VALUE CO-CREATION IN ONLINE COLLABORATIVE INNOVATION COMMUNITIES: EXPLORING THE DRIVERS AND OUTCOMES OF VALUE CO-CREATION ACTIVITIES FROM THE INDIVIDUAL COMMUNITY MEMBER POINT OF VIEW

By

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Abstract

Online collaborative innovation communities are interactive platforms in which independent actors co-create value through resource integration. Despite fruitful research on collaborative innovation with customers, current understanding regarding how value is co-created in online platforms from an individual actor perspective remains limited. It remains unclear what drives individual actors to perform value co-creation activities and what value dimensions they derive as a result of the collaboration experience. Moreover, there is scarcity of knowledge regarding what activities independent actors perform in value co-creation. Only a handful of studies provide typologies of value co-creation activities, and none of these examine co-creation in an online collaborative innovation community context.

This thesis aims to advance existing knowledge on drivers and outcomes of value co-creation activities, namely information sharing, providing feedback, helping, and rapport building, from the perspective of an individual member of a collaborative innovation community. To best capture the drivers of value co-creation activities, a comprehensive set of individual and social factors were employed in this research. Social factors included social interaction opportunities available in the collaboration community and social capital dimensions, namely trust, shared vision, and centrality. Individual factors were captured by applying the motivation, opportunity, and ability framework in the collaborative innovation context. Moreover, value dimensions, namely social, emotional, utilitarian and value for effort, were examined as outcome factors from the individual community member point of view.

Literature on value co-creation was reviewed to uncover potential moderators and mediators of relationships between social and individual factors and value co-creation activities. Accordingly, learning activity was examined as a mediator between social and individual factors and value co-creation activities, while a flow state was analysed as a potential moderator of relationships between social and individual factors and learning and value co-creation activities, respectively. This research comprised an explanatory quantitative study. A self-administered online questionnaire was used to collect data from collaborative innovation community members yielding a total of 309 complete responses. Structural equation modelling was used to analyse data, employing variance-based SEM

with partial least squares (PLS) path modelling in SmartPLS due to the nature of the study and concerns regarding heteroscedasticity and abnormality of the data.

This research makes an important contribution to theory by confirming that independent individuals engage in different value co-creation activities for different social and individual reasons. Results indicated that information sharing is driven by community member centrality and leads to social and utilitarian value. Providing feedback, on the other hand, is driven by social interaction opportunities and individual motivation which generates emotional, utilitarian values, and value for effort. Similarly, helping is an activity driven by social interactions and motivation which leads to utilitarian value. Finally, rapport building is a value co-creation activity performed when community members perceive social interaction opportunities, centrality, have trust in other members, and are motivated. Performing rapport building in the collaborative innovation community generates social, emotional, utilitarian values, and value for effort. Furthermore, the important facilitator role of learning in co-creation of value experience was demonstrated. However, the proposed moderating effect of flow state was not confirmed. Finally, this research provided additional support of current knowledge on the determination and perception of value by demonstrating that different dimensions of value are uniquely and phenomenologically determined by the community members as main resource integrators who perform value co-creation activities in an online collaboration setting. This research also informs collaborative innovation community management about how to facilitate and understand factors that drive community members to perform value co-creation activities and how to contribute to co-creation of different value dimensions. Further research should continue to endeavour to establish a better understanding of how individual actors are engaged in value co-creation activities.

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Declaration

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Chapter 1: INTRODUCTION

1.1. Research background

As the global and networked environments become the main platforms of doing business, all actors involved in interactions begin to rely on each other through voluntary integration of resources (Vargo & Lusch 2011). Service-dominant (S-D) logic has been proposed as a paradigm shift in terms of defining the actors' role in value co-creation through resource integration (Vargo & Lusch 2016). As academic interest in value co-creation through resource integration continues to grow, researchers have proposed various ways for businesses to manage value co-creation (Payne, Storbacka & Frow 2008). However, few studies have focused on understanding how value is co-created from the perspective of independent actors.

It is discussed in the S-D logic literature that value is co-created through the integration of resources and determined uniquely and phenomenologically by the beneficiary (Vargo & Lusch 2016). Companies can make various value propositions to integrate resources in different ways with their customers or other relevant actors (Frow, McColl-Kennedy, Hilton, Davidson, Payne & Brozovic 2014). However, the customer or relevant actor role is critical, as they integrate resources through the self-generated value co-creation activities they choose to perform (McColl-Kennedy, Vargo, Dagger, Sweeney & van Kasteren 2012). There is multiple evidence from services marketing literature that indicates the positive outcomes of a customer's voluntary contribution from a service provider point of view (e.g. Lengnick-Hall 1996; Bettencourt, Ostrom, Brown & Roundtree 2002; Prahalad & Ramaswamy 2000). However, there is limited knowledge on the beneficiary perspective of their role in value co-creation.

There have been calls for research to understand value co-creation from the independent actor point of view (Kleinaltenkamp 2015; Payne et al. 2008), in particular, how individuals engage in value co-creation (Payne et al. 2008). Furthermore, there is a need for empirical research to identify value co-creation activities in several contexts (McColl-Kennedy et al. 2012). It is also important to understand value that is derived and determined by the beneficiary as an outcome of the value co-creation experience (Gummerus 2013; Vargo, Maglio & Akaka 2008). Understanding what drives individuals to perform particular value co-creation activities, and value derived as a result, is not only important for contributing new knowledge to continuously evolving S-D logic (Vargo & Lusch 2016), but also for providing implications for managers who search for ways to improve the value co-creation experience with current and potential customers. However, due to scant research on drivers and outcomes of value co-creation from the perspective of actors who perform self-generated value co-creation activities (Gummerus 2013; McColl-Kennedy et al. 2012) it is unclear how value is perceived as a result of voluntarily performed activities.

1.2. Research objectives

To address the aforementioned calls for research, this research focuses on investigating drivers and outcomes of value co-creation activities in online collaborative innovation communities from the community member perspective. Therefore, this research contributes to a deeper understanding of the independent actor perspective and activities of value co-creation in the online collaborative innovation context, as well as the role of social and individual factors driving members to perform those activities and value dimensions derived as the outcome of value co-creation.

The specific research objectives are:

1) To obtain a deeper understanding of value co-creation in online collaborative innovation platforms from the community member point of view.
2) To identify social and individual factors that drive online collaborative innovation community members to perform value co-creation activities.
3) To determine how value co-creation activities influence online collaborative innovation community member value perceptions.

Several value co-creation behaviour scales have been developed in the literature (e.g. Chan, Yim & Lam 2010; Groth 2005; Yi & Gong 2013) suggesting that if customers show certain behaviours, they contribute to the co-creation of value. Recent observations indicate that a set of self-generated value co-creation activities are performed by the health service customers, while they contribute to co-creation of value on their own terms (McColl-Kennedy et al. 2012). This research identifies a set of four value co-creation activities, namely information sharing, providing feedback, helping, and rapport building that are performed by the collaborative innovation community members.

Although social and individual drivers are acknowledged as important drivers of consumer behaviour, they are rarely examined together in the literature. In this research, to gain a comprehensive view of drivers of value co-creation activities in an online community context, the effects of social and individual factors are captured together. This research includes social interaction opportunities as a social factor in addition to relational, cognitive, and structural dimensions of social capital. It captures three dimensions by measuring trust as relational, shared vision as cognitive, and centrality as structural dimension. It uses motivation, opportunity, and ability (MOA) theory to examine individual factors.

Scholars suggest collective learning as an important aspect of value co-creation with customers (Ballantyne & Varey 2006; Hibbert, Winklhofer & Temerak 2012; Payne et al. 2008). Moreover, flow that is, a state of mind experienced by people who are deeply involved in some activity, is stated as an important concept in terms of improving learning (Choi, Kim & Kim 2007; Hoffman & Novak 1996; Novak, Hoffman & Yung 2000). Therefore, in order to gain a holistic understanding of how individuals are driven to perform value co-creation activities, the mediating effect of learning and the moderating effect of flow state is examined. This research also investigates four value dimensions as the outcome of value co-creation activities: social, emotional, utilitarian value, and value for effort.

1.3. Rational for research context

Online collaborative innovation communities were chosen as the context of this research for two reasons. First, drawing on extensive technological developments in recent times, online innovation communities have found increasing support as a platform for companies to implement interactive innovation strategies with customers and other relevant actors (Boudreau & Lakhani 2013). Collaboration with crowds using online platforms reduces risk of new product failure for companies (Ogawa & Piller 2006). Having the shift from producer innovation to an open approach for innovation, which is collaborating with multiple actors, reduces the innovation cost (Baldwin & von Hippel 2011). This has led to the need for managers of online collaboration communities to build strategies to manage members from all around the globe as independent actors with varying backgrounds (Boudreau & Lakhani 2013). While several strategies, such as reward systems (Baldwin & von Hippel 2011; Boudreau & Lakhani 2013) and competition initiatives (Ogawa & Piller 2006), have been recommended to improve the effectiveness of collaboration, researchers

have recognised the importance of knowing how and why individuals engage in collaboration (De Jong & De Bruijn 2013; di Gangi, Wasko & Hooker 2010). This research direction can be addressed by examining the drivers and outcomes of value co-creation in collaborative innovation from a community member point of view.

Collaborative innovation communities are social platforms in which community members interact and develop new ideas collectively (Bayus 2013; di Gangi et al. 2010). Indeed, community members can perform varying activities, such as submitting new ideas, reviewing other's ideas, submitting product reviews, providing feedback, or identifying new sources of innovation (di Gangi et al. 2010). Numerous studies show the drivers and outcomes of knowledge contribution for collaborative innovation. For example, studies show that community members engage in collaboration to gain social capital through online interactions (Chiu, Hsu & Wang 2006; Hsiao & Chiou 2012). It is also known that customers are engaged in collaboration through customer to customer knowledge exchange when driven by motivation, opportunity, and ability (Gruen, Osmonbekov & Czaplewski 2007). Therefore, collaborative innovation communities are suitable platforms to examine social and individual reasons for actors to perform self-generated activities. In terms of outcomes, it is confirmed that collaborating with others for online innovation creates behavioural change, such as positive future intentions (Füller, Mühlbacher, Matzler & Jawecki 2009) or higher voluntary future participation (Nambisan & Baron 2009). Hence, it can be argued that collaborative innovation communities are platforms in which community members derive value as a result of the activities they perform in the collaboration experience.

The second reason for choosing online collaborative innovation communities as the context for this research is that collaborative innovation communities are engagement

platforms in which independent actors can integrate and exchange resources to co-create value (Lusch & Nambisan 2015). Innovation is essentially a new knowledge creation activity in which multiple actors exchange knowledge (Ramasamy, Goh & Yeung 2006). Since S-D logic also emphasises interactions and centrality of active resource exchange and integration, management of value co-creation frameworks can be applied in the management of collaborative innovation (Greer & Lei 2012). According to S-D logic perspective, distinction between the roles played by the service provider and customer become blur since actors in the service ecosystem is part of value co-creation as resource integrators (Vargo & Lusch 2016). Similarly, in collaborative innovation communities, the roles of the 'innovator' and 'adopter' are not as distinct as in the traditional concept of innovation (Vargo, Wieland & Akaka 2015).

Online collaborative innovation community members have an active and important role in the collaboration as resource integrators. Community members have opportunities to perform several value co-creation activities using community features, such as information sharing, providing feedback, helping, and rapport building. In order to perform those activities, community members integrate their operant (knowledge and skills) and operand (i.e. computer, internet) resources with other members and the innovating company. Thus, collaborative innovation communities are useful platforms to gain deeper understanding of drivers and outcomes of value co-creation from an individual member point of view.

1.4. Research contribution

This research contributes to theoretical developments in marketing and business research, with a particular focus on S-D logic, value co-creation, and innovation communities. It has been long discussed that individual actors play an important role in co-creation of value by integrating resources (Vargo & Lusch 2011, 2016), with value being determined and

derived by individuals (Vargo & Lusch 2004; Payne et al. 2008). Despite these theoretical discussions, sparse empirical evidence exists regarding the factors that drive individuals to perform value co-creation activities and value derived as the outcome (Gummerus 2013; McColl-Kennedy et al. 2012). This research provides a more comprehensive understanding of value co-creation by examining value co-creation activities from the performer perspective. An important contribution of this research is to assist collaborative innovation community managers improve their businesses.

This research makes several theoretical contributions to enrich the S-D logic literature, in particular discussions around value co-creation with individual actors as resource integrators. Although the customer role is regarded as important, specific activities they may perform to contribute their own value co-creation has not previously been empirically measured as a set of activities performed in a collaboration experience. This is important as the beneficiaries determine and derive value from value co-creation activities (McColl-Kennedy et al. 2012). Consequently, it has become clear that there is a need for operationalising a set of value co-creation activities to explore further the concept of value co-creation in online collaborative innovation communities. As mentioned earlier, this research examines four value co-creation activities, namely information sharing, providing feedback, helping, and rapport building. While existing research proposed several constructs and measurements for value co-creation activities (e.g. Groth 2005; Yi & Gong 2013), by measuring those activities as a set in collaborative innovation communities context, this research expands knowledge on how value is co-created as a set of activities performed by individuals with similar goals (Payne et al. 2008).

The establishment of a link between value co-creation experiences and value as the outcome was proposed as an important research direction by Gummerus (2013). Extensive

discussion in the literature emphasises expanding knowledge of value and its dimensions. Although the link between value dimensions and several consumer behaviours has been established in the literature (e.g. Petrick 2002; Pura 2005), there remains a need to further explore value as the outcome of value co-creation. This research, therefore, measures social, emotional, utilitarian and value for effort dimensions separately as the outcome of value co-creation activities performed by collaborative innovation community members.

This research offers an important contribution to knowledge by determining the social and individual factors that drive community members to perform value co-creation activities. As community activities are performed for social or individual reasons, scholars have studied both social and individual factors that drive individuals to behave in certain ways in online communities (e.g. Hsiao & Chiou 2012; Gruen et al. 2007). However, few studies have examined social and individual factors simultaneously, thus limiting our understanding of the relevance of individual factors as compared to others in a comprehensive analysis. Therefore, this research provides further understanding of the social and individual drivers to performing certain activities in online communities.

Along with theoretical contributions, this research provides several managerial implications for managers of online collaborative innovation communities. Firstly, as the set of activities are investigated distinctly, results of this research inform community management to make unique decisions on each activity. Moreover, as driving forces and value dimensions are examined separately, community management has a clear picture of several drivers and outcomes of individual activities. For instance, if an activity is mainly driven by social reasons and creates social value, the social aspects and benefits of this activity can be emphasised. If an activity is performed mainly because of individual reasons and generates both social and emotional value, this activity can be positioned as

‘fun’ and ‘enjoyable’ as well as socially uplifting. Furthermore, if an individually driven activity is mediated by learning, community management can focus on generating platforms based on which members can be educated on community features to perform that particular activity. While designing a learning platform, company managers can make decisions on how to set the balance between skills and challenges by examining the flow state moderating effect between social and individual drivers and learning. Thus, this research can inspire management to build online communities to obtain innovation related benefits and improve value co-creation. In other words, these contributions will help community management unearth the right value proposition that describes potential benefits of resource integration (Frow et al. 2014).

1.5. Thesis structure

Including Chapter 1, this thesis consists of six chapters.

Chapter 1 presented the background and objectives of this research, discussed reasons for choosing collaborative innovation communities as the research context, and highlighted research contributions.

Chapter 2 provides an overview of collaborative innovation, value co-creation in S-D logic perspective, and value literature. First, this chapter examines how innovation evolves into a more open nature with the inclusion of customers in collaboration and why there is a need for a new approach to using collaborative innovation communities to improve understandings of value co-creation concept. Following a review on value co-creation in S-D logic, specific value co-creation activities included in this research are identified. This is followed by the review of social capital and motivation, opportunity, and ability theories to identify the key social and individual factors relevant to the context of this study. This

chapter concludes with a review of the value literature, including an identification of key value dimensions selected for this research.

Chapter 3 presents an integration of several research fields to form the proposed conceptual framework and relevant hypotheses. It outlines specific hypothesised relationships in three stages. The first stage concerns several value dimensions as outcomes of value co-creation activities. The second stage discusses the relationships between social and individual factors and value co-creation activities. The last stage explains the mediating effect of learning and moderating effect of flow state as proposed in the conceptual framework.

Chapter 4 presents the methodological approach employed to collect data and test hypotheses. Specifically, the chapter outlines research objectives and philosophical orientation of the research. The chapter presents the data collection method with a focus on the measurement tool, followed by an elaboration of construct operationalisation. Detailed information on the sample profile is then provided before the chapter concludes with a discussion around the analysis of common method bias.

Chapter 5 outlines the data analysis process and reports the results of structural equation modelling. The chapter begins with examination of the data to assess the necessary conditions for selection of structural equation modelling method. Then, it reports the assessment measurement model procedures, such as reliability and validity, applied to ensure well-fitting constructs. Assessment of the structural model and overarching and subsidiary hypothesis follows. Specifically, this section outlines the results regarding all hypothesised direct, mediation and moderation effects.

Chapter 6 addresses the main contributions and implications of the research. Beginning with a discussion of results in the context of extant academic literature, specific theoretical contributions, such as individual actor's role in value co-creation, drivers and outcomes of value co-creation activities in the collaborative innovation context, are outlined. Relevant implications for managers and developers of online innovation communities are then discussed, leading to an outline of study limitations and future research directions.

Chapter 2: LITERATURE REVIEW

2.1. Introduction

This chapter presents an overview of the literature related to online collaborative innovation and value co-creation. Following an introduction to collaborative innovation with particular focus on online collaboration types, focus turns to the individual contributors co-creating value in online innovation communities and, in turn, the customer's role in value co-creation. A discussion of specific value co-creation activities performed in collaborative innovation follows. The relevant literature concerning social and individual drivers of performing value co-creation activities in collaborative innovation is then outlined and the dimensions of value derived from value co-creation in collaborative innovation are discussed.

2.2. A collaborative approach to innovation

Research on innovation is of interdisciplinary nature (e.g. management, marketing, and information systems). While the variety of perspectives adopted by different disciplines offer a deep understanding of the innovation concept, including the development of new technologies and customer adoption of new products (Hauser, Tellis & Griffin 2006), these varying points of view create a fragmentation in the literature on innovation (Hauser et al. 2006).

In particular, the innovation literature is separated by an emphasis on innovation as outcome, which is the development of new products with particular characteristics (Popadiuk & Choo 2006), and innovation as a new knowledge creation activity, in which multiple actors exchange and combine knowledge to create new knowledge (Nahapiet & Ghoshal 1998; Ramasamy, Goh & Yeung 2006). Such knowledge exchange provides

companies with the competitive advantage (Ramasamy et al. 2006) since it leads to the developments of new products that have the potential to be successful in the market. From a management point of view, a company's organisational structure (Kim & Lee 2006), characteristics and network (Van Wijk, Jansen & Lyles 2008), characteristics of its employees (Connelly & Kelloway 2003) and its innovation management strategies (Cabrera, Collins & Salgado 2006) are important aspects influencing the effectiveness of knowledge exchange.

Since the knowledge is exchanged and combined between at least two parties (Nahapiet & Ghoshal 1998), the knowledge exchange view captures the collaboration aspect commonly deemed critical to innovation (Greer & Lei 2012), due to its ability to offer the insight required to understanding how technologies are adopted or diffused by the customers in the market (Hauser et al. 2006). As widely discussed by the scholars in the innovation field, knowledge can be exchanged between both internal and external parties (Chesbrough, Vanhaverbeke & West 2006; Gianiodis, Ellis & Secchi 2010). Internal resources entail employees, strategic alliances or any internal actors who have the right to use the knowledge, while external resources comprise external partners, suppliers, or customers (Chesbrough & Schwartz 2007; Lichtenthaler 2011). Specifically, it has been noted in the literature that to advance their business, companies should take an open and collaborative approach by including their customers into their innovation efforts (Chesbrough et al. 2006).

2.3. Collaborative innovation with independent actors

Companies that adopt more open and collaborative innovation strategies interact with external parties to have access to the external knowledge and technologies which help them to improve their internal knowledge base (Lichtenthaler 2011). Collaborative

innovation methods are successfully adopted when the organisational structure of the company is appropriate to facilitate collaborative innovation activities (Dodgson, Gann & Salter 2006). Collaborative innovation is effective when companies improve their innovation capabilities and accept external support (Gianiodis et al. 2010). External support comes from suppliers, users, or user communities (Chesbrough et al. 2006) who can provide effective solutions (Lakhani, Jeppesen, Lohse & Panetta 2007).

Customers or users, who might be a source of collaborative innovation, refer to individual end users of products and services (Greer & Lei 2012). von Hippel has given explicit attention to user innovation in the 1970s (Bogers, Afuah & Bastian 2010), reporting results of several investigations conducted to outline the important role that the users play in new product and service development (von Hippel, 1988). Subsequent research provides empirical evidence of the positive effects of user contribution to product development in different industries, such as banking, sports, automotive, medicine, and video games (Bogers et al. 2010; Greer & Lei 2012; von Hippel 2005). Indeed, innovating users and companies are considered partners that have a mutual functional benefit from the collaboratively developed products or services (Lüthje & Herstatt 2004; Lüthje, Herstatt & von Hippel 2005; von Hippel 2005).

Innovating users have specific characteristics as defined in the Lead User Theory (von Hippel 2005). Lead users are individuals whose needs for a development in the service or product occur before the marketplace (Urban & von Hippel 1988). They hold leading edge status in their area of expertise (Morrison, Roberts & Midgley 2004) and their integration into development reduces the risk of new product or service failure (Lüthje & Herstatt 2004; Urban & von Hippel 1988). Although due to their expertise, lead users are more likely to provide ideas that are easy to interpret and implement (Lüthje et al. 2005), the

actual needs and requirements of users are more likely to be detected if ordinary users generate and share ideas derived from their own experiences (Kristensson, Gustafsson & Archer 2004). Ordinary users generate more novel and valuable ideas than advanced users or product developers, particularly when they have an opportunity to create through divergent thinking (Kristensson et al. 2004), by combining different information elements from personal needs to functionality (Kristensson et al. 2004). While ordinary users might not generate ideas directly to be implemented, a company should learn and be inspired to innovate by the ordinary users' integration into the idea generation process (Magnusson 2009).

Collaborative innovation has both social and individual aspects. On a social level, individuals' skills are punctuated in new ways through social interactions (Tsoukas 2003). Individuals, who have an opportunity to interact and reflect, exchange ideas and subsequently create new ideas (Hemetsberger & Reinhardt 2006). On an individual level, innovation is a sophisticated process given the complexity of transformation of tacit knowledge to explicit knowledge (Bechky 2003; Kogut & Zander 1992; Nonaka 1994; Nonaka, Toyama & Konno 2000). According to Nonaka (1994), ideas are generated in a spiral process of ongoing conversion of tacit and explicit knowledge. Once an idea is transformed from tacit to explicit knowledge, it is shared and exchanged by individuals who socialise and collectively spend time in the same environments (Nonaka et al. 2000). Consequently, online platforms become important for collaboration for innovation. Firstly, because of the spontaneous interaction opportunities that the Web 2.0 technologies provide (di Gangi & Wasko 2009). Secondly, by allowing independent individuals to collaborate in innovation voluntarily (Sawhney, Verona & Prandelli 2005).

2.4. Collaborative innovation in online platforms

The use of online platforms as an open approach for innovation has gained popularity with the development of information and communication technologies, mainly the internet, Web 2.0 technologies, and social networks (di Gangi & Wasko 2009). As online platforms allow individuals to become involved in social interactions, new ideas are collaboratively generated through exchanging, combining, adding, modifying and integrating knowledge (Faraj, Jarvenpaa & Majchrzak 2011). A review of the innovation literature reveals three common approaches for collaborative innovation with independent actors. In the first approach, companies use online platforms to invite users to collaborate on innovation projects the company initiates (e.g. Cui & Wu 2015; Mahr, Lievens & Blazevic 2014). Second, online consumer forums or brand/user communities are used to collaborate with members to innovate (e.g. Antorini & Muñiz 2013; Nambisan & Baron 2010). Brand communities are not formed necessarily to innovate, but collaborative innovation occurs organically. Third, companies establish online communities aimed at collaborative innovation with user and non-users of their products and services (e.g. Bayus 2013; di Gangi & Wasko 2009). In the following sections, three types of online collaboration for innovation introduced in the literature are detailed.

2.4.1. Collaboration in company initiated innovation projects

Online platforms are used to invite users of a company's products or services to collaborate in innovation projects initiated by a company. This type of collaboration is important as it leads to early involvement of users in the company's business activities. User involvement in development and design processes leads to stronger relationship building with users who contribute valuable ideas and are more committed to resultant market offerings (Sheth & Parvatiyar 1995). In this research, literature focused on

collaborative innovation projects initiated by the company was reviewed to identify the users' role and drivers and outcomes of collaboration (see Table 2.1).

Studies examining collaborative innovation projects initiated by companies consider users mainly as a source of information (Cui & Wu 2015; Füller et al. 2009; Mele, Spena & Colurcio 2010; Nambisan 2002). From a management point of view, research and development managers should be driven to collaborate with users in innovation projects because of the novelty (Mahr et al. 2014) and nature (Cui & Wu 2015) of the knowledge contributed by users. Furthermore, if companies structure the online platform as easy to use and provide support as necessary, user participation is increased (Füller et al. 2009; Kohler, Fueller, Matzler & Stieger 2011). In the literature focus on company initiated online innovation projects, the role that users play is viewed from the company's point of view. Users are viewed as participants (Füller et al. 2009; Kohler, Fueller, Stieger & Matzler 2011), knowledge contributors (Mahr et al. 2014), project collaborators (Tsai 2009), or users of the new product innovated in the project (Blazevic & Lievens 2008; Füller, Bartl, Ernst & Mühlbacher 2006; Nambisan 2002). From the company point of view, collaboration with users has several positive outcomes. It is argued that ideas contributed by users have the potential to become high performing (Cui & Wu 2015; Tsai 2009) and successful (Nambisan 2002) new products. Thus, user ideas lead to production of radical, incremental, and feasible products (Füller et al. 2006; Gustafsson, Kristensson & Witell 2012; Magnusson 2009).

From the user point of view, the reasons for participating in innovation projects are mainly individual. For example, users may participate in an innovation project if they perceive the experience compelling, inspiring (Kohler, Fueller, Matzler, et al. 2011; Kohler, Fueller, Stieger, et al. 2011), fun (Füller et al. 2006), enjoyable (Füller et al. 2009) and playful

(Kohler, Fueller, Matzler et al. 2011). Users are individually motivated to participate if they think they have knowledge to contribute (Magnusson 2009) or when they need or see the use of a new product (Füller 2010; Magnusson 2009). Users can perform some activities during collaboration. For instance, they share (Füller 2010), provide (Magnusson 2009), or submit (Kohler, Fueller, Matzler et al. 2011) new product ideas. Users can also extend their idea sharing role in a project by reviewing and rating ideas shared in the community, commenting on others' ideas (Kohler, Fueller, Matzler et al. 2011), or providing feedback (Gustafsson et al. 2012).

It is argued that the innovation experience itself may offer a benefit for users (Füller 2010) and yet it may create change in user behaviour. If the innovation experience is compelling, the number of contributions and time spent on a project increases and users develop interest for future projects (Füller et al. 2009; Kohler, Fueller, Stieger et al. 2011). Except for introduction of some potential changes in user behaviour, the current literature is lacking a discussion of the outcomes of participation in an innovation project from the user's point of view.

Table 2.1: Collaborative innovation in online innovation projects

Author(s)	Type of study	Sample	Collaboration platform	Driving factor(s)	Role of users	Outcome(s)
Cui & Wu 2015	Exploratory	Members of product development and management association	New product development projects with customers	Nature of customer knowledge The form of involvement	Information source Co-developer Innovator	Higher new product performance
Mahr et al. 2014	Empirical	Directors of general management, marketing, research and development, or production departments	Customer knowledge co-creation projects	User characteristics Relevance, costs, novelty of knowledge	Knowledge contributors	Innovation success
Gustafsson et al. 2012	Empirical	Service/product development managers	Customer co-creation in development projects	Frequency Direction Modality Content	Share inventiveness Provide feedback	More incremental and radical innovation depending on the communication type
Kohler, Fueller, Stieger et al. 2011	Experiment	Virtual world users	Co-creation of experiences in virtual world	Compelling experience (intrinsically motivating, involving, fun) (measured)	Participants of innovation task	Spend more time Contribute more Further interest
Kohler, Fueller, Matzler et al. 2011	Action research	Representatives of companies Participant observations Virtual world users Experts	Virtual co-creation system	Inspiring Immersive environment Simple experience Clear navigation structure Individual support Playful Challenging tasks	Discussions Reviewing ideas Submitting ideas Rating ideas Commenting on others' ideas	Higher sense of community Higher perceived playfulness More effective problem solving
Mele et al. 2010	Case study	Managerial staff of case company Representatives of customer companies Stakeholders involved in innovation projects	Interactive innovation projects	-	Interact Integrate resources	New value and value-in-use for customer company

Table 2.1: Collaborative innovation in **online innovation projects** – cont'd

Author(s)	Type of study	Sample	Collaboration platform	Driving factors	Role of users	Outcome
Füller 2010	Empirical	Consumers who had participated in at least one virtual co-creation project	Virtual co-creation of innovation	Reward oriented Intrinsically interested Curiosity driven Need driven (measured)	Share creative ideas	Co-creation experience itself may offer a benefit for consumers
Tsai 2009	Empirical	Manufacturing companies engaged in technological innovation previously	Online collaboration with customers	Company's absorptive capacity	Collaborators	Increase performance of new or significantly improved products
Magnusson 2009	Quasi-experimental design	Professionals Guided users Pioneering users	Ideation phase of innovation	Motivation Use experience Knowledge of underlying technology	Provide ideas	Higher propensity to contribute with incremental or radical new ideas
Füller et al. 2009	Empirical	Consumers who had actually participated in at least one virtual co-creation project	Virtual new product development	Empowerment Enjoyment Trust Support (measured)	Participants in virtual tasks of new product development	Higher intention of future participation
Blazevic & Lievens 2008	Exploratory	Electronic service program leaders, general e-service business managers, marketing managers, program team members, engineers, customers	Knowledge co-production in electronic services	-	Passive users Active informers Bidirectional creators	Different roles impacts innovation tasks (detection, development and deployment)
Füller et al. 2006	Case study	Members of virtual communities	Community based innovation	Fun Monetary incentives	Source of ideas Co-creators End-users, buyers	New ideas that have market potential, degree of newness, technical feasibility
Nambisan 2002	Conceptual	Customers	Virtual new product development	Product/service related benefits Community related benefits Medium related benefits	Resource Co-creator of value Users of the new product	Success of the new product

2.4.2. Collaborative innovation in brand communities

In brand or user communities, collaborative innovation emerges organically during community activities. Studies focusing on collaborative innovation in brand communities were reviewed in a similar way to collaboration in innovation projects discussed earlier. The aim of the literature review was to understand the roles identified for brand community members, the driving factors and outcomes of collaboration (see Table 2.2). Online brand communities are not necessarily established with the sole purpose of collaborative innovation. However, because they are rich sources for new product ideas, companies seek to utilise brand communities and engage users in their innovation endeavours (Antorini & Muñiz 2013). In online brand communities, innovation occurs during brand community activities (Füller, Jawecki & Mühlbacher 2007; Rowley, Kupiec-Teahan & Leeming 2007).

Members of a brand community are not tasked with participating in a project or performing specific activities related to innovation. However, community activities such as sharing usage experience, asking or answering product related questions, offering solutions to raised problems, learning or teaching how to use products, sharing or contributing ideas, participating in discussions, or contributing expert knowledge when interacting with others, can lead to co-creation of innovation (Antorini & Muñiz 2013; Füller et al. 2007; Füller, Schroll & von Hippel 2013; Jeppesen & Molin 2003; Roberts, Hughes & Kertbo 2013). Moreover, utilising brand communities for product development is an innovative strategy that allows users to co-create experiences (Rowley et al. 2007). In those co-created experiences, community user members sometimes take the role of co-developer, co-ideator, co-designer, or co-developer (Roberts et al. 2013), or voluntarily participate in product support activities (Nambisan & Baron 2009).

Brand communities are built mainly aiming to create a stronger connection between a brand and its users and users with each other (Muñiz & O'Guinn 2001). Brand community members are usually like-minded individuals who share common hobbies and mutual interest in the brand (Füller et al. 2007; Muñiz & O'Guinn 2001). During brand community interactions members socialise, share and exchange ideas (Franke & Shah 2003). The social nature of brand communities makes social drivers more evident for members to engage in collaborative innovation (Faraj et al. 2011; Füller et al. 2007; Nambisan & Baron 2009, 2010; Roberts et al. 2013; Wasko & Faraj 2005). Individual motivations, on the other hand, show similarities with factors that drive users to participate in innovation projects, such as fun and product related benefits and needs (Antorini & Muñiz 2013; Füller et al. 2007). As a result of collaboration in the community, user members may perceive the value of the co-created experience (Füller et al. 2007) and intend to contribute more in the future (Nambisan & Baron 2009).

Ideas developed during brand community activities have potential to transform into new products or services that gain success in the market (Franke & Shah 2003) and inspire future product ideas (Jeppesen & Molin 2003). Products developed by brand community members tend to be better looking, better functioning, longer lasting, and more relevant to consumer needs (Antorini & Muñiz 2013; Hoyer, Chandy, Dorotic, Krafft & Singh 2010; Jeppesen & Molin 2003). Although positive outcomes of collaboration for the company are evident, outcomes that brand community members derive as a result of collaboration for innovation is not discussed in studies focused on collaborative innovation in brand communities.

Table 2.2: Online collaborative innovation in **online brand communities**

Author(s)	Type of study	Sample	Collaboration platform	Driving factor(s)	Role of users	Outcome(s)
Antorini & Muñiz 2013	Exploratory	User innovators	Engaging with innovators through user communities	Fun Use related benefits	Bring innovation to community	Better looking Better functioning More relevant products
Füller et al. 2013	Empirical case	Community members Non-community members	Open source software community	-	Download software Use software Modify software Develop software further	Creation a strong and trusted software brand
Faraj et al. 2011	Conceptual	Online community members	Knowledge collaboration among members of organisation	Passion Time Social identity Temporary convergence	Making contributions Share ideas Join discussions	Positive and negative consequences on the efforts of the company
Nambisan & Baron 2010	Empirical	Customers	Online customer forum	Sense of responsibility to community Self-image Sense of expertise Sense of partnership with company (measured)	Contributors in value co-creation process	Increase contribution to the community/company in product support
Roberts et al. 2013	Exploratory	Online users community members	Online gaming community Innovation as value co-creation activity	Personal development Social, altruistic Economic opportunity driven	Develop ideas/content Share ideas Give feedback Discuss ways to improve	Develop better products
Hoyer et al. 2010	Conceptual	Consumers	Consumer co-creation in new product development	Financial factors Social factors Technological factors Psychological factors	Participants in all stages of new product development	Higher efficiency/effectiveness Increased complexity Higher satisfaction More relation to consumer needs

Table 2.2: Online collaborative innovation in **online brand communities** – cont'd

Author(s)	Type of study	Sample	Collaboration platform	Driving factor(s)	Role of users	Outcome(s)
Nambisan & Baron 2009	Empirical	Customers	Virtual customer environment	Learning Personal/social integrative Hedonic (measured)	Participants in value creation (product support)	Higher voluntary participation behaviour
Füller et al. 2007	Netnography	Members of communities for basketball shoes	Online consumer communities	Unsatisfied needs Fun/enjoyment Improve skills Receive feedback Recognition	Contribute Observe/read discussions Share reviews Build social ties Show interest in further social interaction	Value of experience Creation of innovation
Rowley et al. 2007	Case study	Sporting kite technology company	Real and virtual consumer community	-	Provide feedback on experience Interact Develop own experience	Product development efforts becomes co-creation of a customer experience
Wasko & Faraj 2005	Empirical	Members of a legal professional association	Electronic network of practice	Social capital Individual reputation Enjoy helping (measured)	Submit message Share/contribute knowledge by providing response to a question	Members contribute helpful knowledge
Jeppesen & Molin 2003	Explorative case study	Online community management Product development staff Online content	Online consumer forum	Intrinsic and extrinsic motivations	Co-developer Designer Model builder Tester (provide feedback)	Creation of new product content that increases the life of the product and inspire new products
Franke & Shah 2003	Exploratory	Users community leaders and members	User communities	Community-based and personal motives	Be active Socialise with other members Share opinions	Innovation is New Commercial Meet urgent needs Has market potential

2.4.3. Collaboration in online innovation communities

An online innovation community is essentially an open call for everyone who wants to make a contribution to develop a new, or improve a current, product/service. Indeed, users and non-users of the innovating community's products or services interact to develop new ideas collaboratively in these communities. Online collaboration for innovation with non-users and users creates advantages for companies, which tend to have a bias towards their own users. Listening to non-users who share their voice brings a new perspective and broader scope of ideas that have potential to become successful products in the market (Sawhney et al. 2005). Collaborative innovation communities also provide companies with relative competitive advantage for the company as innovations developed by community members can be compatible (di Gangi & Wasko 2009). Similar to reviews conducted on previous collaboration types, the literature on online collaborative innovation communities is reviewed to derive insights on the role that a community member plays, and drivers and outcomes of collaboration from the company and community member perspective (see Table 2.3).

The literature focusing on online collaborative innovation communities is unique in that a number of recommendations for effective management of the community are specified. Primarily, it is suggested that while integration of non-users in collaboration leads to creation of more fruitful ideas (Sawhney et al. 2005), the innovating company should be aware of the line between transparency and disclosure (di Gangi et al. 2010). It is also stated that overcoming challenges regarding management of an online innovation community and deriving effective outcomes from collaboration is the company's responsibility (Fuchs & Schreier 2011). If the company manages empowerment through online communities by letting individuals produce their own designs, positive perceptions are developed towards the company (Fuchs & Schreier 2011). To achieve the most

effective innovation, community management should understand ideas from the perspective of members and identify the best ideas shared (di Gangi et al. 2010). Another important challenge that management faces is to ensure sustainability of collaboration in the community (di Gangi et al. 2010). Content analysis shows that learning from product development opportunities drives members to stay in the community (Lu, Singh & Srinivasan 2011). Besides, members who make idea submissions in the community a regular habit are more likely to submit ideas in the future (Bayus 2013).

While submitting ideas is deemed a key activity performed by online collaborative innovation community members as outlined in the literature (Bayus 2013; Chanal & Caron-Fasan 2010; Lu et al. 2011), these individuals may also engage in a range of activities, such as selecting product designs to be produced, voting on which products should ultimately be marketed, providing a title/description for a product, reviewing a product, providing feedback, commenting, or identifying new sources of innovation (di Gangi et al. 2010; di Gandi & Wasko 2009; Fuchs & Schreier 2011), activities that, while mentioned in the literature, have not been empirically measured. Innovation community members thus become an ideator, designer, and intermediary (Lusch & Nambisan 2015) as they interact, learn together, and share an experience with each other (Ramaswamy & Gouillart 2010).

Independent individuals become active in an online innovation community by submitting new ideas for individual and social reasons. Social factors, such as reputation (Chanal & Caron-Fasan 2010) or appreciation (Ramaswamy & Gouillart 2010), drive individuals to be active in the community. Individual factors, such as creativity (Chanal & Caron-Fasan 2010), the possibility of improving self-esteem, and higher earnings (Ramaswamy & Gouillart 2010), drive individuals to engage in an innovation community. Apart from

being a driving factor for members to remain in the community (Lu et al. 2011), as mentioned earlier, learning is indicated as a driving factor of innovation communities (Chanal & Caron-Fasan 2010). It is also stated that independent stakeholders (e.g. junior and senior advisers, customers) become involved in an innovation community due to the opportunities to learn new skills and improve their skill base (Ramaswamy & Gouillart 2010).

Collaboration in innovation communities has positive outcomes for the hosting company. For instance, collaboration with individuals in online communities expands a company's innovation process, generates an increase in profitability, and gives users of the company's products opportunity to connect with the company (di Gangi et al. 2010). Outcomes of collaborating innovation communities have not been previously discussed from the member point of view. The main research gaps identified through the review of literature of different online collaboration types will be discussed next.

Table 2.3: Online collaborative innovation in **online innovation communities**

Author(s)	Type of study	Sample	Collaboration platform	Driving factor(s)	Role of members	Outcome(s)
Lusch & Nambisan 2015	Conceptual	Actor to actor networks Ecosystems	Online innovation communities	-	Ideator Designer Intermediary	Value in use
Bayus 2013	Empirical	Publicly available ideas submit by members	Crowdsourcing community	-	Submit ideas	Submit more implementable ideas
Fuchs & Schreier 2011	Experiment	Consumers who are aware but not actively participated in empowerment initiatives	Online new product development communities	-	Create /submit ideas Select the designs to be produced Vote on products should be marketed	Positive perception towards company that empowers its customers
Lu et al. 2011	Longitudinal data modelling	Online community members	Online innovation community	Learning product development opportunities	Submit ideas	Users retain in the community
Chanal & Caron-Fasan 2010	Case study	Business models create and capture value	Collaborative web-based innovation	Learning Reputation Creativity	Submit ideas Vote ideas	Building effective business models is a learning process
Ramaswamy & Gouillart 2010	Exploratory	Stakeholders (junior, senior advisers, customers)	Interactive technologies	Appreciation Higher self-esteem Higher earnings Acquisition of skills Opportunity to advance	Interaction Learning together Sharing experience	Value for all the stakeholders involved
di Gangi et al. 2010	Case study	Innovation community users Innovation community moderators	Online user innovation community	-	Review products Provide feedback Suggest ideas Identify new sources of innovation	Company expands innovation Increase in profitability Users to connect with company Users realise value of community
di Gangi & Wasko 2009	Exploratory	Ideas posted by end users	Collaborative innovation community	Relative advantage for the company Compatibility of innovation developed by the community members	Post idea/comment Vote Provide title/description Classify the idea	Adoption of end user ideas by the company
Sawhney et al. 2005	Conceptual	Customers	Collaborative product innovation through internet-based mechanisms	-	Ideation Concept testing Designing	Company define value propositions, deliver, share, and communicate value through collaboration

2.4.4. Collaborative innovation and the individual actor

The collaborative innovation through company initiated projects, online brand and innovation communities explored in relevant studies show the advantages of an open and collaborative approach to innovation. However, current studies primarily focus on the organisation, with more insight needed regarding individuals. For instance, although a set of activities are listed (e.g. di Gangi et al. 2010; Kohler, Fueller, Matzler et al. 2011; Wasko & Faraj 2005), activities have not been measured from the individual member perspective. Yet, the measurement of those activities is necessary as it provides a deeper understanding of what individuals do when they collaborate (McColl-Kennedy et al. 2012). Similarly, possible social and individual drivers of participation in a company's innovation effort are listed, but few studies measure these factors from the collaborator point of view (Nambisan & Baron 2009, 2010; Wasko & Faraj 2005). Besides, several positive outcomes of collaboration from a company's point of view are discussed (e.g. Antorini & Muñiz 2013; di Gangi et al. 2010; Gustafsson et al. 2012; Tsai 2009), however, little attention is given to the individual and possible consequences for individuals. Understanding what drives individuals to collaborate and outcomes they perceive is important to obtain a deeper understanding of the collaborative innovation experience (Ramaswamy & Gouillart 2010).

Another limitation of current studies is conceptualisation of the connection between collaborative innovation and value co-creation. Review of the literature on different types of online collaborative innovation shows that online innovation platforms, more specifically, brand and innovation communities, are suitable for value co-creation through resource integration (Lusch & Nambisan 2015; Vargo et al. 2015). In online innovation and brand communities, companies can make value propositions, share, and communicate value offerings (Sawhney et al. 2005), whereas members realise value of the community as

a result of collaboration (di Gangi et al. 2010). Collaboration in the community also helps members to recognise their contribution to value co-creation (Ramaswamy & Gouillart 2010). Using interactive technologies and community platforms for innovation creates value for users, the company and other parties (suppliers, partners, customers, independent inventors) (Lusch & Nambisan 2015). However, the distinction between value co-creation and co-creation of innovation is not clearly identified. A majority of studies articulate collaborative innovation as the co-creation of innovation with involvement of customers (e.g. Mahr et al. 2014; Roberts et al. 2013), thereby, co-created value for the individual as a result of collaboration is not explained. While it is conceptually argued that value is co-created by resource integrating actors in collaborative innovation (e.g. Lusch & Nambisan 2015; Ramaswamy & Gouillart 2010; Sawhney et al. 2005), there is a scarcity of empirical investigation regarding what individuals do to derive value for themselves as a result of collaboration (McColl-Kennedy et al. 2012). Therefore, this research argues that collaborative innovation in brand and innovation communities can be used as foundation to understand what role community members play that results in value co-creation. The next section discusses value co-creation literature to obtain detailed information on the individual actor's role in value co-creation.

2.5. The individual actor's role in value co-creation

Individual actors play an important role in value co-creation (Vargo & Lusch 2016). A review of the literature unfolds three major streams explaining the important role of individual actors, outlined here in chronological order. The first research stream focuses on customers as contributing actors of service production and views customers as participants in production of services. The second stream considers customers as co-creators of value. The third stream introduces individual actors as resource integrators.

2.5.1 Customers as participants in service production

The perspective of customers as participants in service production focuses on dyadic relationships between a service provider and its customers, with a particular focus on the customer role in a company's service production endeavours (Lovelock & Young 1979; Mills & Morris 1986). When customers become participants in the production of service they contribute to improvement of service quality (Lengnick-Hall 1996). To achieve productive service production, customer participation should be managed carefully (Lovelock & Young 1979). Hence, human management models are applied to encourage customer participation (Kelley, Skinner & Donnelly 1992; Lengnick-Hall 1996; Lovelock & Young 1979; Mills & Morris 1986) or human resources management practices are integrated with marketing models to improve customer performance (Bowen 1986).

Customers can be a source of productivity (Lovelock & Young 1979) or they can be partial employees who take part in production of services when they acquire necessary knowledge, skills, and dispositions (Mills & Morris 1986). It is suggested that customers learn their role in the production of service if organisations manage organisational socialisation, which provides customers with the necessary knowledge to function during a service encounter (Kelley et al. 1992). Indeed, companies should offer clear opportunities for participation, enhance customer abilities as co-producers, and increase competitive quality of production processes (Lengnick-Hall 1996). In the co-production of services, the company's role is to provide planned opportunities for customers to influence their performance in service co-production (Harris, Harris & Baron 2001).

Customer participation in service production creates positive outcomes for the service provider and customer. Participant customers display positive behaviours, such as helping, advocating, or recommendation (Bettencourt 1997; Groth 2005). Customers become

participants when they are committed to the company (Bettencourt 1997) and socialise with others (Claycomb, Lengnick-Hall & Inks 2001). As the level of participation increases, customers see employees as more knowledgeable and polite and perceive the service provider more caring and as a provider of individualised attention for its customers (Claycomb et al. 2001). Furthermore, when customers have the opportunity to determine whether they participate in service production, they take more responsibility in the case of service failure (Bendapudi & Leone 2003).

Review of the literature reveals that viewing customers as participants indicates a shift in the role of service customers from passive consumers of resources to active contributors to service production and delivery efforts. However, a customer's role as a participant in service production has some limitations. The development of information and communication technologies, particularly the internet, expand the definition of the customer's role (Prahalad & Ramaswamy 2000, 2002). Customer capacity to interact with companies empowers them as value co-creators, not just providers of immaterial labour (Cova & Dalli 2009). Drawing from similar standpoints, S-D logic suggests a shift from customers as targets to be captured to collaborators in the marketing process and value co-creators (Vargo & Lusch 2004). In value co-creation, the company has less power to make decisions on the role that customers play and customers have more say in determining their own actions (McColl-Kennedy et al. 2012). The role of customers as value co-creators is discussed in the next section.

2.5.2 Customers as value co-creators

According to the second stream of literature, in the dyadic relationship between a company and its customers, customers take on the role of value co-creators. Seeing customers as value co-creators supports the shift from company driven co-production design to

empowering customers through co-created experiences (Prahalad & Ramaswamy 2000, 2002, 2004a, 2004b). Herewith, customers should not be seen as free labour or unwilling contributors to productivity (Cova & Dalli 2009), but the major source of competence (Prahalad & Ramaswamy 2000). Developments in communication technologies allow empowered and networked customers to create their own consumption experiences (Prahalad & Ramaswamy 2000). Moreover, interactions do not stop once the service is produced as they are embedded in continuously co-created experiences (Prahalad & Ramaswamy 2004).

In S-D logic perspective of marketing, it is argued that marketing does not consist of one interaction where customers buy products or services at a single point of exchange, but is a continuous process of value co-creation (Vargo & Lusch 2004, 2016). Indeed, value co-creation is an ongoing open-ended process in which value is co-created as a function of interactions (Ballantyne & Varey 2006). In this process, the customer role is as a co-creator of value (Vargo 2008). It is argued that a company does not dictate (Frow et al. 2014) or deliver (Vargo & Lusch 2008b) value, but communicates value propositions during interactions offering an opportunity for value co-creation (Vargo & Lusch 2004, 2008b). Companies interact with customers in several ways in becoming a part of their usage experience (Frow et al. 2014; Prahalad & Ramaswamy 2004) or part of their life (Vargo & Lusch 2004). As customers are not required to behave in a certain way or are allocated a task to complete the process, they are empowered by being a value co-creator. However, S-D logic has been criticised by service logic scholars because of a company's dominant position in value co-creation (Grönroos & Voima 2013; Heinonen & Strandvik 2009). It is argued that the company controls value co-creation by making value propositions, service offering and expecting customers to experience services (Grönroos & Voima 2013). According to the same argument, in 'use' instances, a company can

create/facilitate potential value for a customer (Grönroos & Voima 2013). A customer does not co-create, but creates value in her/his own sphere without intervention by the company (Grönroos & Voima 2013). Therefore, in these circumstances customers do not engage in a mutual value creation process but are entirely responsible for their own value in use creation (Grönroos & Voima 2013). However, it is argued here that in online collaborative innovation, members play the role of 'co-creators' of value. It is because, in online collaborative innovation, value is co-created through a mutual experience where all members create value for each other through community activities (Payne et al. 2008; Vargo & Lusch 2016).

The role that community members play in collaboration can be extended by a broader perspective that is recently integrated into S-D logic (Frow et al. 2014; Vargo & Lusch 2010). According to this broader view, the scope of interactions is extended (Frow et al. 2014). Companies are no longer recommended to have ongoing dialogue with customers, but to seek interaction opportunities with multiple actors in service eco-systems (Vargo & Lusch 2010). Actors in the service ecosystem connect to each other having similar goals and using similar technologies and institutions, essentially integrating resources to co-create value (Frow et al. 2014; Vargo & Lusch 2016). This has resulted in an extended definition of the role of contributors to value co-creation. They are no longer seen as 'a customer as a value co-creator' but as 'an individual actor as a resource integrator' (Vargo & Lusch 2016). The individual actor's role as a resource integrator is discussed in the next section.

2.5.3 Individual actors as resource integrators

Resource integration refers to a multidirectional process where all actors integrate operant and operand resources for their own benefit and the benefit of others (Vargo 2008).

Operand resources are static and finite, exportable and tangible, while operant resources are invisible and intangible (Vargo & Lusch 2004). Operant resources are likely to be dynamic and infinite, such as knowledge and skills (Vargo & Lusch 2004). As mentioned earlier, resource integration occurs between companies and customers, and generic actors engage in service exchange to create value in service ecosystems (Chandler & Vargo 2011; Vargo & Lusch 2011). Generic actors are resource integrators and use their operant resources acting on operand resources in the integration process (Kleinaltenkamp, Brodie, Frow, Hughes, Peters & Woratschek 2012). For actors to integrate resources they require the ability and intention to integrate (Kleinaltenkamp et al. 2012), as well as to acquire necessary skills and knowledge through interactive learning to integrate their resources effectively (Hibbert et al. 2012). Resource integration contains several forms of collaboration (Kleinaltenkamp et al. 2012), with collaboration opportunities created by various actors (Ramaswamy & Gouillart 2010). Online or offline environments are designed to provide structural support for actors to integrate resources (Breidbach, Brodie & Hollebeck 2014). When the necessary environments are formed, actors integrate their resources while actively engaging in activities that create value (Baron & Harris 2008). Thus, all actors fundamentally do the same thing which is integrating resources in the process of value creation (Vargo & Lusch 2011).

Online innovation or brand communities can be considered service ecosystems in which interactions occur between the innovating company, users, non-users, and individual inventors. A company's role in a dynamic service ecosystem is to make value propositions in ways that do not exist in dyadic relationships (Frow et al. 2014). For instance, a company can make an *invitation to play* which is a metaphor for "encouraging an actor to engage through touch points with other actors" (Frow et al. 2014, p. 12). The actor role then becomes co-creating value with the company and also with other actors as resource

integrators. In a similar vein, it can be argued that an online collaborative innovation community is an innovating company's invitation to play with users, non-users, and individual inventors who become collaborators, thereby, resource integrators.

As a result of review of relevant literature, it can be concluded that members of a brand or an innovation community who collaborate for innovation play the role of resource integrator and value co-creator. Therefore, online communities are resource integration platforms where socially and individually driven members integrate resources to co-create value. To understand how value is co-created in the community it is important to identify activities that individual members perform. The next section of the literature review was conducted to derive specific value co-creation activities performed by community members during resource integration to co-create value.

2.6. Value co-creation activities

Value co-creation is viewed as a set of activities performed by individuals who aim to achieve similar goals (Payne et al. 2008). Through self-generated activities performed, individuals contribute to co-creation of their own value (McColl-Kennedy et al. 2012). An activity is 'actively doing things' (Sweeney, Danaher & McColl-Kennedy 2015). In an online collaborative innovation context, value co-creation activities are self-generated activities that community members choose to perform. Value co-creation activities should be identified and measured to expand investigations on what actors do when they co-create value (McColl-Kennedy et al. 2012).

Customers perform two types of behaviours during service transactions. In role (Yen, Hsu & Huang 2011) or participation (Yi & Gong 2013) behaviour is expected to be performed in order to receive a service without failure. Extra role (Yen et al. 2011), citizenship (Groth

2005; Yi & Gong 2013) or participation (Chan et al. 2010) behaviour is performed when a customer goes beyond expectations and performs activities not required for completion of service production. In the relevant literature, extra role and in role behaviours are identified and measured using behaviour scales (e.g. Bettencourt et al. 2002; Chan et al. 2010; Claycomb et al. 2001; Groth 2005; Yen et al. 2011; Yi & Gong 2013). Some value co-creation (McColl-Kennedy et al. 2012) or engagement (Brodie, Ilic, Juric & Hollebeek 2013; van Doorn, Lemon, Mittal, Nass, Pick, Pirner & Verhoef 2010) activities have been observed and reported. The literature review of value co-creation activities was conducted in two stages. In the first stage, all activities observed, listed or measured in the literature were grouped by mutual themes contained in their definition. In the second stage, following recommendations of Sweeney et al. (2015), particular activities were identified by relevance and applicability to the online collaborative innovation context. Finally, identified activities were selected by being self-generated as opposed to being assigned by community management. This process revealed four self-generated activities that can be performed in online collaborative innovation, namely information sharing, providing feedback, helping, and rapport building. In the following sections, each value co-activity is discussed individually

2.6.1 Information sharing

Information sharing in online collaborative innovation is defined as sharing personal information, knowledge and experiences in the community. Information sharing is viewed as in role and extra role behaviour (see Table 2.4). As an in role behaviour, customers simply share required information, such as their name and contact details, to receive services (Yi & Gong 2013). For example, health service customers collate information to manage basic health-related activities (McColl-Kennedy et al. 2012). However,

information sharing becomes an extra role behaviour when customers share information about the negative and positive aspects of a service (Claycomb et al. 2001) or about their personal needs and opinions of a service and its provider (Bettencourt et al. 2002: Chan et al. 2010; Grissemann & Stokburger-Sauer 2012). Information sharing is also important in value co-creation as individual actors are seen as competence providers (Payne et al. 2008). Similarly, in an online engagement context information sharing becomes an important activity as it leads to online brand engagement (Brodie et al. 2013). In online collaborative innovation, information sharing is a self-generated activity as community members choose to share personal information and knowledge as competence providers (Payne et al. 2008) and not because information sharing is required by community management.

Table 2.4: Information sharing

Articulation	Author(s)	Definition (if it is provided)
Information sharing	Yi & Gong 2013	Participation behaviour (in role behaviour)
Collate information	McColl-Kennedy et al. 2012	Sorting and assorting information (low level activity)
Provide information	Grissemann et al. 2012	Telling travel agency personal wants and needs
Share information	Chan et al. 2010	Measured as an item of participation scale (extra role behaviour)
Communication openness	Bettencourt et al. 2002	Forthcoming, honest, and clear information sharing for successful service production
Information provision	Claycomb et al. 2001	Providing information on good and bad aspects of the service
Sharing	Brodie et al. 2013	Sharing personal information, knowledge and experiences
Competence	Payne et al. 2008	Customers as competence providers

2.6.2 Providing feedback

Providing feedback in an online collaboration community is defined here as the judgments, comments, and suggestions offered by members (Bettencourt et al. 2002; Chan et al. 2010; Yi & Gong 2013). Providing feedback is considered an extra role behaviour in the literature (see Table 2.5) because, while providing feedback or making suggestions would not improve the service received (Groth 2005), performing this activity shows customer willingness to accommodate expert judgment towards past and future services provided (Bettencourt 1997).

Providing feedback is different from information sharing. Shared information contains personal knowledge and expertise (Bettencourt et al. 2002; Claycomb et al. 2001), whereas feedback contains solicited or unsolicited information (Yi & Gong 2013), judgments (Bettencourt et al. 2002) and suggestions (Chan et al. 2010; Groth 2005; van Doorn et al. 2010) regarding past and future services. It is important to note that, in the online collaborative innovation context, providing feedback differs from information sharing. For instance, in order to provide feedback community members are not required to hold specific information or knowledge. Moreover, information can be shared on various topics depending on the discussions occur that in the community (Hsu, Ju, Yen & Chang 2007). On the other hand, members provide feedback when they have a suggestion to improve specific aspects of the community (Yi & Gong 2013).

Providing feedback or making suggestions provide customers with the power to improve their own service experience (van Doorn et al. 2010; Chan et al. 2010). In a similar vein, in collaborative innovation communities members provide feedback to improve their own experience and the experience of other members. Providing feedback in the community is a self-generated activity as it is not a compulsory task defined by community management

(McColl-Kennedy et al. 2012). In the online collaborative innovation setting, providing feedback does not occur between community management and members, but among members which goes beyond company boundaries (Sweeney et al. 2015).

Table 2.5: Providing feedback

Articulation	Author(s)	Definition (if it is provided)
Feedback	Yi & Gong 2013	Contains solicited and unsolicited information for service improvement (citizenship behaviour – extra role behaviour)
Making suggestions	van Doorn et al. 2010	Engagement behaviour
Providing suggestions	Chan et al. 2010	Suggestions to improve services (measured as item of participation scale)
Providing feedback	Groth 2005	Provide helpful feedback to improve the service (citizenship behaviour)
Accommodation	Bettencourt et al. 2002	Willingness to accommodate the desire, approach, expert judgment toward services
Suggestions	Bettencourt 1997	Making constructive suggestions (measured as item of participation scale – extra role behaviour)

2.6.3 Helping

Helping behaviour involves providing assistance to other members in the innovation community. Helping other customers during production of services is an extra role behaviour (see Table 2.6). Customers voluntarily provide assistance to other customers to show them how to use services effectively (Claycomb et al. 2001; Groth 2005; Yi & Gong 2013) or to solve service related problems (Bettencourt 1997). Offering assistance voluntarily indicates customer willingness to improve the service experience for all parties involved (Bettencourt 1997; Yi & Gong 2013). Likewise, helping is a self-generated activity that innovation community members choose to perform to improve the collaboration experience. Thus, it is not a required task set by community management, but is performed by choice (McColl-Kennedy et al. 2012).

Helping others is a different activity to providing feedback. Providing feedback is performed to improve an experience by making constructive suggestions (Bettencourt et al. 2002), which is a planned activity performed by individuals in their own time. On the other hand, helping is a spontaneous act performed as a reaction to an event in which assistance is needed (Yi & Gong 2013). The difference between helping and providing feedback is also evident in the online collaborative innovation context. Helping is performed as a reaction to a problem occurred in the community whereas providing feedback can occur anytime when members chose to provide feedback to make suggestions for a better collaboration experience.

Table 2.6: Helping

Articulation	Author(s)	Definition (if it is provided)
Helping	Yi & Gong 2013	Assisting other customers (citizenship behaviour - extra role behaviour)
Helping others	Yen et al. 2011	A worker role that consumers take on (extra role behaviour)
Helping customers	Groth 2005	Assist, teach, explain other customers (citizenship behaviour)
Shared problem solving	Bettencourt et al. 2002	Individual initiative and shared responsibility for developing solutions and resolving issues
Helping	Claycomb et al. 2001	Teach others how to use the service (measured as item of co-production scale)

2.6.4 Rapport building

In collaborative innovation, rapport building is defined as harmonious connection with others in the community. Rapport building is discussed as an observed activity that customers perform as they engage in co-creation of an experience or value (Brodie, Hollebeek, Jurić & Ilić 2011; McColl-Kennedy et al. 2012) (see Table 2.7). Value co-creating customers build and maintain relationships with the service provider and others in their personal network (McColl-Kennedy et al. 2012). Similarly, in an online collaborative innovation community members, build rapport with community management and other

members while they are active in the community. In the service marketing literature, rapport building mainly captures interactions between an employee and customer (e.g. Bernieri, Gillis, Davis & Grahe 1996; DeWitt & Brady 2003; Gremler & Gwinner 2000). However, rapport building among online community members is possible (Brodie et al. 2011), despite the lack of geographical boundary between members (Muñiz & O'Guinn 2001).

Building strong relationships among actors is significant in terms of the support it provides for actor value co-creation activities (Ballantyne & Varey 2006). Brodie et al. (2011) argue that customers engage in value co-creation or experience once they start to build rapport with others. In a collaborative innovation community, on the other hand, members derive value by performing rapport building with others in the community (McColl-Kennedy et al. 2012).

Table 2.7: Rapport building

Articulation	Author(s)	Definition (if it is provided)
Connecting	McColl-Kennedy et al. 2012	Build and maintain relationships
Rapport	Brodie et al. 2011	Perceived level of harmonious, empathetic, or sympathetic connection to another
Relating	Ballantyne & Varey 2006	Building relationships for structural support

2.6.5 Learning

Learning is defined here as the acquisition of necessary cognitive competencies to perform an activity. Learning is an important activity discussed in the literature focusing on value co-creation (see Table 2.8). Given that a customer has to use the necessary knowledge, skills and competencies to integrate resources in value co-creation (Payne et al. 2008), learning those capabilities becomes an important aspect of value co-creation. In online

communities, for example, customers may learn skills that make purchase and consumption decisions easier (Brodie et al. 2013). Learning is interactive (Hibbert et al. 2012), thereby, multi-dimensional communications should be established among all the actors in resource integration who learn together (Ballantyne & Varey 2006). Learning necessary skills and knowledge to undertake resource integration improves the effectiveness of value co-creation (Hibbert et al. 2012). Customers contribute to value co-creation and improve their life quality by learning necessary skills from external sources and share with others (McColl-Kennedy et al. 2012). In collaborative innovation, members enhance their knowledge on how to collaborate in the community.

Table 2.8: Learning

Articulation	Author(s)	Definition (if it is provided)
Learning	Brodie et al. 2013	The vicarious acquisition of cognitive competencies
Co-learning	McColl-Kennedy et al. 2012	Actively seeking and sharing information from other sources
Customers learning	Hibbert et al. 2012	Self-directed learning to create or facilitate value
Knowing	Ballantyne & Varey 2006	Exchanging knowledge and skills (resources)

In order to understand value co-creation in collaborative innovation communities, the factors that drive community members to perform value co-creation activities should be understood. The next section discusses social and individual drivers selected for value co-creation activities in the online collaborative innovation context.

2.7. Social and individual drivers of value co-creation activities

To determine social factors that drive community members to perform value co-creation activities, social capital theory was adopted in this research with a particular focus on social capital dimensions that drive undertaking value co-creation activities, namely trust,

shared vision, and centrality. In addition to social capital dimensions, 'social interaction opportunities' are included as a social factor due to importance in driving value co-creation (e.g. Payne et al. 2008; Ballantyne & Varey 2006). Individual factors were captured by using the motivation, opportunity, ability (MOA) framework (MacInnis, Moorman & Jaworski 1991).

2.7.1 Social interaction opportunities

S-D logic indicates that market exchange is an open-ended process occurring at numerous touch points in which interaction is essential for value co-creation (Vargo & Lusch 2004). Social interactions that underlie value co-creation are frequent, multi-directional, and active (Gustafsson et al. 2012). Once customers socially interact they generate and exchange information or knowledge, produce meaning, share understanding and thus create value together (Ballantyne & Varey 2006). When there is an interaction between a customer and a service employee, a pleasant and social environment is created in which engagement in value co-creation is easier (Yi & Gong 2013).

Through interactions individuals engage with others in the service ecosystem to integrate resources (McColl-Kennedy et al. 2012). Interactions give companies the opportunity to communicate value propositions and provide customers the opportunity to collaborate in value co-creation (Payne et al. 2008). However, social interactions occurring in resource integration extend beyond the company-customer dyad and include other actors in the market (Sweeney et al. 2015). Similarly, in collaborative innovation, social interactions occur between members and community management and among community members with each other. Service ecosystems are social systems that provide individuals the potential to perform value co-creation activities in a socially constructed world (McColl-

Kennedy et al. 2012). In collaborative innovation, social interactions influence how community members integrate resources through value co-creation activities.

As social interactions have a positive impact on the customer value co-creation experience, companies are advised to create social interaction possibilities while providing online services (Blasco-Arcas, Hernandez-Ortega & Jimenez-Martinez 2014). Similarly, social interaction opportunities are available in collaborative innovation to encourage community members to perform value co-creation activities. Online communities are highly interactive engagement platforms in which members have opportunities to socialise (Brodie et al. 2013). Hence, in collaborative innovation, two-way communication and conversation opportunities that allow community members to interact with others (Blasco-Arcas et al. 2014) drive them to perform value co-creation activities.

2.7.2 Social capital dimensions

Social capital increases the bond between members of a society by transforming them from individuals to members of a group (Mathwick, Wiertz & De Ruyter 2008). It is the goodwill produced through relations within communities (Adler & Kwon 2002), manifest through the nature of relationships (Inkpen & Tsang 2005), that provides mutual benefit and organisational advantage (Nahapiet & Ghoshal 1998). Social capital embedded in interactions has the potential to increase the depth, breadth and efficiency of exchanges between actors (Yli-Renko, Autio & Sapienza 2001).

Social capital theory has been applied at the group level to explain the factors within an organisation (Nahapiet & Ghoshal 1998), and the individual level (Mathwick et al. 2008; Wasko & Faraj 2005). When social capital is recognised at the individual level, it facilitates an individual's collaborative actions, such as knowledge contribution in an

online community (Wasko & Faraj 2005). Individuals take part in collective actions (Adler & Kwon 2002) and invest in building networks with other actors (Nahapiet & Ghoshal 1998) to gain social capital in return. Social capital has previously been discussed as an overarching concept providing a definition according to study context (Mathwick et al. 2008; Adler & Kwon 2002) or as a multi-dimensional construct. Nahapiet and Ghoshal (1998) proposed relational, cognitive, and structural dimensions of social capital.

2.7.2.1 The relational dimension of social capital

The relational dimension of social capital refers to the direct bond individuals have with each other (Inkpen & Tsang 2005). Relational social capital comprises trust, commitment, norms of cooperation, obligations, reciprocity and identification (Chiu et 2006; Nahapiet & Ghoshal 1998; Wasko & Faraj 2005). *Trust* is a relational dimension of social capital that signifies the bond between actors in a network (Nahapiet & Ghoshal 1998). Trust is described here as a member's confidence in reliability and integrity of others in an innovation community (Morgan & Hunt 1994). Intention to share knowledge increases when trust is developed amongst individuals (Chow & Chan 2008). Specifically, trust reflects the belief of consumers that their partners will perform the required tasks and activities as promised and necessary outcomes will occur as a result of collaboration (Etgar 2008).

Trust in other community members is critical in collaborative innovation as trust reflects member belief in the integrity of others to achieve collaboration. Trust makes individuals more open minded toward events that occur in the environment and more willing to be involved in cooperative actions (Nahapiet & Ghoshal 1998). In online communities, trust in others is central to encouraging voluntary cooperation between strangers (Ridings, Gefen & Arinze 2002) as it reduces social uncertainties so relationships function

effortlessly (Lewicki, McAllister & Bies 1998). As online innovation communities by nature are publicly visible and place members into a situation in which they make themselves vulnerable to the actions of others with little knowledge of intentions, members require trust in other members.

2.7.2.2 The cognitive dimension of social capital

The cognitive dimension of social capital refers to the resources that provide individuals with shared representations, interpretations, and systems of understanding (Nahapiet & Ghoshal 1998; Inkpen & Tsang 2005; Chow & Chan 2008). It includes shared vision, language, code and narrative (Chiu et al. 2006; Nahapiet & Ghoshal 1998). *Shared vision* refers to collective goals and aspirations that individuals share in a group (Chiu et al. 2006). Thus, a shared vision acts as a bonding mechanism that helps individuals integrate and combine resources (Tsai & Ghoshal 1998). In the context of collaborative innovation, shared vision is a critical social factor given community members engage in value co-creation activities with the help of shared aspirations and goals. Indeed, drawing on extant research, shared vision has been identified as encouraging and energising employees to understand primary organisational goals (Pan & Scarbrough 1999), as well as influencing motivation to take action in collaboration in intra and inter organisational relationships to achieve desirable outcomes (Li 2005).

2.7.2.3 The structural dimension of social capital

The structural dimension of social capital refers to the overall pattern of the relationship between parties involved in a social activity (Nahapiet & Ghoshal 1998; Inkpen & Tsang 2005), which affects the individuals' habit of cooperation and actions in collective activities (Wasko & Faraj 2005). This dimension may include network configuration,

appropriable organisation, social interaction ties, and centrality (Chiu et al. 2006; Nahapiet & Ghoshal 1998; Wasko & Faraj 2005). *Centrality* refers to an individual's embeddedness in a network (Wasko & Faraj 2005), reflecting an individual's perception as one of the central, important, and core members of a community (Hsiao & Chiou 2012).

One's centrality and ability to share knowledge have a joint positive effect on knowledge exchange behaviour (Reinholt, Torbenfoss & Foss 2011). Indeed, individuals who hold a central position in electronic networks are known to contribute more useful knowledge (Wasko & Faraj 2005). In aforementioned studies, centrality has been determined by the number of interactions that individuals have in their network (e.g. Reinholt et al. 2011; Wasko & Faraj 2005). However, to understand centrality from the community member point of view in the collaborative innovation context, a different approach should be taken.

Online communities enable geographically distributed members to interact with each other, not necessarily in person but virtually using technology (Ahuja, Galletta & Carley 2003). Therefore, a community member's centrality is determined by how deeply he/she feels embedded in the community, as opposed to having a formally defined position (Ahuja et al. 2003). Perceived centrality of community members has a positive effect on their performance in research and development projects (Ahuja et al. 2003). Drawing on Ahuja et al.'s (2003) perspective, this research focuses on community member perceptions regarding their position in the community. Therefore, in collaborative innovation, centrality refers to the extent to which a community member is connected to others in a community, from the perspective of the individual member.

2.7.3 Individual drivers of value co-creation activities

To obtain a deeper understanding of individual factors that drive community members to perform value co-creation activities in collaborative innovation, the MOA framework is used. Originally introduced by Maclnnis and Jaworski (1989), the MOA model describes that individuals perform activities when (1) they are motivated, in other words, when they are energised, ready, and willing to perform, (2) the conditions are conducive to performing activities, and (3) they perceive that they have the necessary skills or proficiencies to perform activities. The MOA framework has been applied broadly in a variety of contexts. It is discussed in organisational behaviour literature to explain organisational performance (Clark, Abela & Ambler 2005), organisational knowledge management (Argote, McEvily & Reagans 2003), and innovation adoption (Azadegan & Teich 2010). In a consumer behaviour context, MOA has been shown to act as an antecedent of performing activities, such as processing brand information from advertisements (MacInnis et al. 1991), delivering electronic word of mouth (Gruen, Osmonbekov & Czaplewski 2006), exchanging knowledge (Gruen et al. 2007), involvement in social media (Leung & Bai 2013), and online know-how exchange (Bigné, Ruiz, Andreu & Hernandez 2013). In an online community context, Gruen et al. (2006) examine and confirm the positive effect of MOA on know-how exchange amongst online forum members, in turn leading to positive value perceptions and electronic word of mouth. It is confirmed that MOA increases the level of interactions between meeting attendees and exchanges that occur between attendees enhance value perceptions and loyalty intentions (Gruen et al. 2007). Individual dimensions of MOA, motivation, opportunity and ability, are discussed individually in the next sections.

2.7.3.1 Motivation

Motivation comprises readiness, willingness, interest, and desire to engage in specific activities regardless of the consequences (MacInnis et al. 1991). There is considerable research in the marketing and management literature exploring motivation drawing on Self-Determination Theory introduced by Deci and Ryan (1985). According to the traditional view, motivation to perform an activity contains two broad aspects: extrinsic motivation and intrinsic motivation (Davis, Bagozzi & Warshaw 1992; Osterloh & Frey 2000; Venkatesh 2000). Extrinsic motivation refers to goal-driven reasons, such as rewards or benefits to perform an activity, whereas intrinsic motivation refers to pleasure and inherent satisfaction derived from a specific activity (Venkatesh 2000). Self-determination theory suggests that extrinsic or intrinsic motivation is an individuals' focus on the outcome of an activity they perform. For instance, customers may choose to try self-service technologies because they find using self-service technologies intrinsically attractive, since using self-service technologies brings them the feelings of accomplishment, prestige, personal growth, or pleasure (Meuter, Bitner, Ostrom & Brown 2005). Similarly, examining employee behaviour, research confirmed that both extrinsic motivations, such as expecting reciprocal benefits as a result of knowledge sharing with others, and intrinsic motivations, such as enjoyment of sharing information, influence positive employee behaviour (Lin 2007).

The MOA framework has a straight forward approach that focuses on the basic force that makes an individual take action. As such, motivation directs individuals to engage in behaviours, make decisions, and process information (MacInnis et al. 1991). Similarly, in the value co-creation context, motivation is defined as a "customer's desire or readiness to engage in value-creating activities with other customers. The motivated customer is energised, ready, and willing to engage in these value creating activities" (Gruen et al.

2007, p. 539). The definition provided in MOA framework is appropriate for value co-creation in the collaborative innovation context. Self-generated value co-creation activities are performed by individuals spontaneously without influence from community management (McColl-Kennedy et al. 2012). Therefore, performing value co-creation activities is driven by personal desire, not because of possible intrinsic or extrinsic outcomes. Hence, in a collaborative innovation context, motivation is a community member's willingness, desire, and energy to perform value co-creation activities.

2.7.3.2 Opportunity

Opportunity refers to the extent to which a situation is supportive to achieving a desired outcome (Gruen, Osmonbekov & Czaplewski 2005). For example, when consumers are exposed to less distraction and more time, their attention to brand information in an advertisement increases (MacInnis et al. 1991). Gruen et al. (2006) suggests that opportunities to perform value creating activities on a service provider website reflect the amount of attention that members invest in performing such activities. In collaborative innovation, members individually perceive the opportunities to perform value co-creation activities. In collaborative innovation, it is argued that when members become aware of the features available in the community website, they are more likely to perform value co-creation activities. According to Gruen et al. (2007), the supportive atmosphere built in a conference encourages individuals to engage in value creating exchanges. Similarly, in collaborative innovation, the supporting atmosphere of the community can be an opportunity for members to perform value co-creation activities. Hence, opportunity in collaborative innovation is the supportive conditions established in the community for members to perform value co-creation activities.

2.7.3.2 Ability

Ability is defined here as individuals having necessary resources, such as knowledge, intelligence, or finance, to engage in an activity (MacInnis et al. 1991). Ability has been viewed in different ways in the literature. For instance, ability is associated with self-efficacy. Bandura (2001) defines self-efficacy as an individual's perceived ability to perform a certain activity. In the online context, internet self-efficacy is a community member's perceived ability to use the internet and web-based tools to participate in online activities (Wang, Chung, Park, McLaughlin & Fulk 2012). Another perspective on the definition of ability provided by Nahapiet and Ghoshal (1998) states that ability is associated with human capital, that is, the knowledge, skills, and capabilities that enable an individual to act in new ways. Finally, Bigné et al. (2013) define consumer ability as judgment of their own capacity to use social media. In MOA theory, ability mainly refers to the resources that individuals possess to perform an activity. According to Gruen et al. (2007), an individuals' ability is his/her skills or proficiencies to contribute know-how in value creating exchanges. It can be argued that in a collaborative innovation context, if community members perceive that they own the operant resources and operand resources to be integrated, they are more likely to perform value co-creation activities. Therefore, the definition of ability provided in the MOA framework is appropriate in the collaborative innovation context. Hence, in online collaborative innovation, a community member's ability refers to judgement of their own expertise, capacity, and skills to perform value co-creation activities.

In conclusion, it is argued here that value co-creation activities are driven by social and individual factors. Relational social capital dimension, trust, cognitive capital dimension, shared vision and the structural capital dimension, centrality, were reviewed as social drivers of collaborative innovation, while individual motivation, opportunity, and ability

were reviewed as individual drivers. It is suggested here that in collaborative innovation, socially and individually driven community members perform value co-creation activities. In value co-creation through resource integration, value is always determined and derived by the beneficiary (Vargo & Lusch 2016). In collaborative innovation, community members are the beneficiaries who derive and determine value as a result of their actions.

2.8. Determination of value

Over the last two decades, extensive discussion has occurred in the literature exploring the meaning and definition of value as well as the process of value creation. Understanding the value concept is extended by researchers in the fields of economics using exchange, utility and labour value theories, or marketing and psychology through consumer behaviour theories (Payne & Holt 2001; Sigala 2006; Woodall 2003). The value of a product or service essentially drives customer preference, either as economic value, which is the worth of a product/service with regard to its price (Payne & Holt 2001), or as perceived value, which is the nonmonetary tendencies developed towards a product/service (Woodall 2003). The profound effect of value on preference and thereby purchase behaviour compels companies to create superior customer value to gain competitive advantage (Woodruff 1997). Furthermore, customers are active actors in value co-creation where value is co-created through resource integration (Vargo & Lusch 2004). This view also indicates that value is the factor that customers aim to achieve and therefore the outcome of resources integration, rather than an antecedent.

In S-D logic the main focus is "on how the value should be positioned in the marketing activities, not on the specifics of how value is uniquely and contextually interpreted" (Vargo & Lusch 2008a, p. 4). Vargo and Lusch (2004) argue that if value is added in goods, explaining the contribution that marketing activities make for value becomes an

issue. Therefore, the focus should be on the roles of the market provider and market beneficiary who co-create value, jointly, reciprocally, and interactively (Vargo & Lusch 2008a). Although, in S-D logic the focus has never been to provide a definition for value, recently value co-creation was defined as "benefit realised from integration of resources through activities and interactions with collaborators in the customer's service network" (McColl-Kennedy et al. 2012, p. 370). The actors perceive benefit when their "wellbeing is somehow improved" (Vargo et al. 2008, p. 150) or they "become better-off in some respect" (Grönroos & Voima 2013, p. 134). Finally, value is co-created in a joint experience and uniquely and phenomenologically determined by the beneficiary (Vargo & Lusch 2008a) as a result of their actions and activities.

In S-D logic value is initially referred to as value-in-use rather than value-in-exchange proposing that value is determined during the consumption process (Lusch & Vargo 2006). The difference between value-in-exchange and value-in-use lies in the traditional and alternative views of economic phenomena (Vargo et al. 2008). While value-in-exchange occurs through exchanges of products/services with money, value-in-use is co-created with customers in the consumption process and through use (Lusch & Vargo 2006). The broader view of service ecosystems introduces a broader view of value, that is, value-in-context (Chandler and Vargo 2011). In service ecosystems, value is not necessarily determined by the customer during the consumption experience, but is derived from the resource integration experience and determined by the beneficiary in her/his own life context (Chandler & Vargo 2011). Resource integration is dynamic and holistic in nature where actors bring their own resources (McColl-Kennedy, Gustafsson, Jaakkola, Klaus, Radnor, Perks & Friman 2015) and value is determined collectively by beneficiaries at anytime in relation to their own life context (Helkkula, Kelleher & Pihlström 2012).

Empirical evidence has confirmed value as an outcome of jointly performed activities. For instance, Dong, Evans and Zou (2008) confirmed a positive effect of a collaborative service e-recovery effort on perceptions of value of future collaborations. Later, Löbler and Hahn (2013) developed a measure for value-in-context that emerges from activities an actor performs. The value-in-context construct includes the actor's own experiences, items that support the actor's activities, and other actors in the interaction (Löbler and Hahn 2013). Furthermore, value co-creation activities are performed by healthcare service customers to achieve higher quality of life (McColl-Kennedy et al. 2012). Performing value co-creation activities while receiving healthcare services is linked to satisfaction, and behavioural intentions (Sweeney et al. 2012). Despite the important information the aforementioned studies provide, they fail to capture the multidimensional nature of value (Ruiz, Gremler, Washburn & Carrión 2008). After examining value as a multidimensional construct, Mohd-Any, Winklhofer and Ennew (2014) confirmed the mediating role of different value dimensions between customer participation in a company's website activities and satisfaction and also intention behaviours. This research adopts their perspective and argues that in collaborative innovation, community members as beneficiaries derive a different dimension of value as a result of their activities. The next section details several value dimensions established in the literature.

2.8.1 Dimensions of value

Understanding value has been acclaimed as an important competitive advantage by marketing scholars (Payne & Holt 2001; Woodall 2003) and understanding its creation is highlighted in the S-D logic literature (Vargo et al. 2008; McColl-Kennedy et al. 2012). The credibility of a unidimensional approach has been questioned, since it fails to represent all the components of value (Sigala, 2006). A multidimensional and sophisticated

approach is proposed, as it has capacity to capture the richness of the value concept (Sweeney & Soutar 2001). Although value has been conceptualised or operationalised as a unidimensional concept, multidimensional approaches have started to receive attention of researchers (Ruiz et al. 2008). Using dimensions proposed by Sheth, Newman and Gross (1991), Sweeney and Soutar (2001) developed a multidimensional scale by indicating the scarcity of a commonly accepted value measure. The consequent research supported the multidimensional approach by examining effects of several value dimensions on consumer behaviour (e.g. Pura 2005; Petrick 2002, 2004; Sigala 2006).

In the collaborative innovation context, adopting a multidimensional view of value provides opportunities to identify different value dimensions derived by performing different value co-creation activities. Therefore, value here is conceptualised as multidimensional, with social, emotional, and utilitarian values, and value for effort.

2.8.1.1 Social value

Social value is defined as the ability of a product chosen among alternatives to enhance an individual's self-concept and approval by others (Sheth et al. 1991). Individuals perceive social value in the alternative they choose, when the alternative has the ability to enhance their self-image (Sweeney & Soutar 2001). Indeed, individuals behave in certain ways when they perceive that utility acquired from an alternative provides approval of others (Pura 2005; Sigala 2006). Similarly, in online collaboration, activities such as sharing information, providing feedback, helping others and building rapport are likely to improve a member's self-image in the community. It is confirmed that when customers participate in the use of online services provided for them they perceive social value (Mohd-Any et al. 2014), that is, improved self-image. In a similar vein, social value is relevant in the online collaborative innovation context in terms of a community members' self-concept in the

eyes of the online public and fellow community members. In other words, performing value co-creation activities offers potential to provide higher self-image and social approval among other community members.

2.8.1.2 Emotional value

Emotional value is defined as the capacity of a product chosen among alternatives to arouse or perpetuate feelings or affective states (Sheth et al. 1991). Emotional value can be created by improving the pleasure, enjoyment, play, excitement, adventure, and humour aspects of a customer experience (Smith & Colgate 2007). Similarly, in collaborative innovation, it is expected that community members may derive enjoyment and fun from their activities. Emotional value reflects the feelings of pleasure and enjoyment an individual gains from his/her actions (Pura 2005). In online services, participation in website activities generates emotional value among service customers (Mohd-Any et al. 2014). Hence, emotional value is relevant in the online collaborative innovation context, as collaboration generates positive feelings and affective states in the form of fun and enjoyment.

2.8.1.3 Utilitarian value

Utilitarian value, also articulated as functional value (e.g. Sigala 2006; Smith & Colgate 2007; Pura 2005), is commonly defined as the extent to which a product chosen among alternatives has desired physical attributes or functions (Pura 2005). Sigala (2006) argues that customers perceive functional value according to the efficiency of completing a task. This view aligns with the collaborative innovation context, as community members potentially derive utilitarian value from their activities after successfully performing them. Utilitarian value is thus associated with functional benefits (Pura 2005) capturing the

convenience, speed, and efficiency of completing a task (Mohd-Any et al. 2014). Hence, it can be argued that in collaborative innovation by performing a value co-creation activity members perceive utilitarian value, that is, efficiency, speed, and convenience of collaboration.

2.8.1.4 Value for effort

In the current studies, value for effort is seen as a sacrifice. Value for effort is associated with behavioural price (Petrick 2002, 2004), which is nonmonetary sacrifices that an individual makes to receive a service. Similarly, the money, energy and time that customers spend to receive a service are perceived as sacrifices (Wang et al. 2012). However, while adopting Zeithaml (1988) price/quality trade-off approach to developing the functional dimension of value, Sweeney and Soutar (2001) define price as a benefit based on value for money. In their conceptualisation, value for money involves a product being reasonably priced, value for money and economical (Sweeney & Soutar 2001). In other words, they conceptualised value for money not as a sacrifice but perceived value of obtaining a product. Sweeney and Soutar's (2001) conceptualisation is deemed most appropriate in the collaborative innovation context, as community members perform value co-creation activities and derive value for the effort they make. Thus, value for effort emerges if activities are perceived effortless or worthwhile performing. Value for effort in collaborative innovation thus refers to value perceived from the effort community members put forward to perform any value co-creation activity.

2.9. Conclusion

This chapter reviewed the relevant literature regarding online collaborative innovation, value co-creation in S-D logic, social capital and MOA theories, as well as value dimensions. The chapter began by discussing online collaborative innovation types explored in the relevant literature, specifically focusing on the collaborator role, drivers, and outcomes of collaboration, value co-creation in collaborative innovation. This section of the literature review indicated a significant lack of understanding regarding value co-creation in collaborative innovation from an individual member point of view, which holds an important challenge for both academics and practitioners. Furthermore, while recent research has conceptualised the individual actor role in value co-creation, studies that explore self-generated activities that lead to value co-creation are only beginning to emerge. Indeed, there is a need to develop a theoretical understanding of drivers and outcomes of value co-creation activities, particularly in collaborative innovation (Lusch & Nambisan 2015).

Chapter 3: HYPOTHESIS DEVELOPMENT

3.1. Introduction

In the previous chapter the literature review indicated significant limitations in our understanding of value co-creation in online collaborative innovation. In particular, this research sought to conceptualise and empirically examine value co-creation activities that members perform in collaborative innovation, developing and empirically testing the drivers of such activities and their ability to contribute to the perceptions of value derived. This chapter presents the development of a conceptual framework and specification of relevant hypotheses for empirical testing.

3.2. Proposed conceptual framework

It was conceptualised in this research that in a collaborative innovation community context self-generated activities performed by community members generate value along four dimensions, namely, social, emotional, utilitarian value, and value for effort (Section 3.3). These value co-creation activities were proposed as they are facilitated by social and individual factors (Section 3.4), with two indirect relationships explored to obtain a deeper understanding of the associations between social and individual drivers and value co-creation activities (Section 3.5). In particular, these indirect effects include the mediating effect of learning and the moderating effect of the flow state. Figure 3.1 illustrates the conceptual framework developed for empirical testing.

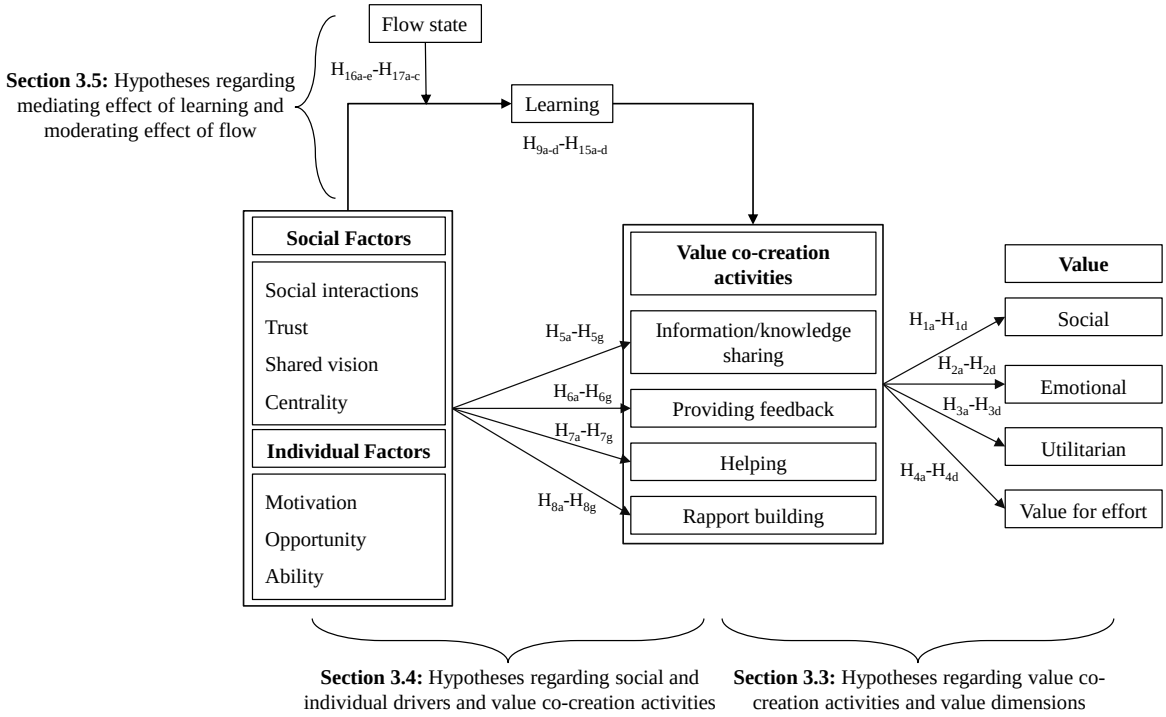


Figure 3.1: Proposed conceptual framework

3.3. Value co-creation activities and value dimensions

In collaborative innovation, communities are platforms where members co-create value in the collaboration experience. It is argued in this research that in a collaborative innovation community members perform self-generated value co-creation activities, such as information sharing, providing feedback, helping, and rapport building, that generate value in the form of social, emotional, utilitarian value and value for effort.

3.3.1 Information sharing and value dimensions

Information sharing refers to an individual's dissemination of his/her acquired knowledge to other members of the community (Hsu et al. 2007). In the collaborative innovation context, information captures direct messages that inform others and deeper knowledge used in community discussions (Davenport & Prusak 1998). Community members share

information with varying regularity and intensity (Hsu et al. 2007). Drawing on the definition of Hsu et al. (2007), members demonstrate information sharing behaviour when they choose to spend time sharing information in the community regularly. Moreover, members may choose to become involved in extended discussions when a complex problem is discussed during community interactions.

Information sharing is proposed here as creating social, emotional, utilitarian value and value for effort. Primarily, the act of sharing makes community members visible to others. Indeed, it is when members share information with others that they recognise their social identity and thus feel part of the community (Dholakia, Blazevic, Wiertz & Algesheimer 2009). Social value relates to enhancement of an individual's self-image and the feeling of being accepted by others (Pura 2005; Sigala 2006). By actively sharing information, members enhance the chance of gaining acceptance, as they expect to gain recognition and respect (Hsu et al. 2007) in turn boosting their self-image. Therefore, information sharing is expected to improve community member self-image as an active member of the community.

Individuals derive emotional value in the form of affirmative states from using a product they choose from among alternatives (Sweeney & Soutar 2001). These affirmative states are positive feelings, such as enjoyment and fun (Smith & Colgate 2007). In the context of this study, spending time to voluntarily share information with others in the community or contributing effort to solving a complex issue by sharing information is expected to create positive feelings. Indeed, Nambisan and Baron (2009) argue that individuals take part in a company's value co-creation activities by sending posts containing product development and supporting ideas to derive fun and pleasure. Hence, it is proposed that information sharing leads members to derive fun and enjoyment, in other words, emotional value.

Utilitarian value is derived from the convenience and efficiency of using a product chosen from among alternatives (Sheth et al. 1991). Individuals perceive utilitarian value as a result of completing a task (Sigala 2006). When a community member expects the information they share helps the community to operate efficiently, they voluntarily show regular and consistent information sharing behaviour (Hsu et al. 2007). Therefore, it can be argued that collaborative innovation information sharing generates utilitarian value that reflects convenience and efficiency of the collaboration experience. Furthermore, as utilitarian value reflects the outcome of an act performed for an intended consequence, rather than a spontaneous act performed with no planned intentions (Babin, Darden & Griffin 1994), members who share information may perceive utilitarian value in the fulfilment or completion of a task.

According to previous conceptualisations, value for money reflects price related to aspects of a product or service, such as being reasonably priced and economical (Sweeney & Soutar, 2001). In collaborative innovation, value for effort reflects a value co-creation activity being effortless and easy to perform. In services, customers voluntarily choose to spend time and effort sharing information to make their opinions known by the service provider (Chan et al. 2010). Similarly, in collaborative innovation members make the effort to share information regularly on varying topics. Hence, members who share information in the community perceive value for effort to collaborate in innovation. In conclusion, information sharing activity in collaborative innovation communities was expected to lead to creation of social, emotional and utilitarian value, as well as value for effort. Therefore, it was hypothesised:

H_1: Information sharing predicts (a) social, (b) emotional, (c) utilitarian value, and (d) value for effort

3.3.2 Providing feedback and value dimensions

Providing feedback refers to the extent to which a community member takes individual initiative and shares responsibility for providing feedback about the community in general and on somebody else's idea in particular. In the services marketing literature, providing feedback is defined as a voluntary activity that customers perform to improve the service they receive (Chan et al. 2010; Bettencourt et al. 2002). Customers who make constructive suggestions through feedback they provide become contributors of value co-creation (Bettencourt 1997). In collaborative innovation, providing feedback is a self-generated activity performed in the form of making comments on others' ideas to improve the idea and the community in general. Providing feedback has similarities with information sharing. Both activities can be performed to improve an existing idea. Besides, both activities can be performed during community discussions on various topics. However, the two activities differ in terms of content shared or provided. For instance, providing feedback captures comments made on a fellow member's idea or suggestion proposed about the community in general, whereas information sharing captures messages to inform others and knowledge used in discussions. Therefore, while feedback is more specific to a particular idea or a particular topic discussed in the community, information sharing is more general and can be performed regularly and on diverging topics.

It is proposed here that members of a collaborative innovation community who choose to provide feedback derive social value. For instance, when members choose to make a comment on somebody else's idea to improve the idea they enhance their self-image (Sweeney & Soutar 2001) in the community. Because feedback provided by a member is seen by the receiver and the entire community, giving constructive feedback on current ideas or indicating a particular issue regarding the community have great potential for a community member to receive acceptance by others (Pura 2005). Indeed, making

comments is a way to express care for others, which leads to social acceptance (Smith & Colgate 2007) by the community as an active member. Therefore, it is reasonable to argue that providing feedback creates social value amongst collaborative innovation community members.

Providing feedback is anticipated to predict emotional value, because performing this activity generates positive feelings in the form of fun and enjoyment (Petrick 2002). In collaborative innovation, new ideas are submitted and improved collaboratively by members of the community (di Gangi & Wasko 2009). Specifically, members engage in idea generation sessions in online communities for a compelling experience that contains enjoyment and fun (Füller et al. 2006). Hence, it was expected that by providing feedback to improve ideas during a collaboration experience, innovation community members derive emotional value.

It is also hypothesised here that providing feedback leads to co-creation of utilitarian value and value for effort. Utilitarian value captures the convenience and effectiveness of collaborative innovation (Babin et al. 1994; Sigala 2006), whereas value for effort reflects the easiness and effortlessness of collaboration in the community. Customers derive utilitarian value and value for cognitive effort once they participate in a company's website activities by using website utilities (Mohd-Any et al. 2014). Similarly, members who provide feedback by commenting on others' ideas or the community in general gain experience using the features and functionality of the community. Consequently, they derive utilitarian value and value for the effort they make to collaborate. Thus, it was expected that providing feedback is related to utilitarian value and value for effort. Therefore, it was hypothesised:

H_2: Providing feedback predicts (a) social, (b) emotional, (c) utilitarian value, and (d) value for effort

3.3.3 Helping and value dimensions

Helping is defined in this research as the extent to which a member voluntarily provides solutions to resolve issues and problems that arise in the collaborative innovation community. In the services marketing literature, helping is seen as an extra role behaviour, as customers take individual responsibility and help other customers by giving advice, offering tips, and teaching others how to use the services (Claycomb et al. 2001; Groth 2005; Yen et al. 2011; Yi & Gong 2013). Indeed, the customer can become part of service solutions by resolving issues and problems that arise in the production of services (Bettencourt 1997). Helping activity is different from giving feedback, as it involves offering advice and tips to solve a specific issue rather than providing feedback to improve somebody's idea or the community in general. In a collaborative innovation context, helping reflects assisting other community members when they are in need or assist others when they face a problem.

Helping behaviour has received considerable attention by management scholars (e.g. Finkelstein 2006; Spitzmuller & Van Dyne 2013), with a particular focus on outcomes of helping behaviour. For instance, it is confirmed that helping others makes volunteers perceive fulfilment of their role and increase intentions to volunteer in the future (Finkelstein 2006). Furthermore, helping peers during interactions provides individuals with benefits, such as reputation, well-being, favourable self-evaluations, satisfaction, and self-development (Spitzmuller & Van Dyne 2013). Helping improves cohesiveness within teams of managers and peers (McAllister 1995). Drawing on the outcomes of helping behaviour outlined in the literature, this research argues that helping other members in the community leads to several dimensions of value.

Helping is expected to generate social value in collaborative innovation. Community members voluntarily help fellow members who have problems or issues regarding the community. There are several occasions where a community member's assistance is needed. For example, while one community member may seek help to resolve an issue preventing her/him to collaborate in the community, others might seek assistance to use specific features available in the community. The Web 2.0 technologies allow a community member's action to be seen in the community immediately once he/she provides her/his assistance. Hence, by providing assistance to others members may evaluate their image in the community more favourably (Spitzmuller & Van Dyne 2013). Indeed, a member who offers a solution for problems recognises the value of receiving acceptance from others (Pura 2005). Therefore, there was sufficient indication to assume that helping leads to social value.

Helping in the community is hypothesised here to predict emotional value, given the appreciation of individual members or the overall community experienced as a result. Helping someone in need generates positive feelings (Anderson & Williams 1996), with collaboration in the community becoming a more enjoyable experience (Wang et al. 2012). Indeed, earlier research in the area of organisational management has shown that helping others in a team creates satisfaction amongst team members (Spitzmuller & Van Dyne 2013). Likewise, community members who offer assistance when there is a need are likely to enjoy the collaboration experience more. Therefore, it was proposed that helping leads to emotional value for a member.

Helping resolve an issue in the community is expected to have utilitarian consequences for the helping member. For instance, when a community member helps others to resolve an issue, the solution he/she offered may prevent the same problem occurring in the future.

Indeed, the functionality of the entire community increases when community members help each other to use the community more effectively (Yi & Gong 2013). For example, when a member shows a fellow member how to use a feature to solve an issue, this piece of advice may spread amongst other community members and become a commonly accepted solution for the problem. Moreover, when community members help others in the community they perceive the efficiency of task completion (Sigala 2006). In other words, helping perpetuates the convenience and efficiency of collaboration in the community (Sweeney & Soutar 2001). Hence, it was proposed here that members who help others realise the utilitarian value of helping in the community.

Helping others, and thus offering assistance, is hypothesised as allowing community members to create value for effort. Community members gain more collaboration experience by using community utilities and features to provide assistance. In turn, they start to perceive collaboration as easy and effortless (Mohd-Any et al. 2014), recognising that the effort they make to help others is worthwhile. Consequently, it was anticipated that helping others in the collaboration experience leads community members to perceive value for effort, hence the hypothesis:

H_3: Helping predicts (a) social, (b) emotional, (c) utilitarian value, and (d) value for effort

3.3.4 Rapport building and value dimensions

Rapport building reflects enjoyable interactions and personal connections with others (Gremler & Gwinner 2000), and thus refers to a level of harmonious connection that a community member perceives towards others. Online communities encapsulate individuals with similar interests and commonly mutual goals (Pitts & Miller-Day 2007), suggesting opportunity for rapport to develop amongst individuals by means of personal interactions.

Such rapport has potential for significant positive consequences that affect a company's performance (e.g. DeWitt & Brady 2003; Gremler & Gwinner 2008). For instance, service employees' establishment of rapport with customers has been shown to increase the customer's positive attitude towards the service provider, in turn increasing positive word of mouth and repatronage intentions (DeWitt & Brady 2003), satisfaction and loyalty (Gremler & Gwinner 2008; Kayeser & Razzaque 2014). Drawing on positive outcomes of rapport building suggested in the services literature, it is argued here that rapport building activity leads to generation of dimensions of value.

It is argued in this research that rapport building has potential to drive social value for community members. In online collaborative innovation, building relationships with others increases a member's chance to be connected socially and relating well to others is also likely to increase community member self-image in the group (Hsu et al. 2007). Indeed, members who relate themselves with others in collaboration have an increased possibility to be accepted by other members (Dholakia et al. 2009). Once members build rapport with others, they perceive the social value of the collaboration experience.

Rapport building implies individual members feel connected with others, in turn generating positive feelings (Gfeller, Lynn & Pribble 1987). When members have harmonious connections with others, they feel welcome, safe, and comfortable in the community (Bernieri et al. 1996). Indeed, extant research shows that when an online community has a harmonious environment, in which individuals can interact with others they like, members feel relaxed and have a more enjoyable collaboration experience (Wang et al. 2012). Hence, it was argued here that rapport building predicts creation of emotional value.

In addition to facilitating positive emotions, rapport building was argued here as predicting utilitarian value a member derives. As members understand each other and interact harmoniously, the collaboration experience can occur in a more effective manner and thus be argued to create task fulfilment (Sigala 2006). This argument is in line with research showing rapport built between individuals as reducing negative feelings in the case of a dysfunction in service production (DeWitt & Brady 2003). Similarly, members who have rapport with others in the community may be more understanding when technical difficulties or other issues regarding community features occur. Therefore, rapport building was hypothesised to predict perceived utilitarian value.

Rapport building requires effort. Community members spend time and energy to build good quality relationships with others (Bernieri et al. 1996), as they engage in developing an understanding of other members and build positive relations through interaction. It is argued here that one member's effort to build a harmonious relationship with other members of the community is likely to be recognised by other members and stimulate a similar reaction from them. The effort that community members make to build good quality relationships and feel comfortable in the community is thus likely to realise the easiness and effortlessness of collaboration in the community. Members perceive value for the effort they make to build rapport and it was hypothesised that:

H_4: Rapport building predicts (a) social, (b) emotional, (c) utilitarian value, and (d) value for effort

3.4. Drivers of value co-creation activities

Following extensive literature review of collaborative innovation and value co-creation, it was hypothesised in this research that members of online collaborative innovation perform value co-creation activities for social and individual reasons. As value co-creation is a resource integration process supported by interactions and activities (Payne et al. 2008), social interactions in the community enable members to perform activities that generate value. Specifically, individuals gain social capital from interactions with a network of actors (Inkpen & Tsang 2005). Furthermore, drawing on MOA theory, it is argued here that individual motivation, perceived opportunities and abilities may drive community members to share information, provide feedback, help, and build rapport in the community. This section first outlines the social factors hypothesised to drive collaboration of community members to perform value co-creation activities before introducing individual factors and discussing their relationships with value co-creation activities.

3.4.1 Social factors and value co-creation activities

Online collaborative innovation is highly interactive with high visibility of action, making the environment inherently social. Indeed, a comment, feedback, or idea shared online becomes public domain and often remains there, open for further discussion and feedback from others. Therefore, social factors are likely to predict value co-creation activities of community members. Social factors investigated in this study entail social interaction opportunities, and social capital dimensions of trust, shared vision, and centrality. The following sections discuss the associations between each social factor and value co-creation activities.

3.4.1.1 Social interaction opportunities and value co-creation activities

Social interaction opportunities refer to two-way, concurrent communication and conversation possibilities that exist amongst community members in collaborative innovation. Social interactions engage individuals in collaborative actions where they co-create experiences (Blasco-Arcas et al. 2014). Online community members become involved in community activities as a result of positive social interaction experiences (Nambisan & Baron 2007). Therefore, opportunities available for community members to socially interact enable them to perform several value co-creation activities in collaborative innovation.

It was predicted in this research that social interaction opportunities have potential to predict community member information sharing and feedback providing activities. Research in the online shopping context has shown that when members perceive a website as social and recognise the presence of others, they enjoy the shopping experience more (Wang, Baker, Wagner, & Wakefield 2007). Indeed, social interactions empower individuals and foster collective decision making in networks (Fyrberg & Jüriado 2009), given that they help all stakeholders understand the dynamics of relationships (Ramaswamy & Gouillart 2010). In online collaborative innovation, social interaction opportunities may empower members to feel comfortable sharing information and providing feedback. For example, community functions that facilitate communication and conversation help community members communicate the knowledge and message they want to share with peers. Hence, opportunities available in the community for social interactions drive members to share information. Moreover, as members have an opportunity to obtain clear understanding of community dynamics they may feel confident to provide feedback on the community in general. Furthermore, social interaction opportunities may increase a community member's interest in fellow members' ideas, and

thereby, the member may provide feedback to improve their idea. Therefore, it was expected that social interaction opportunities drive community member information sharing and providing feedback decision in collaborative innovation, as expressed in the following hypotheses:

H_{5a}: Social interaction opportunities predict information sharing

H_{6a}: Social interaction opportunities predict providing feedback

Social interaction opportunities drive members to help others in the community. Ramaswamy (2011) argues that online engagement platforms that facilitate social interactions enable customers to share productive and meaningful experiences. Drawing on this argument, it was expected that supporting others when they have issues that prevent them from enjoying the experience may give meaning to the co-created experience for members who provided help. Community members become more aware of each other through social interactions, which may cultivate affectionate feelings amongst community members. Positive feelings that members have for each other drive them to make more effort to help when needed. Thus, in social interactions members may recognise somebody else's problem promptly and have the opportunity to help. This argument aligns with research showing that customers can be influenced by the norms that social interactions create to extend help to fellow customers in product related matters (Nambisan & Baron 2007). Therefore, it was argued here that social interaction opportunities available in the community drive members to help others.

Finally, social interaction opportunities are related to a member's rapport building activity. Online communities facilitate interactions among geographically distributed members (Ahuja et al. 2003), as members interact during community discussions, work together on

community projects, or interact via emails. Through social interactions online platforms provide community members opportunity to form relationships (Mathwick et al. 2008) and make life-long friends (Cole & Griffiths 2007). As interacting individuals form cohesiveness and become unified because of mutual attention and involvement with one another, rapport is built (Tickle-Degnen & Rosenthal 1990). Indeed, drawing on the argument of Tickle-Degnen and Rosenthal (1990) that "rapport exists only in interaction between individuals" (p. 286), social interactions in online collaborative innovation communities are proposed here as driving members to build rapport with one another. Thus, it was hypothesised:

H_{7a}: Social interaction opportunities predict helping

H_{8a}: Social interaction opportunities predict rapport building

3.4.1.2 Trust in other community members and value co-creation activities

Trust in other members reflects a community member's confidence in fellow members' reliability and integrity. It is suggested here that trust in other community members is a social factor that drives a member to share information and provide feedback in collaborative innovation. Trust has a central role in reducing perceptions of risk and insecurity regarding e-commerce activities (McKnight, Choudhury & Kacmar 2002). For example, research has identified that when consumers trust an online service, they feel more comfortable sharing personal information and making purchases (McKnight et al. 2002). In online communities, trust in other community members has been shown to be a significant predictor of one's desire to exchange information (Ridings et al. 2002) and share knowledge (Hsu et al. 2007). Moreover, for individuals to provide constructive feedback to improve services in a publicly visible community, trust in partners is required (Bettencourt et al. 2002). Similarly, community members provide feedback if they trust in

other members and their willingness to appreciate and consider the suggestions they make. Therefore, it was reasonable to suggest that trust in other members drives community members to communicate their message and knowledge in the collaborative innovation community, leading to the hypotheses:

H_{5b}: Trust in other members predicts information sharing

H_{6b}: Trust in other members predicts providing feedback

In collaborative innovation, trust in other members is likely to drive community members to help and build rapport with others, given that trust means that individuals become more willing to work together to achieve mutual goals (Morgan & Hunt 1994). In online collaborative innovation communities, members who trust other members of the community may provide assistance to improve the collaboration experience for others. When members have confidence in fellow members' consideration and honesty, they may offer their assistance. Hence, it is suggested that trust in other members prompts helping activity. Indeed, trust in exchange relationships leads to constructive dialogue amongst parties (Schurr & Ozanne 1985), influencing the quality of interactions (Moorman, Zaltman & Deshpande 1992), commitment to relationships (Morgan & Hunt 1994), and relationship quality in service exchanges (Wong & Sohal 2002). As online innovation community members are in an exchange relationship where they integrate their resources, a member's faith in others' reliability and integrity means they become more open-minded and are likely to develop a more empathetic connection to others. Hence, it was hypothesised that trust in other members drives helping as well as rapport building:

H_{7b}: Trust in other members predicts helping

H_{8b}: Trust in other members predicts rapport building

3.4.1.3 Shared vision and value co-creation activities

Shared vision is defined as collective goals and aspirations of members of the collaborative innovation community. A shared vision ties different parts of an organisation to integrate or combine resources (Tsai & Ghoshal 1998). In collaborative innovation, shared visions drive members to perform information sharing and providing feedback activities. Brand communities are usually established for reasons important to members (Muñiz & O'Guinn 2001; Schau, Muñiz & Arnould 2009), with such communities commonly developed around shared interests, expectations and needs (Algesheimer, Dholakia & Herrmann 2005). A shared vision and understanding amongst individuals facilitates meaningful communication, which is essential for new knowledge creation (Li 2005). It is argued in this research that when community members share similar aspirations, goals, and understandings they are more likely to share information and provide feedback during collaborative innovation. Thus, it was hypothesised that:

H_{5c}: Shared vision predicts information sharing

H_{6c}: Shared vision predicts providing feedback

It is assumed here that a shared vision drives community members to help and build rapport with others. A shared vision has the capacity to strengthen the bond between individuals (Tsai & Ghoshal 1998). Indeed, shared expectations and understandings reduce formality and provide individuals with more freedom to take actions (Yli-Renko et al. 2001). Thus, it is argued that similar aspirations and goals may drive community members to offer help when a fellow member seems to have a problem. Indeed, shared vision, shared goals, and understanding keep members of a network together (Yli-Renko et al. 2001), as these members are more likely to have similar expectations regarding how they should interact with one another (Inkpen & Tsang 2005). Hence, in online collaborative

innovation communities shared vision is expected to promote higher levels of harmonious connections amongst members. Indeed, research in a related field has shown that common values and beliefs between group members creates a harmony of interests, in turn reducing the possibility of opportunistic behaviour (Ouchi 1980). Hence, members who see that fellow members have similar aspirations and interests become more sensitive and concerned, as opposed to adopting an opportunistic approach. Therefore, it was argued that when a member shares a vision with others in online collaborative innovation they are more likely to build rapport with others, leading to the hypotheses:

H_{7c}: Shared vision predicts helping

H_{8c}: Shared vision predicts rapport building

3.4.1.4 Centrality and value co-creation activities

Centrality refers to how innovation community members perceive their position embedded in the community. Centrality is hypothesised here to predict the extent to which members share information and provide feedback. In collaborative innovation, centrality captures a member's perception of holding a central position, being important, and a core member of the community. Online community members who build structural capital by being embedded in the community tend to be more active in creating knowledge (Wasko, Teigland & Faraj 2009). That means, in an online collaborative innovation context, members who feel embedded in the community may be more driven to share information and provide feedback to improve the collaboration experience. Therefore, it was hypothesised that centrality predicts information sharing and providing feedback activities of community members:

H_{5d}: Centrality predicts information sharing

H_{6d}: Centrality predicts providing feedback

Moreover, centrality of a member within a community is proposed to stimulate helping and building rapport activities. In online communities, members who hold a central position feel linked to others more closely (Ahuja et al. 2003). As central members of an online community are usually more active and spend more time on community activities (Ahuja et al. 2003), one can expect that such centrality drives these members to help and build rapport with others in collaborative innovation. Thus, it was hypothesised that:

H_{7d}: Centrality predicts helping

H_{8d}: Centrality predicts rapport building

3.4.2 Individual factors and value co-creation activities

The review of online collaborative innovation literature indicated some individual factors, such as personal interests, monetary incentives, personal development, and improved skills, that drive individuals to collaborate for innovation (e.g. Roberts et al. 2013; Nambisan & Baron 2009, 2010; Füller et al. 2007; Wasko & Faraj 2005; Jeppesen & Molin 2003). This research captures individual factors relevant to online innovation communities by adopting the motivation, opportunity, and ability (MOA) framework introduced by Maclnnis and Jaworski (1989). The next section outlines the association between these individual factors and value co-creation activities.

3.4.2.1 Motivation and value co-creation activities

Motivation is a community member's desire or readiness to engage in value co-creation activities. In collaborative innovation, a motivated community member is energised, ready, and willing to engage in value co-creating activities. Motivation forces individuals to engage in know-how exchanges through value creating activities, such as networking, making new contacts, and meeting with new people (Gruen et al. 2007). Given the

voluntary nature of actions performed as part of an innovation community, motivation is deemed critical. Hence, when members have the desire and feel energised they are more likely to share information and provide feedback while collaborating for innovation in the community. Therefore, it was hypothesised that:

H_{5e}: Motivation predicts information sharing

H_{6e}: Motivation predicts providing feedback

Motivation is expected to encourage community members to perform helping and rapport building activities. Indeed, motivated members see helping as a moral obligation where they help others when possible, even if they do not receive assistance in return (Mathwick et al. 2008) because it is simply the 'right thing' to do (Wasko & Faraj 2000). Similarly, in collaborative innovation communities, motivated community members may offer assistance when they see someone facing a problem. Furthermore, online environments have an advantage over offline interactions as it is easier for individuals to connect like-minded people to establish relationships through online platforms (McKenna, Green & Gleason 2002). In online environments individuals project themselves onto others during relationship development due to a lack of visual signs, such as social status, background, or race (Turkle 1995). Therefore, as online environments enable relationship development, a member's individual motivation, that is the desire and enthusiasm he/she has, may drive harmonious connection building, leading to the hypotheses that:

H_{7e}: Motivation predicts helping

H_{8e}: Motivation predicts rapport building

3.4.2.2 Opportunity and value co-creation activities

Opportunity reflects the extent to which conditions present in the community are favourable for collaborative innovation. Opportunity leads to a member's engagement in value co-creation that is not distracted by constraints that stop him/her from performing activities (Gruen et al. 2005). Opportunity is perceived by community members when they are not restricted by factors preventing them from accessing resources to perform value co-creation activities, such as technologies, website features/design, procedures, or assistance. Online communities are essentially platforms that provide opportunities for members to share information to generate new ideas (di Gangi & Wasko 2009). It is argued here that community members perceiving the community as accessible and with access to required resources are more likely to share their information in collaborative innovation.

Opportunity is also a driving factor that enables community members to provide feedback in the collaborative community. Drawing on relevant literature, research has confirmed that opportunities communicated by service providers encourages individuals to participate in tourism development processes in their community at higher levels (Hung, Sırakaya-Türk & Ingram 2011). Similarly, opportunity in social media, which occurs in the absence of factors limiting an individual's social media use, has been shown to improve member involvement in a service provider's social media page (Leung & Bai 2013). Consequently, when community members perceive conducive situations that encourage them to make suggestions, they provide feedback to improve a fellow member's idea or the community in general. Therefore, it is predicted here that when members perceive opportunities existing in the community, they are more likely to share information and provide feedback. Thus, relevant hypotheses were developed:

H_{5f}: Opportunity predicts information sharing

H_{6f}: Opportunity predicts providing feedback

Opportunity is an individual factor expected to drive community members to help and build rapport. Opportunity can be perceived through the supportive environment present in the community (Hung et al. 2011). Individuals put more effort into helping others in a group as a result of a sense of 'we-ness', that is, a sense of belonging to a common group (Flippen, Hornstein, Siegal & Weitzman 1996). Individuals engage in prosocial behaviours, including helpful interventions, when they perceive opportunities occur as a result of relationships (Weinstein & Ryan 2010). Besides, members of an online community state they are willing to help others because being a member of the same group creates opportunity (Wasko & Faraj 2000). Hence, it can be argued that when the community atmosphere generates opportunity members offer assistance where a fellow member experiences a problem.

Online environments provide opportunities for rapport building by reducing social pressures on individuals (Turkle 1995). Specifically, opportunities to build rapport comprise conditions helpful for members to establish harmonious connections. For instance, if members perceive the general community atmosphere as containing opportunities they may be driven to build rapport. Indeed, when community members recognise like-mindedness in others they may 'click' (Tickle-Degnen & Rosenthal 1990) with them in a harmonious relationship. Hence, it is suggested that opportunities perceived by innovation community members encourages them to help and build rapport with others in the community. Thus, it was hypothesised that:

H_{7f}: Opportunity predicts helping

H_{8f}: Opportunity predicts rapport building

3.4.2.3 Ability and value co-creation activities

Ability refers to community member skills or proficiencies to perform value co-creation activities in collaborative innovation, proposed here as predicting information sharing and provision of feedback. Previous research has identified that a consumer's ability to use social media influences their decision to exchange know-how during online purchases (Bigné et al. 2013) and the likelihood of participation in a community, as shown in a tourism related decision-making process (Hung et al. 2011). Ability is an individual's own perception of his/her capacity of performing activities (Bigné et al. 2013). Therefore, it is plausible to argue that when community members acknowledge their capacity, including their skills and proficiencies, they share information on various occasions and provide feedback to improve the collaborative innovation experience. Therefore, it is suggested here that in collaborative innovation communities information sharing and providing feedback are driven by community member judgement of their own ability. Hence, the hypotheses:

H_{5g}: Ability predicts information sharing

H_{6g}: Ability predicts providing feedback

Ability is expressed as encouraging community members to perform helping and rapport building activities. The helpfulness of a comment made in an online brand community depends on the writer's expertise, writing style, and timeliness of the comment (Liu, Yang, Huang, An, & Yu 2008). Employing a similar logic, it can be argued that community members provide assistance when they believe in their competencies to offer a helpful solution. Similarly, in order for individuals to develop rapport they should have mutual responsiveness and the ability to react immediately, spontaneously and sympathetically to other individuals' actions (Tickle-Degnen & Rosenthal 1990). Therefore, belief of

members in their ability to build harmony with others drives them to build rapport with other community members in the collaboration. Hence, it was hypothesised that:

H_{7g}: Ability predicts helping

H_{8g}: Ability predicts rapport building

3.5. Conceptualisation of indirect relationships

3.5.1 Mediating effect of learning

In collaborative innovation, learning refers to spontaneous acquisition of new knowledge that community members use to perform value co-creation activities. Customer learning is an important aspect of value co-creation, as customers obtain necessary skills and knowledge to perform activities through learning (Payne et al. 2008). Learning drives customers to make purchase decisions (Brodie et al. 2013) and helps them to be effective resource integrators (Hibbert et al. 2012). Communication platforms that aim for value co-creation provide opportunities to learn together to make decisions, as learning is interactive in nature (Ballantyne & Varey 2006). Customers contribute to value co-creation by co-learning which is a consequence of active information seeking from external resources and sharing with others (McColl-Kennedy et al. 2012).

Learning activity holds an important position in value co-creation in collaborative innovation. Collaborative innovation platforms provide opportunities for individuals to acquire skills and advance (Ramaswamy & Gouillart 2010). Since members potentially benefit through personal development involved in the challenges of innovation, individuals choose to make contributions (Roberts et al. 2013). Moreover, obtaining better understanding and knowledge about the products, underlying technologies, and their usage drive individuals to collaborate in innovation (Nambisan & Baron 2009). Therefore, it is

argued here that learning predicts value co-creation activities performed by collaborative innovation community members.

To date, learning has been conceptualised as a motivating factor for collaborative innovation (Lusch & Nambisan 2015) and an important activity that facilitates value co-creation (McColl-Kennedy et al. 2012; Payne et al. 2008). By integrating these two perspectives, it is argued here that members who are socially and individually driven to derive value from self-generated value co-creation activities obtain necessary skills and knowledge by learning. In a collaborative innovation context, learning reflects enhancing knowledge on how to collaborate in the community. Furthermore, learning captures a member obtaining knowledge to improve his/her ideas or resolve issues regarding ideas. Finally, depending on the nature of the community, learning reflects gaining knowledge on development occurring regarding the products and services of the innovating company. It is anticipated here that individual and social factors drive community members to perform activities and if social and individual factors drive them to learn first the likelihood of performing activities increases.

Learning is expected to mediate the association between social factors and value co-creation activities. Learning together and mutual decision making, which occur in social environments, facilitate value co-creation (Ballantyne & Varey 2006). Learning in which members enhance their knowledge on how to collaborate in the community mediates social interactions that allow community members to communicate and converse with each other and perform value co-creation activities. Indeed, another social factor, trust in others' integrity and consideration, is likely to drive community members to enhance their knowledge to improve their ideas to perform co-creation activities. Similarly, the visions, goals, and understandings shared in the community drive members to engage in mutual

learning that enable them to perform value co-creation activities. Finally, members who feel embedded in the community structure are more comfortable to observe other member's actions and learn from them to perform their own self-generated value co-creation activities. Therefore, the following hypotheses were formed:

H_{9a}: The relationship between social interaction opportunities and information sharing is mediated by learning

H_{9b}: The relationship between social interaction opportunities and providing feedback is mediated by learning

H_{9c}: The relationship between social interaction opportunities and helping is mediated by learning

H_{9d}: The relationship between social interaction opportunities and rapport building is mediated by learning

H_{10a}: The relationship between trust and information sharing is mediated by learning

H_{10b}: The relationship between trust and providing feedback is mediated by learning

H_{10c}: The relationship between trust and helping is mediated by learning

H_{10d}: The relationship between trust and rapport building is mediated by learning

H_{11a}: The relationship between shared vision and information sharing is mediated by learning

H_{11b}: The relationship between shared vision and providing feedback is mediated by learning

H_{11c}: The relationship between shared vision and helping is mediated by learning

H_{11d}: The relationship between shared vision and rapport building is mediated by learning

H_{12a}: The relationship between centrality and information sharing is mediated by learning

H_{12b}: The relationship between centrality and providing feedback is mediated by learning

H_{12c}: The relationship between centrality and helping is mediated by learning

H_{12}d: The relationship between centrality and rapport building is mediated by learning

Individual factors and co-creation activities are also expected to be mediated by learning. Community members can enhance their knowledge through self-directed learning, where they make a deliberate individual effort to gain new knowledge (Hibbert et al. 2012). Motivation, which is the members' energy and interest for collaboration, lead them to learn with others to improve the experience of performing value co-creation activities. Likewise, if the opportunity, that is the atmosphere and conditions available in the community that support learning, is perceived by members they personally engage in mutual learning. Finally, a member's ability, which refers to his/her skills and expertise to derive relevant knowledge from the collaboration experience, is likely to drive them to learn with other members and perform value co-creation activities. The following hypotheses regarding the mediating effect of learning on the relationship between social and individual drivers and value co-creation activities were formed:

H_{13a}: The relationship between motivation and information sharing is mediated by learning

H_{13b}: The relationship between motivation and providing feedback is mediated by learning

H_{13c}: The relationship between motivation and helping is mediated by learning

H_{13d}: The relationship between motivation and rapport building is mediated by learning

H_{14a}: The relationship between opportunity and information sharing is mediated by learning

H_{14b}: The relationship between opportunity and providing feedback is mediated by learning

H_{14c}: The relationship between opportunity and helping is mediated by learning

H_{14d}: The relationship between opportunity and rapport building is mediated by learning

H_{15a}: The relationship between ability and information sharing is mediated by learning

H_{15b}: The relationship between ability and providing feedback is mediated by learning

H_{15c}: The relationship between ability and helping is mediated by learning

H_{15d}: The relationship between ability and rapport building is mediated by learning

3.5.2 Moderating effect of flow state

Flow refers to a state in which innovation community members are profoundly involved in collaboration "and nothing else seems to matter" (Csikszentmihalyi 1990, p. 4). In collaborative innovation, community members experience flow when the balance of skills a community member possesses and challenges that the collaboration experience presents is established. Initially developed by Csikszentmihalyi (1990), flow theory explains why some individuals enjoy undertaking some tasks regardless of the difficulty inherent in the task. It is argued that when in flow individuals enjoy and feel happy performing an activity regardless of external factors that affect their state (Csikszentmihalyi 1990). Importantly, such an optimal experience is "a sense that one's skills are adequate to cope with the challenges at hand, in a goal-directed, rule-bound action system that provides clear clues as to how well one is performing" (Csikszentmihalyi 1990, p. 71). This means an optimal experience occurs when there is a balance between perceived action capacities and action opportunities (Nakamura & Csikszentmihalyi 2009). Flow state encourages individuals to go to greater lengths, learn how to use new technologies (Webster, Trevino & Ryan 1993) and explore ways to use a computer in the workplace (Ghani & Deshpande 1994).

Flow experience is found to be a useful concept explaining online consumer experience due to its capability to understand underlying components of interactions between consumers, a company and its offerings (Hoffman & Novak 1996). Several positive behavioural outcomes of flow state have been reported in the marketing literature exploring consumer experience in web usage that contains human-computer interactions. In an online experience context, flow is conceptualised as a state of focus and concentration that customers manage to maintain during web use (e.g. Korzaan 2003; Koufaris 2002; Novak et al. 2000). For instance, when consumers experience flow state they enjoy web usage and develop intentions to shop online in the future (Koufaris 2002). Moreover, flow state leads to exploratory behaviour during online shopping (Korzaan 2003; Novak et al. 2000), explains intentions for online gaming (Hsu & Lu 2004), and enhances trust in a hotel booking website (Bilgihan, Nusair, Okumuş & Çobanoğlu 2015). Flow also has the capability of mediating the relationship between user satisfaction and social media users' intention to play social network site games (Chang 2013). Flow state, which is the holistic sensation that individuals feel when actively involved, improves the e-learning experience by affecting students' technology self-efficacy (Choi et al. 2007). Although flow is viewed as a unique state that occurs only if the online experience is compelling, evidence suggests that an online experience can be engaging and enjoyable if the navigational challenge of the online search activity and the skills available to address these challenges are in balance (Mathwick & Rigdon 2004).

The balance between skills and challenges has been proposed as a useful framework for exploring what individuals experience as they learn. For instance, when individuals experience the flow state that contains the skill-challenge balance they tend to learn more about the content of a website and then display positive attitude towards the online service provider (Skadberg & Kimmel 2004). Although flow state has never been proposed as a

potential moderator, Hoffman and Novak (1996) propose customer learning as a positive outcome of the flow experience. These authors argue that a consumer who experiences flow is more likely to learn from the online experience as they remain in the experience to keep skills and challenges in balance. It was also confirmed that the balance between skills and challenges improves student flow experience which leads to superior learning performance and satisfaction during learning (Wang & Hsu 2014). In a similar vein, it is assumed here that social and individual factors drive learning more when community members experience the flow state during collaboration in the community. Thus, flow state is proposed to moderate the relationship between social and individual drivers and learning. Specifically, it was hypothesised that social and individual factors become stronger driving forces of learning if community members experience the flow state:

H_{16a}: The relationship between social interaction opportunities and learning is moderated by a flow state

H_{16b}: The relationship between trust and learning is moderated by a flow state

H_{16c}: The relationship between shared vision and learning is moderated by a flow state

H_{16d}: The relationship between centrality and learning is moderated by a flow state

H_{17a}: The relationship between motivation and learning is moderated by a flow state

H_{17b}: The relationship between opportunity and learning is moderated by a flow state

H_{17c}: The relationship between ability and learning is moderated by a flow state

3.6. Conclusion

Building upon the theoretical background of this study, and the literature review presented in Chapter 2, this chapter proposed a conceptual model of value co-creation in the collaborative innovation community context. The model posits that social and individual factors are drivers, and value dimensions can be positioned as outcomes of, value co-creation activities. Additionally, the conceptual model presented in this chapter proposes the mediating role of learning and moderating role of flow state.

Chapter 4: METHODOLOGY

4.1. Introduction

This chapter outlines the methodology used to collect data and test hypotheses proposed in the research. It begins with research design, including research objectives and philosophical orientation of the research. This is followed by an introduction to the data collection method with a focus on the measurement tool and the operationalisation of constructs is outlined. Next, the study sample is described. The chapter then discusses issues regarding common method bias and methods used to assess common method bias. Finally, data analysis tools used in the research and analysis method employed are introduced. A summary concludes the chapter.

4.2. Research design and objectives

The main objectives of the research, as outlined in chapter 1, are three-fold:

1) To obtain deeper understanding of value co-creation in online collaborative innovation platforms from the community member point of view.
2) To identify social and individual factors that drive online collaborative innovation community members to perform value co-creation activities.
3) To determine the value co-creation activities that influence online collaborative innovation community member value perceptions.

To confirm relationships between the constructs a deductive direction was taken (Neuman 2011). The research objectives were set based on identified gaps in the literature regarding the antecedents and outcomes of performing value co-creation activities. Therefore, the

research objectives were addressed by examining theoretical relationships between abstract constructs based on empirical evidence (Neuman 2011).

4.2.1 Philosophical orientation

The philosophical orientation of a research project is an important aspect in determining research methodology (Krauss 2005). In the positivist orientation, knowledge is obtained and verified via scientific measurements (Krauss 2005). When a positivist approach is taken, facts are established by examining the parts of a phenomenon separately. To discover patterns in the phenomenon, the researcher examines cause and effect relationships based on assumptions of prediction and control (Krauss 2005). In doing so, the researcher remains distant and independent of what is being researched, which allows control for biases to establish objectivity. Positivist researchers use deductive reasoning to hypothesise theories that can be tested (Krauss 2005). They mainly engage in quantitative methodology where hypotheses are tested based on the connection between empirical observations, mathematical and statistical expressions (Neuman 2011).

In this research, a well-established methodological protocol, structural equation modelling (Hair, Hult, Ringle & Sarstedt 2013) was implemented, ensuring the researcher was independent and distant from the research context of online innovation communities and value co-creation. Quantitative data was collected and measured using online surveys conducted with online collaborative innovation community members. In this research, a positivist orientation with quantitative methodology was adopted, due to appropriateness and applicability.

4.2.2 Data collection method

To obtain empirical data for this study, online surveys were conducted amongst innovation community members who had interacted with other members of the community. Common disadvantages of online surveys are related to accuracy of data collected from anonymous respondents (Denissen, Neumann & van Zalk 2010; Fricker & Schonlau 2002). coupled with the difficulty of deriving correct insight in the case of unclear answers, since the researcher does not have the opportunity to clarify responses (Hair, Black, Babin & Anderson 2010). Online surveys are an advantageous data collection method as opposed to face-to-face surveys, due to the capacity to collect a large amount of data at low cost (Hair et al. 2010), given the ability to reach a considerably large number of people regardless of geographical location (Hair et al. 2010). Online surveys also eliminate data entry error (Fricker & Schonlau 2002). and save time allocated for manual work (Denissen et al. 2010), as the data is directly exported to data analysis tools such as SPSS and Excel. Therefore, despite disadvantages highlighted in the literature, online surveys were deemed preferable in this research given respondent profile as members of online brand and innovation communities that facilitate interactions among members.

To reach the target sample through an online survey, Qualtrics™'s online panel was used. The main limitation of online panels is panel conditioning or panel bias (Göritz 2007). which occurs when panel members participate in surveys regularly (Couper 2000). As respondents gain more survey experience, their attitude and behaviour toward surveys change (Couper 2000). To reduce panel conditioning, Qualtrics online panel management limit panel members to complete one survey every 10 days and keep full records on respondent activity, as recommended by Esomar (2005) (see Appendix 1). Online panels are increasingly used to collect quantitative data for marketing research (Callegaro & DiSogra 2008), as they offer methodological and economic advantages. Indeed,

recruitment time and cost is reasonably low, as participants are readily available as pre-recruited (Göritz 2007). Furthermore, a methodological advantage of online panels is that the respondent profile is known, as recruitments are usually undertaken before studies are conducted (Göritz 2007). Moreover, the profile data is accurate, as recruitments occur at the end of off-line surveys depending on the online panel type (Callegaro & DiSogra 2008). Online survey panel was appropriate to reach the target sample of this research considering the profile of the respondents, who are potentially difficult to reach through other means.

4.2.3 Ethics and information confidentiality

The research received ethics approval from the University of Adelaide Human Research Ethics Committee (see Appendix 2). In the introduction to the questionnaire (see Appendix 3), online survey respondents were assured confidentiality of personal information. The research purpose was explained before asking respondents for consent to complete the survey. It was also indicated that the survey forms part of a PhD project emphasising that the nature of the research was not commercial but academic and results were not to be shared with third parties.

4.3. Operationalisation of constructs

Existing measurement scales were used to build the online survey, and adapted to fit the new research context when necessary (Wasko & Faraj 2005) while retaining original meaning. Scales that contain at least three items were selected (Martínez-López, Gázquez-Abad & Sousa 2013) to ensure stable application of structural equation modelling. In one case, a two-item scale was expanded to generate a three-item scale. Next, the constructs included in this research are discussed in more detail.

4.3.1 Social factors

The social factors examined in this study entail social interaction opportunities and three dimensions of social capital. Blasco-Arcas et al. (2014) examined customer to customer interaction opportunities in a customer forum context where members could interchange messages and information, vote and comment on other customers' activities. As this context is consistent with collaborative innovation community context in this research, their four-item social interaction opportunities scale was adopted for this research, measured on a seven-point scale (see Table 4.1).

Table 4.1: Constructs for social interaction opportunities

Construct	Items	Source
Social interactions	This community facilitates two-way communication with other members This community gives me the opportunity to converse with other members This community facilitates concurrent communication with other members The community allows online interactions with other members	Blasco-Arcas et al. 2014

Three social capital dimensions in the exchange of intellectual capital context have been described (Nahapiet and Ghoshal 1998), namely relational, cognitive, and structural, while extant literature has measured social capital dimensions either at the organisational level (e.g Yli-Renko et al. 2001; Lin & Lu 2011) or individual level (Wasko & Faraj 2005; Chiu et al. 2006). The individual level was chosen for this study as the main objective of this research was to understand social factors from an individual community member point of view (see Table 4.2).

Trust was included in the conceptual model to capture the relational dimension. Trust was selected because it reflects relational capital and is seen as a driving factor for certain behaviours in online environments (Hoffman, Novak & Peralta 1999), such as knowledge sharing (Chiu et al. 2006; Hsu et al. 2007) and online shopping (Gefen, Straub & Boudreau 2000). Bansal, Irving and Taylor (2004) capture trust in interrelationships consistent with

the context of this research in which trust amongst collaborative innovation community members is measured. Hence, the six-item trust scale used by Bansal et al. (2004) was adapted to measure trust amongst community members.

Shared vision was measured to capture the cognitive dimension of social capital. This is due to shared vision being the key cognitive driver for performing value co-creation activities in the online collaborative innovation community context, where multidirectional interactions and integration of operant resources occur amongst members (Li 2005). Shared vision was assessed with a three-item scale based on Chiu et al. (2006). They measure shared vision amongst members of an online community consistent with the context of this thesis. Since their study was conducted in knowledge exchange in a problem-solving community, some minor manipulations were undertaken to adapt the scale to the collaborative innovation context.

Centrality was measured as a structural social capital dimension, following the work of Wasko and Faraj (2005). An individual's centrality is one of the most important determinations of the strength of her/his structural link to the network (Wasko and Faraj 2005). In the extant literature, centrality has been measured by the amount of time spent in the community, and communication frequency amongst community members (Chiu et al. 2006) or the number of connections that a member has with others in the network (Wasko and Faraj 2005). In order to capture member perceptions of their centrality in the community, a scale developed by Hsiao & Chiou (2012) was adopted here. Their four-item centrality scale assessed member perceptions of their importance and embeddedness in the community.

Table 4.2: Constructs for social factors

Construct	Items	Sources
Trust	I feel I can trust in the members of this community completely Members of this community are sincere in their promises Members of this community are honest and truthful with me Members of this community treat me fairly and justly I feel that members of this community can be counted on to help me when I need I feel that the members of this community show me enough consideration	Bansal et al. 2004)
Shared vision	Members in this community share a vision Members in this community share the same goals Members in this community share the same understandings	Chiu et al. 2006
Centrality	In this community, I am one of the core members In this community, I stay at the centre In this community, my status is close to the centre of the community I feel very important in this community	Hsiao & Chiou 2012

4.3.2 Individual factors

To measure individual factors that drive community members to perform co-creation of innovation activities, the motivation, opportunity and ability (MOA) framework was employed (MacInnis et al. 1991; Gruen et al. 2006; 2007). This study adopted the MOA scale used by Gruen et al. (2006; 2007), as this scale was developed for, and employed in, the context of customer-to-customer online know-how exchange in the value co-creation process, thus a context similar to this study. Motivation was measured using a six-item scale to assess member readiness and desire to collaborate in the innovation community by performing value co-creation activities. A five-item scale was used to measure *opportunity*, capturing the perceived opportunities available in the community for members to collaborate for innovation. Finally, a five-item scale was used to measure *ability* to assess community member perceptions of their own skills and proficiencies to collaborate in the community (see Table 4.3).

Table 4.3: Constructs for individual factors

Construct	Items	Source
Motivation	When I am active in this community, I am ready to collaborate with others	Gruen et al. 2007
	Collaborating with others is a major reason that I am active in this community	
	The thought of collaborating in this community energizes me	
	During the time I spend in this community, I am interested in collaborating with others	
	Prior to the discussions, I think about the ways I can collaborate	
	I have several "old friends" that I look forward to interacting with in this community	
Opportunity	This community provides plenty of opportunities for collaboration	
	The general atmosphere of this community is conducive to collaborating with others	
	Sometimes there is so much going on in the community I find it hard to collaborate	
	I know very well that there are going to be opportunities to collaborate	
	If I cannot collaborate as much as I want, it is usually my fault, and not the fault of this community	
Ability	I generally find it easy to collaborate with other community members	
	I am generally good at collaboration and have been successful at it in the past	
	I am comfortable collaborating with others in this community	
	Generally, I feel that the time I spend collaborating is productive for me	
	Often I do not collaborate in the community because others might be competitors	

4.3.3 Co-creation of value activities

Four self-generated value co-creation activities were included in the research, namely information sharing, providing feedback, helping, and rapport building. These activities were complemented by the activity of learning, hypothesised to act as a mediator between social and individual drivers and value co-creation activities. All activity constructs were measured on a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree).

Information sharing was measured by adapting the knowledge sharing behaviour scale of Hsu et al. (2007). The five-item scale was applied to capture intensity and diversity of an information sharing activity. Scales that measured the activities of providing feedback and helping were adapted from Yi and Gong's (2013) customer value co-creation behaviour scale. Yi and Gong (2013) identified both activities in a service setting where customers voluntarily provide feedback about services and help other customers during service

production. In a collaborative innovation context, scales were adapted to the community collaboration setting. While five items were employed to measure providing feedback, capturing feedback that community members provide for each other and the community in general in collaboration for innovation, four items were adopted to measure helping, reflecting the assistance that a community member offers to other members as required during collaboration (see Table 4.4).

Rapport building is defined in this study as encapsulating two dimensions, namely personal connection and enjoyable interactions (Gremler and Gwinner, 2000). In line with this definition, Fatima and Razzaque's (2014) rapport building scale was adopted to measure rapport building, given its ability to capture both dimensions of rapport building and assess harmonious and well-related connections amongst community members important in a collaborative innovation context (see Table 4.4).

Table 4.4: Constructs for co-creation of value activities

Construct	Items	Sources
Information sharing	I frequently share my personal knowledge or information in this community I usually spend a lot of time sharing knowledge or information in this community When I collaborate in this community, I actively share my knowledge with others When discussing a complicated issue, I am usually involved in the subsequent interactions I usually involve myself in discussions of various topics rather than specific topics	Hsu et al. 2007
Providing feedback	If I have a useful idea on how to improve somebody's idea, I let them know If I have a useful idea on how to improve this community, I let the company representatives know When I have something to say about the ideas shared by others, I comment about it When I have something to say about this community in general, I comment about it When I experience a problem, I let the company representatives know about it	Yi & Gong 2013
Helping	I assist other community members if they need my help I help other community members if they seem to have a problem I teach other members to collaborate in this community correctly I give advice to other community members	
Rapport building	I have a harmonious relationship with other community members I enjoy interacting with other community members The other community members relate well to me	Fatima & Razzaque 2014

Learning was measured based on a scale used by Nambisan and Baron (2009) as these authors researched customer involvement in product support and innovation activities initiated by a company, a context consistent with this research. Hence, a three-item learning scale was adapted to capture knowledge acquisition of members in the collaboration experience (see Table 4.5).

Table 4.5: Constructs for learning

Construct	Items	Source
Learning	I enhance my knowledge about the process of developing new ideas in this community I obtain solutions to my specific ideas or problems from the discussions in this community I enhance my knowledge about developments in the products / services	Nambisan & Baron 2009

4.3.4 Value dimensions

Four value dimensions, namely social, emotional, and utilitarian value, and value for effort, were included in this research. The scales for social, emotional, and utilitarian value were adapted from Mohd-Any et al. (2014), who measured value in the online tourism services context, a context consistent with online collaborative innovation communities.

Three items measuring *social value* assessed the self-concept (Pura 2005) and self-image (Sigala 2006) of community members. *Emotional value* was assessed by examining intrinsic and effective benefits with specific regard to the enjoyment and fun aspects of the experience. As Mohd-Any et al.'s (2014) scale only entailed two items to measure the emotional value construct, their scale was extended by the conceptually related item utilised by Wang et al. (2004) to generate a 3-item scale for this research. The item included in the construct was chosen because it represented the aspects (enjoyment and fun) captured by the emotional value scale (see Table 4.6).

In the literature, the dimension of *utilitarian value* has been captured as task fulfilment received as a result of functionality, that is, efficient and timely delivery of the service (Sigala 2006). Mohd-Any et al. (2014) views functionality as utilitarian benefits derived from participation in a company's website activities. Similarly, the four-item utilitarian value scale used in this project captured convenience and effectiveness of community collaboration (see Table 4.6).

The *value for effort* scale was adapted from Sweeney and Soutar's (2001) multiple item value scale. Functional customer value is essentially the balance between quality and price (Zeithaml 1988). While developing the multi-item scale for customer value, Sweeney and Soutar (2001) captured the price aspect of customer value using a value for money construct, which captured utilities derived from the product with regards to price. Similarly, in a collaborative innovation context, value for effort captures the balance between effort that community members make and difficulty of collaboration. Thus, the four-item value for effort scale captured utilities derived from collaboration in the community (see Table 4.6).

Table 4.6: Constructs value dimensions

Construct	Items	Sources
Social value	Other people are impressed that I am an active member of this community Collaborating in this community improves the ways I am perceived by others Collaborating in this community helps me to feel accepted by others	Mohd-Any et al. 2014
Emotional value	It is fun being active with others in this community Collaborating in this community provides me with a lot of enjoyment *I feel happy when I am collaborating in this community (Wang et al. 2004)*	
Utilitarian value	This community makes it easy to collaborate I value the convenience of this community This community helps me accomplish collaboration more quickly This community allows me to make a lot of decisions	
Value for effort	Collaborating in this community is reasonably easy Collaboration in this community offers value for the effort I make Collaboration in this community is good for the effort I make Collaboration in this community can be effortless	Sweeney & Soutar 2001

4.3.5 Flow state

There have been several empirical measurement methods discussed in the literature for flow state, with (Moneta 2012) developing three distinctive measurement methods. The first method captures flow state in special activities. The flow questionnaire (FQ) developed for this method contains three detailed definitions of flow state and asks respondents to list some activities in which they experience flow state, then asks them to rate perceived involvement using a Likert scale (Csikszentmihalyi 1982). The second method captures flow state in daily activities. To measure the number of flow states occurring during a day while performing routine activities an experience sampling method (ESM) is used (Csikszentmihalyi & Larson 1987). ESM provides respondents with a device to self-report their status during a stream of actual daily experiences when they are paged (Pace 2004). These methods are valuable for capturing the flow experience accurately in different occasions and provide valuable insight for flow research. However, ESM fails to measure intensity of flow state (Moneta 2012).

A third method, the componential approach, captures flow state as a multidimensional variable and potentially overcomes the aforementioned issues. The componential approach is considered the solution for quantitative hypothesis testing as it enables researchers to capture intensity of flow state (Moneta 2012), thus allowing empirical evaluation of the effect of intensity on outcomes. The scales developed for the componential approach essentially capture components of flow state, including focused attention, reduced awareness, sense of control, distorted sense of time and loss of self-consciousness (Jackson & Eklund 2004). Specifically, Jackson and Eklund (2004) developed, tested, and validated two scales to assess flow state in a particular activity (Flow State Scale-2) and the dispositional tendency to experience flow state during an activity (Dispositional Flow Scale-2). A short version of these scales was developed in German by Rheinberg,

Vollmeyer and Engeser (2003), later testing and validating the English version of the Flow Short Scale in three different contexts (Engeser & Rheinberg 2008). This shortened scale contains components of flow states and two items to measure the balance between skills and challenges.

The balance between skills and challenges has a central role in measurement of flow state (Engeser & Rheinberg 2008). It has been confirmed that the balance of skills and challenges lead individuals to experience flow (Mathwick & Rigdon 2004; Wang & Hsu 2014). Engeser and Rheinberg's (2008) Flow Short Scale was used in this research to capture intensity of flow experienced due to balance between skills and challenges. Specifically, this scale measured components of flow state with a 10-item construct. The items were measured on a 7-point scale (ranging from 1= not at all to 7= very much). Respondents with high scores experienced flow state with higher intensity. To measure balance of skills and challenges, respondents were asked to rate skills they have to collaborate in the innovation community and challenges required for collaboration on a 7-point scale (ranging from 1 = too low to 7 = too high). A neutral score (0 point) of the difference between skill and challenge items was regarded as the balance of skills and challenges (see Table 4.7).

Table 4.7: Constructs for flow state

Construct	Items	Sources
Flow state	I feel just the right amount of challenge	Engeser & Rheinberg 2008
	My thoughts/activities run fluidly and smoothly	
	I don't notice time passing	
	I have no difficulty concentrating	
	My mind is completely clear	
	I am totally absorbed in what I am doing	
	The right thoughts/movements occur of their own accord	
	I know what I have to do each step of the way	
	I feel that I have everything under control	
	I am completely lost in thought	
Balance		
Skill	I think that my competence / knowledge in the area that we have the discussions is	
Challenge	For me personally, the current demands in this community are	

4.4. Research sample

To study the collaborative innovation experience in an online context it was important to solicit members of at least one collaborative innovation community, with sampling focused on the United States of America. Thus, in this research, only members of a collaborative innovation community fulfilled the requirement as a valid respondent. A collaborative innovation community was described as a community established only for innovation purposes. Members of two types of collaborative innovation communities were captured in this research, including communities hosted by a company and those established by independent innovators.

The first type of innovation community included in this study was company hosted innovation communities. The examination of these this type of community, to obtain better understanding on value co-creation in collaborative innovation, is consistent with previous case studies conducted for The Dell Company's IdeaStorm community (Bayus 2013; di Gangi & Wasko 2009; di Gangi et al. 2010), Starbucks' MyStarBucksIdea community (Ramaswamy & Gouillart 2010) and Lego Company's Lego Cuusoo community (Antorini

& Muñiz 2013). The second type of innovation community included here was communities established by independent innovators. These communities have received less scholarly attention, probably due to their recent introduction. However, the importance of innovator communities, such as Shapeways 3D printing innovation community (De Jong & De Bruijn 2013), Quirky innovation community (Battistella & Nonino 2012), and Threadless designer community (Brabham 2010), has been noted in the literature with regards to co-creation experiences. The rationale for including inventor based communities was consistent with co-creation of value experiences in service ecosystems by inclusion of multiple actors, such as independent inventors (Ramaswamy & Gouillart 2010).

In addition, members of the Linux community, a brand community focused strongly on open innovation, were included in the research sample. The Linux community received attention in open innovation literature where the advantages of integrating users in innovation is discussed (von Krogh et al. 2012; West & Gallagher 2006). Including members of Linux community to examine value co-creation in collaborative innovation is consistent with Füller et al. (2013) who examined user collaboration that leads to co-creation of a new software brand. Similarly, Linux community members can contribute to value co-creation by performing community activities in collaborative innovation.

Respondents were reached through an online panel, with two screening criteria used to reach the target sample. Firstly, following the description of a collaborative innovation community respondents were asked about their membership of a collaborative innovation community, screening out individuals without such membership. Secondly, innovation community members who do not interact with other members of the community were screened out. The aim of this criterion was to distinguish collaborative innovation communities from innovation and problem-solving projects held by the companies in

which only dyadic interactions between company and user take place. The interactions available in the online community are deemed essential for the co-creation of value in collaborative innovation, as members integrate resources through multiple interactions between each other and, potentially, the innovating company. Hence, in summary, the research sample entailed members of those collaborative innovation communities in which members interact with others.

4.4.1. Demographic profile of the sample

Following outlier detection and data cleaning processes, discussed in Chapter 5 Section 2, a final sample of 309 respondents was achieved. Data gathered from the survey contained information about the demographic profile of the sample, namely, gender, age and education (see Table 4.8).

Table 4.8: Demographic profile of the sample

Age	**#**	**%**
18-25	27	9
26-35	100	32
36-45	70	23
46-55	41	13
56+	71	23

Gender	**#**	**%**
Female	153	50
Male	156	50

Education	**#**	**%**
High school or equivalent	24	8
Vocational/tech school (2 year)	10	3
Some college	79	26
College graduate (4 year)	123	40
Master's degree (MS)	43	14
Doctoral degree (PhD)	10	3
Professional degree (MD, JD)	20	6

Innovation community members (n = 309)

Age. The sample was divided into five age categories. The sample was mainly dominated by respondents aged 26–35 years (32%), followed by a group aged 36-45 years (23%) and respondents aged 56+ years (23%). While the profile of online innovation communities is unknown, reports produced by the U.S. Census Bureau for internet usage and the Internet

& American Life Project conducted by The Pew Research Centre were used to investigate consistency of the sample profile with the general internet user population. According to an internet usage study conducted by the U.S. Census Bureau, 79% of Americans are internet users who live in households with some internet subscription (File & Ryan 2014). Moreover, the internet plays an important part of American internet user's social life (Rainie, Purcell & Smith 2011). While 84% of American internet users have used the internet to connect to an online community, 50% have connected to a group of individuals who share a similar hobby or interest (Horrigan 2001). Collaborative innovation community members of this research belong to slightly older age groups compared to the general online community, as reported by Horrigan (2001). The general online community is dominated by the 25–34 years group (19%) and 35-44 years (22%) followed by 45-54 years (16%) (Horrigan 2001). One plausible explanation for this result is the nature of collaborative innovation communities. It can be assumed that individuals become a member of a collaborative innovation community after obtaining some years of experience in a relevant field, which makes them relatively older than general internet users and other online community participants.

Gender. The sample comprises an equal proportion of female (50%) and male (50%) respondents. This result is consistent with gender distribution of both American internet users (female = 51%, male = 49%) (File & Ryan 2014) and American online community participants (female = 49%, male = 51%) (Horrigan 2001).

Education. Respondents were asked to state their highest level of educational qualification. Collaborative innovation community members were observed to be highly educated individuals. The sample group was dominated by college graduates (40%), including respondents with a college degree (26%) and a master's degree (14%). Education

levels for the collaborative innovation community were similar to those reported for the American internet user population who tend to be highly educated (high school graduate = 25%, some college degree = 31%, bachelor's degree or higher = 35%) (File & Ryan 2014). Online community participants have also been found to have similar education qualifications (high school graduate or less = 31%, some college = 29%, college degree= 40%) (Horrigan 2001).

Hence, it can be argued that in terms of demographic profile, including age, gender, and education level, of the sample in this research closely represents the demographic profile of the population of internet users and online community participants in the United States.

4.4.2. Collaborative innovation community membership

Survey responses were collected through a self-reported survey answered by target respondents. The majority of respondents (62%) stated that they contribute to only one online collaborative innovation community, of which they have been a member for 2.9 years on average. Respondents were asked to state how frequently they collaborate in the community in which they are active. In the 7-point scale used for the frequency question, the extreme ends were anchored “not very often” “very often” and the average frequency was 5.5 indicating that respondents collaborated in the innovation community regularly (see Table 4.9).

When asked in which innovation community they most frequently collaborate, The Dell Company’s innovation community IdeaStorm was mentioned most often (19%). IdeaStorm is a popular innovation community that has been active since February 2007 (Bayus 2013) and comprises features that allow members to perform value co-creation activities (di Gangi et al. 2010). Similarly, My Starbucks Idea (6%) and Cuusoo (2%)

communities are hosted by the innovating companies Starbucks and Lego Company, respectively. My Starbucks Idea and Cuusoo are popular innovation communities in which members can submit new ideas and perform value co-creation activities examined in this research, namely, information sharing, providing feedback, helping, and rapport building. It is important to note that being a Dell or Lego user or Starbucks customer is not a condition of becoming a member of IdeaStorm, My Starbucks Idea or Cuusoo community. This creates resource integration opportunities with both users and non-users of the hosting company's products and services, which is consistent with the value co-creation in service ecosystems perspective of SD logic (Frow et al. 2014).

The Linux community, the second popular community (10%), is an open source community concentrating on software development. The Linux community has been active since 1991, with members ranging from distributors, software vendors and end users (Corbet 2008). In the Linux community, members essentially contribute codes to improve software collaboratively. However, their responsibility extends to more collaborative activities, such as reviewing, testing, and evaluating their own and other members' products (Corbet 2008). Those additional activities generate resource integration opportunities in which community members can co-create value.

Communities such as Quirky (8%), Hyvecrowd (6%), and Ideasbrewery (4%) consist of independent inventor members. In these communities, collaborative innovation is not controlled by a particular company and value co-creation occurs amongst independent actors. In community activities, members view and contribute to others' ideas, make comments or suggestions, and engage in discussions, in other words, they have opportunities to perform value co-creation activities.

Finally, Threadless (3%), Shapeways (3%) and 99designs (3%) communities consist of designer members. In these communities, members share new designs ideas. Members of Threadless community share t-shirt designs and Shapeways community members share new designs created using 3D printing technologies. 99desingns, on the other hand, is a wider community comprising members who create designs in various categories, ranging from business related graphics to art and illustration. The online designer communities create opportunities for members to trade their designs and improve designs collaboratively. Therefore, in collaboration resource integration and value co-creation opportunities emerge.

The content and nature of 'other' communities mentioned by respondents were examined by the researcher. One hundred respondents indicated 32 additional collaborative innovation communities that they collaborate in regularly. Through observation of the online community's website, the researcher first determined whether there was interaction between community members which allows them integrate resources. The researcher then determined whether suitable features were provided for members to perform value co-creation activities. As 32 online community platforms met these two requirements, those additional communities, such as NineSigma, Communispace, Auto Insights, eYeka, Fold it, Kaggle, Jovoto, and Innocafe, were included as they were deemed suitable for examination of value co-creation in the collaborative innovation context. Hence, in summary, the community membership profile of the research sample represented online collaborative innovation communities where co-creation of value occurs.

Table 4.9: Collaborative innovation community membership

No of collaborated communities	**#**	**%**
Only one	192	62
More than one	117	38

Most frequented innovation community	#	%
IdeaStorm	59	19
Linux	32	10
Quirky	23	8
Hyvecrowd	20	7
Mystarbucksidea	19	6
Ideasbrewery	11	4
Threadless	10	3
Shapeways	9	3
99designs	9	3
Cussoo	7	2
Prefer not to say	10	3
Other communities	100	32

Length of membership (years)	
Minimum	0.5
Maximum	9
Mean	2.9
Standard deviation	1.7

Frequency of collaboration	#	%
Not very often	4	1
2	6	2
3	7	2
4	42	14
5	70	23
6	105	34
Very often	75	24
Mean 5.5		

Innovation community members (n = 309)

4.5. Common method variance

As data was collected through an online survey and self-reported by target respondents at a single point in time, problems such as misleading results due to common method variance had to be addressed. Common method variance refers to variance that occurs due to the method used to measure constructs, rather than variance among constructs included in the model of interest (Podsakoff, MacKenzie, Lee & Podsakoff 2003). Common method variance has potential to create a false internal consistency, that is, an apparent correlation among items of constructs generated due to them being derived from a common source (Chang, Van Witteloostuijn & Eden 2010). This may lead to a misinterpretation of relationships between measured constructs resulting in deriving misleading empirical conclusions (Podsakoff et al. 2003; Reio 2010). To overcome common method bias,

several procedural (Lindell & Whitney 2001; Podsakoff et al. 2003; Podsakoff & Organ 1986) and post hoc remedies using exploratory factor analysis and partial correlations (Lindell & Whitney 2001; Podsakoff & Organ 1986) or using partial least squares (PLS) model are suggested (Chin et al. 2012; Liang, Saraf, Hu & Xue 2007; Rönkkö & Ylitalo 2011). The following procedural and post-hoc procedures were applied for this research.

Procedural remedies: Assuring anonymity of respondents increases their willingness to answer questions honestly (Podsakoff et al. 2003). Informing respondents that there are no right or wrong answers may reduce the possibility of answering questions in a more socially desirable way and generate answers true to the respondents belief or perspective (Podsakoff et al. 2003). In this study, the welcome message at the beginning of the survey assured respondents of anonymity and included a note stating there are no definite right or wrong answers to the questions asked. While researchers using different sources to collect data is a remedy suggested in the literature (Podsakoff et al. 2003), the difficulty of contacting the respondent profile targeted in this study prevented the researcher from using different data collection methods to reach the target audience in sufficient numbers.

Post hoc remedies: It is common to use more than one suggested procedure to assess the impact of common method bias in the marketing literature (e.g., Karpen et al. 2015; Liang et al. 2007; Lowe et al. 2013). First, Harman's one-factor test, which is commonly used to underlie the covariance that emerges as a result of the common method, is applied (Podsakoff & Organ 1986). In Harman's one-factor test, all construct items are entered into a principal components analysis with varimax rotation. In this research, sixteen distinctive factors emerged from 67 items. According to the unrotated factor solution (with eigenvalues greater than 1.0), factor 1 accounted for 47% of total variance. All 10 factors

with eigenvalues greater than 1.0 accounted for 70% of total variance (see Appendix 4). This result indicated there was no significant evidence of common method bias.

Second, the unmeasured latent methods construct (Podsakoff et al. 2003) was applied using the procedure introduced by Liang et al. (2007). In this method, a latent method construct was generated that included all indicators belonging to critical latent constructs in the model. All the indicators of major constructs were formed as sub-constructs with a single indicator (see Figure 4.1). Then, substantive variances for each indicator were obtained from the SmartPLS algorithm. Substantive variance indicated the degree to which each indicator's variance was explained by its principal construct. While average substantive variance was 0.79, the average variance of latent method construct was 0.026 (see Appendix 5). Most path coefficients for the latent method construct were insignificant. This analysis indicated that the common method bias was unlikely to be a critical factor for investigating relationships in the conceptual model.

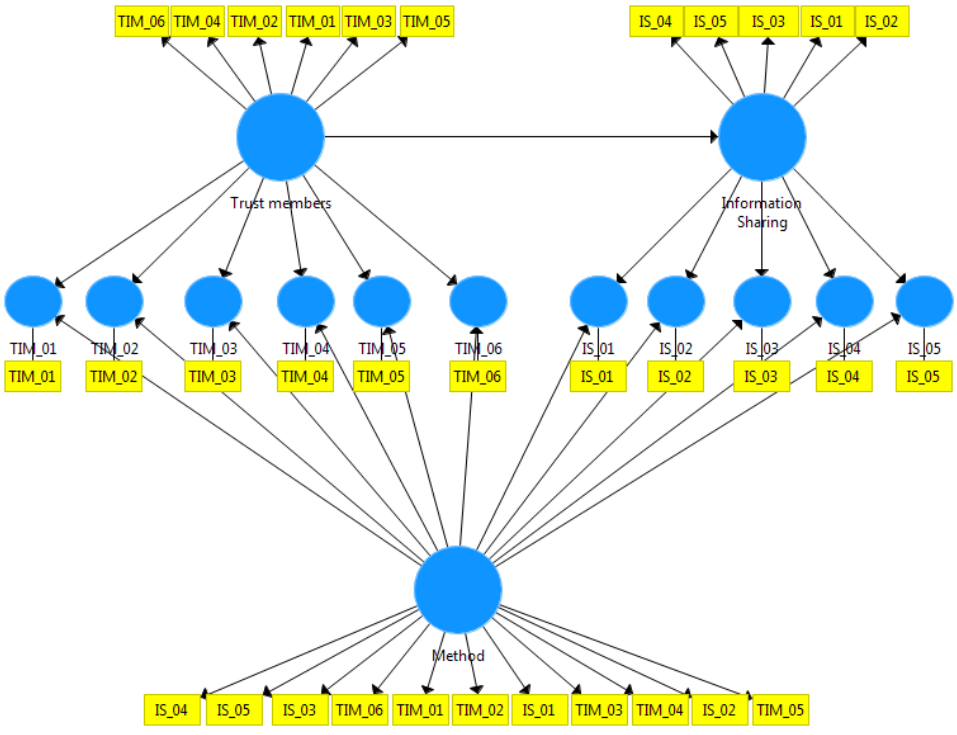


Figure 4.1: Indicators formed as sub-constructs with single indicator (an example)

Third the PLS marker variable model was applied (Rönkkö & Ylitalo 2011). In this method, three marker indicators were included in the model. To identify marker indicators, Rönkkö and Ylitalo's (2011) recommendations were followed. First, cognitive, affective, and behavioural engagement indicators included in the survey measured with a common method with other indicators, but not included in the model, were selected. Spearman's correlation matrix was obtained to investigate correlations between engagement indicators and indicators included in the model. Three cognitive engagement indicators had insignificant correlations with other indicators. As suggested by Lindell and Whitney (2001), those three cognitive engagement indicators were used to form a marker construct. The model was run without the marker construct and variances and their significance were noted. Then the marker construct was included in the model as an exogenous variable predicting each endogenous construct. Later, variances obtained before and after inclusion of the marker construct were compared (see Appendix 6). As the significant variances remained significant, that is, the marker construct did not affect the relationships among indicators, it was concluded that the PLS model was not affected by common method variance (Rönkkö & Ylitalo 2011).

Recognising that all procedures applied in this study have limitations, as discussed in the literature (Chin et al. 2012; Podsakoff et al. 2003), findings obtained from the three procedures detailed above suggested that results of this study were unlikely to be affected by common method bias.

4.6. Data analysis methods

In this research, two statistical analysis tools were employed in analysing data collected from the online survey. SPSS v21.0 was used in initial data examinations, such as general descriptive statistics, outlier detection and data cleaning, normality, homoscedasticity, and

common method bias assessments. Later, during measurement assessments SPSS was used to test reliability and latent construct collinearity. Structural equation modelling (SEM) methodology with SmartPLS 3.0 was used to test hypotheses as per structural model evaluation.

SEM has been used in marketing and management research when cause–effect relations between latent constructs are analysed (Hair, Ringle & Sarstedt 2011). Latent constructs cannot be directly observed, but are assessed by observable measures (Diamantopoulos, Riefler & Roth 2008). As this research uses measured indicators to observe latent constructs, the SEM technique is appropriate. Two primary methods of SEM can be applied in hypothesis testing: co-variance based SEM employs data analysis tools such as AMOS, LISREL, and EQS, while variance-based SEM with partial least squares (PLS) path modelling employs SmartPLS. The researcher made a decision regarding the most suitable SEM method for hypothesis testing (Gefen et al. 2000) based on assumptions related to multivariate data analysis. A detailed explanation of the selection process of SEM method used in this study is presented in the next chapter.

4.7. Conclusion

This chapter provided an in-depth discussion of the research method and design employed in the current research. The research objectives and philosophical orientation of the researcher were presented. A detailed discussion on the data collection method and construct operationalisation process was provided prior to description of the research sample profile and assessment of common method bias. Finally, data analysis tools used in the research and analysis methods employed were introduced.

Chapter 5: RESULTS

5.1. Introduction

This chapter outlines the data analysis process and results of structural equation modelling (SEM). It begins with data examination and assesses the necessary conditions for method selection to conduct SEM. It then reports on measurement assessments conducted to ensure well-fitting constructs included in the structural model. During measurement model assessments, validity and the reliability of the constructs were examined. This is followed by assessment of the structural model in which overarching and subsidiary hypotheses are reported. This part of the chapter contains three stages of analysis. In the first stage, hypotheses formed for direct relationships between constructs included in the model were tested. The investigation of mediation hypotheses followed, then testing of hypotheses predicting moderation.

5.2. Data examination

Data obtained from an online panel should be assessed in terms of response quality (Hair et al. 2010). To improve data quality outliers were identified and removed from the data. Furthermore, data was examined to ensure assumptions of multivariate data analysis were met. Data was also checked for normality, homoscedasticity, and multicollinearity, as proposed by Hair et al. (2010).

5.2.1 Outlier detection and data cleaning

When data is collected through anonymous internet surveys data quality can be of concern as there is a lack of environmental control of unknown distractions to maintain continuous respondent attention during online surveys (Meade & Craig 2012). Issues in the

application of online surveys, such as careless and inattentive responses, should be considered for potential impacts on data and subsequently on results of analyses (Meade & Craig 2012). Factors that affect careless and inattentive responses include respondent interest (Meade & Craig 2012) and environmental distraction. To overcome the potential for low interest, respondents were informed about survey length and their right to withdraw at any time. Duration of the survey was used as an indicator of respondent interest, or lack thereof (Meade & Craig 2012). Considerably short and long response times were regarded as potentially indicative of a lack of interest and discontinuous attention. In total, 10 survey responses of less than 10 minutes and longer than 32 minutes to complete were flagged for removal from the dataset.

To identify environmental distraction, three attention check statements were added to the survey ("Please select strongly agree with this statement"). Respondents who provided wrong responses to attention checks were screened out of the sample before data analysis. Inconsistency in responses or responding too consistently has potential to generate misleading results (Meade & Craig 2012). Inconsistency in responding occurs when there is high individual variance among indicators highly correlated in the sample as a whole (Meade & Craig 2012). Responding too consistently occurs when there is low variance among indicators measuring theoretically distinct constructs (Meade & Craig 2012). To capture inconsistency correlations between indicators of constructs were obtained by each respondent. Individual responses with small correlations were flagged for inconsistency. Over-consistency was captured by calculation of variances of individual responses. Cases with small variances among indicators of different constructs (<0.5) were flagged. As a result, 22 respondents who were inconsistent or overly consistent in responding were eliminated from the dataset. In total, application of procedures to identify careless and

inattentive responses yielded 32 responses that were removed from the dataset used for further modelling.

5.2.2 Fundamental assumptions of multivariate analysis

Before selecting the appropriate SEM method, three important statistical assumptions of multivariate analysis were ascertained, namely normality, homoscedasticity, and linearity (Hair et al. 2010).

Normality is one of the most fundamental assumptions of multivariate analysis because it is required to use *F* and *t* statistics (Hair et al. 2010). In multivariate analysis, if normality assumptions are violated the standard error of path coefficients between latent variables and test statistics may be distorted (Andreassen, Lorentzen & Olsson 2006). A suggested procedure to observe normality is to detect observed variables with excessive kurtosis and skewness (Hair et al. 2010; Andreassen et al, 2006). Skewness of observed variables affects the test of means, where kurtosis affects test of variances and covariances (Byrne 2010). As structural equation models are based on variances and covariances, multivariate kurtosis is a critical figure for determination of multivariate normality (Byrne 2010). Results of this research indicated that, while skewness and kurtosis were below critical values of 3 and 10, respectively, multivariate kurtosis was higher than the critical value of 5 (Byrne 2010) (see Appendix 7). Given the impacts of a lack of normality on multivariate analysis, including the chi-square and t-tests, lack of normality was considered a concern for further analysis. Issues regarding normality assumptions were considered further while selecting the SEM method used to test the conceptual model.

Homoscedasticity is an assumption related to relationships between indicators included in a conceptual model (Hair et al. 2010). *Linearity* is also an assumption of multivariate

analysis conducted to investigate relationships between constructs (Hair et al. 2010). Homoscedasticity and linearity were assessed using SPSS to generate a scatter plot of standardised residuals against standardised predicted values, histogram and normality plot of residuals (Hair et al. 2010). The scatter plot of standardised predicted values and residuals indicated existence of heteroscedasticity (see Figure 5.1). The bell shaped histogram and plots distributed close to the straight line in the normality probability plot supported assumptions of residual normality (see Figure 5.2 and 5.3). Similar to abnormality issues that were detected in the data, issues regarding heteroscedasticity were considered during selection of the SEM method employed in data analysis.

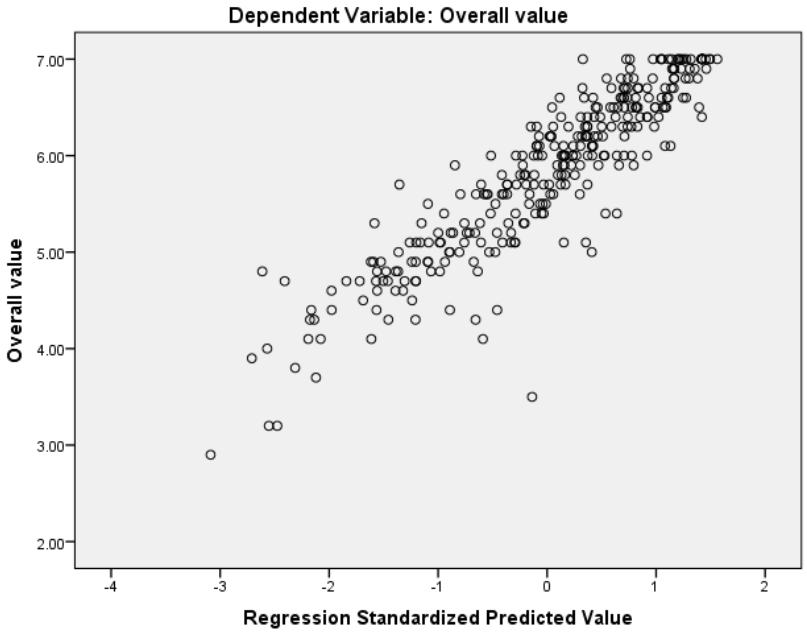


Figure 5.1: Scatter plot (standardised predicted values vs. standardised residuals)

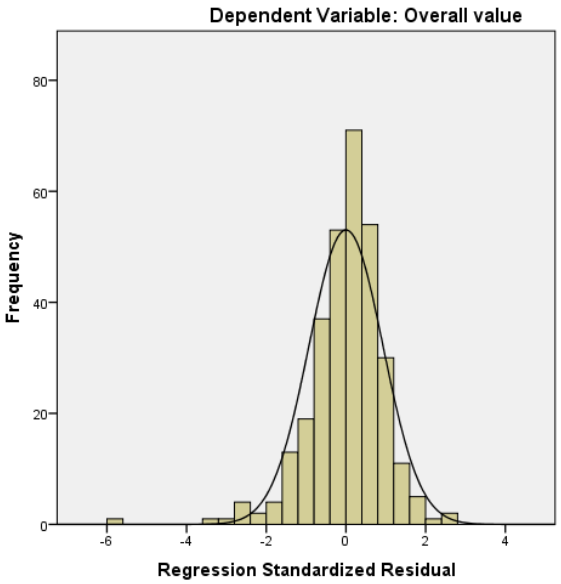


Figure 5.2: Histogram (standardised residuals)

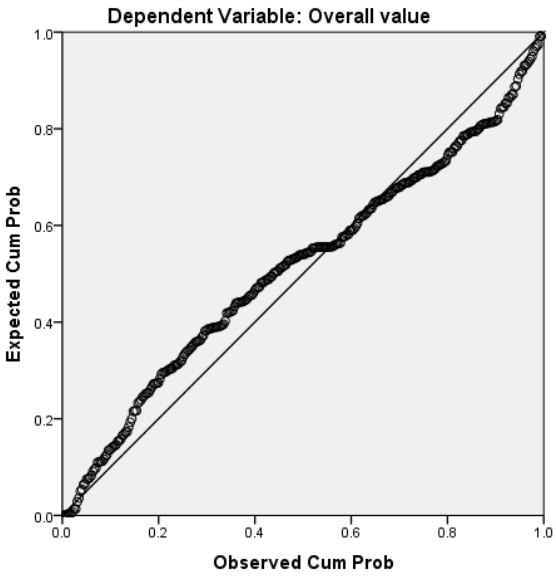


Figure 5.3: Normality probability (standardised residuals)

Finally, *collinearity* checks were conducted to assess correlations among indicators (Mason & Perreault 1991). Collinearity can lead to several problems, such as inaccurate coefficients and standard errors, which inflate variances of regression coefficients (Mason & Perreault 1991). Collinearity was assessed in this research using the variance inflation factor (VIF). Results indicated that collinearity among indicators in the model could be tolerated, as the VIF score for each indicator was lower than the critical value of 10 (Hair et al. 2010) (see Appendix 8).

In summary, although the data fulfilled the assumptions of collinearity and normality of residuals, it failed the assumptions of normality of observed variables and homoscedasticity. Issues regarding homoscedasticity and normality were considered when selecting a strategy to test the conceptual method, as discussed next.

5.3. Measurement models in structural equation modelling

Most of fundamental assumptions related to multivariate analysis are also a concern in structural equation modelling (SEM) (Hair et al. 2010). Structural models and measurement models are two major components to investigate when conducting SEM (Hair et al. 2010; 2011; Diamantopoulos et al. 2008). Structural models contain path relationships between different latent constructs, including exogenous and endogenous constructs. Exogenous constructs are latent constructs with no structural paths pointing at them (Hair et al. 2011). Conversely, endogenous constructs are latent constructs explained by exogenous constructs via structural relationships (Hair et al. 2011). Measurement models should be assessed before results are derived from a structural model, as they explain the relationships between a latent construct and its indicators (Diamantopoulos et al. 2008). Once the measurement model is established, the researcher made a decision on the type of SEM method. The two types of SEM approaches and selection criteria for each approach is discussed next.

5.4. Comparison of covariance based SEM and variance based PLS-SEM

SEM is an application used to test complete theories and concepts in business research (Hair et al. 2011; Hair, Sarstedt, Ringle & Mena 2012) and can be conducted as covariance-based or variance based PLS-SEM. Covariance-based SEM is a method that can confirm, test, and compare established constructs of concepts. PLS-SEM, on the other hand, aims to build conceptual models where dependent variances are explained at the maximum level (Hair et al. 2011). The choice between these approaches depends on the theoretical objective of the research. While covariance-based SEM can be used to test, confirm a theory, or compare alternative theories, variance-based PLS-SEM can be used when the aim is to predict or identify relationships between constructs in the theoretical

model. Secondly, assumptions on multivariate analysis should be considered, as both approaches have advantages and disadvantages related to data and model assumptions (Hair et al. 2012).

Covariance-based SEM, the more commonly used approach in the marketing literature, is preferred when the aim is to identify significance of relationships between existing constructs included in the theoretical model. Indeed, covariance-based SEM generates an estimated covariance matrix and aims to minimise its difference from the observed covariance matrix (Hair et al. 2012). The most important advantage of covariance-based SEM is in providing a 'global goodness of fit' criterion which offers the opportunity to discuss the model fit and compare alternative models (Hair et al. 2011). Covariance-based SEM requires all the assumptions of multivariate analysis to be met including multivariate normality and minimum sample size, as the covariance matrix is obtained via maximum likelihood or generalised least squares (Reinartz, Haenlein & Henseler 2009). This can become a disadvantage because minimum sample size is determined by the number of indicators included in the model (Westland 2010), thus testing complex models when a large data set is not available can be problematic.

Variance-based PLS-SEM is a regression and principal component analysis based approach to examining relationships between constructs which aims to maximise explained variance in the dependent construct (Reinartz et al. 2009; Hair et al. 2010). Although it is difficult to distinguish PLS-SEM theoretically from more commonly employed covariance-based SEM, the statistical methods used to conduct SEM can shed light on the underlying ideas. In PLS-SEM, the coefficients obtained for independent variables are based on prediction of the dependent variable, not the variance they share with each other (Hair et al. 2010). Thus, the strength and significance of the prediction are

the main focus of PLS-SEM, not the strength and significance of the relationship between existing constructs. PLS-SEM has several important advantages in terms of having fewer data and model requirements (Reinartz et al. 2009; Hair et al. 2010; 2012).

One of the most stated advantages of PLS-SEM is its capability to provide high statistical power when data distribution is non-normal. PLS-SEM maximises explained variance using an iterative series of ordinary least squares regressions (OLS) (Reinartz et al. 2009). OLS does not require distributional assumptions for data to be met, as parameter estimates remain stable in the presence of non-normality (Reinartz et al. 2009). Another advantage of PLS-SEM is that it works well with small sample sizes because parameter error increases more slowly as sample size reduces (Reinartz et al. 2009). The number of indicators required for each construct is flexible in PLS-SEM (Hair et al. 2011; 2012). PLS-SEM can be employed independent of underlying indicators belonging to constructs, as its focus is to estimate the measurement model (Reinartz et al. 2009). Despite the advantages of PLS-SEM regarding data and model requirements, the absence of a global fitness index is a serious disadvantage for theory testing (Hair et al. 2012). PLS-SEM has the capacity to detect strength of the measurement model (Hair et al. 2011; Reinartz et al. 2009), however, it underestimates the structural measurement model (Reinartz et al. 2009). To make a decision on the SEM method to use in this research, the researcher reviewed the theoretical objectives of the research, data, and model characteristics as suggested by Hair et al. (2011) and Reinartz et al. (2009) (see Table 5.1).

Table 5.1: Selection criteria for covariance-based SEM and variance-based PLS-SEM

Selection criteria		Current research	Variance-based PLS-SEM	Covariance-based SEM
Research objectives	Predicting key target constructs or identifying key "driver" constructs and theory development	Yes	✓	
	Theory testing, confirmation, or comparison of alternative theories	No		✓
Measurement model	The latent constructs are reflective	Yes	✓	✓
	The latent constructs are formative	No	✓	✓
Structural model	Structural model is complex	Yes	✓	
Data characteristics	Data does not meet the assumptions of minimum sample size	Yes	✓	✓
	Data does not meet the assumption of multivariate normality	Yes	✓	
	The sample size is relatively low	Yes	✓	✓
	Residuals are not homoscedastic	Yes	✓	
Overall model evaluation	A global goodness-of-fit criterion is required	No		✓

Adapted from (Hair et al. 2011; Reinartz et al. 2009)

The theoretical objective of this research was to predict and identify the relationships between key drivers and outcomes of value co-creation activities in online collaborative innovation communities. This research identifies complex relationships of reflective latent constructs in value co-creation in the collaborative innovation community context. PLS-SEM manages to predict path coefficients and variances explained in endogenous latent constructs in complex models, and consequently, provides unbiased and consistent parameter estimates (Hair et al. 2011; Reinartz et al. 2009). In this research, data obtained from online collaborative innovation community members is not distributed normally and the variances of indicators explaining endogenous latent constructs are concentrated rather than random, that is, the model failed homoscedasticity assumptions. The analysis of PLS-SEM is built on a set of nonparametric evaluation criteria (Hair et al. 2013) which provides PLS-SEM with a wider tolerance towards data characteristic assumptions, such as homoscedasticity and normality (Hair et al. 2011). Based on issues regarding data

collected for this research, and the aforementioned favourable assumptions of using PLS-SEM, the decision was made to use PLS-SEM to assess the proposed model. After making a decision on the approach to use PLS-SEM for the conceptual model, the researcher conducted appropriate assessments of measurement and structural models.

5.5. Measurement model assessments

The measurement model and structural model were assessed across two stages (Hair et al. 2013). The measurement model focuses on the quality of predictions made on the relationships between unobserved constructs and their indicators (Hair et al. 2013). Measurement models are assessed on validity (including discriminant and convergent validity) and internal consistency reliability (including composite reliability) (Hair et al. 2013). As all latent constructs were measured by more than one item in this research, multi-item reliability and validity checks were applied.

Validity refers to the extent to which indicators reflect the latent construct intended to be measured (Hair et al. 2010). Reliability refers to internal consistency of indicators representing each latent construct based on interrelation between each other (Hair et al. 2010). Validity and reliability checks were conducted according to guidelines of PLS-SEM (Hair et al. 2013).

5.5.1 Validity assessments

Construct validity is assessed through discriminant validity and convergent validity. In this research, discriminant validity was tested to identify unique indicators that measure the latent construct that is not impacted by other constructs in the model (Hair et al. 2013).

Convergent validity was then tested for indicator positive correlations with other indicators measuring the same latent construct (Hair et al. 2013).

5.5.1.1 Discriminant validity

Discriminant validity refers to a construct's true distinction from other constructs in the conceptual model (Hair et al. 2013). If discriminant validity is not established, the impact of latent constructs on explained variation becomes more than the impact of observed indicators that are theoretically correlated; as a consequence, real structural paths can be a result of statistical discrepancies, not real estimates (Henseler, Ringle & Sarstedt 2015). Fornell-Larcker criterion and examination of factor cross-loadings are the two most commonly used approaches to test discriminant validity (Henseler et al. 2015). However, Henseler et al. (2015) discussed the low sensitivity of current approaches using in variance-based PLS-SEM through a series of simulations. Given the importance of discriminant validity, Henseler et al. (2015) introduced heterotrait-heteromethod (HTMT) criteria as an alternative to other approaches used in SEM studies previously. These authors confirmed that HTMT criteria, based on a comparison of heterotrait-heteromethod correlations with monotrait-heteromethod (MTMM) correlations, has higher sensitivity to discriminant validity. While the MTMM correlation matrix contains correlations of two indicators of a particular construct, the HTMT correlation matrix contains correlations of two indicators of different constructs (Henseler et al. 2015). The HTMT criteria that Henseler et al. (2015) introduced is a ratio of correlations, specifically, the average of heterotrait-heteromethod correlations relative to the average of monotrait-heteromethod correlations. In variance-based PLS-SEM, interrelationships among indicators of each latent construct and correlations between latent constructs must be investigated with sensitivity, as PLS-SEM uses composites of indicators as substitutes for unobserved latent

constructs (Henseler et al. 2015). Therefore, the HTMT ratio is deemed the most appropriate test to confirm discriminant validity in this research.

To conduct discriminant validity assessments, the guidelines recommended by Henseler et al. (2015) were applied. First, the HTMT specification ratio was obtained from a correlation matrix. Henseler et al. (2015) propose three HTMT ratios: $HTMT_{.85}$, $HTMT_{.90}$ and $HTMT_{inference}$ (the confidence intervals) and recommend the use of $HTMT_{.90}$ as it is found to have higher specificity. Correlations higher than .90 in the HTMT matrix indicate discriminant validity between latent constructs. An HTMT matrix was obtained using the PLS algorithm function in SmartPLS 3.0. In the first step, the HTMT matrix contained all indicators measured (Henseler et al. 2015) to investigate latent constructs that failed $HTMT_{.90}$ criterion. In the second step, indicators of those constructs were examined. Indicators with lower MTMM correlations and high HTMT correlations were eliminated from the model. The HTMT matrix was then evaluated again until all $HTMT_{.90}$ ratios met the .90 criterion. Discriminant validity was established for the majority of items in the model (see Appendix 9). Table 5.2 shows the indicators removed from further analyses due to low correlation with the indicators they represent and high correlation with indicators representing other latent constructs.

Table 5.2: Indicators removed due to discriminant validity

Construct	Indicator(s)
Social interactions	This community allows online exchange of information (opinions, recommendations, advice) with other members
Opportunity	Sometimes there is so much going on in this community that I find it hard to collaborate
Ability	Often I do not collaborate in this community because others might be my competitors
Information sharing	When I collaborate in this community, I actively share my knowledge with others
Providing feedback	If I have a useful idea on how to improve this community, I let the company representatives know When I experience a problem, I let the company representatives know about it
Helping	I teach other members to collaborate in this community correctly I give advice to other community members
Rapport building	I enjoy interacting with other community members
Utilitarian value	This community makes it easy to collaborate
Emotional value	I feel happy when I am collaborating in this community (Wang et al. 2004)
Value for effort	Collaboration in this community offers value for the effort I make Collaboration in this community is good for the effort I make

5.5.1.2 Convergent validity

Convergent validity refers to the extent to which indicators correlate positively with other indicators of the same latent construct (Hair et al. 2013). Convergent validity is tested through indicator loadings and average variance extracted (AVE). Indicator loading is the association between an indicator and the latent construct it reflects (Hair et al. 2013). Indicators should have statistically significant loadings of .70 or higher for convergent validity to be established (Hair et al. 2013) (see Appendix 10). In this research, all indicators showed convergent validity other than the indicator named 'When I have something to say about the ideas shared by others, I comment about it', included in the construct 'providing feedback' which failed to meet the criterion with a 0.611 factor loading and was thus removed from further analyses.

AVE is "the grand mean value of the squared loadings of the indicators associated with the construct" (Hair et al. 2013, p. 103). A value of .50 or higher AVE indicates the construct has the ability to explain at least half of the variance of its indicators (Hair et al. 2013).

The AVE value of all latent constructs was higher than .50, which indicated that latent constructs were able to explain variance in the indicators (see Table 5.3). Finally, it was concluded that all constructs included in the conceptual model established convergent validity.

5.5.2 Internal consistency reliability

PLS-SEM does not assume equal weights for indicators like CB-SEM, rather "[it] allows each indicator to vary in how much it contributes to the composite score of the latent variable" (Chin, Marcolin & Newsted 2003, p. 197). Therefore, internal consistency of indicators is a more sensitive criterion than traditional reliability, namely the assessment of Cronbach's alpha (Hair et al. 2013). In this research, composite reliability was assessed to ensure a comprehensive evaluation of reliability. Composite values vary between 0 and 1, with higher values indicating higher levels of reliability and scores between 0.70 and 0.90 regarded as satisfactory for complex measurement models (Hair et al. 2013). All constructs included in this research were found to be reliable (see Table 5.3).

In summary, 14 indicators of several constructs were removed for further analysis as 13 indicators failed to demonstrate discriminant validity and one indicator failed to realise convergent validity. The final list of indicators included in the following analysis is reported in Appendix 11.

Table 5.3: Average variance extracted (AVE) and composite reliability

Construct	AVE	Composite reliability
Social factors		
Social interactions	0.739	0.90
Trust	0.685	0.91
Shared vision	0.771	0.91
Centrality	0.694	0.90
Individual factors		
Motivation	0.654	0.92
Opportunity	0.524	0.81
Ability	0.764	0.91
Value co-creation activities		
Information sharing	0.670	0.89
Providing feedback	0.773	0.88
Helping	0.756	0.86
Rapport building	0.841	0.91
Value		
Social value	0.763	0.91
Emotional value	0.835	0.91
Utilitarian value	0.741	0.90
Value for effort	0.765	0.87
Learning	0.772	0.91

5.6. Structural model assessment

In PLS-SEM, structural model assessment criteria are based on the model prediction, that is, to fit the conceptual model to collected data to obtain the best parameter estimates maximising explained variance of endogenous latent constructs (Hair et al. 2013). The assessment of structural models can only be conducted if the conceptual model realises two important criteria: collinearity between latent variables and heterogeneity of the model. In this research, these two criteria were assessed by the following procedures recommended in the literature (e.g. Grewal, Cote & Baumgartner 2004; Rigdon, Ringle, Sarstedt & Gudergan 2011). Later, the structural model was assessed in three stages in which model predictions were completed.

5.6.1 Assessment of collinearity between latent variables

Multicollinearity between latent variables can result in measurement errors in SEM, as SEM is not a remedy for collinearity (Grewal, Cote & Baumgartner 2004). In order to examine collinearity between latent variables, VIF figures for each latent variable included in the model were obtained using SmartPLS 3.0. Similar to VIF figures obtained for construct indicators, the same critical value (<10) was assessed, as recommended by Hair et al (2010). Results indicated that collinearity among latent variables was nor an issue, as the VIF figure for each indicator was lower than the critical value of 10 (see Appendix 12).

5.6.2 Assessment of unobserved heterogeneity

As it is based on prediction theory, PLS-SEM does not provide a global goodness index. Instead, model heterogeneity should be assessed to confirm the quality of PLS-SEM parameter estimations (Hair et al. 2013). Sample heterogeneity is an important criterion for assessment of the structural model. Heterogeneity is often present in samples or data used in empirical research (Hair et al. 2013; Sarstedt et al. 2011; Sarstedt, Schwaiger & Ringle 2009). Depending on the research objective, observed heterogeneity could be required, but unobserved heterogeneity has the potential to prevent the structural model from predicting relationships accurately (Hair et al. 2013; Sarstedt et al. 2011). Therefore, unobserved heterogeneity in the sample, on which the structural model is based, should be captured to minimise model estimation errors. Especially when the theory is not well developed, understanding unobserved differences between individuals becomes important for introducing a new theoretical model (Rigdon et al. 2011). The finite mixture partial least squares (FIMIX-PLS) approach is proposed to estimate path coefficients for the distinct random segments generated in the sample as opposed to making comparisons between pre-set subgroups, such as country of origin, gender, or industry (Hahn, Johnson, Herrmann &

Huber 2002). Significant differences between the coefficients represent heterogeneity in the sample (Hahn et al. 2002). Capturing the differences between coefficients across random segments is essentially capturing heterogeneity in relationships between latent constructs (Rigdon et al. 2011). In this research, FIMIX-PLS was applied following instructions provided by Rigdon et al. (2011).

The initial step of FIMIX-PLS application is determination of the number of segments (Rigdon et al. 2011). In this research, the determination process started with the one segment solution with the number of segments then increased successively until the size of the latent classes had become small (6% of the total sample) (see Table 5.4).

Table 5.4: Relative segment sizes for five segment solution

	1	**2**	**3**	**4**	**5**	**Sum**
$K = 1$	1.000					1.000
$K = 2$	.582	.418				1.000
$K = 3$	.341	.349	.310			1.000
$K = 4$	.568	.216	.089	.127		1.000
$K = 5$	.255	.394	.195	.093	.063	1.000

The final decision to identify the number of segments for comparison to the structural model was made using information criteria proposed by Sarstedt et al. (2011). These authors suggest the optimum number of segments are most successfully identified based on joint consideration of Consistent Akaike's Information Criterion (CAIC) and Modified Akaike's Information Criterion (Factor 3) (AIC_3). In this research, the entropy normed (EN) criterion, that is, the distinctness of segments from each other, was also investigated, as suggested by Ringle et al. (2011). CAIC indicates a strong under-fitting tendency where AIC_3 indicates strong over-fitting (Ringle et al. 2011), therefore, the number of segments with minimum values of CAIC and AIC_3 can be identified as the optimum solution.

Analysis conducted to generate five segments indicated that the two segment solution had the lowest CAIC, AIC_3 and EN value (see Table 5.5).

Table 5.5: Segment retention criteria

	***K* = 1**	***K* = 2**	***K* = 3**	***K* = 4**	***K* = 5**
CAIC	5,541.58	5,348.03	5,570.94	5,403.92	5,520.68
AIC_3	5,302.64	4,866.43	4,896.67	4,936.98	4,911.08
EN	-	0.796	0.8	0.855	0.869

To validate structural model heterogeneity, significance of the difference between two segments in terms of path coefficients, R^2s, composite reliability, and AVE were tested (see Appendix 13). Results indicated significant differences between only three latent constructs of the two segments in terms of path coefficients (see Table 5.6) and for social value. Although criteria or rules of thumb have not been proposed for unobserved heterogeneity analysis, minor significant differences between two spontaneously generated sub-segments indicate that unobserved heterogeneity is not a considerable issue for proceeding to hypothesis testing. However, in the hypotheses testing stage, statistically significant paths and social value for which potential unobserved heterogeneity was observed were interpreted with caution. After completing assessments of collinearity between latent variables and unobserved heterogeneity, the structural model was assessed to test the hypotheses proposed in this research.

Table 5.6: FIMIX results for two segment solution

		Total sample	**Segment 1**	**Segment 2**	$\|\Delta_{12}\|$
Sample size		309	180	129	
Relative segment size			0.58	0.42	
Path coefficients	Centrality -> Information sharing	0.41**	0.50**	0.25**	0.25*
	Learning -> Rapport building	0.17*	0.37*	0.06	0.31**
	Information sharing -> Utilitarian value	0.37**	0.54**	0.14	0.40**
AVE	Social value	0.76	0.80	0.71	0.09*

Notes: $|\Delta_{ij}|$, absolute differences between path coefficients
Significant coefficients and significant differences between two segments, in terms of path coefficients and AVE.
The threshold p values: *Significant at p<0.05, **Significant at p<0.01

5.7. Hypotheses testing

Social and individual factors in the conceptual model were considered as exogenous latent constructs predicting value co-creation activities. Value co-creation activities were considered as endogenous constructs predicted by social and individual factors and as exogenous constructs predicting the value that online collaborative innovation community members perceived. The structural model was assessed in three stages. In the first stage direct relationships between exogenous and endogenous latent constructs were investigated (see Figure 5.4). In the second stage, the mediation effect of learning was assessed. In the third stage, the moderation effect of flow state was tested.

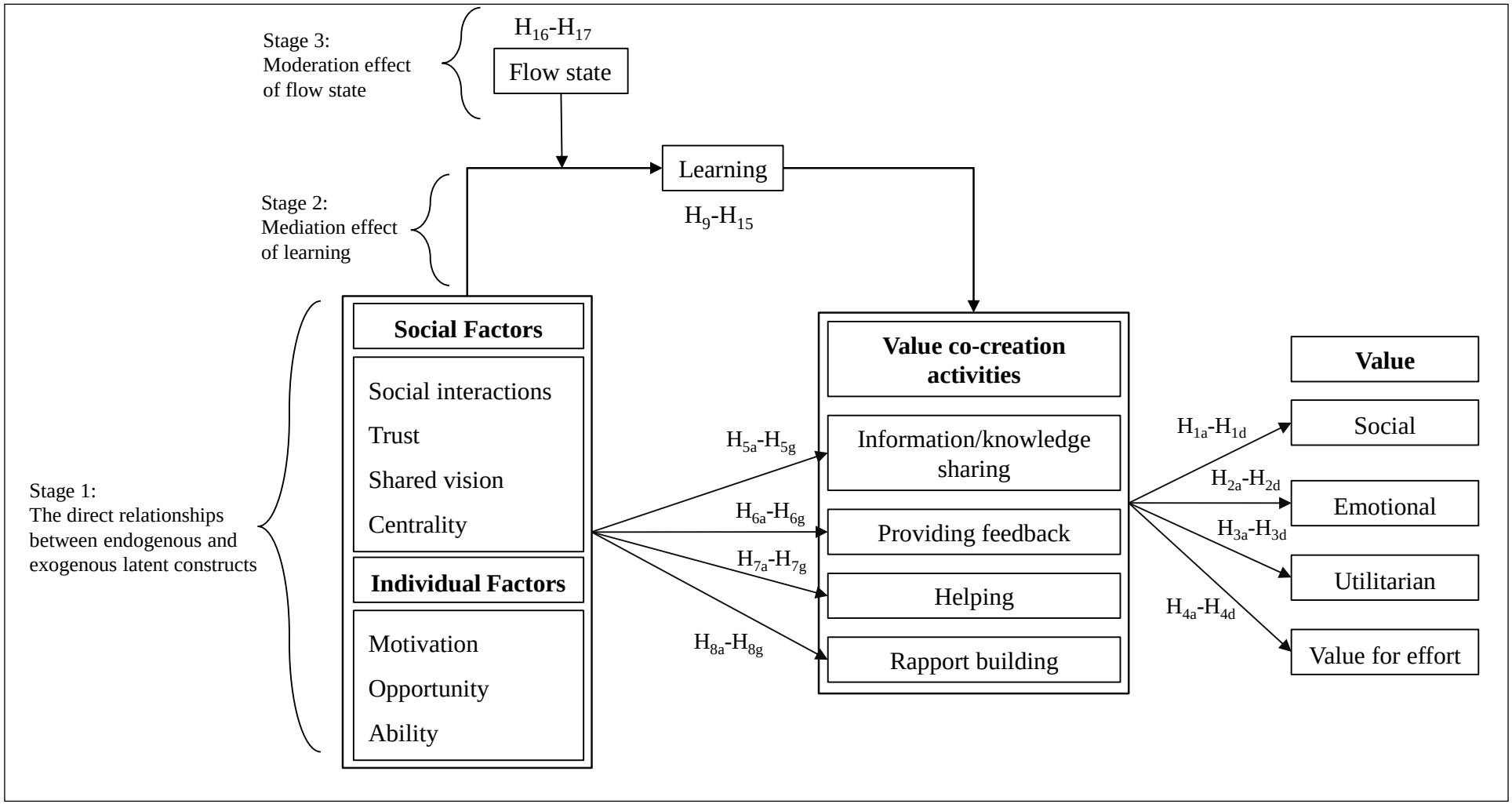


Figure 5.4: Analysis of proposed conceptual model

Note: Endogenous and exogenous constructs contain their associated indicators. For illustration purposes they are not shown in this figure.

5.7.1 Stage 1: Estimations of direct relationships

Eight hypotheses that test estimated relationships between overarching constructs were proposed for the first stage of assessment. Subsidiary hypotheses were proposed to test predictions between individual constructs (see Table 5.7).

Table 5.7: Stage 1: Proposed hypotheses

	H_1: Value co-creation activities predict **social value**
H_{1a}	Information /knowledge sharing predicts social value
H_{1b}	Providing feedback predicts social value
H_{1c}	Helping predicts social value
H_{1d}	Rapport building predicts social value
	H_2: Value co-creation activities predict **emotional value**
H_{2a}	Information /knowledge sharing predicts emotional value
H_{2b}	Providing feedback predicts emotional value
H_{2c}	Helping predicts emotional value
H_{2d}	Rapport building predicts emotional value
	H_3: Value co-creation activities predict **utilitarian value**
H_{3a}	Information /knowledge sharing predicts utilitarian value
H_{3b}	Providing feedback predicts utilitarian value
H_{3c}	Helping predicts utilitarian value
H_{3d}	Rapport building predicts utilitarian value
	H_4: Value co-creation activities predict **value for effort**
H_{4a}	Information /knowledge sharing predicts value for effort
H_{4b}	Providing feedback predicts value for effort
H_{4c}	Helping predicts value for effort
H_{4d}	Rapport building predicts value for effort
	H_5: Social and individual factors predict **information sharing**
H_{5a}	Social interaction opportunities predict Information sharing
H_{5b}	Trust in other members predicts Information sharing
H_{5c}	Shared vision predicts Information sharing
H_{5d}	Centrality predicts Information sharing
H_{5e}	Motivation predicts Information sharing
H_{5f}	Opportunity predicts Information sharing
H_{5g}	Ability predicts Information sharing
	H_6: Social and individual factors predict **providing feedback**
H_{6a}	Social interaction opportunities predict providing feedback
H_{6b}	Trust in other members predicts providing feedback
H_{6c}	Shared vision predicts providing feedback
H_{6d}	Centrality predicts providing feedback
H_{6e}	Motivation predicts providing feedback
H_{6f}	Opportunity predicts providing feedback
H_{6g}	Ability predicts providing feedback
	H_7: Social and individual factors predict **helping**
H_{7a}	Social interaction opportunities predict helping
H_{7b}	Trust in other members predicts helping
H_{7c}	Shared vision predicts helping
H_{7d}	Centrality predicts helping
H_{7e}	Motivation predicts helping
H_{7f}	Opportunity predicts helping
H_{7g}	Ability predicts helping
	H_8: Social and individual factors predict **rapport building**
H_{8a}	Social interaction opportunities predict rapport building
H_{8b}	Trust in other members predicts rapport building
H_{8c}	Shared vision predicts rapport building
H_{8d}	Centrality predicts rapport building
H_{8e}	Motivation predicts rapport building
H_{8f}	Opportunity predicts rapport building
H_{8g}	Ability predicts rapport building

The criteria that PLS-SEM provides for structural relationships assessments are path coefficients (indicator loadings), R^2 (variance explained), f^2 (effect size), and Q^2 and q^2 (predictive relevance effect size) (Hair et al. 2013). In PLS-SEM, R^2 measures predictive accuracy of the model. It represents the exogenous constructs' combined effect on the endogenous construct (Hair et al. 2013). R^2 ranges from 0 to 1, where higher values indicate higher levels of prediction accuracy (Hair et al. 2013). As R^2 increases as the number of exogenous constructs increases, adjusted R^2 (R^2 modified by the number of exogenous constructs relative to sample size) is a better indication of predictive accuracy, especially in complex models (Hair et al. 2013) and was thus utilised in this study.

Stone–Geisser's Q^2 value involves predictive relevance of the structural model (Hair et al. 2013). More specifically, Q^2 value assesses prediction capacity of each exogenous latent construct in the model (Henseler et al. 2009). The Q^2 value is obtained using the blindfolding procedure which is a sample reuse method similar to bootstrapping. In the blindfolding method, first, every d^{th} case (respondent) who has given a score (from 1 to 7) to the indicators of each exogenous latent constructs is omitted. Then estimations of parameters are conducted with data of the remaining cases (Hair et al. 2013). Q^2 value essentially reflects the difference between omitted cases and predicted ones. If Q^2 values computed for each endogenous construct are above 0, it suggests that the structural model has predictive relevance (Hair et al. 2013; Henseler et al. 2009).

Assessment of the structural model, which is essentially the assessment of relationships between exogenous and endogenous latent constructs, was also assessment of hypotheses established for this research. Overarching hypotheses were assessed through combined effects, that is, prediction accuracy and predictive relevance (R^2, Adjusted R^2, Q^2) of exogenous constructs in the path model. Then, strengths of the relationships and individual

effects of exogenous constructs, that is, assessment of subsidiary hypotheses, were investigated by means of path coefficients.

Path coefficients of PLS-SEM represent the strength of hypothesised relationships between latent constructs. Path coefficients vary between -1 and +1 and values closer to 1 indicate stronger relationships (Hair et al. 2013). As normality is not an assumption for conducting tests in PLS-SEM, this method relies on a nonparametric bootstrap procedure to test coefficients for significance (Hair et al. 2013). Bootstrapping is a nonparametric approach to estimate the effect of sizes of constructs in a model with no normal distribution assumption for the sample (Preacher & Hayes 2004). Bootstrapping generates bootstrap samples from the original sample repeatedly as if it were the population (Preacher & Kelley 2011). The aim of bootstrapping is to establish a larger original sample containing numbers of bootstrap samples and keep generating bootstrap samples until a stable test statistic is obtained to determine significance of effects in a model (Preacher & Hayes 2008). As the recommended number of bootstrap samples is 5000 (Hair et al 2013; Henseler, Christian & Rudolf 2009), 5000 bootstrap samples were produced in this research to determine significance of path coefficients.

Effect size f^2 measures change in R^2 of an endogenous construct when a single exogenous construct is omitted from the model. Similar to f^2 for assessing individual effects on R^2, q^2 is related to Q^2 assessing individual impact of predictive relevance of each latent construct (Hair et al. 2013; Henseler et al. 2009). Both measures were calculated to assess individual effects, in addition to path coefficients (see Appendix 14).

5.7.1.1 Assessment of overarching hypotheses

In this section, assessment of overarching hypotheses begins with investigation of the combined effect of value co-creation activities on several dimensions of value. Then, the combined effect of social and individual factors' on value co-creation activities is discussed with an examination each of activity individually.

In this research, value co-creation activities explained high levels of variation in social (55%), emotional (60%), and utilitarian value (60%), as well as value for effort (45%) (see Table 5.8). Q^2 values higher than zero indicated that the path model contained predictive relevance for social (0.42), emotional (0.50), and utilitarian (0.45) values, and value for effort (0.34). Results indicate that variance in all value dimensions was explained by performing value co-creation activities. Therefore, hypotheses H_1, H_2, H_3, and H_4 were supported.

Social and individual factors explained high levels of variation in value co-creation activities, specifically information sharing (68%), providing feedback (67%), helping (54%), and rapport building (66%) (see Table 5.8). Q^2 values larger than zero indicated that the path model contained predictive relevance for information sharing (0.44), providing feedback (0.53), helping (0.39), and rapport building (0.55). R^2 figures obtained from analysis of variances in value co-creation activities, namely information sharing, providing feedback, helping and rapport building were explained by social and individual factors. Therefore, hypotheses, H_5, H_6, H_7, and H_8 were supported.

Table 5.8: Assessment of overarching hypotheses (R^2 & Q^2)

	R^2	Adjusted R^2	Q^2
Value co-creation activities and value			
Social value	0.56	0.55	0.42
Emotional value	0.61	0.60	0.50
Utilitarian value	0.61	0.60	0.45
Value for effort	0.46	0.45	0.34
Social / individual factors and value co-creation activities			
Information sharing	0.68	0.68	0.44
Providing feedback	0.68	0.67	0.53
Helping	0.55	0.54	0.39
Rapport building	0.67	0.66	0.55

Notes:

R^2 represents exogenous construct combined effect on the endogenous construct. R^2 ranges from 0 to 1, where higher values indicate higher levels of prediction accuracy (Hair et al. 2013). Adjusted R^2 is the R^2 modified by the number of exogenous constructs relative to sample size (Hair et al. 2013).

Stone–Geisser's Q^2 value indicates predictive relevance of the structural model (Hair et al. 2013). $Q^2>0$ indicates predictive relevance, $Q^2<0$ indicates lack of predictive relevance.

5.7.1.2 Assessment of subsidiary hypotheses

The individual effect of each exogenous construct was assessed by significance of the path coefficient at .95 and .99 confidence levels. First, subsidiary hypotheses formed for value co-creation activities and value types were tested individually. Then, subsidiary hypotheses formed for value co-creation activities and social and individual factors was tested and reported.

Results show that performing information sharing generates social (β =0.52, p<0.01) and utilitarian (β =0.37, p<0.01) value. By providing feedback, community members derived emotional (β =0.22, p<0.01) and utilitarian (β =0.23, p<0.01) value and value for effort (β =0.32, p<0.01). While helping generated utilitarian value (β =0.12, p<0.05), rapport building lead to generation of all value dimensions included in the model, including social (β =0.24, p<0.01), emotional (β =0.46, p<0.01), utilitarian value (β =0.16, p<0.05) and value for effort (β =0.23, p<0.01) (see Table 5.9). Therefore, hypotheses, H_{1a}, H_{1d}, H_{2b}, H_{2d}, H_{3a}, H_{3b}, H_{3c}, H_{3d}, H_{4b}, H_{4d} were supported.

Table 5.9: Assessment of subsidiary hypotheses formed for value co-creation activities and value types (path coefficients)

	Social	Emotional	Utilitarian	Value for effort
Information sharing	0.52**	0.13	0.37**	0.12
Providing feedback	0.05	0.22**	0.23**	0.32**
Helping	0.01	0.06	0.12*	0.10
Rapport building	0.24**	0.46**	0.16*	0.23**

Notes:

Significant effects were obtained through 5000 bootstrapping procedures in SmartPLS 3.0.

Threshold p values: *Significant at p<0.05, **Significant at p<0.01

Social factors and value co-creation activities. Statistically significant coefficients indicated centrality predicted information sharing activity (β =0.44, p<0.01). Members provided feedback in the community when encouraged by social interaction opportunities available in the collaboration (β =0.40, p<0.01). Similarly, members helped others when driven by social interaction opportunities (β =0.31, p<0.01). Finally, rapport building with other members was driven by social interaction opportunities (β =0.17, p<0.05), trust in other members (β =0.24, p<0.01), and the perception of being in a central position in the community (β =0.26, p<0.01) (see Table 5.10). Hence, hypotheses H_{5d}, H_{6a}, H_{7a}, H_{8a}, H_{8b}, H_{8d} were supported.

Individual factors and value co-creation activities. Results reveal that providing feedback was performed when a member was individually motivated (β =0.30, p<0.01) and perceived their ability (β =0.18, p<0.05). Similarly, helping others was performed when members were motivated (β =0.24, p<0.01). Finally, rapport building with other members was driven by motivation (β =0.20, p<0.05). Therefore, hypotheses, H_{6e}, H_{6g}, H_{7e}, H_{8e} were supported.

Table 5.10: Assessment of subsidiary hypotheses formed for value co-creation activities and social and individual factors (path coefficients)

	Information sharing	Providing feedback	Helping	Rapport building
Social factors				
Social interactions	0.15	0.40**	0.31**	0.17*
Trust	0.08	0.08	-0.01	0.24**
Shared vision	-0.01	0.03	0.03	0.01
Centrality	0.44**	-0.05	0.04	0.26**
Individual factors				
Motivation	0.18	0.30**	0.24**	0.20*
Opportunity	0.06	-0.04	0.08	-0.09
Ability	0.04	0.18*	0.15	0.14

Notes:

Significant effects were obtained through 5000 bootstrapping procedures in SmartPLS 3.0.

Threshold p values: *Significant at $p<0.05$, **Significant at $p<0.01$

5.7.2 Stage 2: Mediation effect of learning

As conceptualised in Figure 5.4, and developed in the previous discussion of important relationships, the conceptual model suggested that learning activity mediates relationships among social and individual factors, and value co-creation activities. Mediation hypotheses should be considered only when the causal order of exogenous, endogenous and mediation constructs can be established on logical and theoretical grounds (Preacher & Hayes 2008). It is argued in this research that social and individual factors impact value co-creation activities through a systematic influence of learning, which should be taken into consideration. Therefore, the mediation effect of learning was tested to fully and accurately understand the nature of cause-effect relationships between social and individual factors, and value co-creation activities (Hair et al. 2013). The mediation effect of learning was tested by 12 hypotheses proposed for relationships between social factors and learning, and by 12 hypotheses proposed for paths between individual factors and learning.

To test mediation hypotheses, a three step procedure suggested by Hair et al. (2013) was applied (see Table 5.11). In the first step of mediation testing, results of hypotheses formed in Stage 1 were reviewed. During this process, exogenous constructs with significant effect on endogenous variables were selected and those with no significant effect were removed from the model. In the second step, mediation construct learning was included in the model and significant indirect relationships were identified to determine the mediation role of learning between social and individual factors and value co-creation activities. In the third and last step, 'the variance accounted for' (VAF) value was calculated to determine the type of mediation.

In the first step of mediation analysis, paths included in mediating analysis were determined. It is worth noting that, although this is not a necessary condition (Shrout & Bolger 2002; Zhao, Lynch & Chen 2010), Hair et al. (2013) suggest retaining only significant paths in the model to be tested for mediation, as this approach makes the results of mediation analysis easier to understand and interpret. Therefore, paths found to be statistically significant in the first stage of hypothesis testing were retained in the model (see Table 5.11).

In the second step, the model established based on significant paths was rerun to test indirect relationships with the inclusion of learning in the model as a potential mediator. As bootstrapping is an advocated nonparametric procedure that makes no normality assumptions, to determine indirect cause- effect relationships between exogenous and endogenous constructs via the mediator bootstrapping was applied (Preacher & Hayes 2004, 2008). Significant indirect effects indicated mediation effect of learning activity on paths between social interactions and providing feedback, helping, and rapport building, respectively (see Table 5.11). Similarly, the association between trust and rapport building

was mediated by learning. Learning mediated the path between centrality and information sharing, but not the path between centrality and rapport building. Learning also mediated relationships between social interactions and providing feedback, helping, and rapport building, respectively. Relationships between motivation and providing feedback, helping, and rapport building were also mediated by learning. Finally, learning emerged as a mediator of the relationship between ability and providing feedback.

In the third step, the type (Zhao et al. 2010) or strength (Hair et al. 2013) of mediation was determined via an assessment of the variance accounted for (VAF). VAF is calculated using the formula: VAF = direct effect / (direct effect + indirect effect, provided by Hair et al. (2013). VAF indicates size of the variance in each endogenous variable explained by the indirect relationship through the mediator. Low VAF figures (<20%) occur when the direct effect is significantly high and declines so slightly that it remains as a significant effect with the mediator, but the indirect effect is too small for mediation to take place (Hair et al. 2013). High VAF figures (>80%) indicate that despite considerable reduction in significant direct effects, indirect effects remain significant, which means that full mediation can be assumed. VAF figures between 20% and 80% indicate partial mediation effect.

Results indicated that learning provides full mediation for associations between social interactions and helping (H_{9c}), trust and rapport building (H_{10d}), centrality and information sharing (H_{12a}), and motivation and helping (H_{13c}) (see Table 5.11). Learning also partially mediates the relationships between social interactions and providing feedback (H_{9b}), rapport building (H_{9d}), motivation and providing feedback (H_{13b}), rapport building (H_{13d}), and ability and providing feedback (H_{15b}).

Table 5.11: Three step mediation analysis

		STEP 1	STEP 2	STEP 3	
Hypothesised mediating effects of learning		**Path selection**	**Path coefficients**	**VAF**	**Mediation type**
H_{9a}	Social interaction - Information sharing	Not selected	-	-	-
H_{9b}	Social interaction - Providing feedback	Selected	0.08**	80%	Partial mediation
H_{9c}	Social interaction - Helping	Selected	0.06*	84%	Full mediation
H_{9d}	Social interaction - Rapport building	Selected	0.07*	59%	Partial mediation
H_{10a}	Trust - Information sharing	Not selected	-	-	-
H_{10b}	Trust - Providing feedback	Not selected	-	-	-
H_{10c}	Trust – Helping	Not selected	-	-	-
H_{10d}	Trust - Rapport building	Selected	0.05*	82%	Full mediation
H_{11a}	Shared vision - Information sharing	Not selected	-	-	-
H_{11b}	Shared vision - Providing feedback	Not selected	-	-	-
H_{11c}	Shared vision – Helping	Not selected	-	-	-
H_{11d}	Shared vision - Rapport building	Not selected	-	-	-
H_{12a}	Centrality - Information sharing	Selected	0.05*	90%	Full mediation
H_{12b}	Centrality - Providing feedback	Not selected	-	-	-
H_{12c}	Centrality – Helping	Not selected	-	-	-
H_{12d}	Centrality - Rapport building	Selected	0.03	-	No mediation
H_{13a}	Motivation - Information sharing	Not selected	-	-	-
H_{13b}	Motivation - Providing feedback	Selected	0.07*	75%	Partial mediation
H_{13c}	Motivation – Helping	Selected	0.05*	85%	Full mediation
H_{13d}	Motivation - Rapport building	Selected	0.06*	72%	Partial mediation
H_{14a}	Opportunity - Information sharing	Not selected	-	-	-
H_{14b}	Opportunity - Providing feedback	Not selected	-	-	-
H_{14c}	Opportunity – Helping	Not selected	-	-	-
H_{14d}	Opportunity - Rapport building	Not selected	-	-	-
H_{15a}	Ability - Information sharing	Not selected	-	-	-
H_{15b}	Ability - Providing feedback	Selected	0.05*	67%	Partial mediation
H_{15c}	Ability - Helping	Not selected	-	-	-
H_{15d}	Ability - Rapport building	Not selected	-	-	-

Notes: Significant effects were obtained through 5000 bootstrapping procedures in SmartPLS 3.0.

Threshold p values: *Significant at p<0.05, **Significant at p<0.01

5.7.3 Stage 3: Moderation effect of flow state

The moderation effect of a construct should be considered when the aim is to determine whether the construct influences an exogenous construct's effect on an endogenous construct (Baron & Kenny 1986; Hayes 2013). Moderating effects have most commonly been tested using a categorical moderator construct that divides the exogenous variable

into subgroups and indicates the domains of exogenous construct that have an effect on the given endogenous construct (Baron & Kenny 1986). However, where the hypothesised moderator construct is continuous, the product indicator approach is used (Henseler & Fassott 2010). In this research, as flow state was measured by a 10-item continuous scale, the moderating effect was tested using the product indicator approach. Moderation analysis was applied to determine whether flow state improves social and individual factor's predictability of learning. Two overarching hypotheses were formed to test the moderation effect (see Table 5.12).

Table 5.12: Stage 3: Moderation analysis - proposed hypotheses

Moderation effect of flow state	
	H_{16}: The relationship between social factors with learning is moderated by a flow state H_{17}: The relationship between individual factors with learning is moderated by a flow state
H_{16a}	The relationship between social interaction opportunities and learning is moderated by a flow state
H_{16b}	The relationship between trust and learning is moderated by a flow state
H_{16c}	The relationship between shared vision and learning is moderated by a flow state
H_{16d}	The relationship between centrality and learning is moderated by a flow state
H_{17a}	The relationship between motivation and learning is moderated by a flow state
H_{17b}	The relationship between opportunity and learning is moderated by a flow state
H_{17c}	The relationship between ability and learning is moderated by a flow state

To employ a product indicator approach, interaction products of each indicator of the exogenous latent construct with each indicator of the moderator construct were built (Chin et al. 2003). Interaction products were generated in SmartPLS 3.0 and the model was rerun with the inclusion of interaction products. Additionally, to test the moderation effect of flow state once the balance of skills and challenges was established, the sample was divided into two groups. The first group consisted of respondents who perceive the balance (Balance), and second group consisted of respondents who do not perceive the balance (No balance). The two groups were generated by a dichotomous variable created from the difference between skills and challenge items of the balance construct. The group

obtaining the neutral score (0 point) of dichotomous variable was regarded as the 'Balance' group and the remaining were grouped as 'No balance". Results indicated that 55 respondents stated a balance between their skills and challenges present for collaboration. On the other hand, 254 respondents did not perceive a balance of skills and challenges.

In contrast to research hypotheses, results indicated that the influence of social and individual factors on learning did not significantly improve when the intensity of flow state increased. Similarly, the flow state moderation effect was not detected amongst respondents who perceived a balance of skills and challenges. Therefore, hypotheses $H_{16a-16d}$ and $H_{17a-17c}$ were not supported (see Table 5.13).

Table 5.13: Flow moderation between social and individual factors and learning

			Confidence intervals	
		Total group	**Balance**	**No balance**
Sample size		309	55	254
Relative segment size		-	0.16	0.84
	Hypothesised interactions	**Path coefficients**		
Social factors	Social interactions x flow x learning	-0.01	0.14	-0.02
	Trust x flow x learning	0.01	0.13	-0.03
	Shared vision x flow x learning	-0.01	0.07	-0.04
	Centrality x flow x learning	0.00	0.09	-0.03
Individual factors	Motivation x flow x learning	-0.01	-0.09	-0.02
	Opportunity x flow x learning	-0.01	0.13	-0.01
	Ability x flow x learning	-0.01	0.13	0.00

Notes:

Significant effects were obtained through 5000 bootstrapping procedures in SmartPLS 3.0.

Threshold p values: *Significant at $p<0.05$, **Significant at $p<0.01$

To test the key role of the balance of skills and challenges leading the flow state experience (Engeser & Rheinberg 2008; Mathwick & Rigdon 2004; Wang & Hsu 2014), significant differences between Balance and No balance was examined. To test the significance of differences between coefficients obtained from the two groups, bootstrap-

based multi group analysis was applied, as suggested in the literature (e.g. Hair et al. 2013; Sarstedt, Schwaiger & Taylor 2011). Significant differences in group-specific path coefficients indicated that flow state had a higher potential moderating effect amongst individuals who perceive a balance of skills and challenges.

As the sample size was too small to assume normality, a non-parametric test was applied to test differences between path coefficients of balance and no balance groups (Sarstedt et al. 2011). Sarstedt et al. (2011) suggest a three step non-parametric approach to compare path coefficients across groups. According to this approach, as opposed to p values of path coefficients, group specific bootstrap confidence intervals are directly compared, regardless of whether data of subgroups is normally distributed. Following the approach of Sarstedt et al. (2011):

1) SmartPLS 3.0 path modelling algorithms were run separately for both groups.
2) Bias-corrected bootstrap confidence intervals (at 95% confidence level) for two groups were obtained.
3) Confidence intervals were observed to determine significant differences. If there was no overlap observed in confidence intervals of compared groups, it was assumed that group-specific path coefficients were significantly different (Sarstedt et al. 2011).

Results indicated no significant difference between coefficients for Balance and No balance groups (see Table 5.14). Therefore, assumptions related to the key role of balance on flow state was not supported.

Table 5.14: Flow moderation between learning and value co-creation activities

	Confidence intervals		
	Balance	**No balance**	**Significance**
Sample size	55	254	
Relative segment size	0.16	0.84	
Social interactions x flow x learning	[-0.082, 0.029]	[-0.152, 0.361]	Not significant
Trust x flow x learning	[-0.073, 0.047]	[-0.149, 0.356]	Not significant
Shared vision x flow x learning	[-0.085, 0.04]	[-0.173, 0.298]	Not significant
Centrality x flow x learning	[-0.08, 0.056]	[-0.304, 0.179]	Not significant
Motivation x flow x learning	[-0.082, 0.046]	[-0.21, 0.324]	Not significant
Opportunity x flow x learning	[-0.093, 0.023]	[-0.205, 0.273]	Not significant
Ability x flow x learning	[-0.093, 0.045]	[-0.228, 0.322]	Not significant

Notes: Significant differences at <0.05

5.8. Conclusion

This chapter presented results of statistical analysis performed to test hypotheses developed in this research. Following outlier detection and data cleaning processes, assessment of fundamental assumptions of multivariate analysis were presented. This was followed by discussion of SEM method selection. As a result of assumptions regarding the nature of this research and concerns with regards to heteroscedasticity and abnormality, variance-based SEM with partial least squares (PLS) path modelling was employed in SmartPLS. The measurement model was assessed, including evaluation of reliability and validity of constructs. During assessments of the structural model, collinearity between latent variables was established and no heterogeneity was observed in collected data. During three stages of the hypotheses testing process, direct relationships between constructs and learning mediation and flow state moderating effects were tested. In Table 5.15, a summary of the results concerning each hypothesis of the research is presented.

Table 5.15: Summary of hypotheses tested

#	Hypotheses tested	Status
	Hypotheses related to direct relationships	
H_1	Value co-creation activities predict social value	Supported
H_{1a}	Information /knowledge sharing predicts social value	Supported
H_{1b}	Providing feedback predicts social value	Not supported
H_{1c}	Helping predicts social value	Not supported
H_{1d}	Rapport building predicts social value	Supported
H_2	Value co-creation activities predict emotional value	Supported
H_{2a}	Information /knowledge sharing predicts emotional value	Not supported
H_{2b}	Providing feedback predicts emotional value	Supported
H_{2c}	Helping predicts emotional value	Not supported
H_{2d}	Rapport building predicts emotional value	Supported
H_3	Value co-creation activities predict utilitarian value	Supported
H_{3a}	Information /knowledge sharing predicts utilitarian value	Supported
H_{3b}	Providing feedback predicts utilitarian value	Supported
H_{3c}	Helping predicts utilitarian value	Supported
H_{3d}	Rapport building predicts utilitarian value	Supported
	Hypotheses related to direct relationships	
H_4	Value co-creation activities predict **value for effort**	Supported
H_{4a}	Information /knowledge sharing predicts value for effort	Not supported
H_{4b}	Providing feedback predicts value for effort	Supported
H_{4c}	Helping predicts value for effort	Not supported
H_{4d}	Rapport building predicts value for effort	Supported
H_5	Social and individual factors predict **information sharing**	Supported
H_{5a}	Social interaction opportunities predict Information sharing	Not supported
H_{5b}	Trust in other members predicts Information sharing	Not supported
H_{5c}	Shared vision predicts Information sharing	Not supported
H_{5d}	Centrality predicts Information sharing	Supported
H_{5e}	Motivation predicts Information sharing	Not supported
H_{5f}	Opportunity predicts Information sharing	Not supported
H_{5g}	Ability predicts Information sharing	Not supported
H_6	Social and individual factors predict **providing feedback**	Supported
H_{6a}	Social interaction opportunities predict providing feedback	Supported
H_{6b}	Trust in other members predicts providing feedback	Not supported
H_{6c}	Shared vision predicts providing feedback	Not supported
H_{6d}	Centrality predicts providing feedback	Not supported
H_{6e}	Motivation predicts providing feedback	Supported
H_{6f}	Opportunity predicts providing feedback	Not supported
H_{6g}	Ability predicts providing feedback	Supported
H_7	Social and individual factors predict **helping**	Supported
H_{7a}	Social interaction opportunities predict helping	Supported
H_{7b}	Trust in other members predicts helping	Not supported
H_{7c}	Shared vision predicts helping	Not supported
H_{7d}	Centrality predicts helping	Not supported
H_{7e}	Motivation predicts helping	Supported
H_{7f}	Opportunity predicts helping	Not supported
H_{7g}	Ability predicts helping	Not supported

Table 5.15: Summary of hypotheses tested – cont'd

#	Hypotheses tested	Status
H_8	Social and individual factors predict **rapport building**	Supported
H_{8a}	Social interaction opportunities predict rapport building	Supported
H_{8b}	Trust in other members predicts rapport building	Supported
H_{8c}	Shared vision predicts rapport building	Not supported
H_{8d}	Centrality predicts rapport building	Supported
H_{8e}	Motivation predicts rapport building	Supported
H_{8f}	Opportunity predicts rapport building	Not supported
H_{8g}	Ability predicts rapport building	Not supported
	Hypothesis related to learning's mediating effect	
H_{9a}	Social interaction - Information sharing	Not tested
H_{9b}	Social interaction - Providing feedback	Partially supported
H_{9c}	Social interaction - Helping	Supported
H_{9d}	Social interaction - Rapport building	Partially supported
H_{10a}	Trust - Information sharing	Not tested
H_{10b}	Trust - Providing feedback	Not tested
H_{10c}	Trust - Helping	Not tested
H_{10d}	Trust - Rapport building	Supported
H_{11a}	Shared vision - Information sharing	Not tested
H_{11b}	Shared vision - Providing feedback	Not tested
H_{11c}	Shared vision – Helping	Not tested
H_{11d}	Shared vision - Rapport building	Not tested
H_{12a}	Centrality - Information sharing	Supported
H_{12b}	Centrality - Providing feedback	Not tested
H_{12c}	Centrality - Helping	Not tested
H_{12d}	Centrality - Rapport building	Not supported
H_{13a}	Motivation - Information sharing	Not tested
H_{13b}	Motivation - Providing feedback	Partially supported
H_{13c}	Motivation - Helping	Supported
H_{13d}	Motivation - Rapport building	Partially supported
H_{14a}	Opportunity - Information sharing	Not tested
H_{14b}	Opportunity - Providing feedback	Not tested
H_{14c}	Opportunity - Helping	Not tested
H_{14d}	Opportunity - Rapport building	Not tested
H_{15a}	Ability - Information sharing	Not tested
H_{15b}	Ability - Providing feedback	Partially supported
H_{15c}	Ability - Helping	Not tested
H_{15d}	Ability - Rapport building	Not tested
	Hypothesis related to flow's moderating effect	
H_{16a}	The relationship between social interaction opportunities and learning is moderated by a flow state	Not supported
H_{16b}	The relationship between trust and learning is moderated by a flow state	Not supported
H_{16c}	The relationship between shared vision and learning is moderated by a flow state	Not supported
H_{16d}	The relationship between centrality and learning is moderated by a flow state	Not supported
H_{17a}	The relationship between motivation and learning is moderated by a flow state	Not supported
H_{17b}	The relationship between opportunity and learning is moderated by a flow state	Not supported
H_{17c}	The relationship between ability and learning is moderated by a flow state	Not supported

Chapter 6: DISCUSSION

6.1. Introduction

This chapter addresses the theoretical and managerial contributions of this thesis, as well as its limitations and directions for future research. Specifically, three primary contributions are elaborated upon; firstly, this thesis provides an improved understanding of value co-creation in the online collaborative innovation community ; secondly, the research empirically evaluates the relationship between value co-creation activities and different dimensions of value; and thirdly, the research contributes to understanding the impact of social and individual factors on performing different value co-creation activities with the inclusion of learning and the flow state as relevant mechanisms. The discussion then moves to important managerial implications regarding how to improve the effectiveness of collaboration amongst individuals in innovation communities. This study contributes to the understandings of S-D logic of marketing by examining value co-creation from an individual member's point of view in the collaborative innovation community context. This study also provides online community managers with a unique understanding of an individual perspective on value co-creation in collaborative communities with a focus on innovation. The limitations of this thesis are addressed within this chapter leading to important directions for future research. The chapter closes with concluding thoughts on the contribution of this thesis from a theoretical and practical perspective.

6.2. Contributions of the research

6.2.1 Value co-creation in online collaborative innovation communities

This thesis sought to understand the individual actor's role in value co-creation in a collaborative innovation context. Following the selection of a set of self-generated value co-creation activities via an extensive literature review, this thesis expanded present knowledge on value co-creation in collaborative innovation communities by examining self-generated activities that lead to several value dimensions from an individual member's point of view.

Collaboration with customers for the purpose of innovation has been confirmed as advantageous for companies, as collaboration generally results in a successful innovation process (e.g. Mahr et al. 2014; Roberts et al. 2010) or successful products (e.g. Antorini & Muñiz 2013). Customers are seen as an important source of information (Füller et al. 2006; Nambisan 2002), taking part in the innovation as knowledge contributors (Mahr et al. 2014; Tsai, 2009), co-developers or designers (Jeppesen & Molin 2003). Scholars in the field of strategy and marketing, who advocate the important role of customers in value co-creation, have recognised the nature of online collaborative innovation that enhances the customer role. For instance, it has been argued that collaborative innovation platforms allow companies to make and communicate value propositions (Sawhney et al. 2005) or customers to realise the value of the innovation community (di Gango et al. 2010). Indeed, the collaboration experience itself may offer value for customers (Rowley et al. 2007; Füller 2010). Moreover, in collaborative innovation customers become co-creators of value or (Füller et al. 2006; Nambisan 2002), participants of (Nambisan & Baron 2009), or contributors to (Nambisan & Baron 2010) value co-creation.

Despite a number of studies that have related value co-creation with collaborative innovation, research to date has failed to use the collaborative innovation context to address some important concerns raised by scholars in terms of expanding understandings of value co-creation. For instance, despite important discussions around value co-creation with customers, it remains unclear what customers actually do when they co-create value (McColl-Kennedy et al. 2012), particularly in a collaborative innovation community context. In this thesis, a set of value co-creation activities were identified from the literature to obtain a deeper understanding of the individuals' role in value co-creation during collaborative innovation. . The identification and integration of these value co-creation activities in the collaborative innovation context is novel for several reasons. First, rather than viewing participation in innovation as a value co-creation activity (e.g. Roberts et al. 2010, Hoyer et al. 2010), this thesis focuses on several activities that allow individuals to derive value. This provides a unique perspective as it captures value co-creation in online innovation communities, arguing that individual members contribute not only to the co-creation of innovation from the perspective of the organisation but also to the co-creation of value in their own terms by performing self-generated activities. Second, this thesis moves beyond conceptual development or identification of activities that can be performed during innovation (e.g. Faraj et al. 2011; Fuchs & Schreier 2011; Kohler, Fueller, Matzler et al. 2011) towards empirically measuring those activities at the individual level as well as the relationship between the activities and their drivers and outcomes. The independent examination of value co-creation activities and their nomological network offers unique insight into the differing drivers and effects of these activities, critical for the continuing theoretical development of this area.

Implementation of a value co-creation perspective in collaborative innovation provides an alternative perspective to traditional thought regarding innovation in several ways (Lusch & Nambisan 2015; Vargo et al. 2015). First, extending the primary research focus beyond the role of the company's customers in the innovation process (e.g. Fuchs & Schreier 2011; Sawhney et al. 2005), this thesis contributes to the knowledge of collaborative innovation by including both users and non-users of the company as the unit of analysis. Therefore, this approach contributes to the broader perspective proposed in S-D logic (Vargo & Lusch 2016), by arguing that value co-creation through resource integration does not occur during dyadic interactions (business-to-consumer or business-to-business), but in service ecosystems in which multiple interactions occur among multiple independent actors (Vargo and Lusch 2016). This is relevant to one of the updated axioms of S-D logic which argues "value is cocreated by multiple actors, always including the beneficiary" (Vargo and Lusch 2016, p. 8). Despite recognition of potential users (Kohler, Fueller, Matzleror et al. 2011), nonusers (Sawhney et al. 2005) and independent innovators (Lusch & Nambisan 2015), extant literature on collaborative innovation community members continues to focus on users (e.g. Bayus 2013; di Gangi & Wasko 2009; di Gangi et al. 2010). This thesis further develops our understanding of value co-creation by integrating all independent actors collaborating in innovation communities.

Second, this thesis builds upon the traditional view of innovation based on knowledge exchange to consider value co-creation through resource integration. According to the traditional view of innovation, new knowledge with potential of being an innovation is created through knowledge exchange (Quintane, Casselman, Reiche & Nylund 2011). Studies concerning collaborative innovation have thus considered new knowledge creation as a focal concept, with research predominantly investigating a user's knowledge exchange behaviour (e.g. Mahr et al. 2014; Blazevic & Lievens 2008; Ardichvili, Page & Wentling

2003). The primary objective of the aforementioned studies has been to understand the outcomes of collaboration from a company's point of view, to provide recommendations for more effective innovation processes and encourage users to exchange knowledge to create new knowledge. However, the findings from this thesis indicate that, by performing activities such as information sharing, providing feedback, helping and rapport building, members contribute not only to the creation of new knowledge, but also the co-creation of different dimensions of value in their own terms. Therefore, this thesis contributes to our understanding of the benefits of collaborating in innovation from an individual member perspective, as well as the different activities that drive these benefits.

6.2.2 Establishment of the relationship between value co-creation activities and value dimensions empirically

This thesis demonstrates an empirical relationship between value co-creation activities and value dimensions. Several customer value co-creation behaviour scales have been developed and measured in the previous literature (e.g. Chan et al. 2010; Groth 2005; Yi & Gong 2013), aligned with the argument that if customers show certain behaviours (e.g. extra role/citizenship or in role/participation behaviours) (Chan et al. 2010; Groth 2005; Yi & Gong 2013) they contribute to value co-creation. Recently, a set of self-generated value co-creation activities were identified that recognise activities performed by customers while they contribute to value co-creation on their own terms (McColl-Kennedy et al. 2012). Using this list of activities researchers established the link between different levels of customer effort in value co-creation activities and (1) quality of life, (2) satisfaction with service and (3) behavioural intentions (Sweeney et al. 2015). However, the link between value co-creation activities and value as an outcome had not been established

empirically, despite being recognised in several calls for future research made by scholars (Gummerus 2010; Payne et al. 2008; Vargo et al. 2008).

Previous research views value dimensions as antecedents of customer choice behaviour (e.g. Pura 2005; Sheth et al. 1991; Sweeney & Soutar 2001) or future intentions (e.g. Cronin et al. 2000; Gruen et al. 2007; Petrick 2002), with a few exceptions to this prevailing view. For instance, it has been demonstrated that customer participation in service recovery creates higher value for future participation (Dong et al. 2008). It was also empirically confirmed that subjective participation, that is, the extent to which an individual feels that he/she influences a decision, generates utilitarian, emotional, and social value (Mohd-Any et al. 2014). This thesis contributes to an understanding that community members engage in value co-creation activities with the expectation of a value outcome, consistent with the perspective of S-D logic, and hence views value as a consequence of activity rather than an antecedent.

By examining the relationship between value co-creation activities (including information sharing, providing feedback, helping, and rapport building) and value dimensions (that are social, emotional, utilitarian value and value for effort) this thesis confirms the ability of value co-creation activities to explain different dimensions of value. As expected, performing the set of value co-creation activities leads community members to perceive utilitarian, emotional, and social value as well as value for effort from the collaboration experience. In other words, all value dimensions selected for the research, namely utilitarian (R^2 = 61%), emotional (R^2 = 61%) and social (R^2 = 56%) value and value for effort (R^2 = 46%), perceived from the collaboration are attributed to performing value co-creation activities. In the context of tourism, Mohd-Any et al. (2014) demonstrated participation to influence different value dimensions, this study broadens our

understanding of the empirical link between various value co-creation activities and value dimensions independently for the first time.

It is demonstrated here that different value co-creation activities predict different dimensions of value. For example, rapport building with other community members generates social, emotional, and utilitarian value and value for effort. Hence, building harmonious relationships with other members in the collaborative innovation community has a significant effect on prediction of value for community members. This finding supports the central role of relating in value co-creation, as emphasised by Ballantyne and Varey (2006). These authors highlight the importance of relationship quality in terms of maintaining the sustainability of value co-creation. Results of this study show that rapport building is one of the most significant activities in terms of explaining emotional value (see Appendix 14). As emotional value reflects the fun and enjoyment aspects of collaboration experience (Pura 2005), feeling connected and in harmony with others in the community is a key predictor of emotional value.

Providing feedback is another activity that has a significant effect on all value dimensions, with the exception of social value. In the service marketing literature, providing feedback is viewed as a responsible behaviour (Bettencourt 1997; Groth 2005; Yi & Gong 2013) that customers perform to improve the services they have received. Customers' proactive behaviours, such as providing feedback, create several advantages for service providers. For instance, by providing feedback customers become productive partners of the company (Bettencourt 1997), or they contribute to production of better services (Groth 2005). However, the benefits from the customer's point of view have received less attention. By taking the independent actor's point of view in the collaboration experience,

this thesis confirms that providing feedback generates emotional value, utilitarian value and value for effort for the individual community member.

In an online collaborative innovation community context, feedback is provided to improve a fellow member's idea or share a comment on a topic discussed by the community. Considering that social value reflects enhancement of one's self-image (Pura 2005; Sigala 2006), this thesis found that providing feedback does not generate an increase in a collaborative innovation community member's perceived status or image in the community. One plausible reason for this unexpected result could be related to the nature of the activity of providing feedback. Although feedback provided is visible to others, community members may view providing feedback as an isolated activity between them and the other member to which they give feedback, or between them and community management. Therefore, it is suggested that community members do not perceive acceptance by others when they provide feedback in the community.

While results of this thesis confirm that information sharing has a significant effect on predicting social value and utilitarian value, this activity generates neither emotional value nor value for effort. Indeed, information sharing is a key predictor of social value (see Appendix 14) with this thesis demonstrating that frequent, extensive information sharing on various topics and discussions is one of the most important activities that influence collaborative innovation community members' self-image. This finding contributes to the literature concerning knowledge sharing behaviour in online communities (e.g. Chiu et al. 2006; Hsu et al. 2007; Kankanhalli, Tan & Wei 2005). Community members are driven to share knowledge to receive social recognition (Hsu et al. 2007; Kankanhalli et al. 2005) or to build up reputation (Chiu et al. 2006). This thesis confirms that if members share information in collaborative innovation they perceive social value as a result. Although

findings show that performing any activity helps community members to perceive utilitarian value, information sharing particularly has a strong effect on predicting it. Individuals derive value by participating in a company's website activities, in which they use the facilities provided by the company (Mohd-Any et al. 2014). Drawing from this idea, it can be argued that in online collaborative innovation communities, members perceive utilitarian value once they share information actively and regularly by using features facilitated by the innovating company.

Research results show that helping other innovation community members influences only utilitarian value perceptions. This result is surprising given the positive outcomes of helping reported in the literature. Helping others creates positive feelings (Anderson & Williams 1996), satisfaction (Spitzmuller & Van Dyne 2013), and enjoyment (Wang et al. 2012). It is also suggested that, although helping may generate positive emotions during offline service delivery, helping is a spontaneous activity that customers perform voluntarily (Yi & Gong 2013) only when their assistance is needed. Similarly, in an online collaborative innovation community members help only when a fellow member seems to need assistance. Therefore it can be argued that, members would perceive utilitarian value, which is convenience and effectiveness of community that allow helping when it is needed. However, spontaneous incidences in the community in which helping is performed does not enhance social, emotional value and value for effort.

6.2.3 Drivers of performing value co-creation activities

This thesis adopts the method of Wasko and Faraj (2005) regarding the collaborative innovation context and examines the prediction effect of individual and social factors collectively. Results indicate that social and individual drivers explain value co-creation activities at different levels. As expected, all value co-creation activities, namely

information sharing (R^2 = 68%), providing feedback (R^2 = 68%), rapport building (R^2 = 67%) and helping (R^2 = 55%), performed in collaboration are attributed to social and individual factors. These results enhance evidence of the effect of social and individual factors obtained in previous empirical studies in different contexts. For instance, social capital dimensions explained 64% of variation in knowledge quality and 17% of variance of knowledge quantity shared in the community (Chiu et al. 2006). Individual factors (MOA) have the capacity to explain 41% of knowledge exchange behaviour (Gruen et al. 2007). According to Wasko and Faraj (2005), social capital dimensions and individual factors, including reputation and enjoy helping, collectively explain 12% of variation in helpfulness of knowledge and 37% of knowledge volume contributed in the community. The higher R^2 figures obtained in this thesis support the significant collective effect of individual and social factors.

The findings contribute to knowledge of both social capital and MOA theories in several ways. For instance, although social capital has been proposed as a driver of collective actions (e.g. Wasko & Faraj 2005; Nahapiet & Ghoshal 1998) such as knowledge contribution and exchange. Comparatively, the MOA framework has never been proposed as a foundation for collective actions in the previous literature, yet it has been confirmed to be an effective driving factor for customer to customer know-how exchange (Gruen et al. 2007; Bigné et al. 2013). This study confirms for the first time that social capital in the form of trust, shared vision and centrality and MOA are collectively significant driving factors for members who integrate and exchange resources as well as contribute in a collaborative act with others. Therefore, this thesis contributes to the understandings of collective collaborative actions in online platforms (Faraj et al. 2011; Schau et al. 2009) by confirming the key role of social capital and MOA frameworks as driving factors, more

specifically their collective positive impact on performing activities in a collective act with all the other actors involved in innovation.

Inclusion of social interaction opportunities as a social factor is another contribution of this research. The value co-creation perspective adopted in this thesis is in line with S-D logic literature in which the importance of interactions amongst actors is emphasised (Ballantyne & Varey 2006; McColl-Kennedy et al. 2012; Payne et al. 2005; Vargo & Lusch 2016). It has been extensively discussed in the S-D logic literature that interactions among the actors underlie value co-creation through resource exchange and integration. By taking the perspective of an individual member, this study provides a unique perspective of their perception on the social interaction opportunities provided by the collaborative innovation community. Therefore, in this study the perceptions of opportunities provided for individuals to socially interact with each other drive members to contribute to value co-creation. To provide empirical support for the importance of interactions, empirical relationships between social interaction opportunities and value co-creation activities were examined. Results provide support for the proposed important role of social interactions for value co-creation by confirming social interactions as a key driver of performing value co-creation activities. The link between social interactions and individual value co-creation activities provide valuable managerial implications for the management of value co-creation activities which is discussed in the managerial implications section of this chapter.

The conceptual model established in this thesis allowed examination of empirical relationships between social and individual drivers and value co-creation activities separately. Results confirm the difference between performing information sharing and providing feedback as online community activities. As argued earlier, providing feedback to improve ideas or the community in general requires making a comment on a specific

issue. Results indicate that before publicly sharing a comment, members need to have communication opportunities, feel individually motivated, and perceive their ability. On the other hand, information sharing is driven by the centrality of a member within the community structure. Hence, members share information regularly and on different occasions as long as they feel embedded in the community as a core and important member. The insights indicating different reasons for performing different activities provides useful managerial implications, discussed later in this chapter.

Results of this study also have important implications for understanding the importance of rapport building. It is a value co-creation activity that is driven by both social and individual factors and generates all value dimensions included in the conceptual framework of this study. For instance, trust in other members emerges as a significant predictor for rapport building. This result is consistent with previous research indicating positive effects of trust on relationship building (e.g. Morgan & Hunt 1994; Lewicki et al. 1998). Building on extant knowledge, this thesis provides new insight into the role of a member's centrality in online communities. In this thesis, instead of measuring the number of connections (e.g. Wasko & Faraj 2005; Sparrowe et al. 2001), a community member's own perception of his/her position in the community (e.g. Ahuja et al. 2003; Hsiao & Chiou 2012) was considered to measure rapport building. Results suggest that when members feel at the centre of the community they build harmonious relationships with fellow members. The contribution of this finding is twofold. First, it provides an insight regarding the dynamics of relationship building in an online community where communications occur amongst geographically distributed members (Ahuja et al. 2003; Muñiz & O'Guinn 2001). Second, it identifies an important driver for rapport building confirmed as a key activity generating value across multiple dimensions.

6.2.4 Indirect effects of learning and flow state

This research is the first to provide empirical evidence of the important role of learning in value co-creation through resource integration proposed by scholars who make theoretical contributions to S-D logic (e.g. Ballantyne & Varey 2006; Hibbert et al. 2012; Payne et al. 2008; Vargo & Lusch 2016). Specifically, this thesis empirically confirms that learning mediates the relationships between social interactions, social capital, individual factors and value co-creation activities respectively.

S-D logic of marketing argues that communication with customers should be based on learning together (Ballantyne & Varey 2006). Communications should aim to learn from customers and influence their learning to help them utilise their own resources and those of the service provider (Payne et al. 2008). Therefore, it is argued that acquiring the competences through learning makes customers effective resource integrators as they engage in value co-creation activities (Hibbert et al. 2012). This study is the first to empirically confirm the key role learning plays in a collaborative innovation community context, as it mediates the impact of social and individual drivers on value co-creation activities. Hence, community members collaborate for innovation in which they exchange knowledge to create new knowledge and also acquire knowledge and information that contribute to their value co-creation activities. In this thesis, learning contains three aspects, namely (1) gaining new knowledge on developments of products/services, (2) obtaining solutions for individual problems regarding products/services, and (3) enhancing knowledge about dynamics of community collaboration. Results demonstrate that social interactions and motivation become stronger drivers of providing feedback, rapport building, and helping if community members perform learning.

The confirmed mediating effect of learning offers an important contribution for understanding value co-creation from an individual's perspective. Specifically, individuals gain competences to integrate their resources in value co-creation from mutual learning (Ballantyne & Varey 2006; Payne et al. 2008). Results of this thesis show that social and individual factors become stronger drivers when members enhance their knowledge of how to collaborate in the community. For instance, social interaction opportunities first enable community members to learn how to collaborate. They then use their enhanced knowledge to provide feedback, help, and build rapport with others. Similarly, community members first are motivated, in other words they have desire and energy, to enhance their capabilities to collaborate in the community. They then use their learnings to perform the same activities of providing feedback, helping, and building rapport.

Although flow state has never been discussed in literature related to either S-D logic or collaborative innovation, the balance of skills and challenges that leads individuals to experience flow state provides a unique insight to obtain a deeper understanding on the dynamics and mechanisms that drive community members to engage in co-creation of value activities. Therefore, based on the literature that focuses on consumer and learning behaviour, this thesis predicted a moderating effect of flow state on the relationship between social and individual factors and learning given the central role of flow as an independent variable in terms of learning amongst students in electronic studies (Choi et al. 2007) and amongst customers in the online shopping context (Hoffman & Novak 1996). Despite the expectations, this thesis found that flow state does not moderate the relationship between social and individual drivers and learning. The research context may offer one plausible explanation for the lack of a significant effect. The study of flow essentially focuses on investigating an optimum experience expressed by individuals who engage in an activity that generates benefits within itself, not in the form of material

incentives (Csikszentmihalyi 1982). Therefore, in the literature flow state is commonly tested as reported by individuals following performing the activities (e.g. shopping online, playing online games, surfing the internet). However, in online collaborative innovation communities, collaboration occurs at any time between members active in the community. Hence, the cross-sectional design used in this thesis may have limited the possibility of measuring flow state following its actual occurrence.

6.3. Managerial implications

The results of this study have stimulating implications for managers interested in managing online communities aimed at leveraging collaborative innovation with individual actors for competitive advantage. Results provide managerial guidance in two ways. First, implications regarding management of value co-creation activities in online communities are outlined. Second, implications of learning in online collaboration are presented.

6.3.1. Drivers and outcomes of value co-creation activities

This thesis integrates innovation with value co-creation in service ecosystems where multiple actors collaborate and create value as resource integrators (Vargo et al. 2015). Drawing on S-D logic, companies should shift their strategies from assigning a specific role for only their customers to undertake in their innovation endeavours, to giving space for all relevant actors to perform value co-creation activities (McColl-Kennedy et al. 2012) with a focus on innovation. This thesis provides managerial implications relating to drivers and outcomes of value co-creation activities performed by members of online collaborative innovation communities.

Rapport building emerged as an important self-generated activity in this study due to its ability to significantly influence all value dimensions. To encourage rapport building, social factors, such as social interaction opportunities, trust and centrality, as well as individual motivation, should be considered as facilitators. Therefore, companies should not only provide social interaction opportunities, but also create enjoyable interactions amongst community members. Community managements can set interactive schemes in which community members enjoy each other's company. Community members build rapport when they feel important in the community and believe in others' honesty and consideration. Although companies may not control rapport building in the community, they may create rapport among members by building a trustworthy environment and make each member feel an important part of the community. Individually, when members feel the energy and desire, they build rapport with others. Consequently, when members build harmonious connections in the community they enjoy collaborating and feel accepted. Building rapport also leads members to perceive utilitarian and value of their effort. Individuals are more likely to build rapport during interactions, if they develop personal interests in each other (Gremler & Gwinner 2008). In order to motivate community members to build rapport, community management can encourage interest amongst community members in each other by developing mechanisms in which each community member is introduced to the community and given opportunity to share personal interests with others.

Providing feedback is another value activity performed by individually motivated members who believe in their ability to collaborate. Social interaction opportunities are important for members to share a feedback in the community. Customer feedback can be a valuable source for companies to achieve their fundamental purpose, that is, meeting

customer needs (Barlow & Møller 1996). This thesis shows that providing feedback activity also generates emotional, utilitarian value and value for effort for the members. Community management should not necessarily assign providing feedback as a role for members, but motivate members to provide feedback by emphasising benefits from a member's point of view. Community management should create social interaction platforms in which members are involved in conversations. Community management should also encourage providing feedback individually by influencing member perceptions of their ability. Community management can consider providing detailed instructions and frequently asked questions section in the community website to encourage providing feedback.

Information sharing is driven by centrality and in turn facilitates creation of social and utilitarian value. Thus, central members who share information feel accepted, perceived highly by others and perceive utilitarian value of the community. Information sharing in online collaborative communities is different from submitting new ideas, in terms of being a self-generated activity rather than a role described by the community management. It is known that ideas shared by customers during online collaboration can be radical and incremental (Gustafsson et al. 2012; Magnusson 2009), new and feasible (Füller et al. 2006), and have potential to become better looking and more relevant (Antorini & Muñiz 2013) products with potential of market success (Franke & Shah 2003). By taking a community members' point of view, this thesis shows that community members also derive value as a result of collaboration if they regularly share information during community activities. Community management should drive members to share information by communicating the importance of the information shared.

Community managers should recognise the difference between providing feedback and information sharing, as the difference between them is evident in this research. Providing feedback should be considered an individually driven activity, as it is performed due to individual reasons and members derive emotional value as a consequence. This suggests that providing feedback is performed to improve the collaboration experience for everyone in the community. On the other hand, information sharing is a socially driven activity which results in social value. As Lüthje et al. (2005) state, information shared by customers can be 'sticky', that is, difficult to interpret and implement. Results of this thesis indicate that community members may be more socially conscious while sharing information, as they are aware of the importance of their knowledge. They presumably assume that the way they communicate their own information in the community will be judged by others. Therefore, providing feedback should be encouraged at an individual level, whereas information sharing should be considered a social activity. To encourage providing feedback, community management can communicate real life stories displaying positive effects of feedback on collaboration experiences of other members. Information sharing can be encouraged by publicly showing how shared information is contributed to the collaboration community.

Helping seems to generate only utilitarian value, however, it is an important activity that should be fostered by community management. Community members who perceive opportunities to communicate with others and feel individual desire provide their assistance when needed. Helping opportunities during social interactions can be highlighted. Members should be aware that they can help if they see someone seems to need assistance. Community management should provide members with appropriate tools to help each other. Moreover, helping should be communicated as a part of community culture (Mathwick et al. 2008).

6.3.2. Implications regarding learning

Social interaction opportunities and individual motivation are the most important drivers of value co-creation activities in collaborative innovation communities. Moreover, this research demonstrates that learning is a strong facilitator between these two key factors and value co-creation activities. To create effective value co-creation platforms, community management may give priority to designing strategies to improve learning through social interactions and individual member motivation.

To manage value co-creation effectively in collaborative innovation, community managers should give priority to social interactions amongst community members involving learning together. As Payne et al. (2008) recommend, the marketing message of the community should contain clear articulation of the value of collaboration. This should be followed by detailed schemas or instructions on how to use community features available to all members. Instructions may also be formed in certain ways that can be integrated into member social interactions. Stories of current members who advanced through learning in the community can be a useful tool in motivating learning.

Community managements should organise training sessions with potential and current members which provide learning opportunities. During the online and offline interactive training sessions, members might have opportunity to learn together. The experiences the members share in the sessions would also give them opportunities to learn from each other. Offline training sessions can be shared online on the collaborative innovation community's website. Online training sessions can also be promoted on the community's main website to communicate learning more broadly. Training opportunities also provide community managements with opportunities to obtain a deeper understanding of collaboration process from community member point of view.

Overall, the empirical examination of driving factors and outcomes of performing value co-creation activities in online collaborative innovation communities provide useful implications for community management to achieve effective collaboration with members. This thesis provides additional support for the proposed shift from traditional innovation approaches, in which the main focus is development of new products, to improving understanding value co-creation for all actors in collaboration (Vargo et al. 2015). This research found that collaborative innovation is a value co-creation experience for community members, as they derive value from activities they choose to perform. Therefore, community managers should implement features that make performing value co-creation activities identified in this thesis easier and more convenient, while developing strategies able to enhance the individual and social factors driving such activities.

6.4. Limitations and directions for future research

Despite the aforementioned contributions and managerial implications, several limitations of this thesis are addressed here with the aim of providing avenues for future research. Firstly, this thesis is limited to cross-sectional data obtained from online survey respondents at a single point in time. Although online surveys provide useful data in a short amount of time (Göritz 2007), the cross-sectional nature of the data does not allow capture of the dynamics of value co-creation. Hence, it would be enlightening to use a longitudinal study to investigate how performing value co-creation activities influence member attitudes in the long term. For instance, performing value co-creation activities that generate value for members may offer a platform for experience enhancement that improves loyalty.

Another limitation of this thesis lies in value co-creation activities selected for examination. Value co-creation activities were derived from the literature according to

suitability in a collaborative innovation context. Although the activities included in this research are confirmed as significant predictors of several value dimension outcomes, other activities could be explored further, such as information seeking (Chen & Raab 2014; Yi & Gong 2013) and cerebral activities (e.g. positive thinking, sense making) (McColl-Kennedy et al. 2012; Sweeney et al. 2015). These activities could be included in a set of value co-creation activities measured in different research settings in the future. For example, online communities established in tourism/travel or education services, additional self-generated value co-creation activities, such as active involvement in decision making, interactions with staff, information seeking, can be performed by the independent actors.

Furthermore, in this thesis collaboration was considered only in online form to keep the research scope reasonable. It would be interesting to extend the research to an offline form of collaboration. For instance, individual actors may be driven to perform certain value co-creation activities while volunteering. Similarly, members of a support group may derive value by performing value co-creation activities. Application of the proposed model of this research in a different research setting would also create an avenue to make comparisons across different services and collaboration types.

Finally, moderation analysis indicates further research on flow state's moderating effect in the value co-creation context. A longitudinal study should be conducted to capture collaborative innovation community members' flow experience over time. The challenges that emerge in a collaborative innovation community are subject to community activities occurring at the time. Community members perceive the same skills in balance for one challenge, but lower or higher for another. Therefore, a longitudinal study would provide a clearer picture of the relationship between the balance of skills and challenges over time.

Moreover, if the intensity of the flow state experienced during community activities is measured over a period of time, the overall intensity of flow state during a collaboration experience can be captured. Hence, the moderating effect of flow state on the relationship between social and individual drivers and learning can be more truly reflected.

6.5. Concluding thoughts

The findings of this thesis conclude that individually and socially driven individuals derive and determine different value dimensions through performing a set of value co-creation activities in an online innovation community context. Drawing on the S-D logic perspective of value co-creation and the individual contributor perspective to the community, theoretical and managerial implications for managing value co-creation activities to generate innovation arose. This thesis also provides evidence to arguments that value co-creation is an interactive set of activities performed by independent actors (Payne et al. 2008; Vargo & Lusch 2011). Specifically, an important theoretical implication lies in the dynamic nature of drivers and outcomes of performing value co-creation activities from an individual member point of view. This study generates support for the dynamic nature of value co-creation and confirms that independent value co-creation of value activities are performed for different social and individual reasons and community members derive and determine different value dimensions as outcome depending on the activities performed. Moreover, this thesis demonstrates the important facilitator role of learning in the value co-creation experience. This thesis demonstrated that value is uniquely and phenomenologically determined by community members who perform certain self-generated value co-creation activities in an online collaboration setting. This is in the line of one of the S-D logic axioms that suggests "value is always uniquely and phenomenologically determined by the beneficiary" (Vargo & Lusch 2016, p. 6). This

thesis also informs collaborative innovation community management about how to facilitate and understand factors that drive community members to perform value co-creation activities and how to contribute to co-creation of different value dimensions. Further research should continue to endeavour to establish a better understanding of how individual actors are engaged to derive value from value co-creation activities through longitudinal research.

Appendices

Appendix 1: ESOMAR recommendations

Qualtrics panel management (Clearvoice Research)'s response to ESOMAR's 26 questions

ESOMAR 26 Questions

1. What experience does your company have with providing online samples for market research?

   Clear Voice Research has been in business providing online sample for four years. Clear Voice was founded after the successful development and management of two of the most popular panelist recruitment sites on the web, www.surveyclub.com and www.surveyscout.com, which were founded over seven years ago. Beyond recruitment, SurveyClub and SurveyScout have been used for online sample.

2. Please describe and explain the types of source(s) for the online sample that you provide (are these databases, actively managed panels, direct marketing lists, web intercept sampling, river sampling or other)?

   Sample is provided from our actively managed panel ClearVoiceSurveys.com, and joint venture partnerships. The ClearVoice Panel is a 100% market research only panel.

   In certain occasions with prior client approval we utilize SurveyClub.com database of 12 million members to fill large general population studies. SurveyClub is viewed as a database and not a panel and is only used with client approval.

3. What do you consider to be the primary advantage of your sample over other sample sources in the marketplace?

   We are a low cost provider with a highly sophisticated panel management system that allows our project managers to complete every task in the standard sampling process with the click-of-a-mouse. The result is industry leading turn around with highly detailed RFP responses and instant sample delivery.

4. If the sample source is a panel or database, is the panel or database used solely for market research? If not, please explain.

   We are a 100% research only panel.

5. How do you source groups that may be hard-to-reach on the Internet?

   Our panel is census representative so we have capabilities among nearly all hard to source groups. When we need additional or supplemental niche sample, we source hard-to-reach segments through partnerships with companies that own unique databases of individuals in desirable niches, we recruit the members into our panel, typically on a revenue sharing basis with those partners.

   We are always interested in understanding what segments our clients find 'hard-to-reach' and will actively pursue panelists in those segments to fill the need if our panel does not have a representative set for that segment.

6. What are people told when they are recruited?

   Members are told that by joining the ClearVoiceSurveys.com opinion panel they will be invited to participate in online market research surveys in exchange for various incentives.

7. If the sample comes from a panel, what is your annual panel turnover/attrition/retention rate and how is it calculated?

   Panel attrition is 8% yearly. This is calculated as total unsubscribed members plus scrubbed members (including panelists who are removed for quality issues and those who go inactive) divided by the total panel size.

8. Please describe the opt-in process.

   Our initial registration form collects basic fields including: Name, Email Address, Postal Address, Gender, DOB & Language. After completing this form a double opt-in/confirmation email is sent to the email address. Only double opt-in/confirmed accounts are invited to participate in surveys. Following opt-in, panelists are asked to complete their profile so that we collect as many data points as possible, which increases our targeting abilities when we send the member survey invitations.

9. Do you have a confirmation of identity procedure? Do you have procedures to detect fraudulent respondents at the time of registration with the panel? If so, please describe.

   Yes, we have several measures currently in place and several soon to be added. Currently we USPS Verify all postal addresses, place flash cookies, and track IP addresses. USPS Verification confirms that the address exists and limits multiple accounts in the same household. Flash cookies prevent multiple registrations from the same machine. IP addresses allow us to verify country of origin for comparison to registration details as well as assisting with limiting multiple accounts from the same machine.

   Soon, we will be implementing a partnership with a major data provider to confirm identities and that name/postal address combinations are valid.

10. What profile data is kept on panel members? For how many members is this data collected and how often is this data updated?

    Full demographic profiles are collected. In addition we also collect profile information on Employment, Autos, Technology and Media Consumption, Gaming, Ailments, CPG use, as well as Travel & Leisure Activities.

    Profiles are available for updating to our members at all times. We actively request that members update their profiles when any changes occur in their lives.

11. What is the size and/or the capacity of the panel, based on active panel members on a given date? Can you provide an overview of active panelists by type of source?

    ClearVoiceSurveys.com is 540,298 panelists spread across the USA, Canada, UK, Australia, India, Turkey, the Philippines, and South Africa. The panel responds at an average of 20% giving it the capacity to fill tens-of-thousands of unique survey completes.

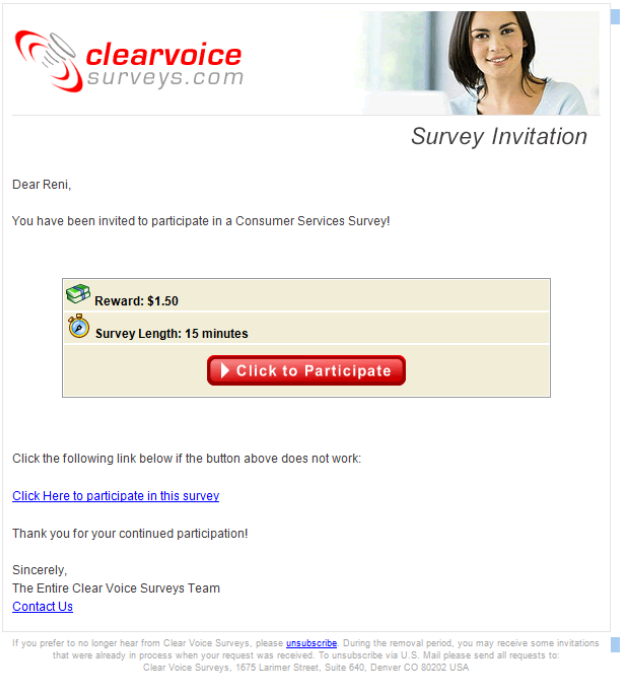
    SurveyClub.com is 12,389,537 members spread across the USA, Canada, UK & Australia. The database responds at an average of 2% giving it the capacity to fill over 100,000 unique survey completes.

12. Please describe your sampling process including your exclusion procedures if applicable. Can samples be deployed as batches/replicates, by time zones, geography, etc?

    Based on client specifications sample is pulled in quota group formats. Simple randomization is used to give a representative sample of new and old members within the quota groups. Sample can be delivered in any fashion the client desires.

13. Explain how people are invited to take part in a survey. What does a typical invitation look like? If so, how is this controlled?

    All panellists are invited to participate via email invitations. Example invitation included below:



14. Please describe the nature of your incentive system(s). How does this vary by length of interview, respondent characteristics, or other factors you may consider?

    We reward our panelists for all survey participation including completes as well as terminates and over-quotas. Each survey participation receives a cash value reward that is credited to their member account on the site. Once their account value exceeds $10, panelists may redeem for either Amazon.com gift certificates, a Payoneer prepaid debit card or a gift certificate for a local restaurant through Restaurants.com

    Incentive amounts are adjusted based on survey length and target audience. Higher value panelists including IT, B2B, and minorities generally receive a higher incentive to maximize response.

15. How often are individual members contacted for online surveys within a given time period? Do you keep data on panelist participation history and are limits placed on the frequency that members are contacted and asked to participate in a survey?

    Panelists are limited to one completed survey every 10 days. We keep full records on panelist activity.

16. Is there a privacy policy in place? If so, what does it state? Is the panel compliant with all regional, national, and local laws with respect to privacy, data protection and children (e.g.: EU Safe Harbour, and COPPA in the US)? What other research industry standards do you comply with (e.g.: ICC/ESOMAR International Code, CASRO guidelines, etc.)?

    Yes, our Privacy Policy states that we will not sell their personal information. We are complaint with all industry guidelines.

17. What data protection/security measures do you have in place?

    Our systems are built on a highly sophisticated and secure .NET platform, and our servers are housed in a secure data center.

18. Do you apply a quality management system? Please describe it.

    We have a quality tracking program with Mktg Inc.

19. Do you conduct online surveys with children and young people? If so, please describe the process for obtaining permission.

    Yes, we invite children to participate in surveys through their parents. We also accept registrations and survey persons 13 years of age or older in compliance with COPA.

20. Do you supplement your samples with samples from other providers? How do you select these partners? Is it your policy to notify a client in advance when using a third party provider? Do you de-duplicate sample when using multiple sample providers?

    We always ask client consent before we utilize outside sample providers. All supplementation through outside partners, as well as other internal properties such as SurveyClub.com, has flash cookies assigned and goes through our IP address location verification.

21. Do you have a policy regarding multi-panel membership? What efforts do you undertake to ensure that survey results are unbiased given that some individuals belong to multiple panels?

    As a major recruiter for the industry we sit in a unique position to maintain a highly unique panel. The majority of the ClearVoiceSurveys.com panel has been recruited through our properties SurveyClub, SurveyScout, as well as other web properties that our parent company owns and operates. SurveyClub recruits for a large number of major US research firms and tracks activity of all members. We also own and operate an affiliate network, which recruits for many of the industry's top panels. However, it is through our joint panel ventures where we have accrued the majority of our unique panelists. Our members are assigned a GUID for each survey, and only 1 invitation is allowed to an email address per survey. We also use flash cookie technology to ensure that a member is only invited to a survey once, no matter how many panels they may be a member in.

22. What are likely survey start rates, drop-out, and participation rates in connection with a provided sample? How are these computed?

    Survey start/participation rate is termed Response Rate. We see an average 15-20% response rate across our panel calculated as Clicks/Invitations Sent.

    Drop-out rates vary greatly due to variations in quality of surveys and variables like topic interest and survey length. Typical drop-out rate for a 15 minute survey is 10-15%.

23. Do you maintain individual level data such as recent participation history, date of entry, source, etc., on your panelists? Are you able to supply your client with a per job analysis of such individual level data?

    Yes, all panelist data is individual and stored permanently. We provide to clients as needed.

24. Do you use data quality analysis and validation techniques to identify inattentive and fraudulent respondents? If yes, what techniques are used and at what point in the process are they applied?

    As we do not host surveys this is very difficult for us to analyze data quality. We work closely with all clients and immediately remove any panelist determined to be a cheat or in-attentive with a zero-tolerance policy.

25. Do you measure respondent satisfaction?

    Yes, in 2010 we are beginning a respondent satisfaction program to determine how to best serve and maintain our panel's high response rate and quality.

26. What information do you provide to debrief your client after the project has finished?

    Typically we provide the number of invitations sent across the quota groups with clicks and response rate. We will provide demographic data upon request.

Appendix 2: Ethics approval

THE UNIVERSITY of ADELAIDE

RESEARCH BRANCH
OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY

BEVERLEY DOBBS
EXECUTIVE OFFICER
LOW RISK HUMAN RESEARCH ETHICS REVIEW GROUP (FACULTY OF HUMANITIES AND SOCIAL SCIENCES AND FACULTY OF THE PROFESSIONS)
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12 March, 2013

Dr S Rao Hill
Discipline of Marketing

Dear Dr Rao Hill

ETHICS APPROVAL No: HP-2013-011
PROJECT TITLE: Continuous Collaboration with Lead Users: The Role of Knowledge Exchange

I write to advise that the Low Risk Human Research Ethics Review Group (Faculty of Humanities and Social Sciences and Faculty of the Professions) has approved the above project. The ethics expiry date for this project is **31 March 2016**.

Ethics approval is granted for three years subject to satisfactory annual progress and completion reporting. The form titled *Project Status Report* is to be used when reporting annual progress and project completion and can be downloaded at http://www.adelaide.edu.au/ethics/human/guidelines/reporting. On expiry, ethics approval may be extended for a further period.

Participants in the study are to be given a copy of the Information Sheet and the signed Consent Form to retain. It is also a condition of approval that you **immediately report** anything which might warrant review of ethical approval including:

- serious or unexpected adverse effects on participants,
- previously unforseen events which might affect continued ethical acceptability of the project,
- proposed changes to the protocol; and
- the project is discontinued before the expected date of completion.

Please refer to the following ethics approval document for any additional conditions that may apply to this project.

Yours sincerely

ASSOCIATE PROFESSOR PAUL BABIE
Convenor
Low Risk Human Research Ethics Review Group (Faculty of Humanities and Social Sciences and Faculty of the Professions)

Appendix 2: Ethics approval – cont'd

THE UNIVERSITY of ADELAIDE

RESEARCH BRANCH
OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY

BEVERLEY DOBBS
EXECUTIVE OFFICER
LOW RISK HUMAN RESEARCH ETHICS REVIEW GROUP (FACULTY OF HUMANITIES AND SOCIAL SCIENCES AND FACULTY OF THE PROFESSIONS)
THE UNIVERSITY OF ADELAIDE
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Applicant: Dr S Rao Hill

School: Discipline of Marketing

Application/RM No: 15937

Project Title: **Continuous Collaboration with Lead Users: The Role of Knowledge Exchange**

Low Risk Human Research Ethics Review Group (Faculty of Humanities and Social Sciences and Faculty of the Professions)

ETHICS APPROVAL No: HP-2013-011

APPROVED for the period until: 31 March 2016

This study is to be conducted by Ms Hande Akman, PhD Candidate.

ASSOCIATE PROFESSOR PAUL BABIE
Convenor
Low Risk Human Research Ethics Review Group (Faculty of Humanities and Social Sciences and Faculty of the Professions)

Appendix 3: Questionnaire

Thank you for taking time and participating in this survey.

We would like to hear your opinions on collaborative innovation communities; and thus on communities in which people collaborate by interacting with other members and sometimes with the innovating company. The results will be used as a basis for academic papers and to provide guidance to managers on how to improve these communities for their members.

The survey will take approximately 15 minutes to complete.

All data obtained from the participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). Please be assured that only the researchers listed below will have access to the responses you provide. The data collected will be stored in the HIPPA-compliant, Qualtrics-secure database until it is deleted by the researchers.

Participation in this research study is completely voluntary. You have the right to withdraw at anytime. If you desire to withdraw, please simply close your internet browser. Please note that by completing this survey, it is assumed that you consent to participate in the survey.

If you have questions regarding this study, you may contact Hande Akman at +61 8 8313 0477 or hande.akman@adelaide.edu.au, Dr Carolin Plewa at carolin.plewa@adelaide.edu.au, or Dr Jodie Conduit at jodie.conduit@adelaide.edu.au.

A1 Several innovation communities are available online. In these communities members can collaborate in the community by sharing and discussing new ideas or concepts about products and services. In some innovation communities, members share their own designs or models with other members and with the innovating company. The following questions are related to yourself and those communities in general.

Are you currently a member of this type of innovation community?

- ❍ Yes
- ❍ No – END SURVEY

A2 In the innovation communities, members actively interact by seeing each other's ideas, giving feedback and making comments or voting on other members' ideas.

Do you have any interaction with the other members in the innovation community?

- ❍ Yes
- ❍ No - END SURVEY

A3 How many innovation communities are you currently a member of?

- ❍ Only one
- ❍ More than one

For the coming questions please consider the innovation community **you collaborate in most frequently**.

A4 How many years have you been a member of that community? Please write number of years in the box below.

.....

A5 How often do you collaborate in that community?
Please use the 7 point scale, where 1 means 'not very often' and 7 means 'very often'.

- ❍ Not very often
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very often

B1 Firstly we are interested in your opinions regarding the innovation community you most frequently collaborate with. Using a scale from 1 to 7, where 1 means ‘strongly disagree’ and 7 means ‘strongly agree’, please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
I feel that members of this community can be counted on to help me when I need	❍	❍	❍	❍	❍	❍	❍
Members of this community treat me fairly and justly	❍	❍	❍	❍	❍	❍	❍
Members of this community are honest and truthful with me	❍	❍	❍	❍	❍	❍	❍
Members of this community are sincere in their promises	❍	❍	❍	❍	❍	❍	❍

B2 Now, you will to read some statements about the nature of the community. Please click the button that best indicates the extent to which you agree or disagree with the statement.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
I feel very important in this community	❍	❍	❍	❍	❍	❍	❍
In this community, my status is close to the centre of the community	❍	❍	❍	❍	❍	❍	❍
Members in this community share the same goals	❍	❍	❍	❍	❍	❍	❍

B3 Using a scale from 1 to 7, where 1 means 'strongly disagree' and 7 means 'strongly agree', please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
I feel that the members of this community show me enough consideration	❍	❍	❍	❍	❍	❍	❍
I feel I can trust in the members of this community completely	❍	❍	❍	❍	❍	❍	❍

C1 Please think about the feelings you might have while you are active in the community that you collaborate in the most. Please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
Sometimes there is so much going on in this community that I find it hard to collaborate	❍	❍	❍	❍	❍	❍	❍
I know very well that there are going to be opportunities to collaborate	❍	❍	❍	❍	❍	❍	❍
If I cannot collaborate as much as I want, it is usually my fault, and not the fault of this community	❍	❍	❍	❍	❍	❍	❍
Please select strongly agree for this statement	❍	❍	❍	❍	❍	❍	❍
I generally find it easy to collaborate with other community members	❍	❍	❍	❍	❍	❍	❍
I am generally good at collaboration and have been successful at it in the past	❍	❍	❍	❍	❍	❍	❍
I am comfortable collaborating with others in this community	❍	❍	❍	❍	❍	❍	❍
Generally, I feel that the time I spend collaborating is productive for me	❍	❍	❍	❍	❍	❍	❍
Often I do not collaborate in this community because others might be my competitors	❍	❍	❍	❍	❍	❍	❍

B4 Now, you will to read some other statements about the nature of the community. Please click the button that best indicates the extent to which you agree or disagree with the statement.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
In this community, I am one of the core members	❍	❍	❍	❍	❍	❍	❍
Members in this community share the same understandings	❍	❍	❍	❍	❍	❍	❍
In this community, I stay at the centre	❍	❍	❍	❍	❍	❍	❍
Members in this community share a vision	❍	❍	❍	❍	❍	❍	❍

C2 Please think about the feelings you might have while you are active in the community. Please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
When I am active in this community, I am ready to collaborate with others	❍	❍	❍	❍	❍	❍	❍
Collaborating with others is a major reason that I am active in this community	❍	❍	❍	❍	❍	❍	❍
The thought of collaborating in this community energizes me	❍	❍	❍	❍	❍	❍	❍
During the time I spend in this community, I am interested in collaborating with others	❍	❍	❍	❍	❍	❍	❍
Prior to the discussions, I think about the ways I can collaborate	❍	❍	❍	❍	❍	❍	❍
I have several "old friends" that I look forward to interacting with in this community	❍	❍	❍	❍	❍	❍	❍
Please select strongly disagree for this statement	❍	❍	❍	❍	❍	❍	❍
This community provides plenty of opportunities for collaboration	❍	❍	❍	❍	❍	❍	❍
The general atmosphere of this community is conducive to collaborating with others	❍	❍	❍	❍	❍	❍	❍

E1 Please think about the activities you perform while you're collaborating in the community. Please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
I frequently share my personal knowledge or information in this community	❍	❍	❍	❍	❍	❍	❍
I usually spend a lot of time sharing knowledge or information in this community	❍	❍	❍	❍	❍	❍	❍
When I collaborate in this community, I actively share my knowledge with others	❍	❍	❍	❍	❍	❍	❍
If I have a useful idea on how to improve somebody's idea, I let them know	❍	❍	❍	❍	❍	❍	❍
When I have something to say about the ideas shared by others, I comment about it	❍	❍	❍	❍	❍	❍	❍

E2 Please think about the activities you perform while you're collaborating in the community. Please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
The other community members relate well to me	❍	❍	❍	❍	❍	❍	❍
When I have something to say about this community in general, I comment about it	❍	❍	❍	❍	❍	❍	❍
This community facilitates concurrent communication with other members	❍	❍	❍	❍	❍	❍	❍
This community allows online exchange of information (opinions, recommendations, advice) with other members	❍	❍	❍	❍	❍	❍	❍
When discussing a complicated issue, I am usually involved in the subsequent interactions	❍	❍	❍	❍	❍	❍	❍

D1 Now think about the experience you have in this community. Please indicate how often you experience each statement using the 7 point scale, where 1 means 'not at all' and 7 means 'very much'.

	1 - Not at all	2	3	4	5	6	7 - Very much
I feel just the right amount of challenge	❍	❍	❍	❍	❍	❍	❍
My thoughts/activities run fluidly and smoothly	❍	❍	❍	❍	❍	❍	❍
I don't notice time passing	❍	❍	❍	❍	❍	❍	❍
I have no difficulty concentrating	❍	❍	❍	❍	❍	❍	❍
My mind is completely clear	❍	❍	❍	❍	❍	❍	❍
I am totally absorbed in what I am doing	❍	❍	❍	❍	❍	❍	❍
The right thoughts/movements occur of their own accord	❍	❍	❍	❍	❍	❍	❍
I know what I have to do each step of the way	❍	❍	❍	❍	❍	❍	❍
I feel that I have everything under control	❍	❍	❍	❍	❍	❍	❍
I am completely lost in thought	❍	❍	❍	❍	❍	❍	❍

D2 Now, please think about the experience you have in the community and indicate the most suitable option for the statement below. Please note that we are interested in your opinions regarding the innovation community you most frequently collaborate in.

D3	1 Too low	2	3	4	5	6	7 Too high
I think that my competence / knowledge in the area that we have the discussions is	❍	❍	❍	❍	❍	❍	❍

D4	1 Too low	2	3	4	5	6	7 Too high
For me personally, the current demands in this community are	❍	❍	❍	❍	❍	❍	❍

E3 Please think about some other activities you perform. Please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
I enhance my knowledge about the process of developing new ideas in this community	❍	❍	❍	❍	❍	❍	❍
I assist other community members if they need my help	❍	❍	❍	❍	❍	❍	❍
I obtain solutions to my specific ideas or problems from the discussions in this community	❍	❍	❍	❍	❍	❍	❍
I enhance my knowledge about developments in the products / services	❍	❍	❍	❍	❍	❍	❍
I give advice to other community members	❍	❍	❍	❍	❍	❍	❍
I help other community members if they seem to have a problem	❍	❍	❍	❍	❍	❍	❍

E4 Please think about some other activities you perform. Please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
I have a harmonious relationship with other community members	❍	❍	❍	❍	❍	❍	❍
This community gives me the opportunity to converse with other members	❍	❍	❍	❍	❍	❍	❍
I teach other members to collaborate in this community correctly	❍	❍	❍	❍	❍	❍	❍
I usually involve myself in discussions of various topics rather than specific topics	❍	❍	❍	❍	❍	❍	❍
This community facilitates two-way communication with other members	❍	❍	❍	❍	❍	❍	❍
I enjoy interacting with other community members	❍	❍	❍	❍	❍	❍	❍

F1 Please think about the feelings you might have after collaborating in the community that you collaborate in the most. Please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
Collaborating in this community provides me with a lot of enjoyment	❍	❍	❍	❍	❍	❍	❍
This community allows me to make a lot of decisions	❍	❍	❍	❍	❍	❍	❍
Collaborating in this community improves the ways I am perceived by others	❍	❍	❍	❍	❍	❍	❍
Please select strongly agree for this statement	❍	❍	❍	❍	❍	❍	❍
I value the convenience of this community	❍	❍	❍	❍	❍	❍	❍
I feel happy when I am collaborating in this community	❍	❍	❍	❍	❍	❍	❍
This community helps me accomplish collaboration more quickly	❍	❍	❍	❍	❍	❍	❍
Collaborating in this community is reasonably easy	❍	❍	❍	❍	❍	❍	❍

F2 Please think about the feelings you might have after collaborating in the community. Please indicate the level to which you agree with the following statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
It is fun being active with others in this community	❍	❍	❍	❍	❍	❍	❍
Collaboration in this community offers value for the effort I make	❍	❍	❍	❍	❍	❍	❍
This community makes it easy to collaborate	❍	❍	❍	❍	❍	❍	❍
Collaboration in this community is good for the effort I make	❍	❍	❍	❍	❍	❍	❍
Collaborating in this community helps me to feel accepted by others	❍	❍	❍	❍	❍	❍	❍
Collaboration in this community can be effortless	❍	❍	❍	❍	❍	❍	❍
Other people are impressed that I am an active member of this community	❍	❍	❍	❍	❍	❍	❍

Eng In following questions, we are interested in your feelings about being a member of this community. Please indicate the level to which you agree with the statements.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
Lots of my thinking revolves around this community	❍	❍	❍	❍	❍	❍	❍
I think a lot about this community	❍	❍	❍	❍	❍	❍	❍
Being a member of this community gets me to think about it	❍	❍	❍	❍	❍	❍	❍
Being a member of this community stimulates my interest to learn more about it	❍	❍	❍	❍	❍	❍	❍
I am proud of being a member of this community	❍	❍	❍	❍	❍	❍	❍
Being a community member makes me happy	❍	❍	❍	❍	❍	❍	❍
I feel good about being a member of this community	❍	❍	❍	❍	❍	❍	❍
I feel very positive about being a member of this community	❍	❍	❍	❍	❍	❍	❍
I am keen to participate in activities in this community	❍	❍	❍	❍	❍	❍	❍
Compared to other members, I am more active in this community	❍	❍	❍	❍	❍	❍	❍
Whenever possible, I am involved in activities related to this community	❍	❍	❍	❍	❍	❍	❍
I spend a lot of time contributing to this community, compared to other communities in which I am a member	❍	❍	❍	❍	❍	❍	❍
Whenever I contribute to a community, it is usually this one	❍	❍	❍	❍	❍	❍	❍
Please select strongly disagree for this statement	❍	❍	❍	❍	❍	❍	❍
I do quite a bit of socializing with other members in this community	❍	❍	❍	❍	❍	❍	❍
I contribute to the conversations in this community	❍	❍	❍	❍	❍	❍	❍
I'm as interested in the input from other members in this community.	❍	❍	❍	❍	❍	❍	❍
A big reason I like this community is what I get from other members	❍	❍	❍	❍	❍	❍	❍
I'd like to meet other people who regularly contribute to this community	❍	❍	❍	❍	❍	❍	❍
I've become interested in things I otherwise wouldn't have because of other members in this community	❍	❍	❍	❍	❍	❍	❍

I1 Some innovation communities are formed independently by individuals to share innovative ideas. Some of them are company initiatives. They are established and hosted by an innovating company. The company representatives moderate those communities. Is the innovation community you most frequently collaborate in hosted by a company?

- ❍ Yes
- ❍ No

I3 Please think about the activities you perform while you're collaborating in the community hosted and moderated by an innovating company and its representative.

	1 - Strongly Disagree	2	3	4	5	6	7 - Strongly Agree
If I have a useful idea on how to improve this community, I let the company representatives know	❍	❍	❍	❍	❍	❍	❍
When I experience a problem, I let the company representatives know about it	❍	❍	❍	❍	❍	❍	❍

H1 And finally please answer the following questions about yourself.
Please select your gender.

- ❍ Female
- ❍ Male

H2 Please select the year you were born.

.....

H3 Please indicate the highest level of education completed.

- ❍ Grammar School
- ❍ High School or equivalent
- ❍ Vocational/Technical School (2 year)
- ❍ Some College
- ❍ College Graduate (4 year)
- ❍ Master's Degree (MS)
- ❍ Doctoral Degree (PhD)
- ❍ Professional Degree (MD, JD, etc.)
- ❍ Other

H4 How closely aligned is your current profession with the innovation community you collaborate in most frequently?

- ❍ 1 - Not at all aligned
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ 7 - Closely aligned

H5 Please indicate the innovation community that you collaborate in most frequently.

- ❍ IdeaStorm
- ❍ Quirky
- ❍ Mystarbucksidea
- ❍ Cussoo
- ❍ Threadless
- ❍ Shapeways
- ❍ NineSigma
- ❍ 99designs
- ❍ eYeka
- ❍ Fold it
- ❍ Ideasbrewery
- ❍ Hyvecrowd
- ❍ Jovoto
- ❍ Kaggle
- ❍ Linux
- ❍ Other (please specify)

Appendix 4: Common method bias – Harman's one factor method

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	33.853	47.527	47.527	33.853	47.527	47.527	9.504	14.185	14.185
2	3.879	5.789	56.316	3.879	5.789	56.316	7.785	11.619	25.804
3	1.796	2.681	58.997	1.796	2.681	58.997	5.747	8.578	34.382
4	1.580	2.359	61.355	1.580	2.359	61.355	4.881	7.286	41.668
5	1.490	2.224	63.579	1.490	2.224	63.579	4.272	6.376	48.044
6	1.201	1.793	65.372	1.201	1.793	65.372	4.092	6.108	54.152
7	1.094	1.633	67.005	1.094	1.633	67.005	2.803	4.184	58.336
8	1.018	1.519	68.524	1.018	1.519	68.524	1.875	2.798	61.134
9	1.013	1.512	70.036	1.013	1.512	70.036	1.759	2.625	63.759
10	.931	1.389	71.425	.931	1.389	71.425	1.635	2.441	66.200
11	.864	1.290	72.715	.864	1.290	72.715	1.553	2.318	68.518
12	.800	1.194	73.909	.800	1.194	73.909	1.475	2.202	70.720
13	.765	1.142	75.051	.765	1.142	75.051	1.415	2.112	72.831
14	.759	1.133	76.184	.759	1.133	76.184	1.391	2.076	74.907
15	.703	1.049	77.233	.703	1.049	77.233	1.384	2.066	76.973
16	.649	.969	78.202	.649	.969	78.202	.823	1.229	78.202
17	.643	.960	79.162						
18	.615	.918	80.080						
19	.597	.891	80.971						
20	.576	.860	81.831						
21	.560	.836	82.667						
22	.527	.787	83.453						
23	.520	.776	84.229						
24	.489	.729	84.958						
25	.481	.718	85.676						
26	.452	.674	86.350						
27	.429	.641	86.991						
28	.425	.635	87.626						
29	.407	.607	88.233						
30	.391	.583	88.816						
31	.377	.563	89.379						
32	.367	.548	89.927						
33	.355	.530	90.458						
34	.340	.507	90.965						
35	.319	.475	91.440						
36	.314	.469	91.909						
37	.297	.443	92.352						
38	.286	.427	92.779						
39	.278	.416	93.195						
40	.270	.404	93.598						
41	.256	.382	93.980						
42	.247	.368	94.349						
43	.239	.356	94.705						
44	.232	.347	95.052						
45	.226	.337	95.389						
46	.223	.332	95.722						
47	.213	.318	96.040						
48	.212	.316	96.356						
49	.197	.295	96.651						
50	.188	.281	96.932						
51	.180	.269	97.201						
52	.164	.245	97.445						
53	.156	.233	97.679						
54	.153	.228	97.907						
55	.149	.223	98.130						
56	.141	.211	98.341						
57	.139	.208	98.549						
58	.126	.189	98.738						
59	.121	.180	98.918						
60	.109	.163	99.081						
61	.107	.159	99.240						
62	.104	.155	99.395						
63	.098	.146	99.541						
64	.084	.125	99.666						
65	.081	.121	99.786						
66	.074	.110	99.897						
67	.069	.103	100.000						

Extraction Method: Principal Component Analysis.

Appendix 5: Common method bias – Liang et al. (2007) method

Construct	Indicator	Substantive variance (R^2)	Substantive variance $(R^2)^2$	Method variance (R^2)	Method variance $(R^2)^2$
Social interactions	Inter_01	0.907	0.823	-0.047	0.00
	Inter_02	0.826	0.682	0.006	0.00
	Inter_03	0.933	0.870	-0.141	0.02
	Inter_04	0.684	0.468	0.171	0.03
Trust	TM_01	0.640	0.410	0.197	0.04
	TM_02	0.806	0.650	0.063	0.00
	TM_03	0.800	0.640	-0.267	0.07*
	TM_04	0.963	0.927	-0.186	0.03
	TM_05	0.735	0.540	0.084	0.01
	TM_06	0.729	0.531	0.099	0.01
Shared vision	SVis_01	0.811	0.658	0.084	0.01
	S_Vis_02	0.847	0.717	0.020	0.00
	S_Vis_03	0.980	0.960	-0.109	0.01
Centrality	InCent_01	0.989	0.978	-0.194	0.04
	InCent_02	0.831	0.691	-0.199	0.04
	InCent_03	0.825	0.681	0.012	0.00
	InCent_04	0.495	0.245	0.372	0.14**
Motivation	Mo_01	0.673	0.453	0.130	0.02
	Mo_02	0.991	0.982	-0.249	0.06*
	Mo_03	0.873	0.762	0.016	0.00
	Mo_04	0.738	0.545	0.118	0.01
	Mo_05	0.787	0.619	0.001	0.00
	Mo_06	0.671	0.450	-0.020	0.00
Opportunity	O_01	0.681	0.464	0.177	0.03
	O_02	0.665	0.442	0.251	0.06
	O_03	0.896	0.803	-0.351	0.12*
	O_04	0.835	0.697	-0.349	0.12*
	O_05	0.320	0.102	0.168	0.03
Ability	A_01	0.849	0.721	0.013	0.00
	A_02	0.952	0.906	-0.071	0.01
	A_03	0.819	0.671	-0.161	0.03
	A_04	0.695	0.483	0.197	0.04
	A_05	0.431	0.186	0.479	0.23**
Information sharing	InfoS_01	0.810	0.656	-0.015	0.00
	InfoS_02	0.901	0.812	-0.153	0.02
	InfoS_03	0.716	0.513	0.113	0.01
	InfoS_04	0.904	0.817	-0.199	0.04
	InfoS_05	0.594	0.353	0.229	0.05
Providing feedback	FeedB_01	0.633	0.401	0.167	0.03
	FeedB_02	0.917	0.841	-0.141	0.02
	FeedB_03	0.761	0.579	0.093	0.01
	FeedB_04	0.823	0.677	-0.129	0.02
	FeedB_05	0.846	0.716	-0.014	0.00
Helping	Help_01	0.818	0.669	0.043	0.00
	Help_02	0.915	0.837	-0.210	0.04
	Help_03	0.662	0.438	0.058	0.00
	Help_04	0.801	0.642	0.074	0.01
Rapport building	Rapp_01	0.934	0.872	-0.184	0.03
	Rapp_02	0.834	0.696	0.055	0.00
	Rapp_03	0.726	0.527	0.125	0.02

Notes: The threshold p values: *Significant at $p<0.05$, **Significant at $p<0.01$

Appendix 5: Common method bias – Liang et al. (2007)'s method -cont'd

Construct	Indicator	Substantive variance (R^2)	Substantive variance $(R^2)^2$	Method variance (R^2)	Method variance $(R^2)^2$
Social value	SV_01	0.943	0.889	-0.107	0.01
	SV_02	0.849	0.721	0.058	0.00
	SV_03	0.831	0.691	0.046	0.00
Emotional value	EV_01	0.868	0.753	-0.005	0.00
	EV_02	0.928	0.861	-0.050	0.00
	EV_03	0.773	0.598	0.059	0.00
Utilitarian value	UV_01	0.900	0.810	-0.061	0.00
	UV_02	0.864	0.746	-0.004	0.00
	UV_03	0.631	0.398	0.205	0.04
	UV_04	0.923	0.852	-0.142	0.02
Value for effort	VE_01	0.900	0.810	-0.194	0.04
	VE_02	0.823	0.677	-0.071	0.01
	VE_03	0.769	0.591	0.100	0.01
	VE_04	0.714	0.510	0.152	0.02
Learning	Lea_01	0.772	0.596	0.119	0.01
	Lea_02	0.831	0.691	0.037	0.00
	Lea_03	0.736	0.542	-0.160	0.03
	Average	0.796	0.650	0.003	0.03

Notes: The threshold p values: *Significant at p<0.05, **Significant at p<0.01

Appendix 6: Marker model - Rönkkö and Ylitalo (2011) method

	Baseline Model		Marker model	
	P coefficients	**p value**	**P coefficients**	**p value**
Social interactions -> Information sharing	0.20	0.01	0.23	0.00
Social interactions -> Providing feedback	0.34	0.00	0.35	0.00
Social interactions -> Helping	0.26	0.00	0.28	0.00
Social interactions -> Rapport building	0.28	0.00	0.29	0.00
Social interactions -> Learning	0.32	0.00	0.33	0.00
Trust -> Information sharing	0.01	0.92	0.00	1.00
Trust -> Providing feedback	0.04	0.54	0.04	0.56
Trust -> Helping	-0.05	0.52	-0.05	0.48
Trust -> Rapport building	0.17	0.01	0.16	0.01
Trust -> Learning	0.17	0.01	0.16	0.01
Shared vision -> Information sharing	0.02	0.70	-0.01	0.89
Shared vision -> Providing feedback	0.03	0.74	0.02	0.83
Shared vision -> Helping	0.06	0.35	0.04	0.55
Shared vision -> Rapport building	0.02	0.71	0.00	0.95
Shared vision -> Learning	0.00	1.00	-0.03	0.62
Centrality -> Information sharing	0.34	0.00	0.25	0.00
Centrality -> Providing feedback	-0.01	0.93	-0.03	0.55
Centrality -> Helping	0.18	0.00	0.12	0.04
Centrality -> Rapport building	0.15	0.00	0.11	0.03
Centrality -> Learning	0.11	0.06	0.03	0.64
Motivation -> Information sharing	0.09	0.32	0.04	0.65
Motivation -> Providing feedback	0.22	0.00	0.20	0.01
Motivation -> Helping	0.32	0.00	0.29	0.00
Motivation -> Rapport building	0.22	0.00	0.19	0.00
Motivation -> Learning	0.20	0.00	0.15	0.03
Opportunity -> Information sharing	0.05	0.51	0.05	0.42
Opportunity -> Providing feedback	0.02	0.71	0.02	0.69
Opportunity -> Helping	-0.01	0.84	-0.01	0.90
Opportunity -> Rapport building	-0.10	0.09	-0.09	0.09
Opportunity -> Learning	0.01	0.90	0.01	0.82
Ability -> Information sharing	0.05	0.47	0.07	0.30
Ability -> Providing feedback	0.12	0.04	0.12	0.02
Ability -> Helping	-0.01	0.93	0.00	0.95
Ability -> Rapport building	0.10	0.15	0.11	0.13
Ability -> Learning	0.17	0.02	0.17	0.01

Appendix 6: Marker model - Rönkkö and Ylitalo (2011) method – cont'd

	Baseline Model		Marker model	
	P coefficients	**p value**	**P coefficients**	**p value**
Information sharing -> Emotional value	0.09	0.25	0.01	0.94
Information sharing -> Social value	0.39	0.00	0.16	0.04
Information sharing -> Utilitarian value	0.27	0.00	0.17	0.02
Information sharing -> Value for effort	0.15	0.03	0.11	0.15
Providing feedback -> Emotional value	0.35	0.00	0.36	0.00
Providing feedback -> Social value	-0.07	0.48	-0.05	0.53
Providing feedback -> Utilitarian value	0.38	0.00	0.39	0.00
Providing feedback -> Value for effort	0.44	0.00	0.44	0.00
Helping -> Emotional value	0.02	0.72	0.00	0.99
Helping -> Social value	0.23	0.00	0.15	0.03
Helping -> Utilitarian value	0.10	0.23	0.07	0.38
Helping -> Value for effort	-0.04	0.56	-0.06	0.47
Rapport building -> Emotional value	0.43	0.00	0.38	0.00
Rapport building -> Social value	0.26	0.01	0.11	0.18
Rapport building -> Utilitarian value	0.13	0.07	0.07	0.37
Rapport building -> Value for effort	0.32	0.00	0.29	0.00
Learning -> Information sharing	0.24	0.00	0.19	0.00
Learning -> Providing feedback	0.22	0.00	0.21	0.05
Learning -> Helping	0.18	0.02	0.15	0.01
Learning -> Rapport building	0.16	0.03	0.13	0.07

Appendix 7: Skewness and Kurtosis of the indicators

Construct	Indicator	Skewness	Kurtosis
Social interactions	I_01	-.793	.090
	I_02	-.785	-.058
	I_03	-.850	.398
	I_04	-1.008	.389
Trust	TIM_01	-1.163	1.605
	TIM_02	-.645	-.571
	TIM_03	-.863	.044
	TIM_04	-.860	-.063
	TIM_05	-.812	.319
	TIM_06	-.864	.344
Shared vision	SV_01	-.847	.460
	SV_02	-.953	.517
	SV_03	-1.056	1.217
Centrality	IC_01	-.682	-.324
	IC_02	-.703	-.094
	IC_03	-.824	.519
	IC_04	-.986	.773
Motivation	M_01	-1.067	1.664
	M_02	-1.049	.760
	M_03	-1.059	.699
	M_04	-1.033	.778
	M_05	-1.126	1.348
	M_06	-.769	-.538
Opportunity	O_01	-.945	.661
	O_02	-.799	.231
	O_03	.070	-1.290
	O_04	-1.610	3.410
	O_05	-.786	-.041
Ability	A_01	-.930	.711
	A_02	-.970	.768
	A_03	-.914	.390
	A_04	-.856	.350
	A_05	.269	-1.504
Information sharing	IS_01	-1.288	1.858
	IS_02	-.991	.890
	IS_03	-.971	.416
	IS_04	-.705	-.281
	IS_05	-1.115	1.192

Construct	Indicator	Skewness	Kurtosis
Providing feedback	PF_01	-.766	-.352
	PF_02	-1.118	.793
	PF_03	-.807	-.406
	PF_04	-.964	.700
	PF_05	-1.106	1.166
Helping	H_01	-.976	.768
	H_02	-.628	-.580
	H_03	-.972	.439
	H_04	-1.051	.868
Rapport building	RBM_01	-.944	.798
	RBM_02	-.912	-.037
	RBM_03	-.839	.089
Learning	L_01	-.648	-.031
	L_02	-.855	.382
	L_03	-.912	.404
Utilitarian value	UV_01	-.999	.764
	UV_02	-1.015	1.278
	UV_03	-.707	-.032
	UV_04	-.987	1.126
Social value	SV_01	-.918	.294
	SV_02	-.966	.858
	SV_03	-1.186	1.543
Emotional value	EV_01	-.959	.684
	EV_02	-1.060	1.137
	EV_03	-.844	.763
Value for effort	VE_01	-1.139	2.567
	VE_02	-.824	.242
	VE_03	-.865	.571
	VE_04	-1.082	1.464
	Multivariate kurtosis		18.478

Appendix 8: Indicator collinearity - Collinearity Statistic (VIF)

		VIF
Social interactions	I_01	3.14
	I_02	3.91
	I_03	3.06
	I_04	3.08
Trust	TIM_01	4.61
	TIM_02	4.01
	TIM_03	3.89
	TIM_04	3.23
	TIM_05	4.14
	TIM_06	3.57
Shared vision	SV_01	4.01
	SV_02	3.73
	SV_03	4.05
Centrality	IC_01	3.77
	IC_02	3.51
	IC_03	2.84
	IC_04	4.44
Motivation	M_01	4.21
	M_02	4.09
	M_03	5.29
	M_04	4.09
	M_05	3.35
	M_06	3.57
Opportunity	O_01	2.72
	O_02	3.70
	O_03_T	2.34
	O_04	1.67
	O_05	1.70
Ability	A_01	3.24
	A_02	4.09
	A_03	4.40
	A_04	5.31
	A_05	2.21
Information sharing	IS_01	3.01
	IS_02	4.12
	IS_03	3.48
	IS_04	3.21
	IS_05	2.47
Providing feedback	PF_01	3.71
	PF_02	3.88
	PF_03	4.14
	PF_04	3.22
	PF_05	2.95
Helping	H_01	3.96
	H_02	1.91
	H_03	3.17
	H_04	3.70
Rapport building	RBM_01	3.74
	RBM_02	3.69
	RBM_03	4.73
Learning	L_01	4.96
	L_02	3.49
	L_03	3.78

Appendix 9: HTMT ratio matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	15	15	16
1	Social interactions																
2	Trust	0.793															
3	Shared vision	0.699	0.878														
4	Centrality	0.617	0.776	0.823													
5	Motivation	0.813	0.792	0.848	0.85												
6	Opportunity	0.899	0.81	0.79	0.632	0.82											
7	Ability	0.807	0.813	0.783	0.744	0.821	0.821										
8	Information sharing	0.76	0.783	0.777	0.899	0.857	0.727	0.765									
9	Providing feedback	0.711	0.612	0.604	0.547	0.669	0.585	0.671	0.667								
10	Helping	0.872	0.744	0.728	0.689	0.84	0.804	0.806	0.835	0.641							
11	Rapport building	0.793	0.843	0.795	0.851	0.86	0.719	0.816	0.888	0.695	0.801						
12	Learning	0.89	0.85	0.795	0.789	0.881	0.81	0.858	0.88	0.706	0.861	0.9					
13	Emotional value	0.825	0.765	0.808	0.754	0.883	0.772	0.8	0.799	0.617	0.75	0.819	0.897				
14	Social value	0.629	0.708	0.803	0.865	0.809	0.629	0.66	0.863	0.586	0.655	0.787	0.801	0.801			
15	Utilitarian value	0.797	0.825	0.847	0.797	0.871	0.846	0.83	0.866	0.671	0.798	0.816	0.898	0.879	0.894		
16	Value for effort	0.822	0.739	0.748	0.647	0.743	0.782	0.828	0.746	0.677	0.756	0.798	0.822	0.815	0.732	0.808	

Appendix 10: Convergent validity - Indicator loadings

Construct	Indicator	Indicator ladings
Social interactions	I_01	0.876
	I_02	0.842
	I_03	0.862
Trust	TIM_01	0.814
	TIM_02	0.861
	TIM_03	0.864
	TIM_04	0.797
	TIM_05	0.811
	TIM_06	0.818
Shared vision	SV_01	0.887
	SV_02	0.862
	SV_03	0.884
Centrality	IC_01	0.826
	IC_02	0.862
	IC_03	0.836
	IC_04	0.809
Motivation	M_01	0.793
	M_02	0.864
	M_03	0.886
	M_04	0.847
	M_05	0.789
	M_06	0.751
Opportunity	O_01	0.852
	O_02	0.895
	O_04	0.772
	O_05	0.79
Ability	A_01	0.861
	A_02	0.89
	A_03	0.881
	A_04	0.865
Information sharing	IS_01	0.799
	IS_02	0.881
	IS_04	0.834
	IS_05	0.754
Providing feedback	PF_01	0.886
	PF_03*	0.611
	PF_04	0.839
Helping	H_01	0.91
	H_02	0.827
Rapport building	RBM_01	0.911
	RBM_03	0.923
Learning	L_01	0.88
	L_02	0.864
	L_03	0.892
Emotional value	EV_01	0.913
	EV_02	0.915
Social value	SV_01	0.86
	SV_02	0.894
	SV_03	0.866
Utilitarian value	UV_02	0.851
	UV_03	0.873
	UV_04	0.859
Value for effort	VE_01	0.887
	VE_04	0.862

*: Removed item

Appendix 11: The final constructs and items list

Construct	Item code	Items	Sources
Social factors			
Social interactions	I_01	This community facilitates two-way communication with other members	Blasco-Arcas et al. 2014
	I_02	This community gives me the opportunity to converse with other members	
	I_03	This community facilitates concurrent communication with other members	
Trust	TM_01	I feel I can trust in the members of this community completely	Bansal, Irving & Taylor 2004
	TM_02	Members of this community are sincere in their promises	
	TM_03	Members of this community are honest and truthful with me	
	TM_04	Members of this community treat me fairly and justly	
	TM_05	I feel that members of this community can be counted on to help me when I need	
	TM_06	I feel that the members of this community show me enough consideration	
Shared vision	SV_01	Members in this community share a vision	Chiu et al. 2006
	SV_02	Members in this community share the same goals	
	SV_03	Members in this community share the same understandings	
Centrality	IC_01	In this community, I am one of the core members	Hsiao & Chiou 2012
	IC_02	In this community, I stay at the centre	
	IC_03	In this community, my status is close to the centre of the community	
	IC_04	I feel very important in this community	
Individual factors			
Motivation	M_01	When I am active in this community, I am ready to collaborate with others	Gruen et al. 2007
	M_02	Collaborating with others is a major reason that I am active in this community	
	M_03	The thought of collaborating in this community energizes me	
	M_04	During the time I spend in this community, I am interested in collaborating with others	
	M_05	Prior to the discussions, I think about the ways I can collaborate	
	M_06	I have several “old friends” that I look forward to interacting with in this community	
Opportunity	O_01	This community provides plenty of opportunities for collaboration	
	O_02	The general atmosphere of this community is conducive to collaborating with others	
	O_04	I know very well that there are going to be opportunities to collaborate	
	O_05	If I cannot collaborate as much as I want, it is usually my fault, and not the fault of this community	
Ability	A_01	I generally find it easy to collaborate with other community members	
	A_02	I am generally good at collaboration and have been successful at it in the past	
	A_03	I am comfortable collaborating with others in this community	
	A_04	Generally, I feel that the time I spend collaborating is productive for me	

Appendix 11: The final constructs and items list – cont'd

Construct	Item code	Items	Sources
Value co-creation activities			
Information sharing	IS_01	I frequently share my personal knowledge or information in this community	Hsu et al. 2007
	IS_02	I usually spend a lot of time sharing knowledge or information in this community	
	IS_04	When discussing a complicated issue, I am usually involved in the subsequent interactions	
	IS_05	I usually involve myself in discussions of various topics rather than specific topics	
Providing feedback	PF_01	If I have a useful idea on how to improve somebody's idea, I let them know	Yi & Gong 2013
	PF_04	When I have something to say about this community in general, I comment about it	
Helping	H_01	I assist other community members if they need my help	
	H_02	I help other community members if they seem to have a problem	
Rapport building	RB_01	I have a harmonious relationship with other community members	Fatima & Razzaque 2014
	RB_03	The other community members relate well to me	
Learning			
Learning	L_01	I enhance my knowledge about the process of developing new ideas in this community	Nambisan & Baron 2009
	L_02	I obtain solutions to my specific ideas or problems from the discussions in this community	
	L_03	I enhance my knowledge about developments in the products / services	
Flow state			
Flow state	F_01	I feel just the right amount of challenge	Engeser & Rheinberg 2008
	F_02	My thoughts/activities run fluidly and smoothly	
	F_03	I don't notice time passing	
	F_04	I have no difficulty concentrating	
	F_05	My mind is completely clear	
	F_06	I am totally absorbed in what I am doing	
	F_07	The right thoughts/movements occur of their own accord	
	F_08	I know what I have to do each step of the way	
	F_09	I feel that I have everything under control	
	F_10	I am completely lost in thought	
Skills-challenge balance	SC_01	I think that my competence / knowledge in the area that we have the discussions is	
	SC_02	For me personally, the current demands in this community are	
Value dimensions			
Social value	SV_01	Other people are impressed that I am an active member of this community	Mohd-Any et al. 2014
	SV_02	Collaborating in this community improves the ways I am perceived by others	
	SV_03	Collaborating in this community helps me to feel accepted by others	
Emotional value	EV_01	It is fun being active with others in this community	
	EV_02	Collaborating in this community provides me with a lot of enjoyment	
Utilitarian value	UV_02	I value the convenience of this community	
	UV_03	This community helps me accomplish collaboration more quickly	
	UV_04	This community allows me to make a lot of decisions	
Value for effort	VE_01	Collaborating in this community is reasonably easy	Sweeney & Soutar 2001
	VE_04	Collaboration in this community can be effortless	

Appendix 12: Latent constructs collinearity assessments

	Collinearity Statistic (VIF)
Ability	3.21
Centrality	2.83
Emotional value	2.32
Providing feedback	2.45
Helping	2.05
Information sharing	2.67
Social interactions	3.02
Learning	3.74
Motivation	4.08
Opportunity	2.95
Rapport building	2.58
Shared vision	3.28
Social value	2.44
Trust	3.76
Utilitarian value	3.33
Value for effort	2.02

Appendix 13: FIMIX analysis

		Total sample	Segment 1	Segment 2	$\|\Delta_{12}\|$
Sample size		309	180	129	
Relative segment size			0.58	0.42	
Path coefficients	Social interactions -> Information sharing	0.08	0.07	0.12	0.05
	Social interactions -> Providing feedback	0.32**	0.42**	0.22**	0.19
	Social interactions -> Helping	0.27**	0.28**	0.28**	0
	Social interactions -> Rapport building	0.11	0.09	0.13	0.04
	Social interactions -> Learning	0.26**	0.27**	0.26**	0.01
	Trust -> Information sharing	0.04	0.02	0.02	0.01
	Trust -> Providing feedback	0.03	-0.06	0.1	0.16
	Trust -> Helping	-0.04	0.02	-0.11	0.12
	Trust -> Rapport building	0.20*	0.22*	0.18	0.04
	Trust -> Learning	0.18*	0.16	0.17	0.01
	Shared vision -> Information sharing	-0.01	0.03	0	0.03
	Shared vision -> Providing feedback	0.03	0.04	0.02	0.02
	Shared vision -> Helping	0.03	0.02	0.03	0.01
	Shared vision -> Rapport building	0.01	0.04	0.05	0.02
	Shared vision -> Learning	0.00**	0	0.04	0.04
	Centrality -> Information sharing	0.41**	0.50**	0.25**	0.25*
	Centrality -> Providing feedback	-0.09	-0.07	-0.09	0.02
	Centrality -> Helping	0.02	0.01	0.04	0.04
	Centrality -> Rapport building	0.23**	0.24*	0.17	0.07
	Centrality -> Learning	0.13*	0.16	0.09	0.07
	Motivation -> Information sharing	0.13	0.08	0.21	0.13
	Motivation -> Providing feedback	0.24*	0.23*	0.25	0.02
	Motivation -> Helping	0.20*	0.22	0.19	0.03
	Motivation -> Rapport building	0.15	0.1	0.17	0.07
	Motivation -> Learning	0.22**	0.29*	0.12	0.17
	Opportunity -> Information sharing	0.05	0.05	0.04	0.01
	Opportunity -> Providing feedback	-0.05	-0.05	-0.01	0.04
	Opportunity -> Helping	0.08	0.14	0.01	0.13
	Opportunity -> Rapport building	-0.09	0.11	-0.04	0.15
	Opportunity -> Learning	0.03	0.01	0.07	0.07
	Ability -> Information sharing	0.25**	-0.08	0.12	0.2
	Ability -> Providing feedback	0.31**	0.06	0.20*	0.14
	Ability -> Helping	0.17	0.04	0.2	0.17
	Ability -> Rapport building	0.23*	0.09	0.16	0.06
	Ability -> Learning	-0.01	-0.02	0.04	0.06

Notes: $|\Delta_{ij}|$, absolute differences between path coefficients

Significant coefficients and significant differences between two segments, in terms of path coefficients and AVE.
The threshold p values: *Significant at p<0.05, **Significant at p<0.01

Appendix 13: FIMIX analysis – cont'd

		Total sample	**Segment 1**	**Segment 2**	$\|\Delta_{12}\|$
Sample size		309	180	129	
Relative segment size			0.58	0.42	
Path coefficients	Information sharing -> Social value	0.52**	0.61**	0.40**	0.21
	Information sharing -> Emotional value	0.13	0.14	0.1	0.04
	Information sharing -> Utilitarian value	0.37**	0.54**	0.14	0.40**
	Information sharing -> Value for effort	0.12	0.11	0.13	0.02
	Providing feedback -> Social value	0.05	0.07	0.04	0.03
	Providing feedback -> Emotional value	0.23**	0.19*	0.27**	0.08
	Providing feedback -> Utilitarian value	0.23**	0.20*	0.37**	0.18
	Providing feedback -> Value for effort	0.32**	0.34**	0.29*	0.05
	Helping -> Social value	0.01	-0.02	0.03	0.05
	Helping -> Emotional value	0.06	0.08	0.05	0.04
	Helping -> Utilitarian value	0.12*	0.09	0.1	0.01
	Helping -> Value for effort	0.1	0.18	0.02	0.16
	Rapport building -> Social value	0.24**	0.13	0.23*	0.1
	Rapport building -> Emotional value	0.46**	0.52**	0.40**	0.11
	Rapport building -> Utilitarian value	0.16**	0.17	0.26**	0.09
	Rapport building -> Value for effort	0.23**	0.24	0.34**	0.1
	Learning -> Information sharing	0.13	0.19	0.18	0.01
	Learning -> Providing feedback	0.12	0.14	0.15	0.01
	Learning -> Helping	0.1	0.11	0.21	0.1
	Learning -> Rapport building	0.17*	0.37*	0.06	0.31**
R^2	Information sharing	0.7	0.72	0.7	0.01
	Providing feedback	0.71	0.71	0.72	0.02
	Helping	0.56	0.53	0.6	0.07
	Rapport building	0.68	0.69	0.69	0
	Learning	0.73	0.73	0.75	0.02
	Social value	0.56	0.55	0.59	0.04
	Emotional value	0.61	0.67	0.55	0.12
	Utilitarian value	0.61	0.63	0.61	0.02
	Value for effort	0.46	0.43	0.5	0.07

Notes: $|\Delta_{ij}|$, absolute differences between path coefficients

Significant coefficients and significant differences between two segments, in terms of path coefficients and AVE.
The threshold p values: *Significant at p<0.05, **Significant at p<0.01

Appendix 13: FIMIX analysis – cont'd

		Total sample	Segment 1	Segment 2	$\|\Delta_{12}\|$
Sample size		309	180	129	
Relative segment size			0.58	0.42	
Composite reliability	Social interactions	0.9	0.9	0.89	0.02
	Trust	0.91	0.93	0.92	0.01
	Shared vision	0.91	0.91	0.91	0.01
	Centrality	0.9	0.9	0.9	0
	Motivation	0.92	0.91	0.93	0.02
	Opportunity	0.81	0.77	0.84	0.07
	Ability	0.91	0.94	0.92	0.02
	Information sharing	0.89	0.89	0.89	0.01
	Providing feedback	0.88	0.87	0.89	0.02
	Helping	0.86	0.83	0.89	0.06
	Rapport building	0.91	0.93	0.89	0.04
	Learning	0.91	0.9	0.92	0.01
	Social value	0.91	0.93	0.88	0.04
	Emotional value	0.91	0.89	0.93	0.05
	Utilitarian value	0.9	0.9	0.89	0.01
	Value for effort	0.87	0.85	0.89	0.04
AVE	Social interactions	0.74	0.76	0.72	0.03
	Trust	0.69	0.7	0.67	0.03
	Shared vision	0.77	0.78	0.77	0.01
	Centrality	0.69	0.69	0.7	0.01
	Motivation	0.65	0.63	0.68	0.05
	Opportunity	0.52	0.49	0.58	0.09
	Ability	0.76	0.79	0.74	0.05
	Information sharing	0.67	0.68	0.66	0.01
	Providing feedback	0.77	0.77	0.81	0.04
	Helping	0.76	0.71	0.8	0.09
	Rapport building	0.84	0.88	0.8	0.07
	Learning	0.77	0.76	0.79	0.03
	Social value	0.76	0.8	0.71	0.09*
	Emotional value	0.84	0.8	0.88	0.08
	Utilitarian value	0.74	0.75	0.74	0.01
	Value for effort	0.77	0.74	0.8	0.07

Notes: $|\Delta_{ij}|$, absolute differences between path coefficients

Significant coefficients and significant differences between two segments, in terms of path coefficients and AVE.
The threshold p values: *Significant at p<0.05, **Significant at p<0.01

Appendix 14: f^2 and q^2 assessments

The f^2 value of 0.02, 0.15 and 0.35, respectively indicate, small, medium and larger effects of individual exogenous constructs (Hair et al. 2013). Similar to f^2 value, q^2 of 0.02, 0.15 and 0.35, respectively indicate, small, medium and larger prediction relevance of individual exogenous constructs (Hair et al. 2013).

As the SmartPLS 3.0 algorithm does not provide a q^2 figure, q^2 value is calculated by the researcher following the instructions given by Hair et al. (2013) and Henseler et al. (2009). To compute the q^2 value of selected exogenous and endogenous latent constructs, the $Q^2_{included}$ and $Q^2_{excluded}$ values are obtained. The $Q^2_{included}$ values for the endogenous constructs in the model were calculated by the SmartPLS algorithm. The $Q^2_{excluded}$ values were calculated after deleting the individual exogenous predicting the individual endogenous latent construct. The calculation of for q^2 is shown below:

$$q^2 = \frac{Q^2_{included} - Q^2_{excluded}}{1 - Q^2_{included}}$$

Table A14 A: Structural model assessments (f^2 and q^2 figures)

		R^2	Adj R^2	Q^2	Path	f^2	q^2
H_1	**Social value**	0.56	0.55	0.42			
H_{1a}	Information sharing -> social value				0.52**	0.23	0.05
H_{1b}	Providing feedback -> social value				0.05	0.00	0.00
H_{1c}	Helping -> social value				0.01	0.00	0.01
H_{1d}	Rapport building -> social value				0.24**	0.05	0.02
H_2	**Emotional value**	0.61	0.60	0.50			
H_{2a}	Information sharing -> Emotional value				0.13	0.02	0.01
H_{2b}	Providing feedback -> Emotional value				0.22**	0.05	0.03
H_{2c}	Helping -> Emotional value				0.06	0.00	0.11
H_{2d}	Rapport building -> Emotional value				0.46**	0.21	0.13
H_3	**Utilitarian value**	0.61	0.60	0.45			
H_{3a}	Information sharing -> Utilitarian value				0.37**	0.13	0.06
H_{3b}	Providing feedback -> Utilitarian value				0.23**	0.06	0.03
H_{3c}	Helping -> Utilitarian value				0.12*	0.02	0.01
H_{3d}	Rapport building -> Utilitarian value				0.16*	0.03	0.01
H_4	**Value for effort**	0.46	0.45	0.34			
H_{4a}	Information sharing -> Value for effort				0.12	0.01	0.00
H_{4b}	Providing feedback -> Value for effort				0.32**	0.08	0.04
H_{4c}	Helping -> Value for effort				0.10	0.01	0.00
H_{4d}	Rapport building -> Value for effort				0.23**	0.04	0.02

Notes:

Significant effects are obtained through 5000 bootstrapping procedure in SmartPLS 3.0. The threshold p values: *Significant at $p<0.05$, **Significant at $p<0.01$

R^2 represents the exogenous constructs' combined effect on the endogenous construct. R^2 ranges from 0 to 1, where higher values indicate higher levels of prediction accuracy (Hair et al. 2013). Adjusted R^2 is the R^2 modified by the number of exogenous constructs relative to the sample size. (Hair et al. 2013).

f^2 is the effect size measures the change in the R^2 of an endogenous construct when a single exogenous construct is omitted from the model. 0.02, 0.15, 0.35, respectively indicate, small, medium and larger effects (Hair et al. 2013).

Stone–Geisser's Q^2 value indicates the predictive relevance of the structural model (Hair et al. 2013). $Q^2>0$ indicates predictive relevance, $Q^2<0$ indicates lack of predictive relevance.

The q^2 value 0.02, 0.15 and 0.35, respectively indicate, small, medium and larger prediction relevance of individual exogenous constructs (Hair et al. 2013).

Table A14 A: Structural model assessments (f^2 and q^2 figures) – cont'd

		R^2	Adj R^2	Q^2	Path	f^2	q^2
H_5	**Information sharing**	0.68	0.68	0.44			
H_{5a}	Social interactions -> Information sharing				0.15	0.03	0.01
H_{5b}	Trust -> Information sharing				0.08	0.01	0.00
H_{5c}	Shared vision -> Information sharing				-0.01	0.00	0.00
H_{5d}	Centrality -> Information sharing				0.44**	0.23	0.08
H_{5e}	Motivation -> Information sharing				0.18	0.03	0.01
H_{5f}	Opportunity -> Information sharing				0.06	0.00	0.00
H_{5g}	Ability -> Information sharing				0.04	0.00	-0.01
H_6	**Providing feedback**	0.68	0.67	0.53			
H_{6a}	Social interactions -> Providing feedback				0.40**	0.18	0.10
H_{6b}	Trust -> Providing feedback				0.08	0.01	0.00
H_{6c}	Shared vision -> Providing feedback				0.03	0.00	0.00
H_{6d}	Centrality -> Providing feedback				-0.05	0.00	0.00
H_{6e}	Motivation -> Providing feedback				0.30**	0.07	0.03
H_{6f}	Opportunity -> Providing feedback				-0.04	0.00	0.00
H_{6g}	Ability -> Providing feedback				0.18*	0.03	0.02
H_7	**Helping**	0.55	0.54	0.39			
H_{7a}	Social interactions -> Helping				0.31**	0.08	0.04
H_{7b}	Trust -> Helping				-0.01	0.00	0.00
H_{7c}	Shared vision -> Helping				0.03	0.00	0.00
H_{7d}	Centrality -> Helping				0.04	0.00	0.00
H_{7e}	Motivation -> Helping				0.24**	0.03	0.01
H_{7f}	Opportunity -> Helping				0.08	0.01	0.00
H_{7g}	Ability -> Helping				0.15	0.02	0.01
H_8	**Rapport building**	0.67	0.66	0.55			
H_{8a}	Social interactions -> Rapport building				0.17*	0.03	0.02
H_{8b}	Trust -> Rapport building				0.24**	0.05	0.03
H_{8c}	Shared vision -> Rapport building				0.01	0.00	0.00
H_{8d}	Centrality -> Rapport building				0.26**	0.07	0.05
H_{8e}	Motivation -> Rapport building				0.20*	0.03	0.02
H_{8f}	Opportunity -> Rapport building				-0.09	0.01	0.00
H_{8g}	Ability -> Rapport building				0.14	0.02	0.01

Notes:

Significant effects are obtained through 5000 bootstrapping procedure in SmartPLS 3.0. The threshold p values: *Significant at $p<0.05$, **Significant at $p<0.01$

R^2 represents the exogenous constructs' combined effect on the endogenous construct. R^2 ranges from 0 to 1, where higher values indicate higher levels of prediction accuracy (Hair et al. 2013). Adjusted R^2 is the R^2 modified by the number of exogenous constructs relative to the sample size. (Hair et al. 2013).

f^2 is the effect size measures the change in the R^2 of an endogenous construct when a single exogenous construct is omitted from the model. 0.02, 0.15, 0.35, respectively indicate, small, medium and larger effects (Hair et al. 2013).

Stone–Geisser's Q^2 value indicates the predictive relevance of the structural model (Hair et al. 2013). $Q^2>0$ indicates predictive relevance, $Q^2<0$ indicates lack of predictive relevance.

The q^2 value 0.02, 0.15 and 0.35, respectively indicate, small, medium and larger prediction relevance of individual exogenous constructs (Hair et al. 2013).

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