knowledge sharing. - Interdependency and knowledge complexity, caused by specialization, had an important interacting effect on the link between coordination and knowledge sharing. -A comparison between the two companies revealed that the organisation-specific context in which the coordination is applied influences the potential of this coordination for knowledge sharing	
Yang (2007)	This research aimed to find out the influence of organisational culture, especially leadership and employees collaboration on knowledge sharing.	- Paper-based survey in Taiwanese hotels. - 499 valid questionnaires. - Correlation and Regression models.	- organisational culture - collaboration - leadership - knowledge sharing	- Collaborative culture positively influences the effectiveness of knowledge sharing. - There was a positive relationship between facilitator, mentor and innovator roles and knowledge sharing effectiveness. - There was a negative association between monitor roles and knowledge sharing	

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
Gupta (2008)	The study aimed to examine the role of human values and the organisational climate regarding knowledge management on knowledge creation/sharing and customer/employee satisfaction.	- Paper-based survey. - 718 valid questionnaires by surveying 4 different sectors in India. - Correlation and ANOVA	- knowledge management - Human values Integrity Cost and time consciousness Trust and team spirit Commitment to total quality - Consequences	- Data analysis reveals that the integrity, respect to others and trust are lower for the executives at higher hierarchy levels in the organisation. - There was very high correlation among all the values with almost all the outcomes. - Organisations whose culture is characterised by openness to change and innovation would likely foster human-to-human contact and stress similarities between individuals.	
Quigley et al. (2007)	This study aimed to develop a model based on integrating all of goal-sitting-social cognitive theory, organisational incentives, and social motivation theory to explain knowledge sharing and its effect on individuals' performance.	- 120 undergraduate students. - Hierarchical regression - Random coefficient modelling technique	- Perspectives of knowledge provider Incentive conditions Norms Knowledge shared by knowledge provider - Perspective of knowledge recipient Self-efficacy Trust Self-set goal	- The group-oriented incentive system have an impact on knowledge sharing; however, this relationship is enhanced when norm for knowledge exists between dyad participants. - The seeker's self-efficacy has a positive impact on performance goals. - Self-set objectives and knowledge sharing individually and interactively have an effect on performance.	- Self-efficacy - Trust
Connelly and Kelloway (2003)	The study aimed to investigate employees' perceptions of the social interaction between culture and management support for knowledge sharing for predicting a positive knowledge sharing culture.	- Paper-based survey in Canada. - 126 valid questionnaires. - Correlation and regression.	Knowledge management Social systems Management services	- Social interaction culture, management' commitment, and the organisational size influence knowledge sharing significantly. - Age, gender, technology, and the organisational tenure did not show positive influence on KS.	
Lai and Lee (2007)	The aim of this study was to importance of the organisational culture and to extent it influences knowledge sharing behaviour within an enterprise.	- Paper-based survey in Taiwan. - 154 valid questionnaires. - CFA and SEM	- Punctilious - Authority - Effective - Knowledge sharing	- An effective culture is shaped by process formalisation and tendentiousness of firm attitudes to decision making should be developed. - Management should plan healthy empowerment systems to motivate employees to utilise their experiences and skills to perform better jobs.	

Appendix B: Summary of online community literature

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
Chiu et al. (2006)	The main aim of this research was to understand "the complex process in which social capital influence knowledge sharing in virtual communities". (p. 1883)	- Web survey. - 310 members of one virtual community in Taiwan. - CFA and SEM	- Social ties. - Relational dimension Trust Reciprocity Identifications -Cognitive dimension Language Vision -Personal outcome expectations -Community-related outcome expectations - Quantity/quality of knowledge (dependents)	- The quantity of knowledge sharing has been found to be influenced by social ties, norms of reciprocity, identifications, and community-related outcomes. - The quality of knowledge contributed has been found to be influenced by trust, shared language, and community-related outcome expectations. - Personal outcomes expectations has had no effect on both quantity/quality of knowledge shared among members.	- Trust - Quality of knowledge (independent)
Bagozzi and Dholakia (2002)	The main aim is to help explain this irresistible allure, the individual and social determinants of the member's intentions to participate are investigated.	- Survey questionnaire of 157 students' participants in USA. - Virtual community of chat - Empirical + LISREL	Desires (mediator) We-intentions (dependant) Past behaviour Subjective norms Group norms Positive/negative anticipated emotions Social identity Attitudes Cognitive-social identity Perceived behavioural control	The main predictors of desires and intention to participation are: Attitudes Social identity Positive anticipated emotions	
Wang and Fesenmaier (2003)	"the objective of this research is to develop and evaluate an integrated model of online travel community participation in order to examine the dynamics of the relations as well as the relationship between overall participation and active contribution" (p. 710)	- Virtual travel communities in the USA - Online survey to 322 members - CFA and SEM	Level of participation (mediator/dependant) Extent of contribution (dependant) Participation benefits: Functional Social Psychological Hedonic Contribution incentives: Instrumental Efficacy Quality control Gaining status Expectancy	-Level of involvement is determined by the social and the hedonic factors. -Instrumental, efficacy and expectancy are major factors to predict the level of contribution. -Level of involvement is a key factor for level of contribution.	

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
Dholakia et al. (2004)	The objective is to study the effect of group norms and social identity on the decision of participating.	- Online survey - 545 users from 7 different USA virtual communities - CFA and SEM	Decision making and participation factors (dependant) Desires We-intention Participation behaviour Social influence variables (mediators) Mutual agreement Group norms Mutual accommodation Social identity Value perceptions (predictors) Purposive-values Interpersonal interconnectivity Social-enhancements Entertainment values	-Regarding participants of small-groups-based communities, interpersonal-connectivity and social enhancement as social benefits are a significant drivers of participation. -Purposive value is found as a significant predictor of participation in the network-based virtual communities. -The intentional social action influence member stem from an understating and/or expectations of benefits that the members seek to obtain from the social interaction. The main antecedents of desires, we-intentions, and participation behaviour are; the purposive value; entertainment value; self-discovery.	
Gupta and Kim (2007)	"the aim of this study is to examine customer commitment formation in a VC from the perspective of balanced cognition and affect" (p. 29)	- Online survey - 275 of an online store for mothers in Korea. - CFA and LISREL	Commitment to virtual community (dependent) Attitude toward virtual community (mediator) Cognition and affect factors Functional useless Social useless System quality Pleasure Arousal	-The main drivers of the attitude towards and commitment to virtual community are; system quality; functional usefulness; and pleasure. -Attitude towards virtual community is a significant influence on commitment.	- System quality
Chen et al. (2010)	The study aimed to produce a comprehensive model integrating some individual factors, contextual factors, and their influence on knowledge sharing and promoting the community.	- Web survey on two of the largest IT-oriented virtual communities. -323 valid questionnaires. -SEM and CFA	Contextual factors : - Reciprocity - Interpersonal trust Personal factors : - Self-efficacy Knowledge sharing (collecting and contributing) Knowledge utilisation Community promotion	-Interpersonal trust, knowledge sharing self-efficacy, and perceived advantages significantly influence knowledge sharing behaviour (contributing and seeking). -Knowledge sharing behaviour influences knowledge utilisation and community promotion.	Individual trust. Self-efficacy Knowledge sharing
Williams and Cothrel (2000)	The aim of this study was to understand how four companies have created online communities to support their business strategies.	- Empirical case study. - 4 online community cases.		-Member development, asset management, and community relations are three key critical activities which are important for community continued viability. - Technology availability is very important requirement for online communities support.	

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
Wu and Tsang (2008)	The main aim is to "investigate whether the sense of trust that develops in members of virtual community websites enhances their willingness to interact with the websites and further encourages them to engage in virtual community activities" (p. 124)	-Web-survey of 625 community members in Taiwan. -SEM and ANOVA	- Antecedents factors Participants trust Institutional trust -Trusting belief -Outcomes of trust Stickiness Sharing information	They found that trust towards the website significantly affects the desire to visit the community and wither they share their information with other members.	
Pentina et al. (2008)	The research aim is "exploring the social processes that take place within virtual communities, their motivational antecedents and their potential to stimulate virtual community influences on members" purchase choices and buying behaviour" (p. 115)	- Online survey of 533 undergraduate - s in virtual communities. - Partial Lest Squire (PLS)	Dominant motivation to join Social integration Entertainment Informational (purposive) Status enhancement Transactional Social identity Informational susceptibility (IS) cognitive IS affective (emotional) IS evaluative IS internalization Informational Normative Buying behaviour	-Socially-oriented motivations →cognitive SI -Socially-Oriented Motivations → Evaluative SI -Socially-Oriented Motivations → Norm internalization -Informational (purposive) motivations → Norm internalization -Transactional motivations → Norms Internalization -Cognitive SI → Normative Susceptibility -Cognitive SI → Informational Susceptibility -Evaluative SI → Informational Susceptibility -Evaluative SI → Informational Susceptibility -Norms Internalization → Normative Susceptibility -Normative Susceptibility → Buying Behaviour Informational Susceptibility → Buying Behaviour	
Lin (2008)	The aim is "to conceptualize, develop, and validate independent variables that result in user satisfaction and loyalty for virtual communities". (p. 138)	- Paper-based survey. - 230 undergraduate students in Taiwan - SEM	Satisfaction with virtual community (mediator) Member loyalty (dependent) Predictors: Ease of use/usefulness System quality Information quality	All antecedents significantly influenced member loyalty directly and indirectly through satisfaction with virtual community.	System quality Information quality
Chen et al. (2009)	This research aimed to understand knowledge sharing behaviour in virtual learning communities via the extension of the Theory of Planed Behaviour with social network ties". (p.136)	- Paper-based survey. - 396 undergraduate and MBA students in Taiwan - CFA and LISERL	Attitudes towards knowledge sharing Subjective norms Knowledge sharing intentions Social network ties Knowledge/web self-efficacy	-Attitude toward knowledge sharing, subjective norms, knowledge self-efficacy, and social network ties influence significantly on knowledge sharing intention and behaviour. -Web-specific self-efficacy was found to affect knowledge sharing intention and behaviour. Knowledge sharing intention influence positively on knowledge sharing behaviour.	Knowledge self-efficacy

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
Butler (2001)	Based on studies of traditional small groups, voluntary associations, and organizations, this research aimed to "present a resource-based model of the internal dynamics of sustainable social structures". (p. 347)	- Empirical with 824 data points: 206 listservs	Membership size Topic variation Communication volume Member gain Member loss	-Larger listservs which have a variety of threads in communication activities experience member loss; however, larger and more active lists experience higher rates of member gain. -Membership size plays a critical role in the developments of online social structure is not as a single, positive effect, as it is characterized in critical mass analysis. -Communication activity and size influence positively and negatively on the sustainability of online social structures.	
Lee et al. (2003)	This study aims to compare different virtual community definitions and develop a working definition. Moreover, it has tried to describe different classifications of virtual community and suggest selective adoption based on different situations.	- Conceptual with literature review - Survey (200); 100 sites google.com; 100 sites yahoo.com - Descriptive statistics	Communication tools: E-mail Forum and discussion group Chat rooms Newsletter Messages Types of community: Relationship communities Interest communities Fantasy communities Transaction communities	-Regarding types, there were 38% interest communities; 43% relationship communities; 12% fantasy communities; and 7% transaction communities. -Regarding tools and the number of communities that use these tools; 52% e-mail; 95% forum; 66% BBS; 58% newsletter; and 64% chat.	
Bock et al. (2005)	The aim of this study is to develop a model able to explain the factors that can increase or decrease employees' tendency to share their knowledge.	- Paper-based survey. - 154 employees from 27 South Korean organisations. - Correlation and partial least squares (PLS).	Organisational climate. Anticipated extrinsic rewards. Reciprocal relationships. Sense of self-worth. Attitude toward knowledge sharing. Subjective norm. Intension to share knowledge.	-Attitude to share knowledge, subjective norm, and organisational climate have influenced positively on intension to share knowledge. -Anticipated reciprocal relationships influences intention to share knowledge via the employees' attitude. -Organizational climate was found to influence the employees' intensions to share knowledge via subjective norm.	
Lu and Yang (2011)	The aim is to study the influence of the different dimensions of the social capital on individuals' behaviour to share their knowledge in virtual communities under extreme disaster conditions.	- Paper-based survey. - 475 undergraduate Chinese students. - Hierarchical analysis and PLS	Structural capital Cognitive capital Relational capital Information quality Information quantity	-Social network ties influences information quantity and the cognitive capital but there is no influence on information quality. -Cognitive capital influences information quality and the relational capital but there is no relation with information quality. The relational capital influences information quality	Information quality

Author	Aim	Methodology	Keywords/constructs	Results	Adopted concepts/variables
Wasko and Faraj (2005)	The main goal of this research is to "better understand knowledge flows by examining why people voluntarily contribute knowledge and help others through electronic networks"(p. 36)	- Online survey. - 173 users of a national legal association in the USA. - PLS	- Individual motivators Reputation Enjoyment in helping others - Structural capital Centrality - Cognitive capital Self-rated expertises. Tenure in the field - Relational capital Commitment Reciprocity - Knowledge contribution	-Reputation and centrality influence positively helpfulness and the volume of contribution. -Tenure in filed influences positively the volume of contribution. -Enjoy helping and self-rated expertise do not influence knowledge contribution.	
Wu and Tsang (2008)	The research aims to fill a "gap exists in terms of the underlying dimensions, causes, and effects of trust on virtual community members" in transaction communities. (p 1025-1026)	- Web-based survey. - 381 members of different transaction communities. - CFA and SEM	- Shared values - Privacy policy - Satisfaction - Trusting belief Benevolence Integrity Predictability - Commitment - Stickiness	-The shared values were found to be significant determinant of trusting beliefs and commitment. - Users' satisfaction was found to be significant predictor of trust, commitment and user stickiness. - Trust was found to be influenced also by web-site privacy. -Trust influences significantly the stickiness and members' commitment.	

Appendix C: TAM validation and previous extension studies

Reference	Technology studied	Methodology	Objective/aim	Model used	Extended variables	Results
Davis (1989)	e-mail and word editors	Empirical (Qualitative) 112 employees and 40 MBA student	To develop valid measures for EOU and PU			
Davis et al. (1989)	Word processor software	Empirical (longitudinal) 107 full-time MBA students FA, multitrait-multimethod approach, R^2	To compare TRA to TAM in explaining technology acceptance and use through intention	TRA and TAM		- PU predicts intentions to use while EOU is secondary and acts through PU. - TRA and TAM can predict the relationship between behavioural intention and usage. - Attitude was not found to be a mediator between PU, EOU, and intention to use.
Mathieson (1991)	Spreadsheet	Empirical 262 students course intro-management	To compare TRA and TBA to TAM in explaining technology acceptance and use	TRA, TPB and TAM		- TAM and TRA can predict the intentions to use better than TPA. - TAM is easier to use and interpret but does not provide detailed information like the TPA model.
Adams et al. (1992)	e-mail and voice mail for study one Graphics software for study two	Empirical - Study one: 118 - Study two: 73 SEM and Chi-square	To validate PU and EOU constructs, in addition to predict the system use by both constructs	TAM		- Study one: usefulness is a significant indicator of system usage. - Study two: PU and EOU influenced system use significantly
Taylor and Todd (1995)	University computing, resource centre.	Empirical 786 student SEM	The main aim is to extend, to integrate and compare models drawn on TAM and TPB.	TAM and TPB	Subjective norms and perceived behaviour control	- All models are fit and have the ability to explain use behaviour - TPB outperforms in terms of providing more explanation of intention to adopt. - In TAM, users' attitude did not show significant influence on intentions to use.
Igbaria et al. (1995)	Microcomputer use	Empirical 236 PT MBA students FA and SEM	Studying the influence of individual, organisational, and system factors on system use through PU and EOU.	TAM	Individual, organisational and system characteristics	- EOU strongly explains PU and system usage, and PU had a significant impact on use - The external variables (management support and external support) impacted both EOU and PU. However, the internal support and internal training had not shown significant influence.
Venkatesh and Davis (1996)	WordPerfect and Lotus	Experimental - 182 students (ex 1) - 214 students (ex 2) - 312 students (ex 3)	Extra validation of the TAM and to assess the psychometric of the construct	TAM		All experiments further validated the TAM model constructs in addition to predict and explain technology acceptance by users.

Reference	Technology studied	Methodology	Objective/aim	Model used	Extended variables	Results
Jackson et al. (1997)	Spreadsheets, database, word processors, and Graphic programs	Empirical 111 organisational employees SEM	To develop a holistic model better explains the factors that lead to system usage.	TAM	Experience, argument for change, situational involvement, and intrinsic involvement	- There is a relationship between the situational involvements and the behavioural intentions as well as attitudes were significant in the negative directions. - Attitude mediates the relationship between the external factors and intention. - Intrinsic involvements play a significant role in forming perceptions (usefulness and ease of use).
Agarwal and Prasad (1999)	Word processing and spreadsheet	Empirical 205 users	To study the personal differences and its relation with technology acceptance.	TAM	Role related to technology Work experience Education Training	-The individual differences are not strong enough to determine technology acceptance (use) -Some individual difference variables (education, experiences, training) showed significant impacts on TAM's beliefs.
Lucas and Spitler (1999)	Workstation	Empirical 135 employees from one financial firm SEM	This paper develops a model to predict the use of a workstation designed for private-client brokers at a major investment bank.	TAM	Social norms (management support), system quality, performance	- Social norms and job nature were found significant predictors of usage. - Users' perception of technology was found to influence usage.
Karahanna et al. (1999)	Microsoft Windows 3.1	Empirical 107 potential adaptors 161 actual users SEM using Partial Least Square (SEM-PLS)	Attempts to contribute understanding of the factors that affect use and resistance to use IT. Specifically, the study tried to study whether differences between the determinants of "(1) adoption and usage of IT, (2) attitude toward adopting and attitude toward continuing to use IT, and (3) subjective norm toward adopting and subjective norm toward continuing to use IT" (p. 184)	TAM	- Attitudes (image, demonstrability, visibility) - subjective norms toward continue from (top management., peers, MIS dep., friends, local computer specialists, supervisor)	- The relationship between behavioural intention and attitude is more important for actual users than for potential users of IT - The relationship between behavioural intention and subjective norm is stronger for potential adopters than for users. - There are no differences in behavioural and normative beliefs between the potential adopters and the actual use**rs.**
Dishaw and Strong (1999)	Software maintenance tools used by programmers	Empirical 60 maintenance projects Path analysis	This study aimed to "develop and evaluate an integrated TAM/TTF model" (p. 10)	TAM and the task-technology fit model (TTF)		- It had been found that the task-technology fit factors (tool experience, task technology fit, tool functionality, task characteristics) significantly affect EOU and U. - The integration of TAM and TTF constructs together in one model leads to explain the choices of using IT.

Reference	Technology studied	Methodology	Objective/aim	Model used	Extended variables	Results
Venkatesh (2000)	Online help-systems Multi-media systems Windows95	Empirical Study (1) 70employees Study (2) 160 employees Study (3) 52 employees SEM using Partial Least Square (SEM-PLS)	It aimed to further discover the determinants of EOU based on two types of factors. 1) Anchor factors (the determinants of ease of use perception. 2) Adjustment factors (the beliefs that are formed as a result of direct experience with the technology.	TAM	-Anchors (computer self-efficacy, perception of external control, computer playfulness) -Adjustments (perceived enjoyment, objective usability)	Anchor elements found to have an influence on EOU regarding new system. Adjustments factors were found significant in determining system specifics EOU especially with increased experience.
Venkatesh and Morris (2000)	Data and information retrieval	Empirical 342 workers (156 women and 186 men) SEM using Partial Least Square (SEM-PLS)	This study aimed to achieve three objectives 1- to understand the influence of gender on the TAM model beliefs (PU and EOU) in their relationships with behavioural intentions to adopt new technology. 2. Integrate subjective norm into TAM using gender as a moderator. 3. Understand gender differences over the long term as it relates to sustained usage of technology with increasing experience". (p. 117)	TAM	Subjective norms Gender Experience	Males were found more influenced by the perceived usefulness more than females. However, females were more affected by ease of use perception and social influence. The effect of subjective norms decreased over time.
Chau and Hu (2001)	Telemedicine	Empirical 408 physicians at public tertiary hospitals in Hong Kong. SEM	The study aimed to address discussed limitations by examining two competing theories (TAM and TPB) for examining individual technology acceptance in the "telemedicine" context.	TAM, TPB and composed TPB	Computability, subjective norms, and perceived behavioural control	-TAM overcame TPB in understanding the physicians' intention to adopt telemedicine technologies. - The decomposed TPB is better than TAM but not in an influential difference. - PU was found to be significant predictor of users' attitudes and behavioural intentions in the TAM and the decomposed TPB model. EOU did not show significant effects on attitude or BI at any model.

Reference	Technology studied	Methodology	Objective/aim	Model used	Extended variables	Results
Venkatesh et al. (2002)	A specific computer technology	Empirical 316 employees in an accounting company SEM using EQS	This study aimed to extend the understanding of TAM through integration with the motivational model MM in addition to understand the different enablers in the context of an integrated model. Moreover, comparing the developed with the other previous models	TAM and Motivational Model MM	- Use adoption enablers (training, training moods, control). -Intrinsic motivations -Extrinsic motivations	The developed model showed stronger ability to understand the factors that influence technology use after training and over the extended period of time. The intrinsic motivations had no effect on the intention to use technology. The pre-training and the training environment are very important in forming the motivation and perceptions that in turn form the behavioural intentions to use technology.
Lewis et al. (2003)	Using World Wide Web for Educational purposes	Empirical 161 full-time instructional faculty members. PLS-SEM	This study aimed to confirm that "institutional forces, social forces, and individual characteristics exhibits significant and differential impacts on two key individual beliefs about the use of information technologies: beliefs related to usefulness and ease of use". (p. 685)	TAM and SCT	- Institutional factors. -Social factors. -Individual factors.	-Top-management commitments to new technology and individual innovativeness showed significant influence on PU and EOU. - Computer self-efficacy showed significant impact on EOU. -Social influences, departmental peers, professional peers, and supervisor and senior leaders had not shown positive impact on PU and PEOU. -Perceived usefulness did not influence ease of use
Yi et al. (2006)	Personal digital assistance (PDA) acceptance by healthcare professional	Empirical 222 participants of faculty physicians in USA LISERL	The study aims to develop a comprehensive view by integrating the TAM model (PU and EOU), TPB, and IDT to develop new model Moreover, examining the new model in the healthcare context to understand technology adoption behaviour among healthcare professionals.	TAM, TPB, and innovation diffusion theory (IDT)	- Subjective norms - Perceived behavioural control. - Demonstrability	- Personal innovativeness in IT positively influenced perceived behavioural control, result demonstrability, PEOU, and subjective norms. - Result demonstrability and image positively influenced PEOU and PU. - Perceived behavioural control positively influenced PEOU and BI. - Subjective norms positively influenced BI, PU, and image. - PU showed positive influence on BI. - PEOU showed positive influence on PU. - There was no relationship between PEOU and BI.

Reference	Technology studied	Methodology	Objective/aim	Model used	Extended variables	Results
Karahanna et al. (2006)	Customer relationship system	Empirical 278 participants in a USA bank SEM-PLS	The study aimed to 1- develop "of a fresh perspective on the notion of compatibility both in terms of dimensionality as well as structure of the construct … and to find empirical support for the theorized consequents of compatibility beliefs" (p. 798)	TAM	-Compatibility w/existing work practices. -Compatibility w/prior experience. -Compatibility w/values.	- PU and EOU are significant determinants to usage scope and usage intensity. - The three variables of compatibility were able to show significant effects on EOU and PU except compatibility w/value was able to show important influence on EOU. - Compatibility w/experience showed significant influence on use scope and use intensity.
Wu and Li (2007)	Knowledge management programme software.	Empirical 132 managers of knowledge management dep. In Taiwan Correlation and regression	The main purpose of this study was "to explore how to integrate human factors, emotional factors and social influences factors into the TAM to enhance its explanatory power with regard to employees' attitude and behaviour intention toward the implementation of a KM program" (276)	TAM	- Human and emotional factors	-The organizations that support KM (by focusing on technology advancement or on encouraging interpersonal communication and knowledge sharing) tend to facilitate and develop higher employee motivation to use the KM program. -Both intrinsic motivation and extrinsic motivation have positive influence on employees' attitude and behaviour intention to use of a KM program. -There were direct and moderating impact of social influence on employees' attitude and behaviour intention to use KM program.
Lin (2008)	Virtual communities participation	Empirical 198 community members Path analysis using SEM	This research aimed to "conceptualize, develop, and validate independent variables that result in user satisfaction and loyalty for VCs. It examines how the technology acceptance model (TAM) and Seddon IS Success Model theoretically differ in explaining VC satisfaction and loyalty and compares whether a research model integrating the two models can predict user satisfaction in the context of VCs better than using either of the two models alone" (p. 138)	TAM Seddon' IS success model	Information quality, sense of belongings, member loyalty	- Attitude is determined by PU and EOU which in turn influences member satisfaction. -The integrated model showed the highest variation where it was able to explain 59% in members' satisfaction -In the integrated model, system characteristics significantly influenced PU and members satisfaction.

Reference	Technology studied	Methodology	Objective/aim	Model used	Extended variables	Results
Barnes and Vidgen (2012)	Organizational intranet	Empirical 131 sales and marketing employees in a multinational manufacturing company. PLS and content analysis	The study aimed to "develop and test a parsimonious model of intranet quality – iQual – that would allow firms to assess and diagnose the quality of their intranets (p. 164).	TAM and iQual	Social influences, usability, design, and information.	-iQual positively influenced behavioural intention. -Perceived usefulness and social influences showed positive impact on behavioural intention. -There was a positive and significant relationship between behavioural intentions and the Intranet use.

Appendix D: Study findings and supporting previous studies

The current study					Supporting previous studies		
Hypothesis, Path, and Model			**St. β (t-value)**	**Result**	**Author(s)**	**St. β**	**Criterion variable and methodology**
H1	PE→UKA	M1	0.44 (8.803***)	Supported	- Burton-Jones and Hubona (2006) - Igbaria and Iivari (1995) - Igbaria et al. (1995) - Karahanna et al. (2006)	0.40*** 0.41*** 0.29** 0.35** 0.39**	- Email and word processing usage - 125 employees (USA) - PLS - Computer usage - 450 employees from 68 companies (Finland) – PLS - Personal computer usage in small businesses – 358 from 203 firms (New Zealand) - PLS - Bank's customer relationship system usage (scope and intensity) – 278 users (USA) - PLS
		M3	0.45 (8.311***)	Supported			
H2	POE →UKP	M2	0.52 (9.29***)	Supported	-He and Wei (2009) -Wasko and Faraj (2005) -Bock et al. (2005)	0.46***[16] 0.15*[17] 0.37***[18]	- Intention to contribute knowledge to respiratory – 161 employees in an international IT company – PLS - Use of legal network of practice for knowledge contribution – 173 users (USA) – PLS - Intention to share knowledge – 154 employees from 27 organizations (South Korea) - PLS
		M3	0.45 (8.40***)	Supported			
H3a	EE→UKA	M1	0.25 (5.00***)	Supported	-Im et al. (2011) - Chang et al. (2007) - Venkatesh et al. (2012)	0.42*** 0.22** 0.20***	- Intention to adopt the Internet banking – 501 users (South Korea and USA) – SEM - Intention to use pharmacokinetics-based clinical DSS- 115 physicians from three hospital from Taiwan- SEM - Intention to use mobile Internet technology – 1512 users (Hong Kong) – PLS
		M3	0.24 (4.52***)	Supported			
H3b	EE→UKP	M2	0.11 (2.08*)	Supported			
		M3	0.02 (0.35^{ns})	Rejected	- Lee et al. (2010) - Zhou et al. (2010b)	0.09^{ns} 0.06^{ns}	- Intention to use the certified electronic Document Authorities' services – 105 users (S Korea) – SEM - Mobile banking adoption – 250 users (83 students and 167 working professionals) – SEM

[16] The independent variable is "enjoyment in helping others"
[17] The independent variable is "reputation"
[18] The independent variable is "reciprocal relationship"

The current study					Supporting previous studies		
Hypothesis, Path, and Model			**St. β (t-value)**	**Result**	**Author(s)**	**St. β**	**Criterion variable and methodology**
H4a	SI→UKA	M1	0.17 (3.69***)	Supported	- Barnes and Vidgen (2012) - Abbasi et al. (2011) - Venkatesh et al. (2012))	0.31*** 0.12* 0.20***	- Intention to use and use of organisational Intranet – 131 users in a multinational company – PLS - Intention to use IT technologies – 504 academics in Pakistan – PLS - Intention to use mobile Internet technology – 1512 mobile internet users (Hong Kong) – PLS
		M3	0.13 (2.61**)	Supported			
H4b	SI→UKP	M2	0.07 (1.43^{ns})	Rejected	- Davis et al. (1989) - Karahanna et al. (1999) - Venkatesh et al. (2011)	0.08^{ns} -0.01^{ns} 0.02^{ns}/0.00^{ns}	- Intention to use word process – 107 MBA full-time students (USA) – Hierarchical regression - Employees' intention to continue use Microsoft Windows – 268 users in one company (USA) - PLS - Intention to continue use SmartID/GovWeb - 3159 for both models (Hong Kong) - PLS
		M3	0.03 (0.66^{ns})	Rejected			
H5a	Trust →UKA	M1	0.12 (2.43*)	Supported	- Ridings et al. (2002) - Gefen et al. (2003a) - Hooff and Huysman (2009) - Chen et al. (2010)	0.15**/0.28**[19] 0.29**/0.22**[20] 0.26** 0.18** 0.13**/0.30**	- Desire to give/get information in virtual communities- 663 users of 36 diverse bulletin boards – PLS - Intention to use online shopping – 213 students (USA)- SEM - Knowledge sharing behavior in organizations – 541 employees from six organizations (Dutch) – SEM - Contributing/collecting knowledge – 323 users of two IT virtual communities (Taiwan) - SEM
		M3	0.12 (2.31*)	Supported			
H5b	Trust→UKP	M2	0.17 (3.15**)	Supported			
		M3	0.13 (2.41*)	Supported			
H6a	SSE→PE	M1	0.16 (2.89**)	Supported	- Compeau and Higgins (1995b) - Compeau et al. (1999) - Reid and Levy (2008) - Lin and Huang (2008)	0.58***/0.46*** 0.43***/0.14** 0.31***/0.21*** 0.12* 0.66***/0.56***	- Outcome expectations (performance/personal) of using WordPerfect/Louts programs at work – (experimental) 88 users (Canada) - PLS - Outcome expectations (performance/personal) of using personal computers – 394 users (Canada) - PLS - Perceived usefulness of using banking information systems – 374 Customers (Jamaica) – SEM - Performance/personal outcome expectations of using organisational KMS – 192 users (Taiwan) – PLS
		M3	0.17 (2.99**)	Supported			
H6b	SSE→POE	M2	0.20 (3.36***)	Supported			
		M3	0.21 (3.51***)	Supported			

19 The independent variable is "trust in other ability"
20 The independent variable is "trust in others' benevolence/integrity"

The current study					Supporting previous studies		
Hypothesis, Path, and Model			**St. β (t-value)**	**Result**	**Author(s)**	**St. β**	**Criterion variable and methodology**
H6c	SSE→EE	M1 M2 M3	0.31 (6.08***) 0.29 (5.40***) 0.28 (5.23***)	Supported Supported Supported	- Jashapara and Tai (2011) - Roca et al. (2006) - Chung et al. (2010)	0.37*** 0.18**/0.46** 0.39***	- Percieved ease of use of e-learning systems – 403 students (Taiwan) - SEM - E-learning systems (computer/Internet) ease of use – 172 users – SEM - Virtual communities ease of use – 452 non-users (online panel) – multiple and hierarchical regression
H7	KSE→POE	M2 M3	0.21 (3.92***) 0.21 (3.82***)	Supported Supported	- Hsu et al. (2007) - Lin and Huang (2010)	0.37*** 0.72***	- Personal expectations of using Yahoo societies – 274 users (Taiwan, China, and Hong Kong) - SEM - Personal outcome expectations of withholding effort – 162 alumni (Taiwan) - PLS
H8a	SQ→PE	M1 M3	0.27 (4.51***) 0.29 (4.62***)	Supported Supported	- Seddon and Kiew (1996) - Lin (2008) - Sørum et al. (2012a)	0.37*** (OLS) 0.33*** (SEM) 0.23*** 0.49***	- Perceived usefulness of using departmental accounting systems – 94 users (Australia) - Perceived usefulness of using virtual communities – 230 undergraduate students (Taiwan) – SEM - Net benefits of using public sector's online services – 541 users (Denmark and Norway) – Correlation
H8b	SQ→POE	M2 M3	0.03 (0.51ns) 0.04 (0.64ns)	Rejected Rejected	- McGill and Klobas (2005) - Floropoulos et al. (2010) - Gorla et al. (2010) - Wu and Wang (2006)	0.03^{ns} 0.13^{ns} 0.02^{ns} -0.03^{ns}	- Individual impact of using spreadsheets for decision making – 159 users in three firms (Australia) - SEM - Perceived usefulness of using taxation information systems – 340 employees (Greek) – multiple regression - Organizational performance – 90 accounting mangers (Hong Kong) – PLS - Perceived KMS benefits – 204 employees from 50 firms (Taiwan) - SEM
H8c	SQ→EE	M1 M2 M3	0.49 (9.23***) 0.47 (8.58***) 0.59 (8.81***)	Supported Supported Supported	- Mabed and Köhler (2012) - Nov and Ye (2008) - Ahn et al. (2007) - Kim et al. (2008)	0.69*** 0.22** 0.58*** 0.18**	- Learning management systems ease of use – 92 high industrial school students (Egypt) - PLS - Perceived ease of use of digital libraries – 170 students (USA) – multiple regression - Online retailing ease of use – 942 customers (South Korea) – SEM - Hotel front office system ease of use – 239 hotel employees – SEM

The current study					Supporting previous studies		
Hypothesis, Path, and Model			**St. β (t-value)**	**Result**	**Author(s)**	**St. β**	**Criterion variable and methodology**
H8d	SQ→Trust	M1	0.23 (3.69***)	Supported	- Park et al. (2012) - Chemingui (2013) - Vance et al. (2008) - Lee and Chung (2009)	0.40**/0.26**[21] 0.21*** 0.29***/0.21*[22] 0.39***	- Trust in IT services providers – 83 employees from two international companies - PLS - Trust in mobile financial services – 300 non-users (Tunisia) - SEM - Trusting beliefs in IT artifacts – 251 MBA students (USA and France) – PLS - Customer trust in mobile banking – 276 users (South Korea) - PLS
		M2	0.16 (2.62**)	Supported			
		M3	0.18 (2.87**)	Supported			
H9a	CQ→PE	M1	0.28 (4.49***)	Supported	- Seddon and Kiew (1996) - Wang (2008) - Lin (2008) - Ahn et al. (2007)	0.26**/0.21* 0.32*** 0.17* 0.37**	- See H8a - Perceived value of using e-commerce systems – 240 employees from five organizations (Taiwan) – SEM - See H8a - See H8c
		M3	0.25 (3.86***)	Supported			
H9b	CQ→POE	M2	0.35 (5.19***)	Supported			
		M3	0.34 (5.06***)	Supported			
H9c	CQ --> Trust	M1	0.41 (6.43***)	Supported	- Park et al. (2012) - Everard and Galletta (2006) - Lee and Chung (2009) - Liang and Chen (2009) - Ho et al. (2012)	0.22** 0.73*** 0.36*** 0.15* 0.48**	- See H8d - Trust in online stores – 272 undergraduate and postgraduate students (USA) – multiple regression - See H8d - Customer trust in the online financial services – 656 users (Taiwan) – SEM - Trust in co-workers – 437 employees from IT companies (Taiwan) - SEM
		M2	0.43 (6.55***)	Supported			
		M3	0.42 (6.24***)	Supported			
H10 H10.1a	Gender (PE→UKA)	M1	$\Delta\chi^2$ (4.74^{a})	Supported	- Venkatesh et al. (2003), Venkatesh et al. (2012); Wu et al. (2012); Wang and Shih (2009)		
H10.1b	Gender (POE→UKP)	M2	$\Delta\chi^2$ (2.80^{ns})	Rejected	- Al-Gahtani et al. (2007); Wang et al. (2012); Birch and Irvine (2009); Alshehri et al. (2012); Powell et al. (2012); Shibl et al. (2012)		
H10.2a	Gender (EE→UKA)	M1	$\Delta\chi^2$ (3.86^{a})	Supported	- Venkatesh et al. (2003), Venkatesh et al. (2012); Wu et al. (2012); Yu (2012)		
H10.2b	Gender (EE→UKA)	M2	$\Delta\chi^2$ (0.86^{ns})	Rejected	- Wang and Shih (2009); Wang et al. (2012); Birch and Irvine (2009); Alshehri et al. (2012); Powell et al. (2012); Shibl et al. (2012)		

[21] System quality was manifested in two latent variables (functional quality and technical quality, respectively)
[22] System quality was measured by two dimensions (Navigational structure and visual appeal, respectively)

The current study						Supporting previous studies		
	Hypothesis, Path, and Model			St. β (t-value)	Result	Author(s)	St. β	Criterion variable and methodology
H11	H11.1a	Age (PE→UKA)	M1	$\Delta\chi^2$ (5.85[a])	Supported	- Venkatesh et al. (2003), Venkatesh et al. (2012); Wu et al. (2012); Birch and Irvine (2009)		
	H11.1b	Age (POE→UKP)	M2	$\Delta\chi^2$ (7.36[a])	Supported			
	H11.2a	Age (EE→UKA)	M1	$\Delta\chi^2$ (0.79[ns])	Rejected	- Yu (2012) ; Shibl et al. (2012) ; Alshehri et al. (2012)		
	H11.2b	Age (EE→UKP)	M2	$\Delta\chi^2$ (1.30[ns])	Rejected			
H12	H12.1a	Experience (EE→UKA)	M1	$\Delta\chi^2$ (0.01[na])	Rejected	- Abbasi et al. (2011); Neufeld et al. (2007); Venkatesh and Morris (2000); Taylor and Todd (1995)		
	H12.1b	Experience (EE→UKP)	M2	$\Delta\chi^2$ (0.02[ns])	Rejected			
	H12.2a	Experience (SI→UKA)	M1	$\Delta\chi^2$ (4.42[a])	Supported	- Thompson et al. (1994); Venkatesh et al. (2003); Venkatesh and Bala (2008); Wu et al. (2012); Shibl et al. (2012)		
	H12.2b	Experience (SI→UKP)	M2	$\Delta\chi^2$ (1.75[ns])	Rejected	- Neufeld et al. (2007); Karahanna et al. (1999); Taylor and Todd (1995)		
H13		UKA → UKP	M3	0.29 (4.92***)	Supported	- Hooff and Ridder (2004) - Hooff and Weenen (2004) - Watson and Hewett (2006)	0.12*** 0.26***/0.35*** 0.20***	- Knowledge donating behaviour – 417 employees from five organizations (Dutch) – SEM - Knowledge donating (departments/employees) – two Dutch organisations (case study) – SEM - Frequency of knowledge contribution – 430 employees from one organisation (USA) - regression

*p < 0.05, **p < 0.01, ***p < 0.001, ns non-significant.

[a] Significant at χ^2 (df=1) < 0.05

- PE – Performance expectancy. POE – Personal outcome expectancy. KSE- Knowledge self-efficacy. SSE- System self-efficacy. CQ- Content quality. EE- Effort expectancy. SQ- System quality. SI- social influence. UKP- Use for knowledge provision. UKA – Using for knowledge acquisition.

Appendix E: Research questionnaire

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
Knowledge self-efficacy	KSE1	I have confidence in my ability to provide knowledge that others in my ***organisation*** consider valuable	Kankanhalli et al. (2005)	0.87	0.96	4 items measure the construct of employees' knowledge self-efficacy	Yes	I am confident in my ability to provide knowledge that others in my community consider valuable.
	KSE2	I have the expertise required to provide valuable knowledge for my ***organisation.***	Kankanhalli et al. (2005)	0.89	0.96		Yes	I have the expertise required to provide valuable knowledge for my community.
	KSE3	It does not really make any difference whether ***I add to the knowledge others are likely to share through EKRs***. (RC)	Kankanhalli et al. (2005)	0.92	0.96		Yes	It does not really make any difference whether I share my knowledge with other members. (RC)
	KSE4	Most ***other employees*** can provide more valuable knowledge than I can. (RC**).**	Kankanhalli et al. (2005)	0.91	0.96		Yes	Most other members can provide more valuable knowledge than I can. (RC**).**
	KSE5						developed based on Lu et al. (2006)	I am confident in my ability to provide knowledge that would help the community to grow.
	KSE6						Developed based on Compeau and Higgins (1995a)	I have the required ability to answer other members' questions or inquiries, give advice or providing examples.
	KSE7						developed based on Bock and Kim (2002)	I am confident in my ability to express my knowledge in written and verbal forms.

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
System self-efficacy	SSE1	The level of my capability to ***finish the job is*** very high.	Lin and Huang (2008)	0.89	0.94	5 items measure the construct of employees' self-efficacy in using KMS.	Yes	The level of my capability in using the community system to successfully share knowledge with other members is very high.
	SSE2	The level of my understanding about what to do in using ***KMSs*** is very high.	Lin and Huang (2008)	0.91	0.94		Yes	The level of my understanding about what to do in using the community system is very high
	SSE3	The level of my confidence in using ***KMSs*** is very high.	Lin and Huang (2008)	0.93	0.94		Yes	The level of my confidence in using the community system is very high.
	SSE4	The level of my comfort in using ***KMSs*** is very high.	Lin and Huang (2008)	0.88	0.94		Yes	The level of my comfort in using the community system is very high.
	SSE5	In general, the level of my skill in using ***KMSs*** for accomplishing the assigned task(s) is very high.	Lin and Huang (2008)	0.91	0.94		Yes	In general, the level of my skill in using the community system for accomplishing the assigned task(s) is very high.

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
Personal outcome expectancy	POE1	***Using PWS will*** improve my image in the ***organisation***	Moore and Benbasat (1991)	0.81	0.79		Yes	Sharing my knowledge through the community improves my image in the community
	POE2	***If I use a computer, I will*** increase my sense of accomplishment	Compeau et al. (1999)	0.58	0.86		Yes	Sharing my knowledge with other members increases my sense of accomplishment
	POE3	***If I use a computer***, my ***co-workers*** will perceive me as a competent	Compeau et al. (1999)	0.73	0.86		Yes	When I share my knowledge, other members perceive me as a competent
	POE4	When I share my knowledge through ***EKRs***, I believe that my queries for knowledge will be answered in future.	Kankanhalli et al. (2005)	0.88	0.85		Yes	When I share my knowledge through community, I believe that my queries for knowledge would be answered in future.
	POE5	I enjoy helping others by share my knowledge through ***EKRs***	Kankanhalli et al. (2005)	0.86	0.96		Yes	I enjoy helping others by sharing my knowledge through the community
	POE6						Developed based on Ensign and Louis (Winter 2010)	Sharing my knowledge enhances my reputation in the community

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
Performance expectancy	PE1	***If I use a computer, I will*** increase the quality of output of my job.	Compeau et al. (1999)	0.83	0.85		Yes	Using the community system would increase the quality of the output of my job.
	PE2	***If I use a computer, I will*** increase the quantity of output for the same amount of effort.	Compeau et al. (1999)	0.72	0.85		Yes	Using the community system would increases the output of my job.
	PE3	***If I use a computer, I wil***l be less reliant on ***clerical support staff***.	Compeau et al. (1999)	0.52	0.85		Yes	Using the community system would make me less reliant on my colleagues.
	PE4	***Knowledge sharing*** helps me reduce errors at work.	Kang et al. (2008)	0.78	0.82		Yes	Using the community system would help me reducing errors at work.
	PE5						Developed based on Willem and Buelens (2007)	Using the community system would help me finding new ways to perform my job
	PE6						Developed based on the interviews	Using the community system would decrease the time needed to perform my job.

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
Effort expectancy	EE1	It is easy to operate the ***equipment in the CRC***	Taylor and Todd (1995)	All fit statistics revealed good fits			Yes	It is easy to operate the community system.
	EE2	It is easy to learn how to use the ***CRC***	Taylor and Todd (1995)				Yes	It is easy to learn how to use the community system.
	EE3	My interaction with the ***site*** is clear and understandable.	Barnes and Vidgen (2012)	0.85	0.92		Yes	My interaction with the community system is clear and understandable
System Quality	SQ1	System reliability	Bharati and Chaudhury (2004)	Uni-dimentionality (0.99), Convergent validity (0.98), and GFI (0.99)	0.73		Yes	The community system is reliable for knowledge sharing
	SQ2	Convenient to access	Bharati and Chaudhury (2004)		0.73		Yes	The community system is convenient to access
	SQ3	System flexibility	Bharati and Chaudhury (2004)		0.73		Yes	The community system is flexible
	SQ4						Developed based on the interviews	The community system is well designed for its users
	SQ5						Developed based on Al-Busaidi et al. (2007)	The community system is always available when I need it.

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
Content quality	**QC1**	The Knowledge/information provided by ***KMS*** is correct.	Wang and Wang (2009)	76	0.86	7 items measure the construct of content quality in a study aimed to develop an instrument for measuring KMS success from the perspective of KMS users.	Yes	The Knowledge/information provided by this online community is correct.
	QC2	The content representation provided by ***KMS*** is logical and fits.	Wang and Wang (2009)	0.66	0.86		Yes	The content representation provided by this online community is logical and fits.
	QC3	The word and phrases in contents provided by ***KMS*** are consistent.	Wang and Wang (2009)	0.63	0.86		Yes	The word and phrases in contents provided by this online community are consistent.
	QC4	The knowledge/information provided by ***KMS*** is available at a time suitable for its use.	Wang and Wang (2009)	0.75	0.86		Yes	The knowledge/information provided by this online community is available at a time suitable for its use.
	QC5	The knowledge/information provided by ***KMS*** is meaningful, understandable, and practicable.	Wang and Wang (2009)	0.8	0.86		Yes	The knowledge/information provided by this online community is meaningful and understandable and
	QC6	The Knowledge/information provided by ***KMS*** is important and helpful for my work.	Wang and Wang (2009)	0.72	0.86		Yes	The Knowledge/information provided by this online community is important and helpful for my work.
	QC7	The knowledge classification/index in ***KMS*** is clear and unambiguous.	Wang and Wang (2009)	0.7	0.86		Yes	The knowledge classification/index in this online community is clear and unambiguous.

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
Behavioural intention	BI1	I intend to continue using this ***site*** in the future.	Suh and Han (2003)	0.90	0.90	3 items measure customer behavioural intention to use electronic commerce. One item was dropped because of low loading.	Yes	I intend to continue using this online community for knowledge sharing in the future.
	BI2	I expect my use of this ***site*** to continue in the future.	Suh and Han (2003)	0.90	0.89		Yes	I expect my use of this online community for knowledge sharing in the future.
	BI3	I will frequently use this ***site*** in the future.	Suh and Han (2003)	0.901	0.92		Yes	I will frequently use this online community for knowledge sharing in the future.
Relational capital (Trust)	Rc1	Our ***company*** members are generally trustworthy	Lee and Choi (2003)	0.8	0.89	6 items measure employees' interpersonal trust to examine its role in knowledge creation process.	Yes	Our community members are generally trustworthy
	Rc2	Our ***company*** members have reciprocal faith in other members' intentions and behaviours.	Lee and Choi (2003)	0.81	0.89		Yes	Our community members have reciprocal faith in other members' intentions and behaviours.
	Rc3	Our ***company*** members have reciprocal faith in others' ability	Lee and Choi (2003)	0.81	0.89		Yes	Our community members have reciprocal faith in others' ability
	Rc4	Our ***company*** members have reciprocal faith in others' behaviours to work toward ***organisational*** goals	Lee and Choi (2003)	0.83	0.89		Yes	Our community members have reciprocal faith in others' behaviours to work toward community goals
	Rc5	Our ***company*** members have reciprocal faith in others' decision toward ***organisational*** interests than individual interests.	Lee and Choi (2003)	0.79	0.89		Yes	Our community members have reciprocal faith in others' decision toward community interests than individual interests.
	Rc6	Our ***company*** members have relationships based on reciprocal faith.	Lee and Choi (2003)	0.8	0.89		Yes	Our community members have relationships based on reciprocal faith.

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
Use for knowledge Provision	**UKP1**	I often use ***EKRs*** to contribute my knowledge ***in my work***.	Kankanhalli et al. (2005)	0.63	0.85		Yes	I often use this community to contribute my knowledge.
	UKP2	I regularly use ***EKRs*** to contribute my knowledge ***in my work***.	Kankanhalli et al. (2005)	0.62	0.85		Yes	I regularly use this community to contribute my knowledge.
	UKP3	What is your frequency of using ***the feature of ..?*** (never to several times a day)	Venkatesh et al. (2012)				Yes	What is your frequency of using this community for acquiring knowledge? (Never to several times a day).
Use for knowledge Acqusition	**UKA1**	I often use ***EKRs to contribute*** my knowledge ***in my work***.	Kankanhalli et al. (2005)	0.63	0.85		Yes	I often use this community to obtain knowledge.
	UKA2	I regularly use ***EKRs to contribute*** my knowledge ***in my work***.	Kankanhalli et al. (2005)	0.62	0.85		Yes	I regularly use this community to obtain knowledge.
	UKA3	What is your frequency of using ***the feature of ..?*** (never to several times a day)	Venkatesh et al. (2012)				Yes	What is your frequency of using this community for obtaining knowledge? (Never to several times a day).

		Original items	Source	Validity	Reliability	No. of original items	Change wording	Modified items
Social influence	SI1	People who are important to me think that I should use ***mobile Internet***.	Venkatesh et al. (2012)	0.80	0.82	3 items measure the social influence for using mobile Internet.	Yes	People who are important to me think that I should use professional online community.
	SI2	People who influence my behavior think that I should use ***mobile Internet.***	Venkatesh et al. (2012)	0.77	0.82		Yes	People who influence my behaviour think that I should use professional online community.
	SI3	People whose opinions that I value prefer that I use ***mobile Internet.***	Venkatesh et al. (2012)	0.75	0.82		Yes	People whose opinions that I value prefer that I use professional online community.
	SI4	I use the ***system*** because of the proportion of ***coworkers*** who use the ***system***.	Thompson et al. (1991)				Yes	I use this community because of the proportion of colleagues who use the professional online community.

Knowledge Sharing and Professional Online Communities: An Integrated Model

Dear Ms/Mr,

My name is Mohammed Montash, A PhD student at Hull University. As a part of my PhD studies at HUBS, I am conducting a research project to understand knowledge sharing behaviour in professional online communities in Egypt. My study aims to examine the role of individual factors (knowledge self-efficacy, system self-efficacy, expectation of providing, and expectation of acquisition), relational capital, and technological factors (system quality and content quality) on knowledge sharing among professionals (e.g. doctors, teachers, pharmacists, engineers) in professional online communities.

Your participation as a member of this community is vital. Completing of this questionnaire should take approximately 15-20 minutes. This is an anonymous questionnaire. Please ensure that you do not write your name, or any other comments that will make you identifiable, on the attached questionnaire. By completing the questionnaire you are consenting to take part in this research. If you decided not to participate, please ignore this email. You are advised to first read the enclosed letter carefully as it explains fully the intention of this project. Your responses will not be used for any other purposes except the objective of this study. A copy of the study findings will be available from me to you on request.

Should you have any concerns about the conduct of this research project, please contact the Secretary, HUBS Research Ethics Committee, University of Hull, Cottingham Rd, Hull, HU6 7RX; Tel No (+44) (0) 1482 463646; fax (+44) (0)1482 463689"

Mohammed Montash
PhD researcher
Hull University, HUBS

Hull
HU6 7RX

0044 (0) 7859129680

Thank you in advance

The researcher

Part one: for this part of questions, please indicate to what extent you agree or disagree with each statement by selecting the answer that best describe how you may (or may not) feel about this statement.

Knowledge self-efficacy						
		Strongly disagree	Disagree	Natural	Agree	Strongly agree
1	I am confident in my ability to provide knowledge that others in my community consider valuable.					
2	I have the expertise required to provide valuable knowledge for my community.					
3	I am confident in my ability to provide knowledge that would help the community to grow.					
4	I have the required ability to answer other members' questions or inquiries, give advice or providing examples.					
5	I am confident in my ability to express my knowledge in written and verbal forms.					
System self-efficacy						
		Strongly disagree	Disagree	Natural	Agree	Strongly agree
6	The level of my capability in using the community system to successfully share knowledge with other members is very high.					
7	The level of my understanding about what to do in using the community system is very high					
8	The level of my confidence in using the community system is very high.					
9	The level of my comfort in using the community system is very high.					
10	In general, the level of my skill in using the community system for accomplishing the assigned task(s) is very high.					
Personal outcome expectancy						
		Strongly disagree	Disagree	Natural	Agree	Strongly agree
11	Sharing my knowledge through the community improves my image within the organization					
12	Sharing my knowledge with other members increases my sense of accomplishment					
13	When I share my knowledge, other members perceive me as a competent					

14	When I share my knowledge through the community, I believe that my queries for knowledge would be answered in the future					
15	I enjoy helping others by sharing my knowledge through the community					
16	Sharing my knowledge enhances my reputation in the community					
Performance expectancy						
		Strongly disagree	**Disagree**	**Natural**	**Agree**	**Strongly agree**
17	Using knowledge from the community increases the quality of the output of my job					
18	Using knowledge from the community increases the output of my job.					
19	Using knowledge from the community makes me less reliant on my colleagues.					
20	Using knowledge from the community helps me reducing errors at work.					
21	Using knowledge from the community helps me finding new ways to perform my job					
22	Using knowledge from the community decreases the time needed to perform my job					
Effort expectancy						
		Strongly disagree	**Disagree**	**Natural**	**Agree**	**Strongly agree**
23	It is easy to operate the community system					
24	It is easy to learn how to use the community system					
25	My interaction with the community system is clear and understandable					
Relational capital (TRUST)						
		Strongly disagree	**Disagree**	**Natural**	**Agree**	**Strongly agree**
26	Our community members are generally trustworthy					
27	Our community members have reciprocal faith in other members' intentions and behaviours.					
28	Our community members have reciprocal faith in others' ability					
29	Our community members have reciprocal faith in others' behaviours to work toward community goals					

30	Our community members have reciprocal faith in others' decision toward community interests than individual interests.					
31	Our community members have relationships based on reciprocal faith.					
System quality						
		Strongly disagree	**Disagree**	**Natural**	**Agree**	**Strongly agree**
32	The community system is reliable for knowledge sharing					
33	The community system is convenient to access					
34	The community system is flexible					
35	The community system is well designed for its users					
36	The community system is always available when I need it					
The quality of content						
		Strongly disagree	**Disagree**	**Natural**	**Agree**	**Strongly agree**
37	The Knowledge provided by community is correct.					
38	The content representation provided by community is logical and fits.					
39	The word and phrases in contents provided by the community are consistent.					
40	The knowledge provided by the community is available at a time suitable for its use.					
41	The knowledge provided by the community is meaningful and understandable and					
42	The Knowledge provided by community is important and helpful for my work.					
43	The knowledge classification/index in the community is clear and unambiguous.					
Social influence						
		Strongly disagree	**Disagree**	**Natural**	**Agree**	**Strongly agree**
44	People who are important to me think I should use professional online community					
45	People who influence my behaviour think I should use professional online community					
46	People whose opinions that I value prefer that I use professional online community					
47	I use this community because of the proportion of colleagues who use the professional online community					
Use for knowledge provision						

		Strongly disagree	Disagree	Natural	Agree	Strongly agree
48	I often use this community to contribute my knowledge					
49	I regularly use this community to contribute my knowledge					
50	What is your frequency of using this community for sharing your knowledge?	(never to several time a day)				
Use for knowledge acquisition						
		Strongly disagree	Disagree	Natural	Agree	Strongly agree
51	I often use this community to obtain knowledge					
52	I regularly use this community to obtain knowledge					
53	What is your frequency of using this community to obtain knowledge?	(never to several time a day)				

Part two:

The remainder of the questionnaire asks for some information about you. This information is important to allow us to study the effects of differences between people on their perceptions about their communities. For each question, please tick an answer.

54 How long have you been using the Internet?

☐ Less than one year

☐ 1 - Less than 3 years

☐ 3 - Less than 5 years

☐ 5 - Less than 7 years

☐ More than 7

55 How much time do you spend using the Internet in a week? (Hours/week):

☐ Less than 7 hours

☐ 7 – Less than 14 hours

☐ 14 – Less than 21 hours

☐ 21 – Less than 28 hours

☐ 29 – Less than 36 hours

☐ More than 36

56 How many hours per week do you spend on this community?

☐ Less than one hour

☐ 1 – Less than 3 hours

☐ 3 – Less than 6 hours

☐ 6 – Less than 10 hours

☐ More than 10 hours

57 How long have you been using this community?

☐ Less than 1 year

☐ 1 – Less than 2 years

☐ 2 – Less than 4 years

☐ More than 5 years

58 Gender?

☐ Female

☐ Male

59 Age?

☐ Less than 25

☐ 25 – Less than 30 years

☐ 30 – Less than 35 years

☐ 35 – Less than 40 years

☐ 40 – Less than 50 years

☐ Over 50

60 What is the highest level of education that you have completed?

☐ High school or less

☐ Technical institution (2 years)

☐ Bachelor or Licentiate/technical institution (4 years)

☐ Master

☐ Doctorate

61 Occupation

☐ Lawyer/ attorney

☐ Teacher (general education/higher education)

☐ Physician

☐ Dentist

☐ Engineer

☐ Veterinarian

☐ Accountant/financial services

☐ Tourism services

☐ Pharmacist

☐ Other

Thank you for your participation

العوامل المؤثرة علي مشاركة المعلومات و المعرفة بين المهنيين في المجتمعات التخيلية) الإلكترونية

اسمي محمد عبدالحكيم علي - مدرس مساعد بكلية التجارة - جامعة الأزهر .كجزء من دراستي أقوم الأن بإجراء دراسة تهدف إلى دراسة العوامل المؤثرة على مشاركة المعلومات و المعرفة بين المتخصصين والمهنيين) مثل الأطباء، الأكاديميين، المعلمين، المهندسين، المحامين، ...... ألخ (داخل المجتمعات المعرفية) مثل منتديات و/أو ملتقيات المتخصصين professionals' forums and bulletin boards ، المجموعات البريدية mailing list/Listservs .....ألخ (والتي تستخدم الإنترنت كوسيط في تبادل وتشارك المعلومات والمعرفة بين أعضاءها .الغرض من هذه الدراسة هو التعريف بعدد من العوامل الفردية) مثل القدرة علي التعامل مع نظام مشاركة المعرفة، والنتائج المتوقعة من هذا التشارك ودرجة رضائك عن هذ المجتمع (وعدد من العوامل الاجتماعية والتكنولوجية) مثل العلاقات بين أعضاء المجتمع، جودة النظام المستخدم في المشاركة وجودة المحتوى (ومن ثم دراسة أثر هذه العوامل علي مشاركة المعلومات والمعرفة بين أعضاء هذه المجتمعات .مشاركتك كعضو في هذا المجتمع المعرفي ضرورية جداً لتحقيق أهداف البحث .هذا الاستبيان سوف يستغرق حوالي 15 - 20 دقيقة وأي بيانات يتم الإدلاء بها سوف يتم التعامل معها بسرية تامة ولن تستخدم إلا لغرض البحث فقط .لذلك من فضلك تأكد من عدم كتابة اسمك أو أي بيانات تدل علي شخصيتك و إذا كان لديك أية استفسارات بشأن هذا الاستبيان أو ترغب في نسخة من النتائج النهائية للبحث من فضلك قم بمراسلة الباحث .تذكر أن إكمالك لهذا الاستبيان يُعد موافقة ضمنية علي المشاركة، فإذا كان قرارك هو عدم المشاركة، من فضلك تجاهل هذا الإيميل .

إذا كان لديك استفسارات أو اهتمامات تتعلق بهذا البحث من فضلك قم بالباحث علي الإيميل التالي : m.montash@2008.hull.ac.ukأو قم بالاتصال بكلية إدارة الأعمال علي العنوان التالي HUBS Research, : Ethics Committee, University of Hull, Cottingham Rd, Hull, HU6 7RX; Tel. No (+44) 1482463689 (0)أو يمكنك مراسلة الباحث على العنوان التالي Mohammed Montash Hull : University, HUBS, Cottingham Rd, Hull, HU6 7RX, UK

شكراً مقدماً علي حُسن تعاونكم

من فضلك قبل القيام بإجابة أسئلة هذا الاستبيان قم بقراءة ما يلي بعناية -1 :المقصود بـ" المجتمع "هنا هو المجتمع الإلكتروني الذي من خلاله يقوم أعضاء هذا المجتمع بتبادل المعلومات والمعرفة التي ترتبط بمجال عملهم أو تخصصاتهم المهنية) مثل المنتديات والملتقيات والصفحات الإلكترونية التي تجمع أصحاب تخصص أو مهنة معينة، أو تجمع أشخاص لديهم اهتمامات وأهداف تتعلق بتبادل المعلومات والمعرفة المرتبطة بمجال عملهم وتخصصاتهم -2 .(إذا ما وصلك هذا الاستبيان خارج المجتمع الإلكتروني الذي تشارك فيه وفي نفس الوقت أنت مشارك في أكثر من مجتمع، من فضلك عند الإجابة على هذه الأسئلة ضع في ذهنك المجتمع الذي تشارك فيه أكثر من غيره -3 .هذا الاستبيان يتكون من 10 أسئلة بالإضافة إلي عدد من الأسئلة الديموجرافية) السن، التعليم، المهنة،... ، ألخ)

السؤال الأول :النتائج المتوقعة من الحصول على معلومات ومعرفة الآخرين

الحصول علي المعلومات والمعرفة من هذا المجتمع تساعدني علي:

موافق تماماً (5)	موافق(4)	محايد (3)	غير موافق (2)	غير موافق علي الإطلاق (1)	
❍	❍	❍	❍	❍	زيادة جودة مخرجات وظيفتي(1)
❍	❍	❍	❍	❍	زيادة كمية مخرجات وظيفتي(2)
❍	❍	❍	❍	❍	أن أكون أقل اعتمادا على زملائي في العمل(3)
❍	❍	❍	❍	❍	تخفيض عدد الأخطاء في عملي(4)
❍	❍	❍	❍	❍	إيجاد طرق وأساليب جديدة لأداء وظيفتي(5)
❍	❍	❍	❍	❍	تخفيض الوقت المطلوب لأداء بعض مهام وظيفتي(6)

السؤال الثاني :النتائج المتوقعة من وراء مشاركة معلوماتك ومعرفتك باقي أعضاء المجتمع

من النتائج المتوقع الحصول عليها من مشاركة باقي أعضاء المجتمع معلوماتي ومعرفتي هو:

موافق تماماً (5)	موافق(4)	محايد(3)	غير موافق (2)	غير موافق علي الإطلاق (1)	
❍	❍	❍	❍	❍	تحسين صورتي داخل المجتمع(1)
❍	❍	❍	❍	❍	ارتفاع مستوى إحساسي بالإنجاز(2)
❍	❍	❍	❍	❍	رؤية باقي أعضاء المجتمع لي كعضو كفء(3)
❍	❍	❍	❍	❍	قيام الأعضاء بالرد على أسئلتي واستفساراتي في المستقبل (4)
❍	❍	❍	❍	❍	شعوري بالمتعة لمشاركتهم معلوماتي ومعرفتي (5)
❍	❍	❍	❍	❍	تعزيز سمعتي داخل المجتمع (6)

السؤال الثالث :القدرة على مشاركة المعلومات والمعرفة مع باقي أعضاء المجتمع

موافق تماماً(5)	موافق(4)	محايد(3)	غير موافق (2)	غير موافق علي الإطلاق(1)	
❍	❍	❍	❍	❍	أثق في قدرتي علي المساهمة بالمعرفة التي يعتبرها باقي أعضاء المجتمع قيمة (1)
❍	❍	❍	❍	❍	لدي الخبرة والقدرة الكافية للمساهمة في المجتمع بالمعرفة القيمة (2)
❍	❍	❍	❍	❍	أثق في قدرتي علي المساهمة بالمعرفة التي تساعد علي نمو وازدهار هذا المجتمع (3)
❍	❍	❍	❍	❍	لدي القدرة المطلوبة للإجابة علي أسئلة واستفسارات الأعضاء و إعطاء أمثلة و نصائح (4)
❍	❍	❍	❍	❍	أثق في قدرتي علي التعبير وتوصيل معلوماتي ومعرفتي لباقي الأعضاء كتابةً و شفاهةً (5)

السؤال الرابع :القدرة على التعامل مع النظام الإلكتروني للمجتمع

من فضلك تذكر أن المقصود بـ" نظام المجتمع "هو الموقع أو الصفحة أو أي وسيلة اتصال إلكترونية The online community systemيستخدمها أعضاء المجتمع في تبادل معلوماتهم ومعرفتهم.

	غير موافق علي الإطلاق (1)	غير موافق (2)	محايد(3)	موافق (4)	موافق تماماً(5)
مستوى قدرتي علي استخدام نظام المجتمع بنجاح في مشاركة المعلومات والمعرفة مع باقي الأعضاء مرتفعة جداً(1)	❍	❍	❍	❍	❍
مستوي فِهْمي و استيعابي عما يجب أن أفعله عند استخدام نظام المجتمع مرتفع جداً(2)	❍	❍	❍	❍	❍
مستوي ثقتي في نفسي عند استخدام نظام المجتمع مرتفعة جداً(3)	❍	❍	❍	❍	❍
مستوى إحساسي بالراحة عند استخدام نظام المجتمع مرتفعة جداً(4)	❍	❍	❍	❍	❍
بشكل عام، مستوى مهاراتي في استخدام نظام المجتمع في تحقيق مهام تتعلق بالحصول علي المعلومات و المعرفة مرتفعة جدا(5)	❍	❍	❍	❍	❍

السؤال الخامس :جودة المعلومات والمعرفة التي يقدمها المجتمع

يمكن القول أن المعلومات والمعرفة التي يقدمها هذا المجتمع:

	غير موافق علي الإطلاق(1)	غير موافق (2)	محايد(3)	موافق(4)	موافق تماماً(5)
تتصف بالدقة(1)	❍	❍	❍	❍	❍
منطقية ومناسبة(2)	❍	❍	❍	❍	❍
تتصف بالاتساق(3)	❍	❍	❍	❍	❍
تتوافر في الوقت مناسب(4)	❍	❍	❍	❍	❍
ذات معنى ومفهومة(5)	❍	❍	❍	❍	❍
مهمة ومفيدة لعملي(6)	❍	❍	❍	❍	❍
يتم تصنيفها وترتيبها بشكل واضح ومفهوم(7)	❍	❍	❍	❍	❍

السؤال السادس :جودة النظام الإلكتروني للمجتمع

من فضلك تذكر أن المقصود بـ" نظام المجتمع "هو الموقع أو الصفحة أو أي وسيلة اتصال إلكترونية the online community systemيستخدمها أعضاء المجتمع في تبادل معلوماتهم ومعرفتهم .

	غير موافق علي الإطلاق(1)	غير موافق (2)	محايد(3)	موافق(4)	موافق تماماً(5)
من السهل فهم أسلوب عمل نظام المجتمع(1)	❍	❍	❍	❍	❍
من السهل تعلم كيفية استخدام نظام المجتمع(2)	❍	❍	❍	❍	❍
التعامل مع النظام الإلكتروني للمجتمع هو أمر واضح ومفهوم(3)	❍	❍	❍	❍	❍
نظام المجتمع المستخدم يمكن الاعتماد عليه في مشاركة المعرفة بين الأعضاء(4)	❍	❍	❍	❍	❍
نظام المجتمع المستخدم سهل الدخول) الولوج (إليه(5)	❍	❍	❍	❍	❍
النظام المستخدم مرن ويمكن تهيئته ليناسب احتياجاتي المتنوعة(6)	❍	❍	❍	❍	❍
نظام المجتمع المستخدم تم تصميمه بشكل جيد ومناسب لمستخدميه(7)	❍	❍	❍	❍	❍
نظام المجتمع دائما متاح عندما أحتاج إليه(8)	❍	❍	❍	❍	❍

السؤال السابع :العلاقات داخل المجتمع

	غير موافق علي الإطلاق(1)	غير موافق (2)	محايد(3)	موافق (4)	موافق تماماً(5)
كل أعضاء المجتمع محل ثقة(1)	❍	❍	❍	❍	❍
أعضاء المجتمع لديهم ثقة متبادلة في نوايا و سلوكيات باقي الأعضاء(2)	❍	❍	❍	❍	❍
أعضاء المجتمع لديهم ثقة متبادلة في قدرة باقي الأعضاء علي مشاركة معلوماتهم ومعرفتهم(3)	❍	❍	❍	❍	❍
أعضاء المجتمع لديهم ثقة متبادلة في سلوك باقي الأعضاء للعمل علي تحقيق أهداف المجتمع(4)	❍	❍	❍	❍	❍
أعضاء المجتمع لديهم ثقة في أن قرارات الأعضاء ترجح مصلحة المجتمع على المصالح الشخصية(5)	❍	❍	❍	❍	❍
جميع العلاقات داخل المجتمع يتم بناؤها على الثقة المتبادلة(6)	❍	❍	❍	❍	❍

السؤال الثامن :تأثير الزملاء، الأصدقاء والمقربين علي استخدامك المجتمعات المعرفية الإلكترونية

	غير موافق علي الإطلاق(1)	غير موافق(2)	محايد(3)	موافق(4)	موافق تماماً(5)
أنتوي الاستخدام المستمر لهذا المجتمع(1)	❍	❍	❍	❍	❍
أتوقع أن يستمر استخدامي لهذا المجتمع في المستقبل (2)	❍	❍	❍	❍	❍
سأستخدم هذا المجتمع باستمرار ولفترة طويلة قادمة (3)	❍	❍	❍	❍	❍

السؤال الثامن :تأثير الزملاء، الأصدقاء والمقربين علي استخدامك المجتمعات المعرفية الإلكترونية

	غير موافق علي الإطلاق(1)	غير موافق(2)	محايد(3)	موافق(4)	موافق تماماً (5)
الأفراد المهمين بالنسبة لي يعتقدون أنه ينبغي أن أستخدم أحد المجتمعات المعرفية الإلكترونية(1)	❍	❍	❍	❍	❍
الأفراد الذين لديهم تأثير علي قراراتي يعتقدون أنه ينبغي أن أستخدم أحد المجتمعات المعرفية الإلكترونية(2)	❍	❍	❍	❍	❍
الأفراد الذين أقدر أرائهم يفضلون أن أستخدم أحد المجتمعات المعرفية الإلكترونية(3)	❍	❍	❍	❍	❍
أستخدم المجتمعات المعرفية الإلكترونية لأن معظم زملائي يستخدمونها(4)	❍	❍	❍	❍	❍

السؤال التاسع :الحصول علي المعلومات والمعرفة من أعضاء المجتمع

غالباً ما استخدم هذا المجتمع للحصول علي المعلومات والمعرفة التي أطلبها(1)	❍ غير موافق علي الإطلاق (1)	❍ غير موافق (2)	❍ محايد(3)	❍ موافق(4)	❍ موافق تماماً (5)
أحصل علي المعلومات والمعرفة التي أطلبها بشكل مستمر من هذا المجتمع(2)	❍ غير موافق علي الإطلاق (1)	❍ غير موافق (2)	❍ محايد(3)	❍ موافق(4)	❍ موافق تماماً (5)
ما هو معدل استخدامك لهذا المجتمع الإلكتروني في الحصول علي المعلومات والمعرفة ؟(3)	❍ لا استخدمه علي الإطلاق (1)	❍ مرة في الشهر(2)	❍ عدة مرات في الشهر(3)	❍ عدة مرات في الأسبوع(4)	❍ مرة أو عدة مرات في اليوم(5)

السؤال العاشر :مشاركة أعضاء المجتمع بمعلوماتك و معرفتك

غالباً ما أشارك باقي أعضاء المجتمع معلوماتي ومعرفتي (1)	❍ غير موافق علي الإطلاق (1)	❍ غير موافق (2)	❍ محايد(3)	❍ موافق(4)	❍ موافق تماما(5)
أستخدم هذا المجتمع بشكل مستمر لمشاركة معلوماتي ومعرفتي مع باقي الأعضاء (2)	❍ غير موافق علي الإطلاق (1)	❍ غير موافق (2)	❍ محايد(3)	❍ موافق(4)	❍ موافق تماما(5)
ما هو معدل استخدامك لهذا المجتمع في مشاركة معلوماتك ومعرفتك باقي أعضاء المجتمع ؟(3)	❍ لا استخدمه علي الإطلاق (1)	❍ مرة في الشهر(2)	❍ عدة مرات في الشهر(3)	❍ عدة مرات في الأسبوع(4)	❍ مرة أو عدة مرات في اليوم (5)

منذ متى وأنت تستخدم الإنترنت؟

- ❍ أقل من سنة(1)
- ❍ من سنة لأقل من ثلاث سنوات(2)
- ❍ من ثلاث لأقل من خمس سنوات(3)
- ❍ من خمس سنوات لأقل من سبع سنوات(4)
- ❍ سبع سنوات فأكثر(5)

كم من الوقت تقضيه مستخدماً الإنترنت؟) عدد الساعات/أسبوع(

- ❍ أقل من 7 ساعات بالأسبوع(1)
- ❍ من 7 - 14 ساعة بالأسبوع(2)
- ❍ من 15 - 21 ساعة بالأسبوع(3)
- ❍ من 22 - 28 ساعة بالأسبوع(4)
- ❍ من 29 - 36 ساعة بالأسبوع(5)
- ❍ 37ساعة فأكثر(6)

كم عدد الساعات التي تقضيها في تصفح هذا المجتمع؟) عدد الساعات/الأسبوع(

- ❍ أقل من ساعة في الأسبوع(1)
- ❍ من 1-3 ساعة/أسبوع(2)
- ❍ من 4-6 ساعة/أسبوع(3)
- ❍ من 7-9 ساعة/أسبوع(4)
- ❍ 10ساعات فأكثر(5)

منذ متى وأنت عضو في هذا المجتمع المعرفي؟

- ❍ أقل من سنة(1)
- ❍ من(2) 1-3
- ❍ من(3) 3-4
- ❍ خمس سنوات فأكثر(4)

الجنس

- ذكر(1)
- أنثى(2)

العمر

- أقل من(1) 25
- 25سنة لأقل من(2) 30
- 30سنة لأقل من(3) 35
- 35سنة لأقل من(4) 40
- 40سنة لأقل من(5) 50
- 50سنة فأكثر(6)

المؤهل الدراسي

- ثانوية أو أقل(1)
- فني متوسط(2)
- بكالوريوس / ليسانس(3)
- دبلومه / ماجستير(4)
- دكتوراه(5)

المهنة

- في المجال القانوني(1)
- في مجال التعليم) تعليم عام/جامعي(2) (
- طبيب بشري(3)
- طبيب أسنان(4)
- في المجال الهندسي(5)
- طبيب بيطري(6)
- في المجال المالي/الإداري(7)
- في مجال السياحة(8)
- صيدلي(9)
- أخرى(10)