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Factors affecting Active Participation in B2B Online Communities: An Empirical Investigation

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Abstract

There is a lack of understanding on the factors affecting active participation in business-to-business (B2B) online communities (OCs). To address this gap, we developed a model based on two theories: social exchange theory and the information systems success model. The model was validated by using

survey data collected from 40 B2B discussion forums on LinkedIn (n = 521). Our work made several significant contributions including an integrated model of factors affecting active participation in B2B OCs and a new validated measure for active participation. Further, we proposed several guidelines that assist B2B OC providers in building and maintaining successful communities.

Keywords: B2B Online Communities, Active Participation, Social Exchange, and Information Systems Success

1 1 Introduction

Online communities (OCs) have been seen as a very popular research subject for the past two decades. This research specifically concerns with business-to-business relational OCs (B2B OCs). The UK Business Forum (ukbusinessforums.co.uk) and B2B discussion groups on LinkedIn are examples of B2B OCs. Companies are increasingly investing and participating in OCs. For example, past research has shown that approximately 70% of small businesses use some kind of OCs [4]. B2B OCs have revolutionized the way businesses communicate and interact, exchange information and knowledge, and build and maintain business relationships with one and other. Information and knowledge sharing can be considered as one of the main reasons for the existence of many OCs including B2B OCs [1, 3, 5, 6]. Other specific benefits of OCs for companies include accessing business intelligence and innovation opportunities [7-9], a means of expanding markets, accessing information at low cost [2, 10], and gaining competitive advantage [11]. However, a B2B OC cannot deliver these great benefits without active participation (ACP) of its members [12-15].

Despite the importance of ACP for OCs, there appears to be no reported research on what exactly ACP means and how it can be measured in the context of B2B OC. Although ACP in OCs has attracted attention, there is still no agreement on what exactly ACP means and how it can be measured [16-18]. Moreover, past research provides very limited understanding of the factors affecting ACP in B2B OCs. A considerable amount of research examined the participation phenomenon in various types of OCs

including online knowledge sharing communities [5, 7, 19-21], online travel communities [16, 22], social media [4, 13, 23, 24], online health communities [25, 26], online innovation communities [27, 28], B2B e-commerce [29], and C2C OC such as product review sites [30-37]. However, our analysis of the extant literature [25, 38-40] reveals that there is still a lack of research on what may affect ACP in B2B OCs. Considering the growing importance of B2B OCs for organizations, this study aims to close this research gap.

Drawing upon social exchange theory (SET) and the information systems success model (ISSM), we developed and validated a research framework that provides a foundation for a better understanding of the factors affecting ACP in B2B OCs. Our research makes significant contributions to OC research and practice. It helps to better understand the factors affecting members' ACP behavior in B2B OCs. Our study also provides some practical guidelines that can help community providers to develop and maintain successful communities. The remainder of this paper is organized as follows: we first discuss the theoretical background of our research, next we describe our research model, and then in sequence we present our developed hypotheses, research methodology, and empirical results. Finally, we summarize conclusions, contributions, implications, and the limitations of our study.

2 2 Theoretical Background

2.1 2.1 Active Participation

ACP is the key success factor for OCs [15]. For an OC to succeed and flourish, there should be a large proportion of members who are actively involved in the community [20]. Despite the importance of ACP for OCs, it is not clear what exactly ACP means and how it should be measured. For example, scholars have used the following approaches to measure the concept:

1. The number of postings – The majority of studies defined the active participants based on the number of postings [18, 41, 42], but there were discrepancies in terms of what is the acceptable quantity of postings for an active participant. For example, some research suggests that active participants in OCs are those members who post at least one message inside their community [18, 41], but other studies indicate that active participants are those members who post three or more messages or post above average [17, 18, 43, 44].

2. The number of postings and replies – Some researchers used both postings and replies as indicators for ACP [17]. For example, active participants were identified as those members whose posted messages received at least one reply [45]. Based on this, it could be argued that OC members, who post several messages but do not get replies, are inactive participants.

3. Reading and posting – Other studies suggested that active participants can also be identified as those members who have been reading for some period of time and have just posted for the first time [46]. According to this, one could argue that members who post messages (e.g., asked questions), but hardly spent time reading messages could not be considered as active participants.

4. Average time spent in OCs – Several studies suggested that the active participants of OCs can be determined by the average time they spent in the community regardless of posting behavior [16, 22]. This implies that OC members who lurk without making any content contribution are still considered as active participants.

Following our observation of the extant literature on participation in OCs, this study argues that ACP measures, in particularly B2B OCs, require further attention for several reasons. First, the current literature lacks a standard measure because past studies suggested that ACP in OC environments can be measured in different ways [16-18]. Second, the extant literature indicates that the definition and measure of the construct can vary from one OC type to another [17]. For example, in OCs such as discussion fora

with the focus on information sharing, ACP can be determined through quantity of postings [18, 41]. Whereas in OCs such as B2C OCs with the focus of raising customer brand awareness, ACP can be determined by the time spent reading inside the community [47]. However, one could argue that in OCs such as social networking sites (e.g., Facebook) ACP can be measured by the number of different activities such as number of friends, shared files, shared videos, and likes. Third, we found that the quantity of postings is extensively used to measure participation levels in various OC types. Yet the literature shows conflicting views on the number of posts that OC participants should make in order to be recognized as an active participant of the community [18, 41]. Fourth, we discovered that using the quantity of posts as an indicator for ACP has certain limitations. This is not only because of the contradictory findings in the literature but also because OC members might provide high quantity but low-quality posts and this is seen as a problem that can discourage other active participants [18]. Several researchers have also acknowledged this limitation and therefore called for a better measure for participation and further suggested that other factors (e.g., quality of posts) should also be included in the measure of ACP [48, 49]. For these reasons, we felt that it is necessary to conduct an exploratory study to define ACP and its measure in B2B OCs. Based on the literature review and our exploratory study, we define ACP in B2B OCs as, "*community members carrying out several activities on a regular basis (e.g., daily or weekly). These activities include logging on to the community website, keeping their profile up to date, complying with community rules and regulations, posting quality messages that engender discussions, and replying to posted questions.*" Accordingly, these are used as indicators of ACP in B2B OCs in our research.

2.2 2.2 SET and ISSM

Our analysis of the extant OC literature suggests that the majority of past research [e.g., 20, 35, 40, 42, 49, 51, 52] focused on social, cognitive, motivational, and contextual factors, and has paid little attention to technological factors [50]. However, OCs have been recognized as sociotechnical systems [53], and previous research has shown that technological factors have an effect on participation in OC

environments [54]. Therefore, we combined SET and ISSM to develop our theoretical model. The combination of two theories not only helped us to propose a framework to explain the determinants of ACP in B2B OCs but also enabled us to gain a more comprehensive understanding of both social and technological-related factors affecting ACP in B2B OCs.

2.2.1 2.2.1 SET and ACP

SET is one of the most influential theories that has been successfully used to investigate the participation phenomenon in various community types as participation in OCs has been recognized as social exchange [5, 20, 42, 55]. We selected SET for our research because it provides a suitable theoretical lens for us to understand the members' participation behavior of B2B OCs as compared with other theories such as social capital and social identity. Social capital and social identity theories have been found to be effective in research that examined the participation phenomenon in OCs such as social networking sites, where the members are largely individuals who join such OCs to gratify their individual needs (e.g., socializing). However, the members of B2B OCs are business owners and managers, and therefore participation in this instance of OC is driven by the members' business needs rather than their personal needs. Participation in OCs has been recognized as social exchange, which involves voluntary actions by individuals, groups, and firms [56, 57]. SET posits that all human relationships are formed by analyses of cost-benefits and comparison of alternatives [58]. The theory views an OC as a place for exchanging resources (e.g., information and knowledge) among its participants (e.g., individuals, groups, or businesses). The theory suggests that participants of OCs use a cost-benefit approach when interacting with each other [12]. From that perspective, in a B2B OC, a member may decide to help other members (e.g., by replying to their posted messages) if he/she received help (e.g., received replied to his/her posted questions) in the past or expect to receive help in the future. For the contributor, the time spent replying to other people's messages can be seen as the cost and the received replies (i.e., advice received) can be seen as benefits. Thus, reciprocity is central to the theory [56]. Two types of reciprocity – "direct reciprocity" and "indirect reciprocity" are reported in the literature [12, 24, 49, 59, 60]. In OCs, direct reciprocity is

concerned with members who provide information and whom expect the recipients of that information to reciprocate with information in the future. However, in the context of indirect reciprocity, also known as "generalized" or "long-term" reciprocity, the contributor would expect help from the community as a whole rather than from individual members who received information from them in the past. A close examination of the current literature suggests that reciprocity in B2B OCs is mainly associated with generalized reciprocity (RCP) as participation in OCs is voluntary and members expect help from the whole community rather than individual members.

Along with reciprocity, commitment has also been seen as another vital aspect of SET, which has been a strong focus in the OC literature. Commitment arises from social exchanges [61] and has been described as one's intention to continue a relationship [56]. Thus, in the B2B OC context, commitment focuses on the members' intention and desire to stay with the community. The paradigm has been seen as a complex and multidimensional construct [56, 61]. Three dimensions of commitment (continuance commitment, affective commitment (ACM), and normative commitment) have been reported in the OC literature [61]. From the SET perspective, continuance commitment suggests that in B2B OCs, members continue to participate in the community because they feel that leaving the community would prove costly and the received benefits from the community are not available elsewhere [61]. In contrast, normative commitment suggests that members may decide to stay with the community and to continue to participate in the activities because of a sense of obligation regardless of receiving any direct benefits from the community [61]. Conversely, ACM suggests that members wish to stay and continue to participate in the community because of their strong sense of belonging and attachment to the community [61]. In our study, we only considered ACM as a predictor for ACP in B2B OCs for several reasons. First, the importance of ACM for B2B relationships is well documented in the literature. The construct has been seen as one of the key elements determining the outcomes of a B2B relationship, which ensures the relationship will continue in the future [62, 63]. Second, normative commitment may not apply to the OC context because the construct focuses on feelings of obligation or responsibility and that does not make the participants make content contributions as participation is voluntary in OCs [20, 64]. Third, we found

very little evidence on how continuance commitment may influence ACP in OCs. Past research findings indicate that continuance commitment is positively associated with lurking behavior but not ACP behavior [61].

Trust has been identified as another element of social exchange and therefore has been examined under SET [55, 57]. In OC settings, trust shapes and maintains the social exchange relationships, which can lead to ACP (e.g., knowledge sharing) afterwards [65]. In B2B OCs, SET suggests that trust involves expectation of the members whose expectation is based on calculations that weight the costs and benefits of certain course of action to either trustor or trustee [57]. Accordingly, in B2B OCs, if a member feels satisfied with the ability, integrity, and benevolence of other members, he/she will participate actively to reciprocate the trustworthy relationship [65]. Similar to commitment, trust is also a complex and a multidimensional concept [66]. It has been defined differently throughout the literature. Gefen et al. [67] performed a comprehensive literature review and found numerous different definitions of trust, which illustrates the long-lasting confusion about the concept. In our study, we refer to trust as the willingness of a party to be vulnerable to the actions of another party based on the anticipation that the other party will perform a certain action vital to the trustor, regardless of the ability to monitor or control the other party [21, 54, 68]. Our analysis of the literature revealed three types of trust: disposition to trust, institution-based trust, and trusting beliefs (TRBs) [69]. After a thorough examination of these dimensions, we found only TRBs to be important for ACP in B2B OCs. For example, disposition to trust would not best capture the definition of trust in the context of OC, because it does not reflect on one's belief in others to be trustworthy [69, 70]. Institution-based trust reflects an individual's perceptions of the institutional surrounding of a system and the structural assurance, which makes the participants feel secure [71]. Accordingly, it could be argued that this type of trust is more applicable to OCs such as B2B e-commerce and B2C e-commerce, than to B2B OCs because transaction is the main purpose of the community in the former two types [72-74]. TRBs pertain to a type of trust that one agent has in another agent on an individual level [66]. Accordingly, we argue that this type of trust is more applicable to B2B OCs, as the primary focus is the interaction between the community members (e.g., business owners and

managers). This observation has been noted in previous research that examined the trust phenomenon in OCs [75]. Furthermore, three subconstructs of TRBs – ability[1], benevolence[2], and integrity[3] are found in the literature [69, 76, 77]. Accordingly, we adopted these dimensions to capture the multidimensional aspect of the trust phenomenon in B2B OCs.

2.2.2 **2.2.2 ISSM and ACP**

In addition to SET, we used ISSM to address the technology-related factors affecting members' ACP behavior in B2B OCs. Using the ISSM enabled us to investigate the technological-related factors in B2B OCs as compared with other theories (e.g., TAM) from a more comprehensive perspective. Particularly, in the information system (IS) literature TAM has been criticized for being too simplistic and parsimonious [78]. Moreover, selecting the model helped us to provide a better insight into the determinants of TRBs in B2B OCs. Past research suggests that when trust is examined in OC settings, the antecedents of trust also need to be examined [65]. Studies have shown that the antecedents of trust in OCs can be classified into three categories: the community members, the community website, and the community provider [57, 65]. Three elements of the ISSM by DeLone and McLean [79], such as system quality (STQ), information quality (IFQ), and service quality (SRQ), were found to be well-aligned to these three categories. Accordingly, they were selected as the antecedents of TRBs as well as predictors for ACP in B2B OCs. Other constructs (e.g., net benefits), seen as the dependent variable (DV) in the ISSM, were found to be irrelevant to our model and therefore were not included in our study. ISSM has been applied in various internet settings, including e-commerce, but very few studies have used the theory in the context of OC [80]. To the best of our knowledge, no study has empirically tested the impact of the three factors (IFQ, STQ, and SRQ) on trust and on members' participation behavior in B2B OCs.

2.3 2.3 Research Model and Hypotheses

[1] Ability-based trust is concerned with an individual's belief that others are able to help fulfil his/her needs.
[2] Benevolence-based trust relates to an individual's belief that others voluntarily care about his/her needs.
[3] Integrity-based trust focuses on an individual's belief that others are telling the truth and will fulfil promises they make.

Based on the theoretical development outlined in the earlier section, we proposed the research model as shown in Figure 1. Three constructs (RCP, TRBs, and ACM) from SET and three constructs (IFQ, STQ, and SRQ) from ISSM are identified as the most relevant factors likely to affect members' ACP behavior in B2B OCs. The control variables in terms of community size and community age are also shown in the model.

2.4 2.4 Generalized Reciprocity

SET suggests that ACP in B2B OCs depends on RCP. OC members tend to make more contributions if they think they will get payback for what they contribute [59]. Hence, in B2B OCs, members will provide support and help to other members of the community by replying to their posted messages because they believe that they will benefit (e.g., they will receive replies to their posted questions) in the future. A large stream of research appears to emphasize the importance of RCP in different types of OCs. Lu and Yang [49] found that RCP has a positive impact on the quantity of information posted in online discussion forums. Similarly, Ray et al. [20] indicated that RCP encourages knowledge contribution intention in OCs. Evidence of RCP has also been noted in online transactional and online professional communities [35, 42]. Various empirical studies examined the impact of reciprocity on participation in various OC types. There is however limited evidence regarding reciprocity and its effects on participation in B2B OCs. Accordingly, this study hypothesizes that:

H1: RCP has a positive impact on members' ACP behavior in B2B OCs.

2.5 2.5 Affective Commitment

SET suggests that ACM is one of the key elements determining the outcomes of a B2B relationship in B2B OCs, which ensures that the relationship will continue in the future [62, 63]. In a B2B relationship

with higher ACM, participants are more likely to honor decisions and agreements that they make, to be open with one and other, and to share more information with one and other [81]. Accordingly, this study postulates that ACM positively influences ACP in B2B OCs. This implies that in B2B OCs, members who benefited greatly (e.g., received lots of help and advice from the community in the past) would develop stronger emotional attachment and a higher sense of belonging to the community and that makes it difficult for them to leave the community and they therefore continue to actively participate in the community. Accordingly, this study hypothesizes that:

H2: ACM has a positive impact on members' ACP behavior in B2B OCs.

2.6 2.6 Trusting Beliefs

SET suggests that TRBs are a crucial element in social exchange [82]. The construct can be seen as a social bond in B2B relationships, which can determine the outcomes of the relationship [49, 63]. In the context of B2B OC, TRBs are very important because this type of online platform creates a risky atmosphere for its members [67]. Particularly, members who are business owners and managers might share information and interact with other members with whom they never meet or have had no previous interaction with. Hence, in B2B OCs, members require some level of trust as businesses may be reluctant to share information or disclose such sensitive information with other businesses they do not trust. Specifically, disclosing one's business weaknesses and providing vital information can be used to harm the business [83]. Accordingly, this study hypothesizes that in a B2B OC, members who have a higher belief in the ability, integrity, and benevolence of other members will participate more actively. Evidence emphasizing the importance of TRBs for participation in various OC types is well documented in a large stream of empirical studies [42, 68, 77, 84, 85]. This study also postulates that TRBs is positively related to ACM in B2B OCs. The members of a B2B OC will be more emotionally attached and develop a higher sense of belonging to the community if trust is very high between the members. Perry et al. [63] posited that trust is a positive determinant of commitment. Morgan and Hunt [86] argued that parties are more

willing to commit themselves to a relationship where trust is highly valued. Vatanasombut et al. [21] conducted a study to investigate IS continuance intention in web-based applications such as OCs and found a positive association between trust and commitment. Therefore, we postulate that:

H3a: TRBs has a positive impact on members' ACP behavior in B2B OCs.

H3b: TRBs has a positive impact on members' ACM in B2B OCs.

2.7 2.7 Information Quality

IFQ was found to be one of the critical success factors for OCs [80]. Various definitions and diverse attributes of the construct are reported in the literature [87-89]. Consistent with past research [79, 90], this study measures the IFQ construct by several attributes related to the posted messages. These include accuracy, meaningfulness, relevancy, completeness, currency, and the format of posted messages [10, 79, 90]. We postulate that B2B OC members expect to obtain quality information from their communities and this will influence their decision to actively participate in the community. Particularly when community users' expectations are high they are unwilling to accept low-quality information [91]. In B2B OCs, members often may make decisions in their business environment based on the responses to their posted questions. Thus, low quality of information (i.e., outdated or inaccurate information) can be a deterrent factor for the members. On the positive side, high IFQ could positively influence members' participation behavior [80, 92]. Moreover, we also hypothesize that IFQ is positively related to TRBs. In B2B OCs, there is lack of face-to-face contact between the members, and therefore any information exchange may require accuracy, completeness, and currency. Thus, one may postulate that outdated, inaccurate, irrelevant, and incomplete data can be seen as deterrent factors and make members lose their trust in their B2B OCs. A considerable amount of research examined the relationship between IFQ and trust in e-commerce. However, limited research has focused on the positive impact of IFQ on TRBs in OC settings. Therefore, we propose that:

H4a: IFQ has a positive impact on members' ACP behavior in B2B OCs.

H4b: IFQ has a positive impact on members' TRBs in B2B OCs.

2.8 2.8 System Quality

In this study, STQ is described as the general characteristics of B2B OC websites such as usability, reliability, adaptability, stability, and security [79, 87, 93, 94]. The current literature provides contradictory information on how the construct might influence members' participation behavior in OCs. Wang and Fesenmaier [22] stated that the ease of communication of OC systems encourages members' contributions. Preece et al. [18] collected data from various OCs and revealed that usability is one of the top five reasons for lurking. However, several researchers discovered that usability issues were not the major factors affecting content contributions in OCs [95]. These contradictory findings could be due to two main reasons. First, the construct may have different effects on participation depending on the community type. For example, in OCs where the members have advanced IT skills because of their professions, STQ may not play an important role, whereas in OCs where the members are less IT literate, then STQ could be seen as a crucial factor. Second, STQ may influence other factors (e.g., trust) rather than ACP itself and this is further supported by empirical research [69, 77]. Nicolaou and McKnight [96] found that STQ is an important factor for trust building in online interaction. A study by Ratnasingam [97] discovered that STQ increases trust in online environments. McKnight et al. [69] developed and tested a model of consumer trust in an electronic e-commerce vendor. Their framework included STQ (e.g., website quality) as an antecedent factor for TRBs. They further empirically tested their model and the results suggested that STQ is a powerful tool that vendors can use to increase consumer trust. Considering the lack of research in the area of B2B OCs, it is important to investigate the STQ phenomenon in this context. Accordingly, this study hypothesizes that:

H5a: STQ has a positive impact on members' ACP behavior in B2B OCs.

H5b: STQ has a positive impact on members' TRBs in B2B OCs.

2.9 2.9 Service Quality

There is a lack of clear understanding of what exactly SRQ means in the OC context. Our examination of the literature revealed that a large number of studies were unclear in distinguishing between SRQ and IFQ or STQ. Particularly, most of the dimensions of SRQ have also been identified as the dimensions of IFQ or STQ [98-101]. According to Lee and Lin [100], in online environments, such as online shopping sites, SRQ focuses on web site design, reliability, responsiveness, trust, and personalization. Furthermore, Ho and Lee [101] identified five dimensions of e-SRQ namely, IFQ, security, website functionality, customer relationships, and responsiveness. Yang et al. [99] developed an instrument to measure SRQ in web portals, which included the following dimensions: usability, usefulness of content, adequacy of information, and accessibility of information. Yang and Fang [98] conducted research to better understand SRQ and customer satisfaction in online securities brokerage services. They identified 16 different dimensions of SRQ, including accessibility, timeliness, security, ease of use, system reliability, and flexibility. Accordingly, this study first explored the meaning of SRQ in the context of B2B OC and found that the SRQ was related to the services provided by moderators, not necessary by the community providers (e.g., preventing distribution in community and encouraging members to participate). The literature is also contradictory on how SRQ may affect ACP in OCs. Kuo [102] has identified SRQ as one of the key predictors for members' intention to use OCs. Elliot et al. [103] have emphasized the importance of SRQ in OCs and further found the construct to have a significant effect on members' satisfaction and trust. Similarly, Lin [104] found the construct to have a positive impact on user satisfaction and behavior intention to use OCs. In contrast, some studies suggest that SRQ does not apply to the OC context. For example, Lin [10] modeled STQ and IFQ as the only two dimensions of IS success for OCs. Having discovered limited and contradictory research focused on SRQ in B2B OCs, one could argue that it is quite important to investigate the phenomenon. In B2B OCs, if the members find that their community is well moderated then they will develop higher levels of TRBs and will participate more

actively in their community's activities. Considering lack of research on the impact of SRQ on participation in B2B OCs and consistent with the two previous hypotheses, this study postulates that:

H6a: SRQ has a positive impact on members' ACP behavior in B2B OCs.

H6b: SRQ has a positive impact on members' TRBs in B2B OCs.

3 3 Methodology

To develop an in-depth understanding of the ACP phenomenon and to test our model, we used a combination of qualitative and quantitative research methods. First, we conducted 12 semistructured interviews with B2B OC members and recorded and transcribed the interviews. Subsequently, then applied thematic analysis and cross-checked the transcribed data and our coded themes with four academics in order to ensure our coding reliability. The qualitative study provided rich information that helped us to develop the measures for ACP and SRQ in the context of B2B OC and to pilot test our questionnaire. Afterward, we conducted a quantitative study to test our proposed theoretical framework. The data for this study were collected for more than 6 weeks using an online survey administered to the members of 40 B2B discussion groups in LinkedIn. In total, 4500 invitation e-mails with a link to our survey were sent out. After 3 weeks, a reminder was sent out. A total of 521 usable questionnaires were returned. Based on our objectives and the research model, the unit of analysis was the individual participants who were mainly owners or managers in business organizations. The respondent demographic data and business characteristics are shown in Tables 1 and 2.

We used variation of a wave analysis to check for nonresponse bias. Following previous studies [105, 106], we divided the sample into two groups: early responses (the first 10% of the sample) and late responses (the last 10% of the sample). We applied independent sample t-test and chi-square tests using SPSS to compare the demographic data and business characteristics between the two groups. First, we conducted t-test for age, position, and company size as these are ordinal variables. Afterward, we

conducted chi-square test for gender, education, and industry type because these are nominal variables. The results indicate that the nonresponse bias was not a significant issue for our study because there was no significant difference between the two groups. All the p values were greater than the significance level (e.g., $p \leq 0.05$).

4 4 Measures

Survey items used to measure the constructs in our model are provided in Appendix A. They are either adapted from existing scales or developed from the qualitative study. Items were measured in Likert scales anchored on "1 = strongly disagree" and "7 = strongly disagree." The measurement items for RCP were adapted from a previous study by Kankanhalli et al. [51]. ACM measure was adapted from a previous study by Bateman et al. [61]. Three subconstructs of TRBs namely: ability-based trust (ABT), integrity-based trust (IBT), and benevolence-based trust (BBT) were adapted from previous studies by McKnight et al. [69] and Ridings et al. [77]. Six items measured ABT that focused on trusting other members' skills, knowledge, capabilities, and performances in the B2B OCs. Four items measured IBT, which focused on the other members' behavior, fairness, trustworthiness, and honesty. Four items measured BBT, which is related to community members caring about helping other members, caring about the importance of others, and not taking advantage of other members or disturbing other members. Five items were used to measure IFQ that reflected on information accuracy, usefulness, completeness, currency, and format of information presentation. Five indicators were also used to measure STQ and these reflected on reliability, accessibility, response time, and flexibility of community's website. All these indicators from both constructs were adapted from previous studies [79, 90, 107]. Five items were used to measure SRQ, and they reflected the moderator's role, e.g., getting involved in solving problems and disputes, stopping disruptive members, and encouraging ACP. Six items were used to measure ACP, reflected on B2B OC members conducting several activities such as login regularly, keeping their profile up-to-date, complying with the community rules and regulations, making quality posts such as posting

questions that generate discussion, and replying to posed questions. The measures for SRQ and ACP were developed from our qualitative study.

5 5 Data Analysis

We used structural equation modeling (SEM), a covariance-based approach using AMOS for the main data analysis. We selected SEM because it is a second-generation approach, which is seen as a more rational choice for our study. Specifically, our theoretical framework included several DVs, which required us to conduct a series of regression analyses in a single test. Several techniques and programs such as LISREL, AMOS, EQS, and PLS were used to perform SEM [108, 109]. Based on statistical algorithms, these were also divided into two categories: covariance-based approach (LISREL and AMOS) and partial-least-square-based approach (EQS and PLS-Graph) [109]. Considering the primary aim of this study, the confirmatory (theory testing) nature of our research, and the sample size, a covariance-based approach was seen as a rational choice. PLS has been seen to be robust in the case of small sample sizes [105]. Our sample size was considerably large (n=521). Scholars have suggested that the degree of knowledge and time are the two important factors that researchers should consider in reaching a better decision when selecting a data analysis technique [110]. Considering these factors, we decided to use AMOS as the main data analysis technique. Data analysis was performed in several stages. First, a preliminary data analysis in SPSS was performed to ensure accurate and unbiased results. Subsequently, an exploratory factor analysis (EFA) in SPSS was conducted to assess the newly developed measures. This was followed by a confirmatory factor analysis (CFA) in AMOS to validate the measurement model. In the final stage, the structural model was validated in AMOS.

5.1 5.1 Confirmatory Factor Analysis

Before conducting the CFA, several pre-data examinations were performed to check accuracy and unbiased results. This included evaluating and treating for missing data, normality, collinearity, outliers,

and sample size. The missing data were treated with expectation maximization. Our data were normally distributed as the Skewness–Kurtosis Z-score values for all the variables and were within the accepted range (± 2.58) [108, 109]. No issues with collinearity were detected as the variance inflation factor (VIF) values for all the independent variables were less than the threshold of 4.0 [111]. By using the three-standard deviation rule, we discovered that 39 cases had outliers on at least one of the indicators [109, 112, 113]. A further investigation revealed that these records had very little impact on the CFA results and therefore they were retained in the subsequent analysis [113]. It was found that the sample size (n=521) was adequate.

An EFA in SPSS was conducted because two of the scales (ACP and SRQ) were newly developed and the measures for a number of other constructs (e.g., IFQ, STQ, and TRB) were adopted from multiple sources. We performed a principal component factor analysis with a promax rotation to validate the scales. Nine factors were extracted, which together explained 73.6% of the total variance. The factor loadings for ACP5, ACP2, STQ1, SRQ1, and BBT1 were 0.33, 0.59, 0.40, 0.43, and 0.66, respectively, which was below the accepted threshold of 0.7 [109]. Further, it was discovered that IBT4 (−0.81) and STQ3 (−0.74) had negative loadings. The negative loadings indicate that the participants perceived the two questions related to IBT4 and STQ3 differently from the pertinent question groups (IBT and system quality), and therefore they did not accurately measure their relevant constructs. Subsequently, they were eliminated from the scale. We reanalyzed the scales and discovered two more items – STQ4 (0.66) and SRQ4 (0.69) – that did not load strongly and therefore they were also deleted from the analysis. Subsequently, satisfactory results were achieved. The final results of the EFA are shown in Appendix B.

CFA was performed to validate the measurement model. The reliability of each construct was assessed by examining the Cronbach's α value. Table 3 shows that none of the constructs had reliability issues as the values of Cronbach's α were all above the accepted threshold (0.7) [109]. Further, the convergent validity was assessed through examining the factor loadings of the items on to their associated constructs and the average variance extracted (AVE). The measures had acceptable convergent validity as all item loadings

were >0.70 (see Appendix B), and all of the constructs had an AVE >0.5 as shown in Table 3. Finally, we assessed the discriminant validity of the factors through comparing AVE with squared interconstruct correlations (SICs) [108, 109]. Table 3 shows the discriminant validity test results, which indicate adequate discriminant validity as all the AVE estimates were greater than the corresponding SIC.

5.2 5.2 Measurement Model Validation Results

The measurement model consisted of seven main reflective constructs and a second-order factor "TRB," which was formed by the three subconstructs: ABT, IBT, and BBT. We tested the measurement model in AMOS using maximum likelihood estimation method. We used the following fit indices to determine the overall model fit: normed chi-square (X^2/df), root mean square error of approximation (RMSEA), standardized root mean square (SRMR), normed fit index (NFI), incremental fit index (IFI), Tucker–Lewis index (TLI), and comparative fit index (CFI). The measurement model evaluation test results indicated good model fit as all the obtained values for the fit indices were within the accepted range as shown in Table 4.

5.3 5.3 Common Method Bias Assessment

Following Podsakoff et al.'s [114] guidelines and several previous studies [115, 116], we performed two statistical analyses to test for common method bias (CMB). First, the Harman's single-factor test on the nine constructs was conducted. An EFA with no rotation on one construct was conducted. The results indicated that the most variance explained by a single factor was approximately 42%. Hence, Harman's test suggested that CMB was not a major issue in our study. Afterward, we used the common latent factor approach to assess common variance among all the observed variables in our model. Two CFA tests were performed using AMOS for two models. The first model included all the factors with all the items each linked to an associated latent factor. The fit indices for this model are shown in Table 4, which were all

within the accepted thresholds. In the second model, we included an additional factor: common latent factor. All the 34 items were linked to this additional factor as well as to their associated constructs. The fit indices for this model were as follows: X^2 = 1120.152, df = 502, p = 0.000, X^2/df = 2.23, RMSEA = 0.05, SRMR = 0.05, NFI = 0.92, IFI = 0.96, TLI = 0.95, and CFI = 0.96. Thus, they all fulfilled the recommended thresholds for a good model fit. By examining the results of the two models, we found very minor difference between the fit indices and the path coefficients of the two models. Accordingly, we concluded that CMB was not a major issue in our data and therefore we proceeded to the next stage of the data analysis.

5.4 5.4 Structural Model Validation Results

The structural model was specified based on the theoretical model and tested in the same way as the measurement model [109]. Thus, the same fit indices were used to examine goodness fit of the model. The test results indicated good model fit as all the fit indices – X^2 (1483.332), df (595), p (< 0.001), X^2/df (2.50), RMSEA (0.06), SRMR (0.06), NFI (0.91), IFI (0.94), TLI (0.93), and CFI = (0.94) – were within the accepted range. After achieving a satisfactory model, we then examined the causal relationships among the latent constructs. Figure 2 depicts the model test results and Table 5 shows further details on the results of the hypotheses. The research model explained a large amount of variance in the DVs. As shown in Figure 2, the model explained 66% of the variance in TRBs, 41% of the variance in ACM, and 32% of the variance in ACP. We performed an effect size analysis using G*Power V3.1 to determine the required sample [117]. Given the number of independent variables (6) and the sample size (521), effect size (F^2=0.47) as inputs, the results indicated that the statistical power of our study was >0.99, exceeding the recommended threshold of 0.80 for moderate and large effect sizes [118]. Thus, it was found that our sample size was large enough to test our research model.

The analysis provided evidence supporting all the hypotheses identified under SET except for H3a. A positive relationship was found between RCP and ACP (H1, $\beta = 0.34$, $p \leq 0.001$) and between ACM and

ACP (H2, $\beta = 0.30$, $p \leq 0.001$). However, the direct association between TRBs and ACP was not significant (H3a, $\beta = 0.08$, $p = 0.42$). Nevertheless, a positive relationship between TRBs and ACM (H3b, $\beta = 0.64$, $p \leq 0.001$) was detected, and this way H3b was accepted. The three subconstructs (IFQ, STQ, and SRQ) of ISSM were found to be positively associated with TRBs (H4b, $\beta = 0.40$, $p \leq 0.001$; H5b, $\beta = 0.11$, $p \leq 0.05$; H6b, $\beta = 0.40$, ≤ 0.001), and this evidence supported H4b, H5b, and H6b. There was also a positive relationship between STQ and ACP (H5a, $\beta = 0.16$, $p \leq 0.05$). Surprisingly, H4a and H6a were rejected as both IFQ and SRQ were found to have no direct association with ACP (H4a, $\beta = -0.09$, $p = 0.25$; H6a, $\beta = -0.10$, $p = 0.124$).

5.5 5.5 Post Hoc Analysis

We performed additional analyses to assess any mediation and moderation effects in the model. First, we tested the mediating effect of ACM on the relationship between TRBs and ACP. Following the guidelines of Preacher and Hayes [119] and previous studies [105, 106], using bootstrapping strategy and bias-corrected technique, we explored the total as well as the direct and indirect effects of TRBs on ACP [105]. Table 6 shows the results of the mediation analysis. Before ACM was included as a mediator, TRBs had no direct impact on ACP ($\beta = 0.21$, $p = 0.08$). When ACM was introduced as the mediator, TRBs also did not have a direct effect on ACP ($\beta = 0.08$, $p = 0.42$). However, the indirect effect of TRBs on ACP through ACM was found to be significant ($\beta = 0.19$, $p < 0.001$). Furthermore, the total effect of TRB on ACP was also significant ($\beta = 0.37$, $p < 0.01$). These results showed that ACM partially mediated the relationship between TRB and ACP.

Moreover, we conducted multigroup SEM analysis in AMOS to examine the moderating effects of IFQ, STQ, and SRQ on the relationship between TRB and ACM. Following previous studies [52, 120], the sample was categorized into two groups (low and high) according to the respondents' perceptions of the moderating variables: IFQ, STQ, and SRQ. For this, median split was used in order to have adequate

sample size [52, 120]. Separate structural models were built for the two subsamples. We run two models (constrained and unconstrained) for each of the quality factors and then conducted a chi-square difference test between the two models. The results are shown in Table 6, which indicated that there was moderating effect in our model as significant changes in the chi-square (Δx^2 = 68.38, $p < 0.001$; Δx^2 = 82.15, $p < 0.001$; Δx^2 = 81.26, $p < 0.001$) between the constrained and unconstrained models were detected [121]. The impact of the moderating variables was explored by examining the difference between the paths for the subgroups. As shown in Table 6, the path between TRBs and ACM for the high IFQ subsample (β= 0.57, $p < 0.001$) was stronger than the low IFQ subsample (β= 0.42, $p < 0.001$). Similarly, in the high STQ subgroup (β= 0.59, $p < 0.001$), the relationship between TRBs and ACM was slightly higher than the low STQ subgroup (β= 0.54, $p < 0.001$). The path between TRBs and ACM was much stronger for the high SRQ group (β= 0.65, $p < 0.001$) than for the low SRQ group (β= 0.51, $p < 0.001$). To further investigate the direction and significance of the relationship between TRBs and ACM at given levels of IFQ, STQ, and SRQ, we plotted the interactions and then conducted simple slope tests. The test results are shown in Appendix C, which further affirmed that the three quality factors strengthen the relationship between TRBs and ACM.

6 6 Discussion

Our results reveal a number of interesting findings. RCP and ACM are positively associated with ACP in B2B OCs. This finding is consistent with past research [20, 49], suggesting that OC members who have a higher belief in RCP, a higher level of emotional attachment, and sense of belonging will participate more actively. Different to our expectation and the outcomes of past research [29, 122], the direct relationship between TRBs and ACP is not significant. However, the construct is still seen vital for the development of B2B OCs. TRBs has a positive impact on ACM as predicted [123] and also has an indirect effect on ACP via ACM. This finding indicates that B2B OC members who develop a higher level of TRB will develop a higher sense of belonging and a higher emotional attachment and connection to the community, which ultimately leads to them becoming actively involved in the activities of the community. Thus, TRB

is still vital for the development of B2B OCs. Contrary to the results of the past studies [80, 124], we find no direct relationship between IFQ and ACP. Nevertheless, the construct is found to be a strong predecessor for TRBs. Furthermore, the construct is also found to moderate the relationship between TRBs and ACM. These findings indicate that IFQ is still crucial for ACP in B2B OCs. STQ has a positive impact on both ACP and TRBs. In addition, the construct has a positive effect on the relationship between TRBs and ACM. Hence, our results provide empirical evidence emphasizing the importance of STQ in B2B OCs in line with past research [22, 77]. Similarly, evidence supporting the importance of SRQ in B2B OCs is also found. The direct relationship between SRQ and ACP was not significant, yet the construct was positively associated with TRBs. SRQ is also found to have a positive impact on the relationship between TRBs and ACM. Finally, within control variables, only community size is found to have a negative impact on ACP in B2B OCs. This finding implies that in a smaller B2B OC group, members may get to know each other better than in larger B2B OCs, hence will participate more actively.

6.1 6.1 Theoretical Contributions

This research is among few studies that have explored ACP in the context of B2B OC. Thus, it advances the theoretical development in this field and adds to the existing literature by further enhancing the understanding of key factors affecting ACP in B2B OCs. Our study makes several significant contributions to OC research.

First, our research contributes to the OC participation literature by theorizing the ACP phenomenon in OCs. A validated theoretical model on the factors affecting members' participation behavior in B2B OCs is proposed. The model integrates two different theories covering social and technical factors affecting ACP. The results demonstrate the appropriateness and robustness of our proposed model, which can provide a foundation and guidance for future studies by highlighting the need for more integrative theoretical approaches while offering model factors for further exploration. More specifically, despite numerous studies having examined the antecedents of participation in various OC types [4, 15, 24, 27, 32,

61, 95, 125], few have focused on B2B OCs, which are different from other OC types because the members are mostly business owners and managers who have joined for their business purposes rather than for their personal needs.

Second, previous studies in this area mainly focused on social, cognitive, motivational, and contextual factors [e.g., 20, 35, 40, 42, 49, 51, 52]. In response to a recent study that found there to be a lack of attention to technological factors among OC scholars [50], our model reveals that technological-related factors are also crucial for increasing ACP in OCs. The outcome of our model contradicts the view of OC scholars (e.g., Yang [95]) who suggest that technological factors are no longer the major factors affecting people's participation behavior in OCs.

Third, our work contributes to OC research by developing a comprehensive and validated measure for ACP. This provides a new tested instrument for researchers to adapt in OC research, particularly B2B OCs. Most previous studies on participation in OCs [17, 18, 41, 46] used the number of posts, the number of replies, and the time spent browsing as indicators to measure participation in OCs. However, our study has revealed that the measure of ACP in OCs should also include quality elements. Accordingly, this research can be seen as a response to studies highlighting the need for better measures for OC participation [48, 49].

Fourth, our findings extend existing knowledge on trust and commitment in OCs. Our research suggests that it is important for scholars to pay greater attention to the multidimensional aspect of the two concepts when investigating participation phenomenon in OCs. Our study shows that the applicability and importance of the several types of commitment (e.g., continuance, normative, and affective) and trust (e.g., disposition trust, TRBs, and system trust) vary from one community type to another. Most studies have viewed trust and commitment as unidimensional constructs [126], failing to capture their multidimensional aspects. Furthermore, the final outcomes of our model suggest that the relationship between trust and commitment in OCs is more complex than examined in previous studies [63, 85, 86].

The post hoc analysis revealed that ACM mediates the relationship between TRBs and ACP. This implies that in B2B OCs, if the members are satisfied with the ability, integrity, and benevolence of each other, then they will develop a higher sense of belonging and attachment to the community and that will encourage them to stay active. Although studies have examined the mediating effects of commitment on the relationship between trust and customer satisfaction in online business communities [127], very few have examined how ACM may mediate the relationship between trust and participation in OCs. Recognizing the mediating role of commitment contributes to the previous understanding of OC participation by revealing the underlying mechanism of how commitment and trust may influence the participation behavior of OC members. In addition, the post hoc analysis also discovers that IFQ, STQ, and SRQ positively moderate the relationship between TRBs and ACM. This indicates that in B2B OCs, where the quality of the posted information is high, where the community website is of high quality, and where the community is well moderated, the relationship between TRBs and ACM is also higher. To the best of our knowledge, these moderating effects are yet to be examined in the OC literature.

Lastly, this study offers interesting theoretical insights into SRQ in the OC context. Our study not only discovers that SRQ is crucial for the development of OC but also reveals that its definition differs in the OC literature. Previous studies suggest that SRQ relates to services provided by the platform providers [128]. However, our study shows that SRQ in OCs is more concerned with services provided by in-group moderators, but not necessary by the platform providers. Our review of the literature discovered that scholars have paid little attention to how moderation influences participation in OCs. One study highlighted the importance of moderators in OCs, but provided no empirical evidence [61]. Furthermore, past research [107], only used STQ and IFQ from the ISSM when investigating the participation phenomenon in OCs, and therefore excluded SRQ.

6.2 6.2 Practical Implications

The results of our research provide valuable practical guidelines for the owners and managers of B2B OCs. This study demonstrates that RCP, TRBs, and ACM affect ACP. Furthermore, it also emphasizes the importance of the three quality factors (IFQ, STQ, and SRQ) for the development of B2B OCs.

In our study, the active participants who had high beliefs in RCP were more active in their communities. Hence, they were more eager to provide support and help to other members if they believed they would be helped in the future. Members were willing to return the value they had obtained from the community to other members and this was seen as crucial for an on-going affective relationship. Thus, it is important for B2B OC managers and moderators to develop strategies that improve the members' perceptions on the benefits that they gain from the community. Therefore, we suggest community managers to encourage reciprocal participation by regularly reminding members about the help they received from other members and continuously encouraging them to provide help and support to other members in need. Developing such reciprocal awareness among community members may therefore be a vital step that not only boosts ACP in the community but also ensures a long-term sustainable relationship between members.

ACM not only positively influences ACP but also mediates the relationship between TRBs and ACP. Participants who feel a strong sense of connection and strong sense of belonging to communities are more actively engaged in their community's activities. This accentuates that ACM is a crucial component for successful OCs. Therefore, we suggest that B2B OC managers find ways to increase their members' ACM. Furthermore, it is also equally important for community managers to find ways to increase the level of TRBs among community members. One might argue that ACM or TRBs may be difficult to develop and foster in OCs, particularly at a large scale [61]. However, this might be achievable through developing affective relationship with the members, encouraging high-quality contribution (e.g., IFQ), having an effective website (STQ), as well as an effective moderation mechanism (SRQ) [56]. Accordingly, it is important to ensure that posted messages are always up-to-date, accurate, relevant to the community, and presented in an aesthetically relevant format. Incorporating a rating mechanism may

be effective in this regard. Other suggestions would be to continuously raise members' awareness about the importance of the quality of posting, set clear guidelines, frequently monitor posted messages, and remove messages that are not relevant to the community. Our study also suggests that it is important for B2B OC owners to ensure that their community website is easy to use, easy to navigate, and trustworthy. Particularly, it would be essential for community owners to regularly elicit feedback from the members on their experience with the website and make changes to the features and functionalities of the community's website whenever necessary. Most importantly, we highly recommend that community managers not only acknowledge the moderator's contributions but also encourage them to get more involved in the community activities and recruit more moderators from experienced community members.

6.3 6.3 Limitation and Future Research

This study has several limitations that need to be addressed in future research. Although the study has followed the common practice of sampling in data collection and achieved a large data set, it is important to mention some sampling issues associated with data collection. Our sample appears to have a gender bias, in that the vast majority of the participants were male. Furthermore, a large proportion of the respondents were from service sector microbusinesses. In addition, the sample was drawn from B2B OCs on LinkedIn and data were collected from members who had some visible activities and whose profile was available to the public. All these sampling bias-related issues limit the generalization of the outcomes of our study. Accordingly, future research should be conducted to test our model with other B2B OCs that use different online platforms such as vBulletin, iP.Board, phpBB, and SMF. Moreover, the measure for the DV (ACP) was primarily developed from a small sample size consisting of 12 participants. Although the results of validity and reliability tests provided sufficient confidence, further validation is desirable based on a larger and more representative sample. Thus, there is an opportunity to further validate the measure for ACP in other OC environments.

7 7 Conclusion

This study develops and tests a research model drawing upon two well-known theories (SET and ISSM) to examine the antecedent factors affecting ACP in B2B OCs. The empirical results indicate that RCP and ACM are strong predictors for ACP. TRBs are found to have no direct impact on ACP, yet empirical results highlight the importance of TRBs in B2B OCs, because the construct is found to have a direct influence on ACM and indirect influence on ACP. The three constructs – IFQ, STQ, and SRQ – identified under the ISSM are seen as important elements of B2B OCs. Our study makes several significant contributions to OC research and practice. It also provides directions for future research.

8 8

9 Appendices

Appendix A: Summary of Model Constructs and Measurement Scales

Construct (ABBREVIATION)ITEMS		**Source**
Generalized Reciprocity (RCP)		
RCP1	I know that other members will help me, so it is only fair to help other members	[51]
RCP2	I trust that someone would help me if I were in a similar situation	
RCP3	When I respond to other members' questions, I expect my queries to be answered in future	
Affective Commitment (ACM)		
ACM1	I feel like a part of the group at the *XXXX*	[61]
ACM2	I have a real emotional attachment to the *XXXX*	
ACM3	The *XXXX* has a great deal of personal meaning for my business	
ACM4	I feel a strong sense of belonging to the *XXXX*	
ACM5	I feel a strong connection to the *XXXX*	
Ability-based trust (ABT)		

ABT1	I feel very confident about the skills the other members have in relation to the topics we discuss	[69, 77]
ABT2	The other members have much knowledge about the subject we discuss	
ABT3	The other members have specialized capabilities that can add to the conversation on the forums	
ABT4	The other members are well qualified in the topics we discuss	
ABT5	The other members are very capable in performing tasks in the topics we discuss	
Integrity-based trust (IBT)		
IBT1	The other members are fair in dealing with one another	[69, 77]
IBT2	The other members are truthful in dealing with one another	
IBT3	The other members are genuine and sincere in dealing with one another	
IBT4 [d]	The other members do not behave in a consistent manner (R)	
Benevolence-based trust (BBT)		
BBT1 [d]	The other members are very concerned about the ability of members to get along	[69, 77]
BBT2	The other members would not intentionally do anything to disrupt the conversations	
BBT3	The other members are concerned about what is important to others	
BBT4	The other members would do everything within their capacity to help others	
Information quality (IFQ)		
IFQ1	The content of the discussion boards of *XXXX* is always accurate	[10, 79, 90]
IFQ2	The content of the discussion boards of *XXXX* is always complete	
IFQ3	The content of the discussion boards of *XXXX* is always up-to-date	
IFQ4	The content of the discussion boards of *XXXX* is well formatted	
IFQ5	The content of the discussion boards of *XXXX* is always useful	
System quality (STQ)		

STQ1[d]	The *XXXX* always operates reliably	[10, 79, 90]
STQ2	The *XXXX* allows information to be readily accessible	
STQ3[d]	It takes too long for *XXXX* to respond to my request (R)	
STQ4[d]	The *XXXX* can be adapted to meet a variety of needs	
STQ5	It is easy to use the *XXXX* website	
STQ6	It is easy to navigate through the *XXXX* website	
Service quality (SRQ)		
SRQ1[d]	The moderator of *XXXX* does not show a sincere interest in solving member's problems (R)	Developed
SRQ2	The moderator of *XXXX* protects its members from disruptive members	
SRQ3	The *XXXX* is well moderated	
SRQ4[d]	The moderator of *XXXX* often encourages me to take part in the discussions	
SRQ5	The moderator of *XXXX* would not allow people to disrupt the discussion boards	
Active participation (ACP)		
ACP1	I regularly login to the *XXXX* and read posted discussions	Developed
ACP2	I always keep my profile up-to-date on the *XXXX*	
ACP3	I regularly post relevant and useful information to the *XXXX* that engender discussions	
ACP4	I regularly reply with relevant and useful information to posted questions on the discussion boards	
ACP5[d]	I always conform to the rules and regulations outlined by the *XXXX*	
ACP6	I am an active member of *XXXX*	

XXXX Community Name R Reversed Item [d] Dropped out

Appendix B: Items Loading and cross-Loading

										Initial Eigenvalues [a]		
Items	**ACM**	**ABT**	**IFQ**	**ACP**	**STQ**	**RCP**	**SRQ**	**IBT**	**BBT**	*Total*	*% of variance*	*Cumulative %*
ACM5	**.99**	−.01	−.02	−.05	−.05	.00	.04	.05	−.05			
ACM2	**.97**	−.04	.08	.03	−.03	−.08	−.01	−.02	−.05			
ACM4	**.96**	−.05	.01	−.02	−.06	.00	.05	−.02	.03	25.041	41.847	41.847
ACM3	**.88**	.02	.08	.01	−.03	−.02	.07	−.10	.00			
ACM1	**.73**	.06	−.15	.06	.27	.03	−.08	.09	−.03			
ABT3	−.06	**.98**	.00	.00	.07	−.02	−.10	−.03	−.03			
ABT2	.01	**.96**	−.02	−.10	−.05	.03	.03	.05	−.09			
ABT4	−.02	**.95**	.00	.03	−.03	−.04	.05	−.04	.01	5.793	9.681	51.528
ABT5	.00	**.80**	.01	.05	−.04	−.07	.02	.05	.11			
ABT1	.04	**.72**	.06	.02	−.04	.11	.04	−.01	.01			
IFQ3	−.01	.01	**.92**	.03	.06	−.02	−.07	−.06	.01			
IFQ2	.02	−.06	**.91**	.01	−.08	.03	.08	−.04	.03			
IFQ1	.04	.04	**.86**	−.03	−.09	.00	−.01	.16	−.08	4.905	8.197	59.725
IFQ4	−.04	−.01	**.74**	−.04	.21	.08	.02	.00	−.03			
IFQ5	.09	.08	**.73**	.00	−.01	−.02	−.02	−.01	.11			
ACP3	−.04	−.06	.07	**.93**	−.06	−.06	−.01	−.01	.05	2.917	4.874	64.599

ACP1	−.11	−.08	−.04	**.78**	−.05	.10	.19	.06	−.04			
ACP6	.12	.01	−.02	**.76**	.07	.01	−.11	.12	−.09			
ACP4	.07	.13	−.05	**.75**	.02	.03	−.08	−.13	.10			
STQ5	.02	−.01	−.01	−.05	**.96**	.02	−.01	−.11	.05			
STQ6	−.01	−.06	−.05	.01	**.93**	.00	.02	.00	.03	2.118	3.539	68.138
STQ2	−.09	.03	.18	.01	**.70**	−.05	.03	.12	−.03			
RCP1	−.09	.00	−.03	−.01	.01	**.93**	.03	.03	−.02			
RCP2	.01	.08	−.12	−.03	.04	**.89**	.02	.03	−.01	2.016	3.369	71.507
RCP3	.01	−.10	.21	.10	−.07	**.78**	−.06	−.10	−.04			
SRQ5	.10	−.04	−.02	−.01	−.01	−.03	**.88**	.06	−.05			
SRQ2	−.03	.00	.04	.00	−.07	.04	**.85**	−.02	.10	1.633	2.729	74.236
SRQ3	.03	.08	−.03	.03	.16	−.01	**.78**	−.05	.00			
IBT3	.01	.03	.00	.00	−.09	−.03	−.01	**.92**	.03			
IBT2	.03	−.05	.00	.01	−.04	.00	.01	**.89**	.11	1.419	2.372	76.607
IBT1	−.08	.08	.03	.02	.10	.01	.02	**.84**	−.10			
BBT2	−.17	.00	.02	.09	.04	−.15	.10	−.04	**.91**			
BBT3	.02	−.03	.03	−.03	.05	.04	−.06	.07	**.84**	1.323	2.211	78.819
BBT4	.18	.02	−.06	−.09	−.03	.15	−.05	.06	**.72**			

Appendix C: Simple Slope Analysis

To further examine the direction and significance of the relationship between TRBs and ACM at given levels of IFQ, STQ, and SRQ, we plotted the interactions following the recommendations by Cohen and Cohen [129] (see Figures 3a–3c). We then conducted simple slope tests using Aiken and West's [130] procedure. For the purpose of the simple slope test, we divided the moderators (IFQ, STQ, and SRQ) into a high group (one standard deviation greater than the mean) and a low group (one standard deviation less

than the mean). The results indicated that the three quality factors strengthen the relationship between TRB and ACM. Specifically, the simple slope of the regression of ACM onto TRB for the high-level IFQ group (one standard deviation above the mean; slope=0.67, t=7.45, p<0.001) was greater than for the low-level IFQ group (one standard deviation below the mean; slope=0.49, t=7.06, p<0.001). This is depicted in Figure 3a. The simple slope for the high-level STQ group (slope =0.66, t=11.91, p<0.001) was also higher than the low-level STQ group (slope=0.54, t=11.40, p<0.001) and this is apparent in Figure 3b. Finally, the test results revealed that the simple slope of the regression of ACM onto TRB for the high-level SRQ group (slope=0.62, t=12.77, p<0.001) was much higher than the low-level SRQ group (slope=0.49, t=12.04, p<0.001) and this is shown in Figure 3c.

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Elly Philpott, PhD, is a senior research fellow at the University of Bedfordshire and a senior fellow of the Higher Education Academy. She is also a DBA tutor at the University of Liverpool and a private business consultant. Her principal research interests are in the processes of innovation management in small-to-medium-sized enterprises and the use of Virtual Team Communities of Practice in project management. Elly has managed projects funded by the local, regional, national, and international bodies, and has worked with many small businesses to support their innovation activities. She has published several book chapters, journal articles, and conference papers.

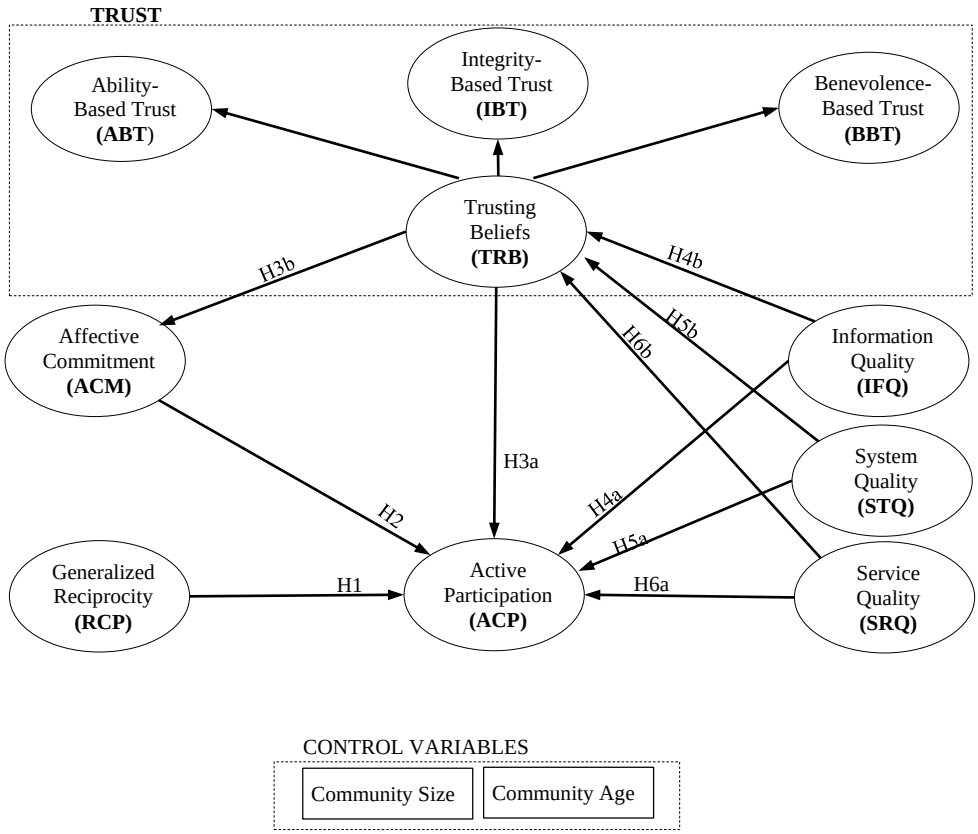

Figure 1: Proposed Framework

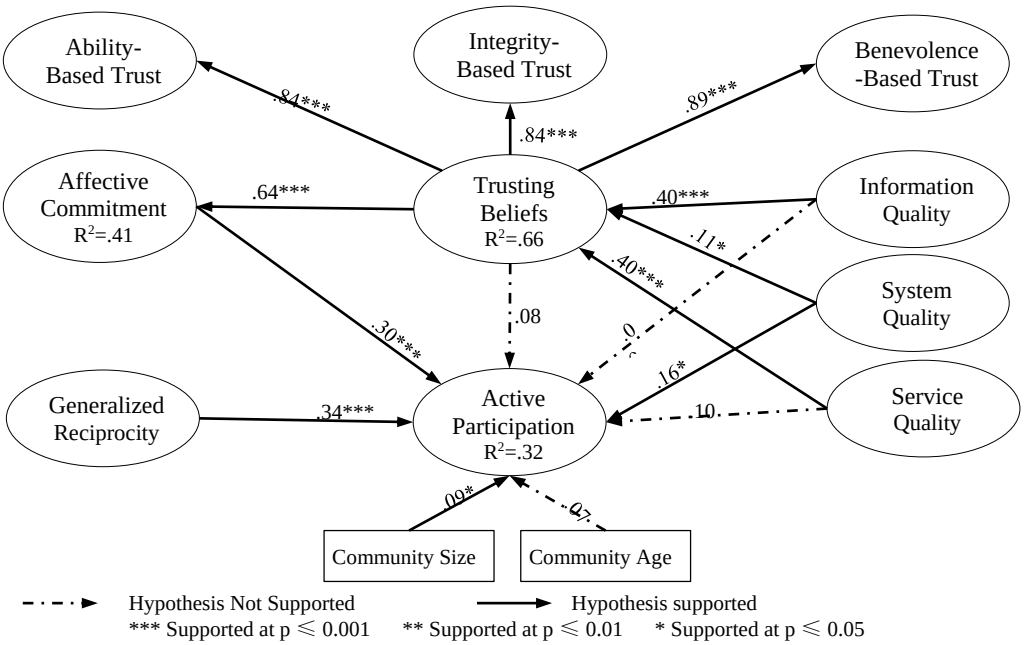

Figure 2: Hypotheses Test Results

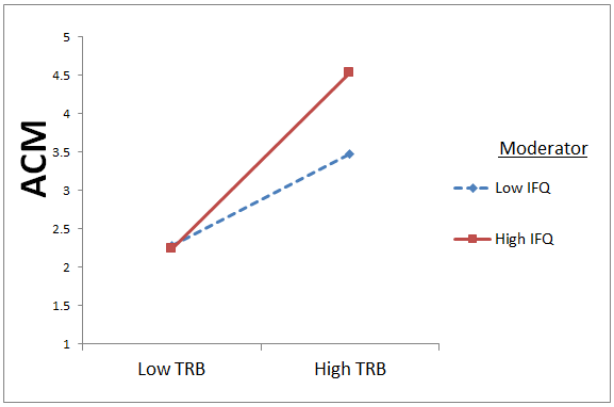

Figure3a: Moderating effect of IFQ on the relationship between TRB and ACM

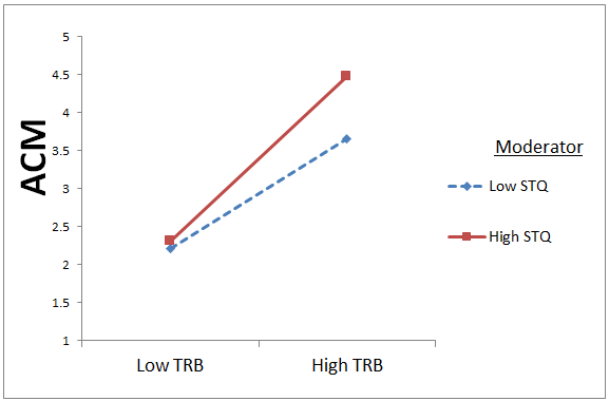

Figure3b: Moderating effect of STQ on the relationship between TRB and ACM

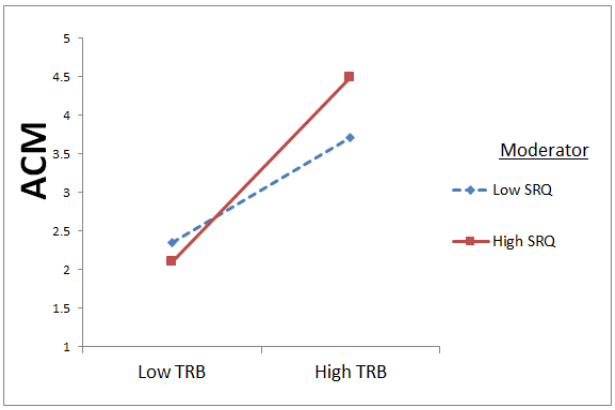

Figure3c: Moderating effect of SRQ on the relationship between TRB and ACM

Table 1: Respondents' Demographic Variables

	F	%	Early vs. Late Comparison (P Value)
Gender			
Male	373	71.6	0.475
Female	148	28.4	
Age Group			
18–21	4	0.8	
22–25	31	6.0	0.764
26–30	61	11.7	
31–40	148	28.4	
41–50	128	24.6	
51–60	102	19.6	
61+	47	9.0	
Education Background			
School Certificate or equivalent	22	4.2	0.224
GCSE/O Levels or equivalent	8	1.5	
AS/A Levels or equivalent	29	5.7	
Bachelor Degree or equivalent	213	40.9	
Master Degree or	196	37.6	

equivalent			
PhD or equivalent	24	4.6	
Others	29	5.7	

Table 2: Respondents' Business Characteristics

	F	%	Early vs. Late Comparison (P Value)
Industry type			
Manufacturing	53	10.2	
Business Services	298	57.2	0.099
Financial Services	35	6.7	
Retail	27	5.2	
R&D	36	6.9	
Others	72	13.8	
Position			
Staff	53	10.2	
Senior Staff	118	22.6	0.147
Manager	108	20.7	
Director	85	16.3	
CEO	157	30.1	
Company size			
1–10	304	58.3	
11–50	84	16.1	0.767
51–250	50	9.6	
251–1000	41	7.9	
>1000	42	8.1	

Table 3: Reliability and Discriminant Validity Test Results

	Mean	SD	CA	IBT	RCP	ACP	ACM	IFQ	STQ	SRQ	ABT	BBT
IBT	4.44	0.88	0.89	**0.74**								
RCP	5.18	0.88	0.83	0.25	**0.62**							
ACP	3.74	0.96	0.84	0.10	0.24	**0.57**						
ACM	3.19	1.11	0.95	0.21	0.20	0.21	**0.78**					
IFQ	4.56	1.03	0.92	0.33	0.21	0.10	0.34	**0.70**				
STQ	4.23	0.79	0.87	0.24	0.19	0.13	0.20	0.36	**0.69**			
SRQ	4.47	0.90	0.86	0.32	0.23	0.09	0.27	0.44	0.41	**0.67**		
ABT	4.96	0.97	0.93	0.56	0.32	0.14	0.24	0.36	0.22	0.41	**0.73**	
BBT	3.84	0.75	0.83	0.58	0.34	0.13	0.37	0.41	0.30	0.40	0.51	**0.62**

AVE are shown as bold in the diagonal of the table. SICs are shown as normal in the columns and rows

CA: Cronbach's Alpha; SD: Standard Deviation

Table 4: Measurement model fit test results

Fit Indices	Obtained Value	Recommended Threshold	
X^2=1276.223 *df*=503 *p*= 0.000			
X^2/df	2.54	≤	3
RMSEA	0.05	≤	0.08
SRMR	0.05	≤	0.10
NFI	0.91	≥	0.90
IFI	0.95	≥	0.90
TLI	0.94	≥	0.90
CFI	0.95	≥	0.90

Table 5: Hypotheses Test Results

							Supported Yes/No
			β	S.E.	C.R.	P	
Effects of Generalized reciprocity							
H1	RCP	→ ACP	0.34	0.05	5.70	***	Yes
Effects of Affective Commitment							
H2	ACM	→ ACP	0.30	0.06	4.90	***	Yes
Effect of Trusting beliefs							
H3a	TRB	→ ACP	0.08	0.14	0.81	0.42	No
H3b	TRB	→ ACM	0.64	0.08	11.85	***	Yes
Effect of Information Quality							
H4a	IFQ	→ ACP	−0.09	0.07	−1.16	0.25	No
H4b	IFQ	→ TRB	0.40	0.04	7.27	***	Yes
Effect of Systems Quality							
H5a	STQ	→ ACP	0.16	0.08	2.32	*	Yes
H5b	STQ	→ TRB	0.11	0.05	2.13	*	Yes
Effect of Service Quality							
H6a	SRQ	→ ACP	−0.10	0.09	−1.18	0.24	No
H6b	SRQ	→ TRB	0.40	0.05	6.70	***	Yes
Control Variables							
Community Size		→ ACP	−0.09	0.00	−2.04	*	
Community Age		→ ACP	−0.07	0.06	−1.38	0.17	

*** Supported at $p \leq 0.001$ ** Supported at $p \leq 0.01$ * Supported at $p \leq 0.05$

Table 6: Post Hoc Analyses Test Results

Mediating effect of ACM on the relationship between TRB and ACP

	Direct effect without ACM			Direct effect with ACM			Indirect effect		Total effect	
TRB→ACP **Mediator: ACM**	*$X^2/df=2.33$, RMSEA=0.05, SRMR=0.06, NFI=0.91, IFI=0.95, TLI=0.94, CFI=0.95*			*$X^2/df=2.50$, RMSEA= 0.06, SRMR=0.07, NFI= 0.91), IFI = 0.94, TLI = 0.93, CFI = 0.94*			*Number of Sample: 1000 Bias-Corrected Confidence Intervals: 95%*		*bootstrapping*	
β	C.R.	P		β	C.R.	P	β	P	β	P
0.218	1.778	0.08		0.08	0.811	0.42	0.19	***	0.37	**

Moderating effects of IFQ, STQ, and SRQ on the relationship between TRB and ACM

	Constrained Model	Unconstrained Model			Δx^2		
	X^2(df)=2138.62(1053)	X^2(df) = 2070.25(1016)			68.38 ***		
		Low (N=274)			*High (N=247)*		
TRB→ACM **Moderator: IFQ**		β	C.R.	P	β	C.R.	P
		0.42	5.73	***	0.57	6.19	***

	Constrained Model	Unconstrained Model	Δx^2
	X^2(df)= 2044.19	X^2(df) = 1962.04 (1016)	82.15

	(1053)				***	
TRB→AC		*Low (N=251)*			*High (N=270)*	
M		β	C.R.	P	β	C.R.	P
Moderator:						
STQ		0.54	7.00	***	0.59	7.21	***

	Constrained Model	Unconstrained Model	Δx^2
	X^2(df)=2238.547(1053)	X^2(df) = 2157.29(1016)	81.26** *

TRB→AC		*Low (N=280)*			*High (N=241)*	
M		β	C.R.	P	β	C.R.	P
Moderator:						
SRQ		0.51	7.04	***	0.65	6.54	***

**** Significant at p ≤ 0.001 ** Significant at p ≤ 0.01 * Significant at p ≤ 0.05*