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Enterprise Social Network Systems Implementation Model for Knowledge Sharing among Supply Chain IT Professionals

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Enterprise Social Network Systems Implementation Model for Knowledge Sharing among Supply Chain IT Professionals

by

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We hereby certify that this dissertation, submitted by Edgardo Velez conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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An Abstract of a Dissertation Submitted to Nova Southeastern University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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With the increased use of social network technologies in organizational environments, there is a need to understand how these technologies facilitate organizational knowledge management, particularly knowledge sharing. Prior research has focused on the relationship between knowledge management and enterprise social networking systems (ESNS), but little research has been conducted relating to how organizations implement and use ESNS for knowledge sharing. The goal was to construct and validate internally a model that offers guidance for the successful implementation and use of ESNS for knowledge sharing and building successful virtual communities of practice (vCoPs) among IT supply chain professionals in a healthcare context. An ESNS implementation model was developed and validated using design and development research methods. The study was carried out in three phases. First, a preliminary model was constructed based on a synthesis of the existing ESNS, knowledge management, and vCoPs literature. Second, the preliminary model components guided the design of a questionnaire that was completed by 144 stakeholders. Follow up one-on-one interviews were conducted with a subset of six participants from this population to gain a deeper understanding of the questionnaire responses that supported the model construction. Descriptive statistics were used to organize and report the closed-ended questions and a thematic content analysis was used to analyze and organize the data from open-ended questions and interviews. The model was revised based on stakeholder input. In phase three, the revised model was presented to a panel of experts representing the target population. The Delphi technique was used to guide the review of the revised model. The data collected from this process were used to report additional modifications that were considered to further improve the model. The resulting model demonstrates the constructs from the original Corcoran and Duane (2017) regarding antecedents, key motivators, organizational problems, individual problems, organizational benefits, and individual benefits. In addition, the resulting model includes additional constructs from the original model that emerged as themes from the participant interviews. These items are technical content source under the key motivators' category, lack of governance, large number of groups, personal and professional content under the organizational problems' category, privacy and trust concerns under the individual problems' category, centralized knowledge management under organizational benefits, and increased connection with an organization with under the individual benefits category. The results of this study aim to provide researchers a foundation from which to explore further development of this type of ESNS implementation model in other contexts. For practitioners, the model can help organizations successfully implement and manage ESNSs and vCoPs intended for knowledge sharing.

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Chapter 1

Introduction

Background

Successful knowledge management (KM) and knowledge sharing (KS) continue to be considered as key performance indicators for many organizations (Valmohammadi & Ahmadi, 2015). As new technologies advance, particularly Web 2.0 technologies, organizations have focused on deploying tools like Enterprise Social Networking Systems (ESNS) in efforts to grow KM and KS and improve organizational learning (Nath, 2017). Scholars have studied the ESNS, KM, and KS relationships with studies mostly focused on testing the impacts between the constructs (whether ESNS have a positive impact on KM and KS) (Qi & Chau, 2018). However, research is limited as it relates to how organizations can implement and facilitate the use of ESNS to enable KS. What follows is a research study that focused on the construction and internal validation of a model for successful KS deployment and use of ESNS.

Problem Statement

Enterprise Social Networking Systems (ESNS) have become an important technology investment by organizations that are looking to gain the associated benefits from their deployment (Hacker, Bodendorf, & Lorenz, 2017). ESNS can be defined as Internet-based technologies that can be used to create, edit, and share content with others throughout the enterprise (Qi & Chau, 2018). Examples of these systems include Microsoft's Yammer, VMWare's SocialCast, Salesforce's Chatter, and IBM's Connections. These types of ESNS typically include features that enable people to create profiles, send instant messages, blog, and engage in online communities. Potential benefits of ESNS include social capital formation (van Osch, Steinfield, & Balogh, 2015), improved knowledge sharing and productivity (Ellison,

Gibbs, & Weber, 2015), and improved organizational learning (Qi & Chau, 2016). Along with potential benefits of ESNS, there are also barriers. For example, Carr (2011) identified ten obstacles to ESNS related to a command-and-control culture that does not promote transparency, similarities to Facebook and perceptions that ESNSs promote "frivolity," lack of integration with other systems, and misfit with existing business processes and workflows. Healey (2013) reported on *InformationWeek's* 2013 Social Networking in the Enterprise Survey, that while 85% of the respondents reported using some type of ESNS, only 18% indicated that it was a "great success." Buettner (2015) analyzed 253 working professionals and found that privacy is one of the main contributors to avoiding the use of ESNS in organizations.

As organizations develop their Web 2.0 platforms and subsequently adopt ESNS, there is a growing interest in how these systems can be used for KM (Nath, 2015, 2017; Qi & Chau, 2018). For example, Corcoran and Duane (2017) identified a gap in the management of organizational knowledge and the promotion of knowledge sharing in higher education institutions. They examined how ESNS can enable staff knowledge sharing. The study was performed in three cycles over a 12-month period with the development of a conceptual model in the design phase. The findings supported the developed conceptual model and provided insights into the antecedents necessary for the creation of an enterprise social network-enabled knowledge-sharing environment, the motivators for and barriers to participation, and the perceived organizational and individual benefits of increased staff knowledge-sharing activity. However, this study has its limitations as it is focused on a single localized higher education institution and the authors recommend further development of the conceptual model and studying it in other conceptual settings to address these research limitations.

In a similar study, Qi and Chau (2018) wanted to understand if and how ESNS impact organizational processes and outcomes. They focused specifically on how ESNS influenced knowledge creation and knowledge sharing, as well as how they directly influenced organizational learning. They found significant mediating effects of knowledge creation and knowledge sharing on organizational learning, as well a positive correlation between the use of ESNS and organizational learning. However, one limitation of their study was their use of a Web survey and non-probability sampling, which may have skewed their results by not including those participants who were not necessarily interested in sharing their thoughts about ESNS use. In addition, their recruitment efforts spanned multiple organizations and asked for participant perceptions, which might not have reflected reality. Qi and Chau (2018) suggested: "collecting data in a real organizational setting and inviting both ordinary employees and managers" (p. 52).

While these studies validate the benefits of ESNSs to promote knowledge management activities such as knowledge sharing and knowledge creation, research on this topic is still in its nascent stages. There are few guidelines, frameworks, and models that can assist in the successful implementation and use of ESNS for knowledge management and to facilitate organizational learning through knowledge sharing, in particular (Chin, Choo, & Evans, 2015; Aboelmaged, 2018). This is the research problem that was addressed by this study. That is the lack of guidance for the implementation and use of ESNSs for the purpose of knowledge sharing. The context of this study was a large healthcare organization.

Dissertation Goal

The goal of this study was to construct and validate a model for the successful implementation and use of ESNS for knowledge sharing and building successful virtual

communities of practice (vCoPs) among supply chain IT professionals in a healthcare context. A design and development research approach (Richey & Klein, 2014) was used.

Research Questions

The following research questions guided the study:

1. What guidelines, models or frameworks are currently available for the use of ESNS as tools for knowledge sharing and what are their benefits and limitations?
2. What needs to be considered to design an effective model to guide the implementation of vCoPs in ESNS for knowledge sharing in a healthcare organization?
3. How do ESNS stakeholders perceive this model regarding effective knowledge sharing within the healthcare industry?
4. What modifications are needed to improve the proposed ESNS implementation and use of the model?

Relevance and Significance

Knowledge is a significant organizational resource. From the late 1990s, knowledge, knowledge workers, and knowledge management were topics receiving increasing attention from a variety of disciplines including information systems (IS) (Ives, Torrey, & Gordon, 1997). Consistent with the interest in organizational knowledge and KM, IS researchers began promoting knowledge management systems (KMS) in the late 1990s and early 2000s (Alavi & Leidner, 2001). This early trend of focusing on KM was even being called a management fad (Scarbrough & Swan, 2001). However, there has been a recent increase in KM studies as Web 2.0 technologies continue to develop and be deployed in organizations (Levy, 2009). In addition, the use of ESNS in organizations has started to produce a sort of resurgence and received

increased attention in academia and practice over the past few years (Wehner, Ritter & Leist, 2017).

Many organizations and companies have deployed ESNS. Evidence of this trend can be observed as in 2013, 85% of Fortune 500 companies used MS Yammer as their ESNS (Microsoft Yammer Team Site, 2013). The deployment of these types of systems is often a significant investment of resources (financial and human) for an organization without a guarantee that it would produce organizational and personal benefits. This study provides value to organizations by developing a model for the successful implementation of vCoPs in ESNSs for knowledge sharing. In addition, it can aid in the optimization of the use of the existing ESNS and vCoPs.

Barriers and Issues

The study of KM and ESNS in a private organization can prove to be a challenge due to the access limitations to useful data. The research provided a unique opportunity to access data from multiple organizational levels in the reporting hierarchy (i.e., from senior director to analyst) and functions that use the ESNS platform via communities of practice and that were willing to participate in the study. The access to the data and participants for the study, proved useful to the development and internal validation of the model.

The study of KM, KS, and ESNS is one that has been pursued since the advent of the original intranet communication systems. With the development of Web 2.0, further academic studies have been conducted to explain the relationships, benefits, and potential barriers for the use of ESNS for KM and KS. However, most of the reviewed literature focused on proving that there are effects in organizational learning of using ESNS as KM or KS systems, leaving a lack of studies that would aid in the successful implementation and use of the ESNS for KS. As indicated by Leonardi, Huysman, and Steinfield (2013), social media (aka ESNS in the proposed

study) are increasingly implemented in work organizations as tools for communication among employees. It is important that we develop an understanding of how they should be deployed and used to enable the benefits of organizational learning. With technology being more accessible to many organizations, it is important that we understand what could potentially influence the success or failure of these tools. Obtaining data for these types of studies is inherently difficult for researchers, as evidenced in the literature. A lot of data are collected by self-report surveys and other instruments, which may lack the insight of direct interaction with the users of ESNS platforms. The research provided a unique opportunity to have access to users at all levels of the organization.

Definition of Terms

Knowledge Management–The process through which organizations generate value from their intellectual and knowledge-based assets (Levinson, 2007).

Knowledge Sharing –The act of making knowledge available to others within the organization. Knowledge sharing between individuals is the process by which knowledge held by an individual is converted into a form that can be understood, absorbed, and used by other individuals. The use of the term sharing implies that this process of presenting individual knowledge in form that can be used by others involves some conscious action on the part of the individual who possesses the knowledge. Sharing also implies that the sender does not relinquish ownership of the knowledge; instead, it results in joint ownership of the knowledge between the sender and the recipient (Lin, 2007).

Enterprise Social Networking Systems–Internet-based technologies that can be used to create, edit, and share content with others throughout the enterprise (Qi & Chau, 2018).

Virtual Communities of Practice - An informal group bound together by a common interest or passion which links relationships, taking place in a virtual space like the Internet (Jiménez-Zarco, González-González, Saigí-Rubió, & Torrent-Sellens, 2015).

List of Acronyms

KM–Knowledge Management

KS–Knowledge Sharing

ESNS–Enterprise Social Networking System

vCoPs–Virtual Community of Practice

Summary

In this section the problem of the lack of guidance for the implementation and use of ESNSs for the purpose of knowledge sharing was identified, and the goal of constructing and validating a model for the successful implementation and use of ESNS for knowledge sharing and building successful virtual communities of practice (vCoPs) among supply chain IT professionals in a healthcare context was presented. In addition, the research questions, relevance and significance, barriers and issues, terms, and acronyms were defined. In Chapter 2, a review of the literature is provided followed by the methodology in Chapter 3, results in Chapter 4, and conclusions, implications, recommendations, and summary in Chapter 5.

Chapter 2

Review of the Literature

Chapter 2 includes a review of the literature on four topics that served as a foundation for the study. These topics include: knowledge management (KM), knowledge sharing (KS), enterprise social networking systems (ESNS) and how they are used for KM and KS, and communities of practice (CoPs), including virtual communities of practice (vCoPs). Exemplar studies pertaining to each of these studies along with a discussion of their strengths and weaknesses are provided. This chapter concludes with an analysis of research methods that are used in similar studies and a chapter summary.

Knowledge Management and Knowledge Sharing

To better understand the relationship between KM and KS the definition and current areas of focus for KM are presented. The term knowledge management is defined differently depending on the field of study as presented by Girard and Girard (2015). For the purposes of this research, KM is defined as "the process through which organizations generate value from their intellectual and knowledge-based assets" (Levinson, 2007, p. 1). KM continues to be a topic of study in multiple areas such as software development (Dingsøyr, Røyrvik, & Djarraya, 2019), project management (Reich & Wee, 2019), and social media (Nisar, Prabhakar, & Strakova, 2019).

Enterprise Social Media is defined by Leonardi et al. (2013) as web-based platforms that allow workers to communicate messages with specific coworkers and explicitly indicate or implicitly reveal coworkers as communication partners. This communication serves as a foundation for potential knowledge sharing.

In addition, it is important to understand why people use social media, specifically ESNS. Ma and Chan (2014) conducted a study based on the theory of belonging and the intrinsic motivation of altruism to explore the factors contributing to knowledge sharing behavior. Using a survey of 299 high school students applying for university after the release of the public examination results, Ma and Chan found that perceived online attachment motivation, defined as the degree to which an individual believes that he or she can improve his or her social interaction and the sense of communion with others on an online learning platform, and perceived online relationship commitment, defined as the degree to which an individual believes that he or she can persist in a relationship with others on an online learning platform, have positive, direct, and significant effects on online knowledge sharing. In addition, the study showed altruism has a direct and significant effect on online knowledge sharing. This study helped in establishing the relationship between KM and ESNS, and how it impacts organizational learning through social learning while pointing at altruism as having a significant effect on KS. The study does have a limitation in generalizability as it was constrained to high school graduates using only one social media platform.

In studying KM and KS, it is important to not only understand the motivators or enablers for KS but potential barriers. On the topic of KS and knowledge creation in KM in a social context, Ray (2014) examined the barriers to KM due to various national cultural dimensions to understand how social media can be used to mitigate those barriers to KM processes within organizations. Ray (2014) provided a review of the literature to understand the key concepts in KM and national culture followed by a discussion of important dimensions of national culture and the barriers they introduce to the KM processes. Ray (2014) linked the areas of KM, national culture and social media, and presented a clear picture of how social media can overcome KM

barriers due to specific cultural traits. Ray (2014) found that national culture has multiple dimensions (individualism, power distance, uncertainty avoidance, and long-term orientation) and each of these dimensions can act as a significant barrier to KM within organizations. Ray emphasized the importance of choosing the correct social media tool with specific features to help alleviate the issues introduced by specific cultural traits. Knowing these potential barriers is important when considering the process of building and validating a model for KS through ESNS. One of the limitations of the study is that it only considered four types of Web 2.0 technologies including web logs, wikis, online communities, and social networks, so future studies could expand on other Web 2.0 technologies.

Moving to the topic of organizational learning as a positive outcome of KM via ESNS, Thomas and Akdere (2013) presented the concept of collaborative media to describe the purposes for which social media tools are utilized within organizations. Thomas and Akdere (2013) explained the increasingly important role of social media tools to enhance and advance workplace learning and knowledge management. In a review of the literature, they presented the term *collaborative media*. The clarity brought by this term served to help human resource development (HRD) professionals within organizations adopt collaborative media tools as a workplace learning and knowledge management strategy and to attain organizational support for such tools at the highest level and capacity. Thomas and Akdere (2013) demonstrated that enterprise social media (ESM) usage has positive effects on knowledge management processes and workplace learning. The study does have a limitation in generalizability as it was focused on HRD professionals.

Regarding the use of Web 2.0 technologies (which ESNS are a part of), Nath (2015) studied the relationship between the use of Web 2.0 in KM and its effect on the tacit knowledge sharing

and perceived learning. He also studied the effects of KM context variables on these relationships. By conducting a qualitative positivist case-study, Nath (2017) tested six propositions related to Web 2.0 and KM, particularly knowledge sharing. The findings show that the use of Web 2.0 for KM can positively affect tacit knowledge sharing and perceived learning, once more highlighting the impacts on ESNS in KM and KS in organizations.

ESNS

Before addressing ESNS use impact, it is important to baseline the discussion with a review of the motivating factors of the user for a social network system, in this case, Facebook. This is important as many ESNS users are familiar with the Facebook platform and many of the ESNS tools share many traits with the social media platform. To this end, Smock, Ellison, Lampe, and Wohn (2011) analyzed data collected from undergraduate students at a large Midwestern university which revealed that users' motivations for using Facebook predicted their use of different features, such as status updates and wall posts, but features that share similar capabilities do not necessarily share underlying motivations for use. When these results are contrasted against models employing a more unidimensional measure of Facebook use, they found differences between motivations for both general Facebook use and the use of specific features of the site. The results suggest that uni-dimensional measures of SNS use unclear motivations for using specific features. These findings are important to consider in the context of ESNS as there is a possibility that this behavior could occur as well and should be accounted for in the study. The study does have the limitations of focusing on a single social media platform (Facebook); however, user behavior and motivational aspects could be relevant while studying ESNS.

Having established that KM via ESNS can provide the positive benefits of organizational learning, it is important to highlight possible challenges for the knowledge sharing in ESNs. To this point, Fulk and Yuan (2013) presented how the affordances of ESNS can help reduce three challenges in sharing organizational knowledge. These challenges include the location of expertise, motivation to share knowledge, and social capitalization in the form of developing and maintaining social ties with knowledge providers to actualize knowledge sharing. Building on previous theories and empirical research, Fulk and Yuan (2013) argued that the affordances of ESNS could better address these knowledge-sharing challenges than those of conventional knowledge management systems in that social networking applications can blend connective and communal sharing of knowledge. They concluded that effective knowledge sharing systems are crucial to for-profit firms seeking a competitive advantage, but also to virtually every possible type of organization around the globe. This study provides a roadmap for conducting theory-driven research on how the use of ESNS can reduce knowledge-sharing challenges.

Finally, van Osch, et al. (2015) explored the challenges and opportunities that ESM technologies provide for organizational communication. Merging existing conceptual work on ESM with findings from thirteen appreciative inquiry interviews with professionals from a large multinational organization, van Osch et al. (2015) offered six areas of opportunities and challenges—Social Capital Formation, Boundary Work, Attention Allocation, Social Analytics, Adoption and Use Incentives, and Governance and Control—that could guide researchers and practitioners in understanding and informing the use of social media technologies in their most productive and impactful ways. This framework provided a structure to conduct research on the productivity of ESNS in KM by improving organizational learning.

The Link Between KM and ESNS

Having reviewed the individual concepts of KM and ESNS, the next area for review is the link between the two. Mäntymäki and Riemer (2016) studied how employees use ESNS and what value they found in these uses. Using qualitative content analysis, Mäntymäki and Riemer (2016) identified five uses of ESNS including problem-solving, ideas and work discussion, events and updates, task management, and informal talk. Additionally, they also showed how these uses drive the value of ESN. Conducting quantitative and qualitative analysis, the authors tested eight hypotheses for this research about the use of ESN and potentially positive effects on value. All hypotheses except one (related to the use of ESN to give and receive updates on events and topical issues in the work environment having a positive effect on the value of the ESN) were supported by the findings. The results demonstrated that generating and obtaining new ideas for work by participating in discussions and finding solutions for work-related problems are the key sources of value. The results further showed that the socially and work-oriented ESN uses are closely intertwined. Hence, the informal discussions in ESN are enablers for more utilitarian uses that should not be excluded from the platform due to their informal nature. The elements presented in this study provide insights into the informal use and aspects of KM and ESNS, which were important to consider for the research.

The potential organizational benefits of the use of ESNS for KS and KM were key in determining the relevance of the study. To this end, Archer-Brown and Kietzmann (2018) examined if and how ESM could be understood as a strategic knowledge management phenomenon to improve organizational performance. They used intellectual capital theory and its functional building blocks to organize different types of ESM platforms, based on data from software vendors who compete in the ESM market space. Archer-Brown and Kietzmann (2018)

connected these findings to the underlying intellectual capital tenets to introduce a conceptual model that explains how ESM impacts strategic knowledge management and vice versa. Archer-Brown and Kietzmann (2018) concluded that ESM provides a unique complement to traditional strategic knowledge management. Their study provided the first review of the business needs that are served by the software functions and management processes under the ESM banner. Archer-Brown and Kietzmann's (2018) model could potentially serve as a framework to measure the effectiveness of the model in the proposed study.

The following two papers served as the foundation for the research as they looked at the direct impact of ESNS on KM, KS, and organizational learning. First, Qi and Chau (2018) investigated the impact of ESNS usage on KM processes and organizational learning. They examined the mediating role of knowledge creation and KS. Four theories from sociology and strategic management were used to build the hypotheses in the research model (Information Public Goods Theory, Social Capital Theory, Social Cognitive Theory, and Knowledge-based View). Five hypotheses were tested in the developed research model: H1) ESNS usage is positively related to knowledge creation, H2) ESNS usage is positively related to knowledge sharing, H3) ESNS usage is positively related to organizational learning, H4) Knowledge creation is positively related to organizational learning, and H5) Knowledge sharing is positively related to organizational learning. An online survey (n=151) was conducted to empirically test the model. Results showed that ESNS usage, directly and indirectly, influences organizational learning and that knowledge creation and sharing mediate the path between the two. This study contributes to the existing literature on ESM being among the first to connect the three independent concepts (social media, knowledge management, and organizational learning) and explore their relationships in one theoretical framework. This research provided implications for

future ESNS researchers as it underlined the effectiveness of ESNS usage in modern organizations.

In a similar manner, Corcoran and Duane (2017) examined how enterprise social networks can enable staff knowledge sharing in communities of practice in higher education. The action research project covered three cycles over a 12-month period. During the diagnosing phase, a conceptual model (Figure 1) was developed for empirical testing. Data were collected through 30 semi-structured interviews and several focus groups. Interviews were supplemented by content analysis and reflective journaling. The findings supported the conceptual model and provided insight into the antecedents necessary for the creation of an enterprise social network-enabled knowledge-sharing environment, the motivators for and barriers to participation, and the perceived organizational and individual benefits of increased staff knowledge-sharing activity. The main limitation was its higher education focus; therefore, the findings may not be generalizable to other types of organizations. The authors encouraged further development of the conceptual model and testing in other contextual settings. The study expanded on the scope by Corcoran and Duane (2017) by focusing on a healthcare organization.

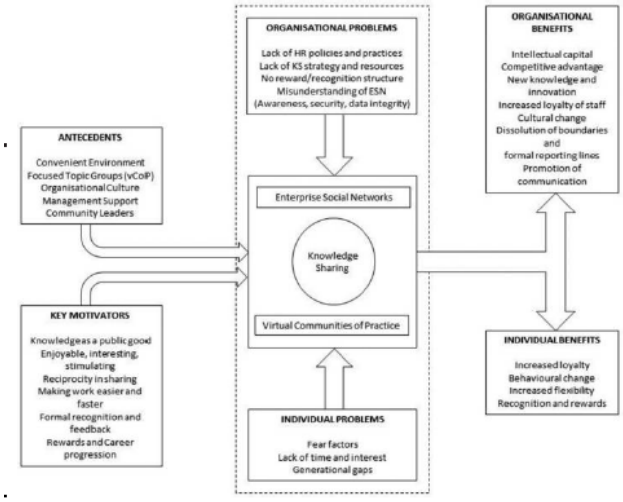

Figure 1. ESN for knowledge-sharing conceptual model from Corcoran and Duane (2017).

Communities of Practice

Bolisani and Scarso (2014) assessed the importance of communities of practice (CoPs) in the KM literature to: 1) trace how this notion is defined and used, both in practical and theoretical terms, 2) classify the approaches used by KM research on CoPs, and 3) discuss the results that research and practice in CoPs have led so far, the open issues, and the potential role of this notion in a future KM research agenda. Bolisani and Scarso (2014) discussed the findings of a systematic literature review on CoPs focusing on papers published in the most influential knowledge management and intellectual capital (IC) journals including an analysis of 82 articles published in 12 different KM and IC leading journals from 1997 to 2012. An issue is presented for researchers as the necessity to formulate an agreed definition of CoPs under the KM umbrella, which can also help to implement comparable empirical studies and to build theories that provide an understanding of how CoPs can be managed. The outcomes of the study can be summarized as follows: 1) CoPs have a central place in KM literature, 2) There is no consensus on a definition of CoPs and their applications 3) Qualitative methods prevail in the study of CoPs. These outcomes of the review are important for KM scholars who research CoPs, because they point to potential gaps and future research opportunities in this area. In addition, the paper highlights that, despite many studies on this topic, the notion of CoP is still used in different ways and the specific experience of each company is difficult to generalize and transfer to other cases. Bolisani and Scarso's (2014) study is one of few that focuses on CoPs and their application in KM, although it has the limitations of focusing on face-to-face CoPs. As virtual CoPs (vCoPs) were part of possible mediators or enablers for KS through ESNS in the study, it is important to understand what has been previously studied in that relationship in the past and understand the challenges in possible future research.

By further reviewing the literature, other organizational elements emerged that could influence the use and the user interaction with an ESNS platform, as described by Cao, Gao, Li, and Friedman (2013). In their research in which a statistical model was built, they conducted an analysis of logistic regression, which confirmed that both geo-location, and position in a corporate hierarchy are significant in predicting user interaction with the ESNS. Furthermore, they found that users are more willing to interact if the hierarchy distance is small. As a result of this review, the elements of geo-location, and position in corporate hierarchy were added to the model under the individual problems moderating variables.

Another element discovered in reviewing the literature is the role of the vCoPs. In Corcoran and Duane's (2017) model, the role of the vCoPs is demonstrated as an antecedent of the knowledge sharing; however, it can also be considered as a motivator for the use of the platform. Jiménez-Zarco, Gonzalez-Gonzalez, Saigí-Rubió, and Torrent-Sellens (2015), conducted an analysis of logistic regression on the co-learning process in healthcare professionals by assessing the user satisfaction in vCoPs. This study showed the perception of efficiency and effectiveness in collaboration with the members of a vCoP as positively influencing the perceived satisfaction with the CoP. In addition, they found that the degree of individual participation in the community affects the degree of perceived satisfaction. Based on this study, the element of vCoPs was added as a potential motivator in the model.

The next element added, to the model was based on the research by Huang, Vir Singh, and Ghose (2015), who developed a dynamic structural framework to analyze the social-media content creation and consumption behavior of employees within an enterprise. The framework incorporates two key features that are ubiquitous in blogging forums: users face (1) a trade-off between blog posting and blog reading; and (2) a trade-off between work-related and leisure-

related content. Through this framework the researchers were able to obtain insights into employee competition on blog postings in ESNS. This highlights competition as an additional motivator in ESNS use, and it was added to the model. Additionally, the blogging analysis demonstrated that leisure-related blogging has positive spillovers for work-related blogging, and hence a policy of abolishing leisure-related content creation can inadvertently have adverse consequences on work-related content creation in an enterprise setting. This finding was considered for potential impacts due to imposed policies for the use of ESNS, if the deterrents of use identified in the data collection include policy against leisurely posts.

The next elements added to the model were self-efficacy and social interactions as possible motivators. Kwahk and Park (2016), performed an empirical analysis on the effects of network sharing on knowledge sharing activities and job performance in ESNSs. The analysis revealed that knowledge self-efficacy, social interaction ties, and the norm of reciprocity positively influence the tertius iungens (third who joins) orientation and knowledge-sharing activities in social media, while enjoyment of helping does not have a significant influence. In addition, the tertius iungens orientation has a significant impact on knowledge-sharing activities in social media, which in turn influences individual job performance. This reciprocity element was already included in the baseline model by Corcoran and Duane (2017); therefore, it was not necessary to add.

Other literature was reviewed to confirm the elements included in the model particularly the outputs. For example, Mäntymäki and Riemer (2016) used a mixed methods approach to examine how employees use ESN and the value of these uses as described previously. The output elements of innovations and problem solving as benefits are part of the intellectual capital that is already described as organizational benefits of the KS using ESNS in the baseline model.

Finally, the work from Qi and Chau (2018), highlights two important elements of the model. First, it validated the output of organizational learning (seen as knowledge creation in the model) and second, it highlighted that both knowledge sharing and knowledge creation are mediators in obtaining those outputs. With this information, the element of knowledge creation was added to the model.

Research Methods for Studying ESNS and vCoPs

There are many research methods that can be applied to the study of ESNS and vCoPs. Early in the development of Web 2.0 platforms, specifically ESNSs, the literature consisted of mainly empirical studies to better define Enterprise Social Media (Leonardi et al., 2013), studies to classify ESNSs in terms of collaboration in the workplace (Thomas & Adkere, 2013), and literature reviews conducted to highlight a research agenda (Bolisani & Scarso, 2014; Wehner, et al., 2017).

Recently, the study of ESNS and vCoPs; specifically, their relationship with KM, and KS, has been increasingly structured for model development. Examples of this transition include the work from Corcoran and Duane (2017), Qi and Chau (2018), and Archer-Brown and Kietzman (2018). The use of models coincides with the emphasis on being able to replicate successful implementations of ESNSs and vCoPs for KS to obtain their benefits. A summary of the literature that informs the proposed study and construction of the model is presented in Table 1.

Table 1

Literature Review Summary

Study Title	Authors	Research Approach	Contribution
Enterprise social network analysis and modeling: A tale of two graphs	Cao, Gao, Li, & Friedman, 2013	Observation, analysis, and build statistical model (model development)	Geo-location, and position in corporate hierarchy are significant in predicting user interaction
Enterprise social media: Definition, history, and prospects for the study of social technologies in organizations	Leonardi, Huysman, & Steinfield. 2013	Qualitative methods	Definition of ESNs
Social media as collaborative media in workplace learning	Thomas & Adkere, 2013	Qualitative methods	Adoption of collaborative media in the workplace
The co-learning process in healthcare professionals: Assessing user satisfaction in virtual communities of practice	Jiménez- Zarco, Gonzalez-Gonzalez, Saigí-Rubió, & Torrent-Sellens, 2015	Analysis of logistic regression	Perception of efficiency and effectiveness of vCoPs
Knowledge sharing and social media: Altruism, perceived online attachment motivation, and perceived online relationship commitment	Ma & Chan, 2014	Quantitative Research (model development)	Perceived online attachment motivation and perceived online relationship commitment have positive, direct, and significant effects on online knowledge sharing. Altruism has direct and significant effect on online KS
Overcoming cross-cultural barriers to knowledge management using social media	Ray, 2014	Qualitative methods	Overcoming cultural barriers in KM through use of social media

Study Title	Authors	Research Approach	Contribution
The place of communities of practice in knowledge management studies: a critical review	Bolisani & Scarso, 2014	Literature review	Establish the relationship of CoPs with KM
A structural model of employee behavioral dynamics in enterprise social media	Huang, Vir Singh, & Ghose, 2015	Dynamic structural modeling (model development)	Motivation by competition. Impact on policies in using the platform
The Use of enterprise social network sites for knowledge sharing in distributed organizations - The role of organizational affordances	Ellison, Gibbs, & Weber, 2015	Qualitative methods	How do individual and organizational affordances impact KS through ESNs use
Web 2.0 for knowledge management in organizations and their effects on tacit knowledge sharing and perceived learning	Nath, 2015	Case study	Web 2.0 for KM can positively affect tacit KS and perceived learning
Defining knowledge management: Toward an applied compendium	Girard & Girard, 2015	Qualitative methods	KM Definition
Enterprise social media: Challenges and opportunities for organizational communication and collaboration	Van Osch, Steinfield, & Balogh, 2015	Case study	Identified six areas of challenges on communication and collaboration and how ESNSs could impact them
Enterprise social networking: A knowledge management perspective	Mäntymäki & Riemer, 2016	Mixed methods	Generating and obtaining new ideas for work by participating in discussions and finding solutions to work related problems are the key sources of value. Informal discussions in ESN are a lubricant to more utilitarian uses that

Study Title	Authors	Research Approach	Contribution
			should not be removed from the platform.
The effects of network sharing on knowledge-sharing activities and job performance in enterprise social media environments	Kwahk & Park, 2016	Quantitative methods	KS, self-efficacy, social interaction toes, and the norm of reciprocity influence the tertius iungens orientations.
Using enterprise social networks as a knowledge management tool in higher education	Corcoran & Duane, 2017	Action Research	Baseline mode
Uses of web 2.0 for knowledge management at group level in organizations: Understanding the effects	Nath, 2017	Case Study	Web 2.0 for KM can positively affect group level performance
Enterprise social networks: A literature review and research agenda	Wehner, Ritter, & Leist, 2017	Literature Review	Identify the research agenda for ESNS
Will enterprise social networking systems promote knowledge management and organizational learning? An empirical study	Qi & Chau, 2018	Quantitative methods	ESNS usage directly and indirectly influences organizational learning, and that knowledge sharing mediate the path.
Strategic knowledge management and enterprise social media	Archer-Brown & Kietzmann, 2018	Qualitative methods	Establishing ESNS as a unique complement to traditional KM

Summary

Chapter 2 presented a view of current literature regarding the areas of knowledge management (KM), knowledge sharing (KS), enterprise social networking systems (ESNS) and how they are used for KM and KS, and virtual communities of practice (vCoPs). It concluded with a summary of relevant studies that were used to inform the development of a preliminary

model for KS in ESNSs that employ vCoPs. Chapter 3 begins with an overview of the research methodology and design followed by a detailed description of a three-phased research approach. Each phase includes which research question(s) are addressed, what data collection instruments and procedures were used, the proposed sample, how data were analyzed, formats for presenting results, and resources used. A summary concludes Chapter 3.

Chapter 3

Methodology

Overview

Few guidelines, frameworks, and models exist that can assist in the successful implementation and use of ESNS for knowledge management and to facilitate organizational learning through knowledge sharing, in particular (Chin, Choo, & Evans, 2015; Aboelmaged, 2018). This is the research problem that this study addressed. The goal was to construct and validate internally a model that offers guidance for the successful implementation and use of ESNS for knowledge sharing and building successful virtual communities of practice (vCoPs) among IT supply chain professionals in a healthcare context. A qualitative design and development approach (Richey & Klein, 2007) was used as the guiding research methodology. Regarding model research, Richey and Klein (2007) identified three types including model development, model validation, and model use. In this study, the research methods for model development and internal validation were applied. Internal validation, as opposed to external validation, is the process of evaluating the components and processes of a model. External validation studies do not focus on the verification of model components but rather a documentation of the model's use (Richey & Klein, 2007). Model use is beyond the scope of this research.

This study was carried out in three phases. First, a preliminary model was constructed based on a synthesis of the existing ESNS, KM, and vCoPs literature. Second, the preliminary model components guided the design of a questionnaire aimed to seek input from approximately 144

stakeholders. Follow up one-on-one interviews were conducted with a subset of this population of six people to gain a deeper understanding of the questionnaire responses that aided in further model construction. Descriptive statistics were used to organize and report the closed-ended questions and thematic content analysis (Braun & Clarke, 2012) was used to analyze and organize the data from open-ended questions and interviews. The model was revised based on stakeholder input. In the third and final phase, the revised model was presented to a panel of experts representing the target population. The Delphi technique was used to guide the review of the revised model. The data collected and analyzed from this process were used to report additional modifications considered to further improve the model.

Phase One: Preliminary Model Development

Phase one answers the first research question: What guidelines, models or frameworks are currently available for the use of ESNS as tools for knowledge sharing and what are their benefits and limitations? The preliminary model is shown in Figure 2. Corcoran and Duane's (2017) conceptual model serves as the foundation. Additional elements were added to this model based on a synthesis of the literature reviewed in chapter 2.

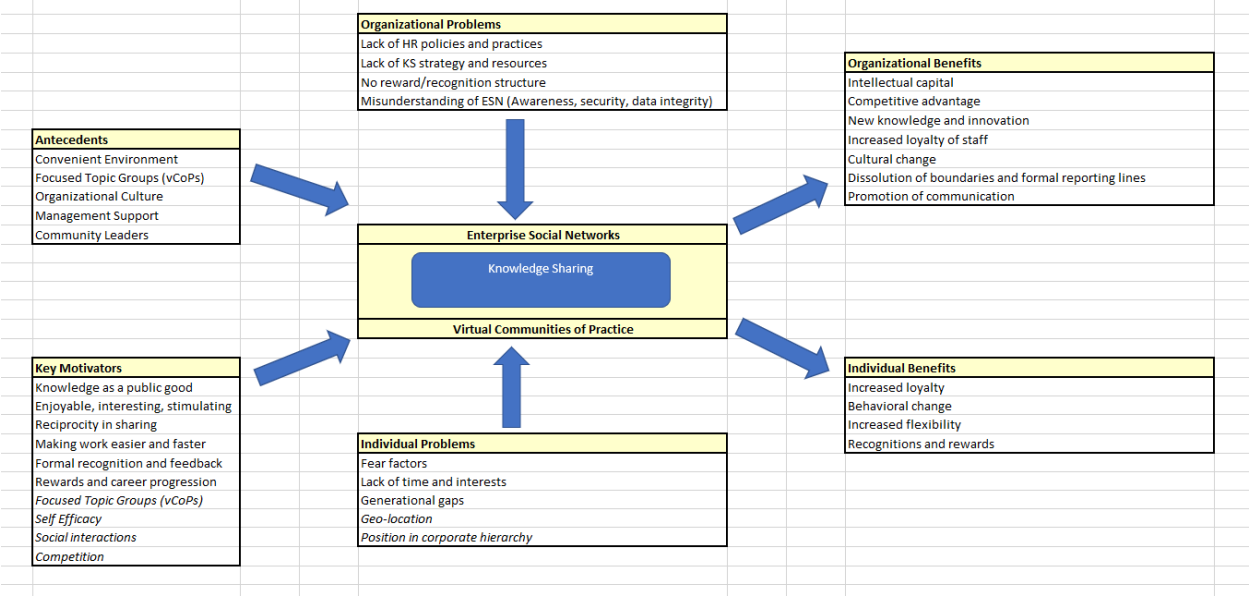

Figure 2. ESNS for KM through vCoPs proposed model

The following elements were added to Corcoran and Duane's (2017) model. All elements were further explored in phase 2 with a focus on guidance that can be provided to facilitate the implementation of these elements.

- Key Motivators
  - Focused Topic Groups (vCoPs)
  - Self-efficacy
  - Social interactions
  - Competition
- Individual Problems
  - Geo-location
  - Position in corporate hierarchy
  - Usability of the platform

Phase Two: Needs Assessment

Phase two answers the second research question: What needs to be considered to design an effective model to guide the implementation of vCoPs in ESNS for knowledge sharing in a healthcare organization? A needs assessment is defined as a tool for identifying the problem and then selecting the appropriate intervention (Kaufman & English, 1979; Kaufman, Rojas, & Mayer, 1993), or can also be known as a needs analysis to identify gaps in performance and then determine whether the gaps are worth addressing through an intervention (Morrison, Ross, Kalman, & Kemp, 2011). The needs assessment was implemented using the following four sub-phases: (2a) planning, (2b) data collection, (2c) data analysis, and (2d) reporting (Morrison et al., 2011). These phases are described in the following subsections.

Phase 2a: Planning

In the planning phase, it was important to identify what questions needed to be included that would help uncover needs related to ESNS implementation and use. Second, the target audience for the questionnaire was also identified. The questionnaire was guided by the review of the literature, research questions, and previous design and development research (See Appendix A). The questionnaire was web-based and developed using the Survey Monkey website tool. The structure included two general demographic multiple-choice questions, followed by two questions asking about prior use of ESNS. These questions were followed by an open-ended question on the antecedents and motivators for the use of ESNS and participation in vCoP. Next, seven questions asking about the organizational and individual benefits were presented. The questionnaire ends with three open-ended questions that investigate organizational and individual problems.

The questionnaire was pilot tested with a total of nine people from the target audience population. These individuals are information technology professionals and users of the Yammer platform. Table 2 shows the company title, ESNS role, gender, age, and Yammer usage level of each person in the pilot test group. The feedback was collected in one-on-one sessions where questions were clarified, and edits were made to the questionnaire based on the collective feedback.

Further revisions were made to the questionnaire during reviews with the Information Security Risk Management and Human Resources groups to address any privacy and inclusion concerns. These modifications resulted in the removal of two demographic questions (one related to age, and the second related to gender), and two questions related to the follow-up interview (one asking about willingness to participate, and the second one requesting the name and email

to contact potential participants). Finally, an additional question related to the use of MS Yammer for organizational knowledge sharing was removed as it was a duplicate of an existing question.

Table 2

Pilot Test Participants

Position	ESNS role	Gender	Age	Yammer usage level
IT Senior Director – Strategy & Operations	User	Female	49	Infrequent user
IT Director – Network Programs	User	Female	51	Infrequent user
IT Manager – Strategy, Operations, and Analytics, Portfolio Manager	Yammer group admin	Female	41	Power User
IT Lead – Program Manager, Technology Lifecycle Management	User	Male	52	Regular user
IT Lead – Program Manager, Technology Lifecycle Management	User	Female	50	Regular user
IT Consultant	User	Male	22	Infrequent user
IT Associate Analyst	User	Female	22	Frequent user
IT Manager	User	Male	45	Frequent user
IT Manager	User	Female	54	Infrequent user

Phase 2b: Data Collection

The first step for the data collection was to obtain Institutional Review Board approval from Nova Southeastern University. Once approved, the researcher coordinated for initial email

distribution to the IT departments at the selected organization (approximately 140 users). This pool was selected with the expectation that around 30 anticipated responses, with a total of 40 actual responses, were received. The users included Business Analysts, IT Leads, IT Managers, an IT Senior Manager, IT Directors, IT Senior Directors, and IT Vice Presidents of the supply chain manufacturing information technology division in the organization. This email explained the purpose of the questionnaire, the purpose of the study and the URL where the survey could be accessed with a corresponding QR code to facilitate ease of access. In addition, the email contained the participation letter for the purpose of attaining informed consent. After the results were collected, 20 participants who expressed interest in the study to the researcher, were contacted to assess their interest in participating in the interviews. After confirmation of acceptance, the interview sessions were scheduled.

Microsoft Outlook calendar was used to schedule the session and Microsoft Teams was used to conduct the virtual interview meetings. A webcam was used during the interviews to obtain the nonverbal cues from the participants' responses and reactions. Hans and Hans (2015) categorized these non-verbal communication channels as kinesics, haptics and oroxemics and highlighted the importance that these elements be observed. The sessions were recorded, and permission was provided by each participant prior to the start of each session.

For the interviews to be used in the qualitative analysis, they needed to be transcribed into text. Microsoft Teams provides this feature as part of the product and therefore, the transcripts were accessed for each interview. Further details on the text analysis are presented in the qualitative analysis process described later in this chapter and the results are presented in Chapter 4. The security topic is very critical regarding data and confidentiality and to maintain

confidentiality, so pseudonyms were used in place of the participant names to avoid disclosure of their identities.

In addition to the previously described steps for confidentiality, consent was obtained from each participant at three levels. Initial consent was obtained when the participants took the initial online survey. Second, the subjects consented to participate in the interview when asked as a follow up to the survey. Third, before the interview process, the researcher specifically informed the users of the interview process, intent, that they will be recorded, and asked for their agreement before proceeding.

The interview guide (See Appendix B) was designed to guide the conversation with a subset of questionnaire respondents. Open-ended probing questions were used to further understand the needs of stakeholders about their use of the Yammer platform.

Phase 2c: Data Analysis

The next step in the process was data analysis. Considering that the methods to be used would yield both quantitative and qualitative data, the data analysis methods were selected to address each data type.

For the quantitative data, descriptive statistics were used to analyze the data. Descriptive statistics help organize and summarize data, such as graphs, percentages, and averages (Holcomb, 2016). Descriptive statistics can also be defined as numbers that summarize the data with the purpose of describing what occurred in the sample (Thompson, 2009). The selection of descriptive statistics allows for succinct and objective presentation of the quantitative data analysis.

For the qualitative data, thematic analysis was used (Braun & Clarke, 2012). Thematic analysis is “a method for systematically identifying, organizing, and offering insight into patterns

of meaning (themes) across a data set" (Braun & Clarke, 2012, p. 57). The key aspect of that definition is in the patterns. The aim was to identify, describe, and present the patterns in the qualitative data. The six-phase guide provided by Braun and Clarke (2006) was used. These six phases include: (1) become familiar with the data, (2) generate initial codes, (3) search for themes, (4) review themes, (5) define themes, and (6) write-up.

Phase 1: Familiarizing yourself with your data. To conduct this phase, a review of the survey data was performed with the intent of recalling common data elements and themes from the quantitative analysis. The next step was to listen to the recorded interviews. During this process, notes were taken on initial impressions of potential emerging codes and common patterns.

Following this initial review of the collected interview data, the next step was the transcription of the verbal data into text. The transcription product features from Microsoft Teams were used to transcribe the audio into text format. Once the text was available, a reading of the transcript proceeded to confirm the accuracy and that the text reflected the context and the intent from the interviews. Updates and corrections were made as needed. Finally, a second reading was conducted after the required updates to start the analysis of the content and a list was generated with the codes on Yammer usability, use, value, learning, and knowledge, among other topics.

Phase 2: Generating initial codes. In this phase, the data collected in Phase 1 were reviewed to produce initial codes. As described by Braun and Clarke (2006), these codes are the minimum data aspect that can provide information. The codes at this phase were generated manually by analyzing the data extract and tabulating the codes. The researcher looked for indicators in the text that reflected elements such as ease of use, benefits of use, and how useful the platform and

CoPs are for the users. Special attention was given to emerging codes on benefits, frequency of use, learning, and value. However, the entirety of the data was evaluated to avoid potentially missing important contextual elements from the text associated with the coded themes.

Phase 3: Searching potential themes. With all the data coded, the next phase was to start the generation of themes in the data set. By analyzing the codes, mind-maps were generated to organize the codes into themes. A summary of the process can be found in Appendix F. This process helped to generate initial thematic maps. These maps included the relationship between the codes and focused on the Yammer use elements, vCoPs, and KM. All other remaining topics were classified as miscellaneous themes, as at this stage no themes were removed and were used to establish further unseen relationships amongst themes. The outcome of this phase was the candidate themes of the analysis.

Phase 4: Reviewing themes. In this stage, the candidate themes generated in the previous stage were reviewed and refined by checking for themes that might be joined, split, or eliminated due to lack of data. In this phase, two levels of review and refinement of the themes occurred. In the first level, all the themes were reviewed at the code level to ensure that patterns were coherent. When the patterns were not coherent, the theme was revised. When the patterns were coherent, the thematic map was generated, and the themes went through the second level of review. This second level of review was at the entire data set level. Following a similar process from level one, the themes were evaluated for coherence and consistency. At the end of this phase the different themes and their relationships were established, and a thematic map of the data was produced.

Phase 5: Defining and naming themes. After the thematic maps were generated, a review of the data extract was conducted. A detailed analysis of the individual themes was performed and

presented in tabular format. This analysis maps the relationship of the themes back to each of the research questions. Each theme was evaluated individually, in relation to other themes, and if it contained sub-themes. The expected themes are related to the main categories of the research including ESNS, KM, vCoPs, and model.

Phase 6: Producing the report. A summary of the data, codes, themes, and their development process was produced at the end of the analysis. This summary report highlights examples of where the themes are in the data and how they correlate to the research.

Phase 2d: Reporting Results

For the descriptive analysis, the results are reported using the standard tabular and graphical formats for descriptive data reporting such as histograms, bar charts, and line graphs. These graphs display the quantitative analysis elements such as sample size, central tendency, proportions, mean, median, mode, data distribution, standard deviation, and range. For the thematic analysis reporting, the results are demonstrated for the defined themes in a thematic map, providing a visual representation of the discovered themes and their relationships for the qualitative data.

Phase Three: Internal Validation

Phase three answers the third research question: How do ESNS stakeholders perceive this model regarding effective knowledge sharing within the healthcare industry? The results from the data analysis from Phase 2 were used to revise the model. This revised model takes into consideration which factors are important for that population of employees in the use of ESNS and their participation in vCoPs for knowledge sharing. A Delphi study was conducted to validate the revised model. The Delphi technique was used as a method for gathering data from a group of experts with goal of reaching consensus (Hsu & Sandford, 2007). The selection of

Delphi aligns with the types of data and analysis that were generated in the study as it can be applied to both quantitative and qualitative methods.

Delphi Panel Data Collection

The revised model was distributed to a group of four experts via email. The experts were asked to provide their feedback within one week, and the incorporated revisions were sent back to the experts for a final review and approval.

The experts were guided by the following questions:

1. How would you modify/improve the model?
2. How easy/difficult do you find the model to follow?
3. How easy/difficult do you believe this model would be for a regular user to follow?
4. In which area of the model are the most revisions needed?

Delphi Panel Participants

The Delphi panel consisted of three participants who are healthcare manufacturing supply chain professionals. The Delphi panel information is presented in Table 3.

Table 3

Delphi Panel Participants

Position	ESNS role	Gender	Years in the company
Senior Director– Digital Manufacturing and Data Analysis	Group Sponsor/ KM Expert	Male	1
Senior Director–Strategy & Operations	Power user	Male	13
Vice President–Supply Chain Manufacturing	Platform Sponsor	Male	20

This group provided a diverse level of expertise and experience in the evaluation of the model.

Formats for Presenting Results

The analysis results were presented to the Delphi panel. The Delphi panel was formed by the identified stakeholders and complied with the four requirements for expertise, knowledge and experience with the issues under investigation, capacity and willingness to participate, sufficient time to participate in the Delphi, and effective communication skills, as identified by Skulmoski, Hartman, and Krahn (2007). The panel reviewed the summary of the survey results and the thematic map to form a list of improvements for the model. The method being used for this phase is the three round Delphi process as described by Skulmoski, Hartman, and Krahn (2007), as it has been identified that for most research purposes two or three iterations are enough (Delbecq, Van de Ven, & Gustafson, 1975). The changes on each iteration were documented as these are the basis for answering the fourth research question: What modifications are needed to improve the proposed ESNS implementation and use model?

Resource Requirements

The resources required for the study included access to the online survey tool Survey Monkey, access to computing Microsoft computing resources such as Outlook for email, and calendar functions, Microsoft Teams for web meetings, recording, and transcription, Microsoft Word for document development, and Microsoft Yammer which is the ESNS being studied.

In addition to the technological resources, access to the current body of knowledge and literature regarding the research topics was needed. Also, the access to the Delphi experts, as well as access to the users of the Yammer platform in the health care manufacturer context.

Access to the technology resources was available to the researchers, as well as access to the people who are the researcher's peers and co-workers.

Summary

This section presented the overview of research methodology/design, the specific research method (design and development research) employed, and how this method was carried out both conceptually and operationally. It also presented the method of analysis and reporting of the results, in addition to the Delphi panel formation and iteration process. Finally, it presented the instrument development and validation, sample, data analysis, format for presenting the results and resource requirements. The next chapter presents the results of the data collection and analysis.

Chapter 4

Results

This study set out to develop and validate an Enterprise Social Network Systems implementation model for knowledge sharing among supply chain IT professionals.

To obtain these results, a needs assessment was conducted by distributing a questionnaire and collecting ESNS user data. The questionnaire obtained quantitative and qualitative data regarding ESNS use, vCoPs, and knowledge sharing. This questionnaire was then followed by interviews with participants that expressed interest in sharing additional insights regarding the use of ESNS particularly in knowledge sharing. The results of the data analysis of the questionnaire and interviews were used to update the preliminary model for the use of ESNS for knowledge management through the use of communities of practice. This updated model was then presented to a selected Delphi panel who provided additional feedback on the model and recommendations for changes. What follows is a presentation of the results of the questionnaire, interviews, and resulting model after two Delphi iterations.

User Needs Questionnaire

As previously noted, the questionnaire contained both quantitative and qualitative elements. The questionnaire was sent to a total of 144 potential participants which produced a participation of 40 (27.77%). The participants of the survey are part of an Information Technology group under the manufacturing support division of a large international supply chain health care organization. Due to privacy concerns discussed with the company information security officials, the Asia Pacific region was excluded from participation.

Quantitative Elements

The questionnaire contained a total of nine quantitative elements. Tables 4 and 5 show the level in the organization and years of experience respectively. Table 4 shows the Manager group with the most participation (45%) followed by the Lead group (25%). The data also show participation at all levels in the organization (from Analyst to Vice President).

Table 4

Questionnaire Respondent Organizational Level (N=40)

Position	Percentage	Count
Analyst	12.50%	5
Lead	25.00%	10
Manager	45.00%	18
Director	15.00%	6
Vice President	2.500%	1
Other (please specify)	0.0%	0

Table 5 shows the years that the participants have worked on the information technology group. The highest scored was between 11-20 years (37.50%) followed by the group from 21-30 years (27.50%).

Table 5

Questionnaire Respondent Years in Technology Group Level (N=40)

Years of Work Experience	Percentage	Count
Less than 5 years	25.00%	10
5-10 years	7.50%	3
11-20 years	37.50%	15
20-30 years	27.50%	11
More than 30 years	2.50%	1

After these initial demographic questions, the questionnaire then proceeded to ask about the MS Yammer use frequency and whether the participant was part of a vCoP. The results are presented in Table 6 and Table 7 respectively.

Table 6

Questionnaire Respondent MS Yammer Use Frequency (N=40)

I use MS Yammer often.

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total responses
Number	8	5	12	9	5	39

I use MS Yammer often.

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total responses
Percentage	20.51%	12.82%	30.77%	23.08%	12.82%	

Table 7

Questionnaire Respondent Being Part of vCoP (N=40)

I am a part of a virtual community of practice (vCoP).

	Yes	No	Total responses
Number	18	21	39
Percentage	46.15%	53.85%	

The results in Table 7 show that close to half of the participants are currently part of a virtual community of practice.

After confirming the level of use of MS Yammer and participation in the vCoP, the questionnaire then presented the questions regarding the benefits of MS Yammer to individual KS, the benefits of MS Yammer to organizational KS, and how MS Yammer helps participants' job performance. The results of these questions are shown in Table 8.

Table 8

Questionnaire Respondent MS Yammer Perceived Benefit (N=40)

MS Yammer has been beneficial to my knowledge sharing.						
	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total responses
Number	3	4	9	10	7	33
Percentage	9.09%	12.12%	27.27%	30.30%	21.21%	
The use of MS Yammer improves organizational knowledge sharing.						
Number	1	1	6	18	7	33
Percentage	3.03%	3.03%	18.18%	54.55%	21.21%	
The information in MS Yammer helps me improve my job performance.						
Number	2	4	14	10	3	33
Percentage	6.06%	12.12%	42.42%	30.30%	9.09%	

The results of this section could potentially indicate that participants perceived the use of ESNS as more beneficials to the organization than themselves individually.

The next set of questions are related to the virtual communities of practice by asking whether the vCoP makes efficient use of MS Yammer, and whether the vCoP improves organizational knowledge sharing. The results of these questions can be found in Table 9.

Table 9

Questionnaire Respondent vCoP Feedback (N=40)

My virtual communities of practice make efficient use of MS Yammer.						
	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Total responses
Number	2	5	19	6	1	33
Percentage	6.06%	15.15%	57.58%	18.18%	3.03%	
The use of virtual communities of practice improves organizational knowledge sharing.						
Number	0	0	8	16	9	33
Percentage	0.00%	0.00%	24.24%	48.48%	27.27%	

The results from Table 9 seem to confirm the participants' perception that the benefits of the MS Yammer platform and the vCoP are greater at the organizational level than at the individual level.

Qualitative Elements

The questionnaire contained six open-ended questions that aimed to obtain insight into the motivations for ESNS use and participation in vCoPs, benefits of KS for the organization, benefits of KS for the individual, dominant problems associated with the implementation of ESNS in the organization, elements that would aid in the use of MS Yammer and participation in vCoPs to improve knowledge sharing in the organization, and the main barriers for use and participation in vCoPs. For this analysis the researcher reviewed the individual answers on each response and identified patterns and repetitions to highlight the main themes. The consolidated

themes from the open-ended responses are in Table 10. The tree structure of the consolidated themes can be found in Appendix E. A summary of the overall thematic analysis including the coding process can be found in Appendix F.

Table 10

Consolidated Themes from Open-ended Questions (N=40)

Question	Number of Answers	Individual Themes
What are the key motivators for you to use ESN and participate in vCoP?	36	Communication Learning Knowledge (Share, Obtain) Collaborate Connect
What are the perceived benefits of knowledge sharing for the organization?	33	Collaboration Innovation Knowledge (Share, Obtain) Information (Centralized, Accessible) Learning Connection
What are the benefits of knowledge sharing for you as a user?	33	Productivity Connection (Socialize) Learn from others Informed Knowledge (Share, Obtain)
What are the dominant problems associated with the implementation of ESN in the organization?	30	Can be a distraction Too much information Lack of controls Not the only channel Number of active contributors Too many groups Lack of governance Privacy
What elements do you believe would aid in the use of MS Yammer and Virtual Communities of Practice for better knowledge sharing in our organization?	30	Controls on communities Reduce the number of channels Integration with other systems Prioritization of content Improve searching More time to use
What are the main barriers to your use and participation in vCoP?	30	Lack of time to use Lack of controls Number of active contributors

The results of this section show common themes of communication, connection, learning, and knowledge sharing among the key benefits listed by the participants. The smaller representation of responses relating to problems, barriers, and improvements, may suggest hesitation in sharing this type of feedback.

User Interviews

After the questionnaire was distributed, data were collected, and the questionnaire closed, 20 participants were contacted to confirm their interest in participating in individual interviews in an effort to obtain additional insights into their use of MS Yammer and their thoughts of using the platform for knowledge sharing, particularly through the virtual communities of practice. Results of this section show common themes of communication, connection, learning, and knowledge sharing. The interviews were conducted using the interview guide (Appendix C) as described in Chapter 3. The following are the results of that process.

The first step that the researcher conducted after the interviews was to review and become familiar with the data. This was done by re-watching the interviews as well as reading the transcripts. During the transcript reads, several errors in the automated transcriptions were detected and corrected.

After the initial data review, the first theme map was generated based on a summary of the input provided. Figure 3 shows the resulting view.

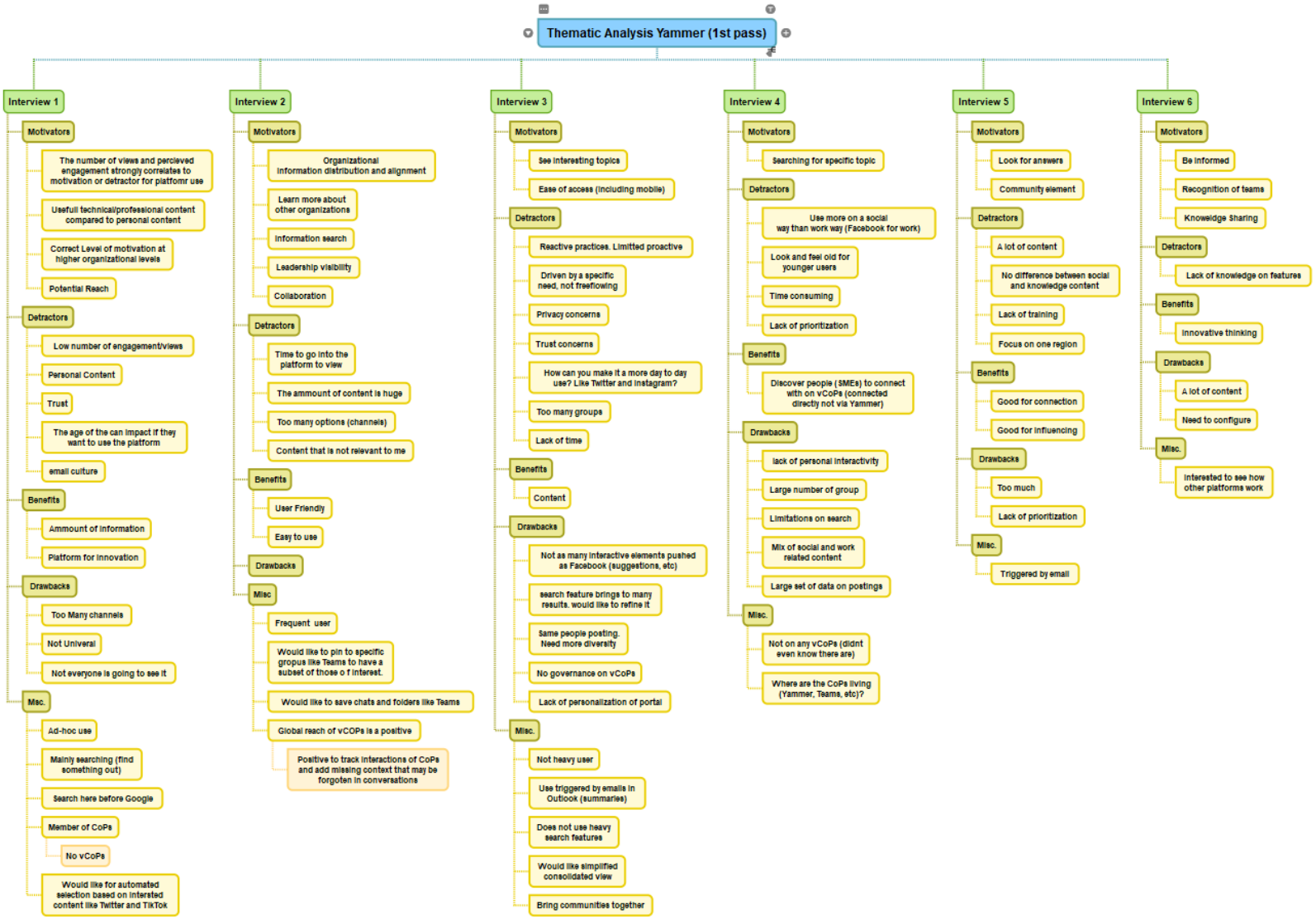

Figure 3: Thematic Analysis First Pass

After the generation and initial review of the first themes several themes were consolidated while keeping the same categories for motivators, detractors, benefits, and drawbacks. Based on consolidating and eliminating some elements, the second theme map was generated as shown in Figure 4. This review also considered the elements identified in the open-ended questions of the questionnaire.

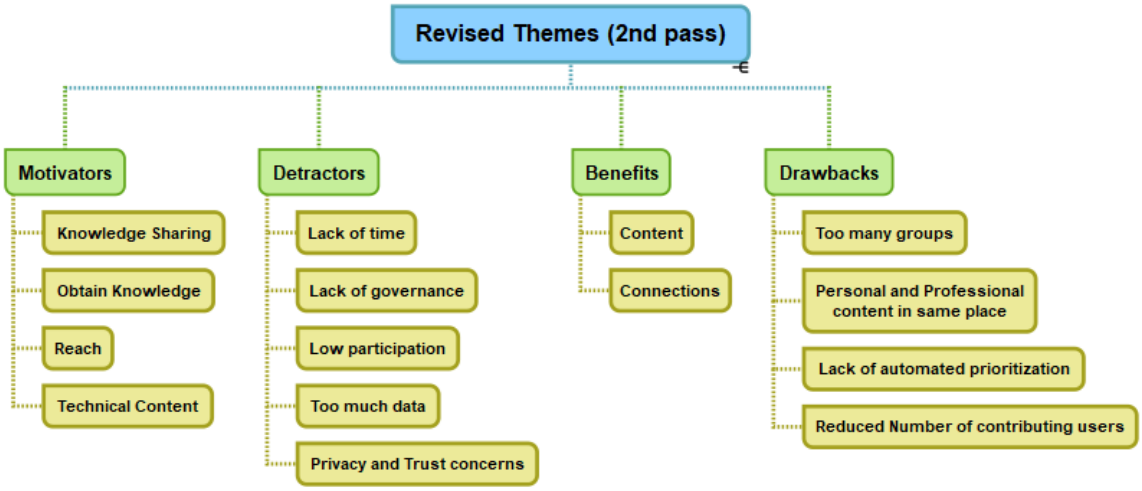

Figure 4: Revised Themes

After the second pass of themes was completed, the themes were compared against the preliminary model developed. The elements that resulted from the theme analysis that were not in the preliminary model were added. Under the key motivators the technical content source was added, followed by the lack of governance (lack of specific guidance or rule set from the organization regarding the use of the platform), number of groups, and the personal and professional content in the same environment were added under organizational problems. The privacy and trust concerns were added under the individual problems, followed by the

centralized knowledge management in the organizational benefit topic. Finally, the increased connection with the organization was added as an individual benefit. The resulting updated model can be seen in Figure 5.

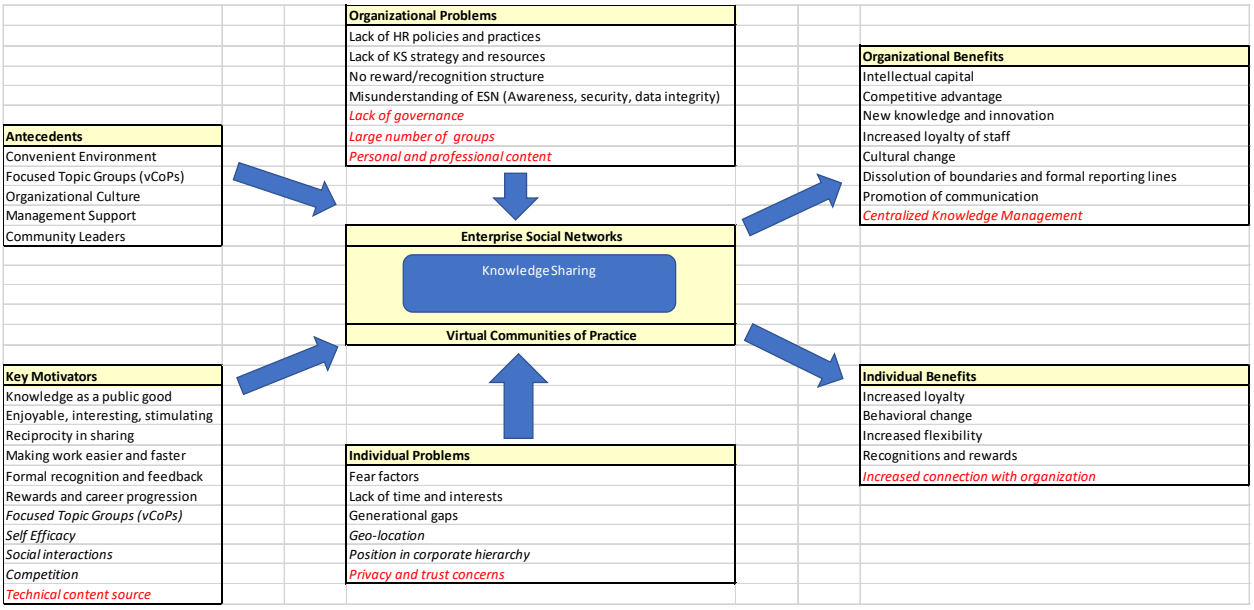

Figure 5: ESNS for KM through vCoPs updated model before Delphi

The updated model was then used as the initial point of review for the Delphi panel. What follows is the Delphi panel review of the model.

Delphi Panel Review

The Delphi panel consisted of three individuals that provided a diverse perspective regarding the use of the ESNS platform as well as insights regarding influencing factors that could potentially impact users in their participation with MS Yammer in the organization. All three members of the panel were aware of the research study and volunteered to provide their perspectives. The first participant is a Senior Director in the areas of Digital Manufacturing and Data Analysis at the company. This participant just joined the organization and previously worked at a technology company in charge of research and development. He has experience in multiple user communication platforms as well as established collaborations with several

consulting firms related to knowledge sharing and knowledge management. One key aspect of this participant is that being new in the organization, he provided an external perspective compared to the more established participants in the organization. The second Delphi panel participant is the Senior Director for Strategy & Operations. This participant is responsible for the overall execution and strategy of the business technology manufacturing division. Part of these responsibilities includes user engagement and communications. This participant comes from a business unit background and provided a business (non-IT) user perspective to the evaluation process. The third Delphi panel participant is the Vice President of Supply Chain Manufacturing Business Technology. This participant is responsible for all areas of supply chain manufacturing business technology in the organization. He is currently a champion of multiple communication and engagement initiatives as well as a professor of manufacturing and technology processes in Rutgers University. The three members of the Delphi panel were part of the initial survey and had previously agreed to participate as experts.

The review was conducted when the researcher requested the panel to meet to discuss the model. During the meeting the researcher explained the process for the development of the model including the tools used. The first review with the Delphi panel yielded two additions to the model.

The first addition is the inclusion of the lack of in person interactions in the organizational problems. The feedback from the expert who suggested this addition is that the organization has a relationship driven culture, and the lack of rewarding personal interaction could be a potential detractor for using the ESNS for knowledge sharing. The second addition is the inclusion of the organizational culture that focused on operations versus learning in the organization. This last addition refers to the aspect that the organization is very efficient in

solving problems and recognizing the individuals for solving the problems in contrast to perhaps an organization that would focus on learning and recognize the lessons learned from solving problems themselves, in essence recognizing the how problems are solved in the same manner as the what problem is solved.

The researcher then called for a second round of model review with the first-round feedback incorporated. In this second round, there were two suggestions to incorporate in the model, which highlights the outputs from the central KS construct to a different color to those on the inputs. In addition, a second suggestion was made to identify which constructs were added after each step of the research study. Both suggestions were incorporated, and no additional comments were made resulting in the final model as presented in Figure 6.

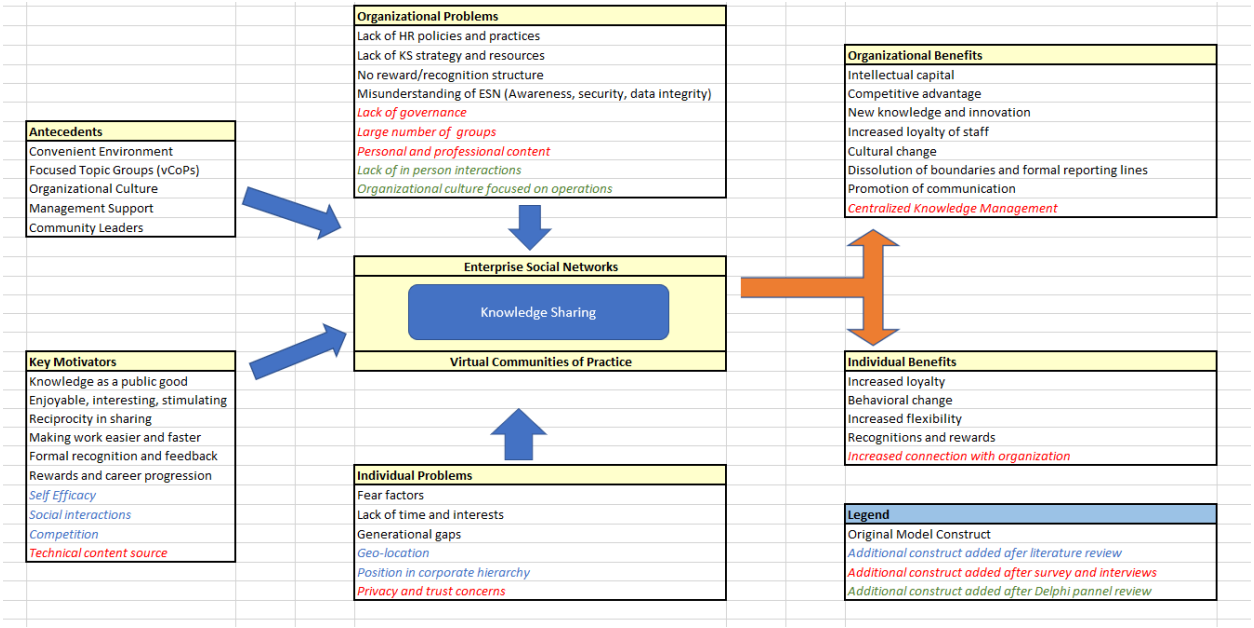

Figure 6: ESNS for KM Through vCoPs Final Model

The feedback from the panel on the model was positive. The panel praised the value and the discipline in the process of obtaining and presenting the data, themes, and model that resulted from the study. The panel members felt enthusiastic about the results and are looking to address

some of the identified organizational and individual problems to improve KS and ESNS use in the organization. Some of the replies from the panel include:

- "Very complete model."
- "This has given us great insight into the areas we need to focus on."
- "This is very useful to our organization."

The panel provided insights into additional areas of opportunities which will be covered in the conclusion section.

Summary

This section presented the results of the study. The study was conducted with the intention of developing and validating a model for the use of ESNS for KS through VCoPs internally. An online questionnaire was developed and distributed in the target organization to understand the organizational needs on ESNS and vCoPs as well as the benefits related to its use. In addition, the questionnaire also included the drawbacks or impediments in the use of the ESNS tool which in this case is MS Yammer. The quantitative data were analyzed, and results documented.

After the questionnaire responses were analyzed, follow-up interviews were conducted with six participants who opted in to share more information about their questionnaire responses These interviews were recorded and the data were analyzed in the development of qualitative codes and themes, performing a thematic analysis. The model was updated with the thematic analysis outcome.

Finally, the model was presented to a Delphi panel for the internal validation. Two rounds of the Delphi were conducted from which the panel members' input on the first round was incorporated into the model and accepted during the second round. After the second round, the panel reached a consensus and did not require any additional revisions to the model.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

The purpose of this research was to construct and validate internally a model that offers guidance for the successful implementation and use of ESNS for knowledge sharing and building successful virtual communities of practice (vCoPs) among IT supply chain professionals in a manufacturing technology healthcare context. This model expanded on the previously developed Corcoran and Duane (2017) model by providing a multi-national perspective and a different environment for the study. The first step of the process was a thorough literature review focused on the areas of knowledge management and knowledge sharing; enterprise social networking systems; the link between knowledge management and enterprise social networking systems; communities of practice; the preliminary model developed by Corcoran and Duane (2017); and the methods of studying ESNS and virtual communities of practice. A preliminary model was developed using the Corcoran and Duane (2017) model and literature review as a framework. Quantitative and qualitative data were collected via a need assessment questionnaire and user interviews to understand the needs and opinions regarding MS Yammer as an ESNS in the organization. These data were analyzed and used to update the conceptual model with additional insights and outputs of the thematic analysis conducted from the interview data. Finally, the updated model was validated internally by a Delphi panel representing users in the organization. What follows are the conclusions, implications, recommendations, and summary of the study.

Conclusions

The following is a discussion about how the study addressed each of the research questions.

Research question 1: *What guidelines, models or frameworks are currently available for the use of ESNS as tools for knowledge sharing and what are their benefits and limitations?*

The initial step in answering the first research question was performing a literature review. The model from Corcoran and Duane (2017) was used as a baseline on which additional elements were added based on the synthesis of the review of the literature. The literature review was organized by the following topics and served as the foundation for the study: knowledge management and knowledge sharing, enterprise social networking systems, the link between KM and ESNS, and communities of practice. The research approach, design and development research, was also evaluated to determine its suitability for addressing the research problem and answering the research questions.

Model development was identified as an emerging trend in the study of ESNS and vCoPs, in particular in their relationships with KM and KS. This was demonstrated in the studies from Corcoran and Duane (2017), Qi and Chau (2018), and Archer-Brown and Kietzman (2018). Once the existing models and frameworks were studied and the proposed model was developed, the researcher proceeded to step 2 in performing the needs assessment.

Research question 2: *What needs to be considered to design an effective model to guide the implementation of vCoPs in ESNS for knowledge sharing in a healthcare organization?*

To understand what needs to be considered in the design of an effective model, a needs assessment was developed using the phases of planning, data collection, data analysis, and reporting (Morrison et al., 2011). The user needs questionnaire consisted of 15 questions that

aimed to obtain a better understanding of considerations for the model as well as the demographics of the users of the platforms. A total of 40 responded to the questionnaire. The results indicated that the ESNS is strongly used amongst mid to later career professionals at the lead and management levels. The questionnaire also showed tendencies of medium use of the platform while almost half of the respondents did belong to a community of practice. The general sentiment from the answers is that the MS Yammer platform has been beneficial to some extent in knowledge sharing and obtaining information about the organization. In addition, the results indicated that the ESNS platform helped the users with their job performance. Six out of the fifteen questions were open ended, from which the main impediments for using the ESNS platform for knowledge sharing were: lack of time, too much information, lack of controls, number of active contributors, and lack of governance.

The next step in the research was conducting user interviews to obtain additional insights and qualitative data related to ESNS use for KS that would further develop the model. Interviews were conducted with six participants who volunteered to share additional information related to their use of the MS Yammer platform, the benefits they perceive from their use, and the problems they perceived in using the platform for KS.

A five-phase thematic analysis (Braun & Clarke, 2006) was performed on data collected from the interviews. In the first phase, the data from the interviews were analyzed along with the open-ended questions on the questionnaire. This was followed by phase two generating the initial code categories of: motivators, detractors, benefits, drawbacks, and others. In phase three, the search of potential themes was performed using the interview guide questions. Phase four consisted of reviewing the themes with the feedback from the interviews to the different categories. Finally, phase five consisted of consolidated and summarizing the developed themes.

Once the thematic analysis was performed, the model was updated with the developed themes and input from the questionnaires open ended items. This provided the additional considerations for the model from the user perspective.

Research question 3: *How do ESNS stakeholders perceive this model regarding effective knowledge sharing within the healthcare industry?*

To address this research question, a Delphi panel was used to perform an internal validation of the effectiveness of the model. Three experts were presented with the model to obtain their feedback, which was generally positive. There were no challenges to the previously established constructs in the model and the overall sentiment was that this model is quite valuable to the organization in providing a guideline for knowledge sharing. Some of the comments that demonstrate this sentiment are:

> "This model will help us in understanding on which areas we have gaps in our knowledge sharing experience."
>
> "This model helps us in our journey of moving from a doing company to a learning company."
>
> "This study provides us with a framework to move forward with improving how we manage knowledge in the organization."

The general feedback from the panel was that this study and resulting model serve as catalysts for further exploration of the knowledge sharing technologies and human factors that impact their use.

Research question 4: *What modifications are needed to improve the proposed ESNS implementation and use of the model?*

The Delphi panel consisted of two rounds. During the first round two additional elements were suggested as additions to the model. Both additions were under the category of the organizational problem in the model. The first addition was the lack of personal interactions, meaning that in a relationship culture organization the personal connection achieved with in-person collaborations could potentially be a problem in motivating the use of virtual tools. The second addition was to include that the organizational culture is focused on operations, meaning that the organization puts its efforts in solving issues, perhaps dedicating less into learning from those issues and further sharing those learnings to avoid similar issues from occurring in the future.

During the second round of review, these additions were discussed with the Delphi panel and no further updates were made to the content. Additional formatting changes were made to the model along with the addition of a color-coded legend were made to aid in the readability based on the panels feedback.

Implications

This study helped in identifying the organizational and individual factors that need to be considered in the implementation and use of ESNS for KS by vCoPs. The review of the literature, needs assessment questionnaire, and interviews provided the elements for building the conceptual model for the design and development of constructs and their relationships. A panel of experts reviewed the developed model and provided additional organizational elements that were incorporated into the final version, which was validated internally.

The contributions to the body of knowledge in information systems are that it provides guidance for the implementation and use of ESNSs for the purpose of knowledge sharing in a large healthcare organization context, thereby addressing this study’s problem statement. This

research also adds to the body of knowledge by further validating the original constructs from the baseline Corcoran and Duane's (2017) model and adding new constructs to enhance the model applicability in a healthcare organization context. In addition, this study also contributes to the body of knowledge by providing an example of design and development research as well as thematic analysis in the context of organizational learning technologies.

Limitations

There are several limitations that are important to highlight from this study. The first limitation was that due to privacy and other concerns, the Asia Pacific region was not included as part of the study. This was discussed with the organization's human resources representative and it was decided to exclude this region from participation.

Another limitation is that the study was conducted in a large healthcare manufacturing context. The generalizability of the model could be different in smaller organizational settings on which the culture and individual motivators and detractors for the use of ESNS could be different.

Recommendations

For future research, the first recommendation would be to expand the scope from the manufacturing technology area of the organization to a broader context. This would provide additional insights and support in further validating the model in other contexts as other business units may differ in their nature for knowledge sharing and use of ESNS.

Another potential future study could involve the applicability of the model using interactive platforms such as Microsoft Teams. With the COVID-19 pandemic forcing most of the workforce to collaborate digitally on enterprise platforms such as Microsoft Teams, many of the knowledge sharing and collaborations are occurring in that virtual space. With the lines of

ESNS and other collaboration platforms coming together (Microsoft deployed a Yammer app that can be accessed through Teams) it would be of interest to explore their interactions and how many of the current constructs are impacted by this relationship. This idea was discussed as part of the feedback from the Delphi panel.

Additional suggestions from the Delphi panel included technical interface modifications to the ESNS tool that would enable better content filtering and targeting based on user interest. This technology is prevalent with more recent mainstream social media tools (i.e., Tik Tok, Twitter, etc.) and the Delphi panel experts believed this would aid in some of the identified problems on the model. Future research may include exploring these updates and measuring their impact on the ESNS use for KS.

Finally, the inclusion of additional tools for mining the content of the ESNS posts was discussed with the panel as a potential to address some of the problems and maximize the organizational benefit of the ESNS for KS. Additional research on the impact of these machine learning tools could be explored in the future.

Summary

Research about social networking systems, knowledge sharing, and virtual communities of practice has previously been focused on the individual aspects of each of these topics. Few studies are available that would offer insights into their interactions and fewer studies provide a model or framework for successfully deploying and using ESNS tools. Corcoran and Duane (2017) provided the initial framework for establishing the relationships of these constructs; however, the study was limited by its context being on a single educational institution and generalizability.

The goal of this study was to provide guidance for the implementation and use of ESNSs for the purpose of knowledge sharing. This study addresses this problem by building a model for the design and development of enterprise social networking systems for knowledge sharing through virtual communities of practice in a large healthcare technology manufacturing context. This model was developed and validated internally by using the following research questions as the guideline:

1. What guidelines, models or frameworks are currently available for the use of ESNS as tools for knowledge sharing and what are their benefits and limitations?
2. What needs to be considered to design an effective model to guide the implementation of vCoPs in ESNS for knowledge sharing in a healthcare organization?
3. How do ESNS stakeholders perceive this model regarding effective knowledge sharing within the healthcare industry?
4. What modifications are needed to improve the proposed ESNS implementation and use of the model?

The research methodology used for this study was design and development research (Richey & Klein, 2007) and was implemented in the following phases:

Phase 1: Preliminary Model Development

A review of the literature was conducted in this first phase and answered the first research questions. This review of the body of knowledge yielded the baseline model from Corcoran and Duane (2017) and the additional constructs for each of the categories on key motivators (focused, topics groups, self-efficacy, social interactions, competition), and individual problems (geo-location, position in corporate hierarchy, usability of the platform) which resulted in a preliminary model.

Phase 2: Needs Assessment

A needs assessment was conducted through planning, data collection, data analysis, and reporting. The first stage of this assessment was the distribution of a 15-item questionnaire which addressed the areas of MS Yammer use, benefits, perceived value, and impediments of use for KS. The questionnaire had nine closed-ended questions, on which quantitative analysis was performed.

The second stage of the needs assessment was conducted through individual user interviews. A total of six interviews were conducted, which produced qualitative data on additional insights into the ESNS, KS, and vCoPs. The data from the interviews as well as the six open-ended questions were used to perform a thematic analysis (Braun & Clarke, 2006), which yielded a set of codes and themes that were used to update the model.

Phase 3: Internal Validation

The reviewed model which incorporated the inputs from phase 2 was presented to a Delphi panel. The panel consisted of three experts with different areas of focus related to knowledge sharing, and diverse professional and academic backgrounds. There was a total of two rounds of review with the first round producing two additional organizational problems (lack of personal interaction, and organizational culture focused on operations) being added to the model. The second round of panel review did not produce any additional comments.

The model was positively received by the panel who pointed to its completeness, organizational areas covered, and constructs. The feedback included that it aligned to the organizational reality and experiences from the experts. Additional formatting and clarifications were added to the model producing the final version.

Appendix A

Study Invitation E-Mail

Dear SCT Make colleague,

You are receiving this email as I would like to kindly request your participation in a survey to support my dissertation research as part of the Ph.D. program in Information Systems at Nova Southeastern University (NSU).
The research is focused on *knowledge sharing on enterprise social network systems (ESNS)* with the purpose of developing and validating a model for deployment and use among supply chain IT professionals.
As part of this study, you would be completing a quick survey. Your participation in the survey will take approximately 5 minutes.
There is minimal risks to you. All information will be handled in a strictly confidential manner, and the responses to the survey are anonymous.
Your participation in this survey is strictly voluntary.

By clicking on the link below and completing the survey, you indicate your consent to participate.
You may withdraw from this survey at any time by exiting the survey.
There is no penalty for refusing to participate in the survey.
For additional details, please refer to the attached letter.

The survey will be available until **February 26th, 2021.** Although your prompt participation is greatly appreciated.

The survey can be found by clicking on the following link:
https://www.surveymonkey.com/r/5MJNVM5

You may also access the survey via your mobile device by using the following QR code:

If you have any questions, please contact me via email or the numbers in my signature below.
Thank you for your support.

Edgardo L. Velez
Make Strategy & Operations Leader
J&J Supply Chain Technology

787-520-0058
evelez6@its.jnj.com

Appendix B

Needs Assessment Questionnaire

NSU Florida
NOVA SOUTHEASTERN UNIVERSITY

INSTITUTIONAL REVIEW BOARD
3301 College Avenue
Fort Lauderdale, Florida 33314-7796
PHONE: (954) 262-5369

NSU Consent to be in a Research Study Entitled
Enterprise Social Network Systems Implementation Model for Knowledge Sharing Among Supply Chain IT Professionals

Who is doing this research study?

This person doing this study is Edgardo L. Vélez with the College of Computing and Engineering. He will be helped by Marti M. Snyder, Ph.D.

Why are you asking me to be in this research study?

You are being asked to take part in this research study because you are identified as someone who uses Yammer within the organization.

Why is this research being done?

The purpose of this study is to find out what needs employees have with regard to the use of virtual communities of practice and tools such as Yammer for knowledge sharing.

What will I be doing if I agree to be in this research study?

You will be taking a one-time, anonymous survey. The survey will take approximately 15 – 20 minutes to complete.

Are there possible risks and discomforts to me?

This research study involves minimal risk to you. To the best of our knowledge, the things you will be doing have no more risk of harm than you would have in everyday life.

What happens if I do not want to be in this research study?

You can decide not to participate in this research and it will not be held against you. You can exit the survey at any time.

Will it cost me anything? Will I get paid for being in the study?

There is no cost for participation in this study. Participation is voluntary and no payment will be provided.

How will you keep my information private?

Your responses are anonymous. Information we learn about you in this research study will be handled in a confidential manner, within the limits of the law. There is a minimal risk that security of any online data may be breached. Only the researchers will have access to your information. No identifying information will be collected or connected with your responses, which will be anonymous. Only the researchers will have access to your information. No identifying information will be collected or connected with your responses, which will be anonymous. The benefits of the study should provide

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practitioners with useful information about the needs employees have with regard to the use of enterprise social networking systems, such as Yammer, as a way to share knowledge. This information will be used to construct a model that offers prescriptive guidance for the successful implementation and use of ESNS for knowledge sharing and building successful virtual communities of practice (vCoPs). procedures for protecting privacy. This data will be available to the researcher, the Institutional Review Board and other representatives of this institution, and any granting agencies (if applicable). All confidential data will be kept securely in password protected and encrypted electronic storage. All data will be kept for 36 months from the end of the study and destroyed after that time by deleting all survey response records on the survey platform and all response exports.

Who can I talk to about the study?

If you have questions, you can contact Edgardo L. Vélez (Dissertation Candidate) at (787) 640-5876 or email at evelez6@its.jnj.com. You may also contact Marti M. Snyder, Ph.D. (Dissertation Chair) (954) 262-2074 or email at smithmt@nova.edu.

If you have questions about the study but want to talk to someone else who is not a part of the study, you can call the Nova Southeastern University Institutional Review Board (IRB) at (954) 262-5369 or toll free at 1-866-499-0790 or email at IRB@nova.edu.

Do you understand and do you want to be in the study?

If you have read the above information and voluntarily wish to participate in this research study, please click on the access link included in the invitation email.

Demographics

1. On which level do you work in the technology group?
    a. Analyst
    b. Lead
    c. Manager
    d. Director
    e. VP
    f. Other (please specify) _____

2. How long have you work in the technology group?
    a. Less than 5 years
    b. 5-10 years
    c. 11-20 years
    d. 21-30 years
    e. More than 30 years

Prior ESNS Use

3. I use MS Yammer Often

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

4. I am a part of a virtual community of practice (vCoP)?
    a. Yes
    b. No

Antecedents and Motivators

5. What are the key motivators for you to use ESN and participate in vCoP?

Organizational and Individual Benefits

6. MS Yammer has been beneficial to my knowledge sharing

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

7. What are the perceived benefits of knowledge sharing for the organization?

8. What are the benefits of knowledge sharing for you as a user?

9. The information in MS Yammer helps me improve my job performance

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

10. My virtual communities of practice make efficient use of MS Yammer

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

11. The use of MS Yammer improves organizational knowledge sharing

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

12. The use of virtual communities of practice improves organizational knowledge sharing

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

Organizational and Individual Problems

13. What are the dominant problems associated with the implementation of ESN in the organization?

14. What are the main barriers for your use and participation in vCoP?

15. What elements do you believe would aid in the use of MS Yammer and Virtual Communities of Practice for better knowledge sharing in our organization?

Appendix C

Yammer User Interview Guide

NSU Florida
NOVA SOUTHEASTERN UNIVERSITY

INSTITUTIONAL REVIEW BOARD
3301 College Avenue
Fort Lauderdale, Florida 33314-7796
PHONE: (954) 262-5369

General Informed Consent Form
NSU Consent to be in a Research Study Entitled
Enterprise Social Network Systems Implementation Model for Knowledge Sharing Among Supply Chain IT Professionals

Who is doing this research study?

College: College of Computing and Engineering

Principal Investigator: Edgardo L. Vélez, Bachelor of Science in Computer Engineering, and Masters in Business Administration in Technology Management.

Faculty Advisor/Dissertation Chair: Mari M. Snyder Ph D

Co-Investigator(s): None

Site Information: Online research

Funding: Unfunded

What is this study about?

This is a research study, designed to test and create new ideas that other people can use. The purpose of this research study is to construct and validate a model that offers prescriptive guidance for the successful implementation and use of ESNS for knowledge sharing and building successful virtual communities of practice (vCoPs) among IT supply chain professionals in a healthcare context. By building and deploying this model, it is intended that it will result beneficial to organizations and individuals who primarily communicate and interact via online tools. This research is particularly important in today's context as a result of the new ways of working in a global pandemic.

Why are you asking me to be in this research study?

You are being asked to be in this research study because are an active Yammer user and have agreed to participate by indicating it in the survey.

This study will include about 5 to 7 people.

What will I be doing if I agree to be in this research study?

While you are taking part in this research study, one interview session will take place with a duration between 45 and 60 minutes.

You may have to be contacted by the researcher one additional time to clarify any question pr clarification resulting from your previous session.

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Research Study Procedures - as a participant, this is what you will be doing:

- This portion of the study involves individual interviews related is to gain a deeper understanding of the factors that impact your use of MS Yammer in our organization. Specifically, regarding sharing knowledge in the platform and the impact of vCoPs in using the system.
- The eligibility for this portion of the survey is to be a user of the Yammer platform and have previously opted in on the survey portion of the study.
- The interview will be one session with a duration of 45 to 60 minutes.
- There is a possibility of one further intervention to clarify any doubts or questions that may arise during the collected data analysis portion of the study. This session will probably be between 5 to 10 minutes.

Could I be removed from the study early by the research team? There are several reasons why the researchers may need to remove you from the study early. Some reasons are: If the researcher determines at any point that the participant may be in danger, feels uncomfortable and requests to end their participation, or if the participant is no longer part of the organization.

Are there possible risks and discomforts to me?

This research study involves minimal risk to you. To the best of our knowledge, the things you will be doing have no more risk of harm than you would have in everyday life.
The potential risk of your participation of the study is regarding privacy. As with all electronic data formatting there is a risk of the security being breached and the data being exposed. However, no identifiable information will be included in either the audio, or transcript portions of the interview. Aliases will be used throughout the process.

What happens if I do not want to be in this research study?

You have the right to leave this research study at any time, or not be in it. If you do decide to leave or you decide not to be in the study anymore, you will not get any penalty or lose any services you have a right to get. If you choose to stop being in the study, any information collected about you **before** the date you leave the study will be kept in the research records for 36 months from the end of the study but you may request that it not be used.

What if there is new information learned during the study that may affect my decision to remain in the study?
If significant new information relating to the study becomes available, which may relate to whether you want to remain in this study, this information will be given to you by the investigators. You may be asked to sign a new Informed Consent Form, if the information is given to you after you have joined the study.

Are there any benefits for taking part in this research study?

There are no direct benefits from being in this research study. We hope the information learned from this study will help the organization and individuals to gain insight into successfully sharing knowledge on ESNSs.

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Will I be paid or be given compensation for being in the study?

You will not be given any payments or compensation for being in this research study.

Will it cost me anything?

There are no costs to you for being in this research study.

How will you keep my information private?

Information we learn about you in this research study will be handled in a confidential manner, within the limits of the law and will be limited to people who have a need to review this information. All data will be stored in encrypted format, with password protection. This data will be available to the researcher, the Institutional Review Board and other representatives of this institution, and any regulatory and granting agencies (if applicable). If we publish the results of the study in a scientific journal or book, we will not identify you. All confidential data will be kept securely in electronic format in an encrypted cloud drive. All data will be kept for 36 months from the end of the study and destroyed after that time by deleting the content on the drives.

Will there be any Audio or Video Recording?

This research study involves audio and/or video recording. This recording will be available to the researcher, the Institutional Review Board and other representatives of this institution, and any of the people who gave the researcher money to do the study (if applicable). The recording will be kept, stored, and destroyed as stated in the section above. Because what is in the recording could be used to find out that it is you, it is not possible to be sure that the recording will always be kept confidential. The researcher will try to keep anyone not working on the research from listening to or viewing the recording.

Whom can I contact if I have questions, concerns, comments, or complaints?

If you have questions now, feel free to ask us. If you have more questions about the research, your research rights, or have a research-related injury, please contact:

Primary contact:
Edgardo L. Vélez (Dissertation Candidate) can be reached at (787) 640-5876 or email at evelez6@its.jnj.com.

If primary is not available, contact:
Marti M. Snyder, Ph.D. (Dissertation Chair) can be reached at (954) 262-2074 or email at smithmt@nova.edu

Research Participants Rights
For questions/concerns regarding your research rights, please contact:

Institutional Review Board
Nova Southeastern University

NSU Florida
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You may also visit the NSU IRB website at www.nova.edu/irb/information-for-research-participants for further information regarding your rights as a research participant.

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Research Consent & Authorization Signature Section

Voluntary Participation - You are not required to participate in this study. In the event you do participate, you may leave this research study at any time. If you leave this research study before it is completed, there will be no penalty to you, and you will not lose any benefits to which you are entitled.

If you agree to participate in this research study, sign this section. You will be given a signed copy of this form to keep. You do not waive any of your legal rights by signing this form.

SIGN THIS FORM ONLY IF THE STATEMENTS LISTED BELOW ARE TRUE:

- You have read the above information.
- Your questions have been answered to your satisfaction about the research

Adult Signature Section

I have voluntarily decided to take part in this research study.

Printed Name of Participant	Signature of Participant	Date
Printed Name of Person Obtaining Consent and Authorization	Signature of Person Obtaining Consent & Authorization	Date

The purpose of this interview is to gain a deeper understanding of the factors that impact your use of MS Yammer in our organization. Specifically, regarding sharing knowledge in the platform and the impact of vCoPs in using the system.

1. Describe your typical MS Yammer use during a week.
2. How do you feel about the platform?
3. How do you think using the platform helps you?
4. What motivates you to use the platform?
5. What are the main drawbacks for using the platform?
6. How would you improve the platform use?
7. What value do you get from the vCoPs?
8. What are some elements that need to be considered in the model?
9. What additional questions or comments do you have?

Appendix D

IRB Exempt Memorandum

NOVA SOUTHEASTERN UNIVERSITY
Institutional Review Board

MEMORANDUM

To: **Edgardo Velez**

From: **Ling Wang, Ph.D.,**
Center Representative, Institutional Review Board

Date: **September 14, 2020**

Re: **IRB #: 2020-432; Title, "Enterprise Social Network Systems Implementation Model for Knowledge Sharing Among Supply Chain IT Professionals"**

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review under **45 CFR 46.101(b) (Exempt 2: Interviews, surveys, focus groups, observations of public behavior, and other similar methodologies)**. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms, they must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE EVENTS/UNANTICIPATED PROBLEMS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and Ling Wang, Ph.D., respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

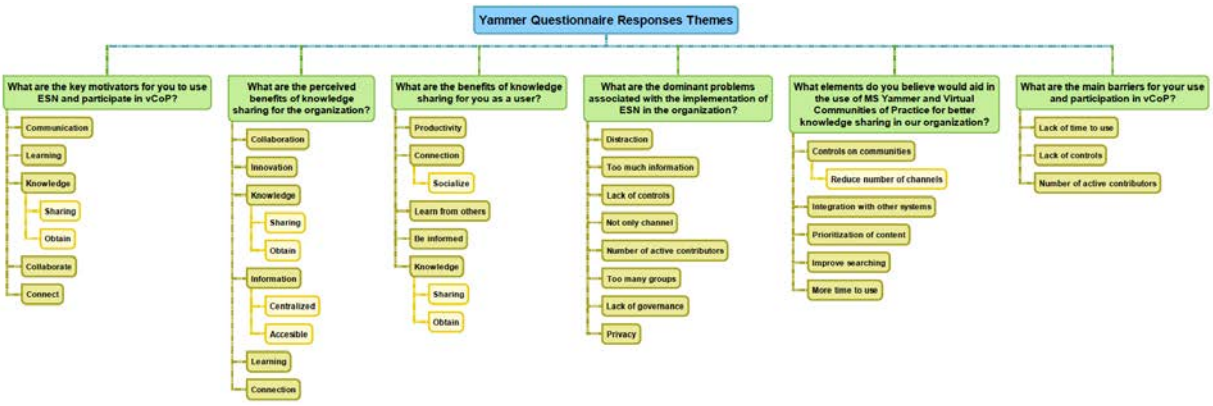
3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Marti Snyder, Ph.D.
Ling Wang, Ph.D.

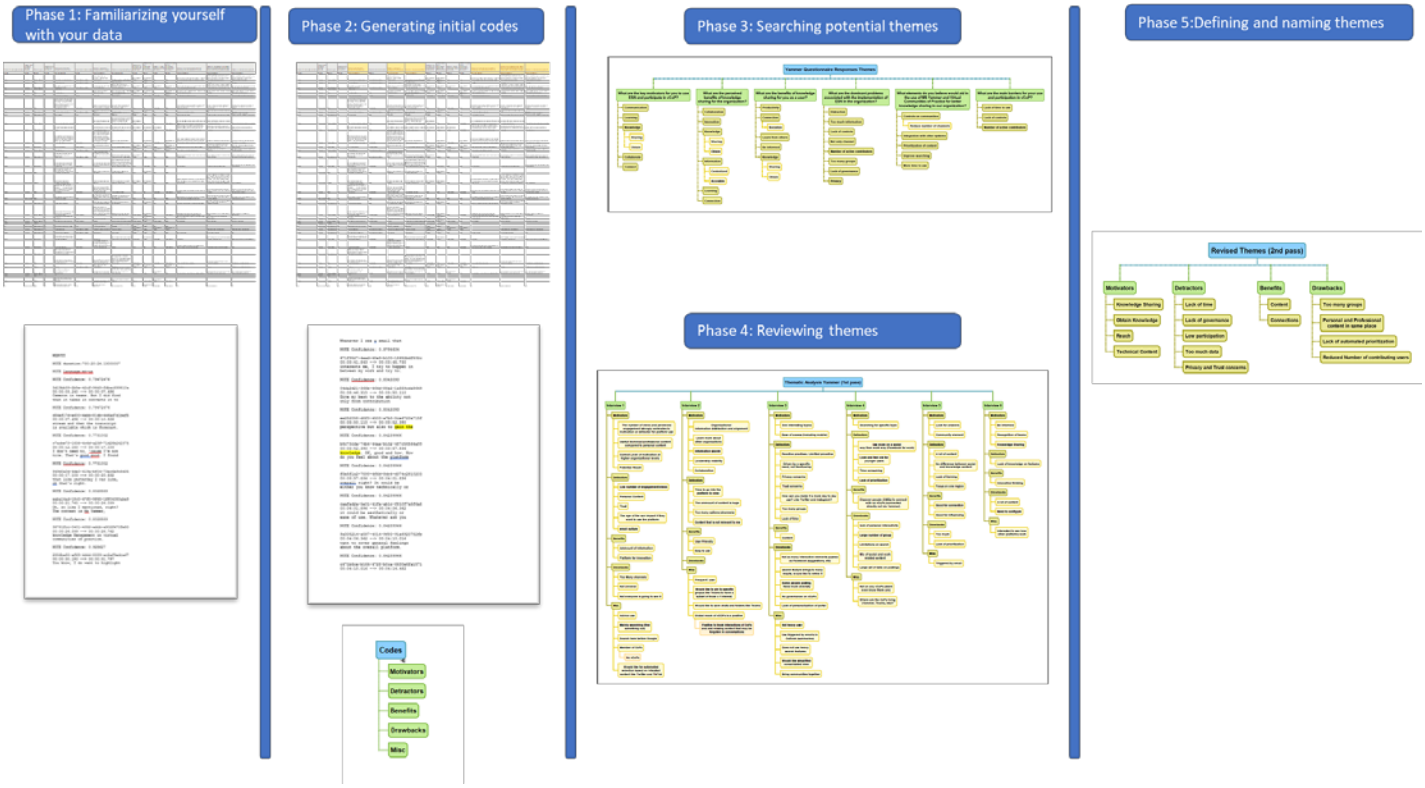
Appendix E

Response Themes



Appendix F

Thematic Analysis Phases Summary



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