Knowledge Dissemination through Online and Offline Communication Channels: An Examination of Audiences' Attitudes, Channel Effectiveness, and Engagement Drivers

by

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Author's Declaration

I hereby declare that I am the sole author of this major research paper. This is a true copy of the major research paper, including any required final revisions, as accepted by my examiners. I understand that my major research paper may be made electronically available to the public.

Abstract

The effect of disseminating knowledge has been numerically investigated in this research. This study examined both online and offline dissemination channels. Specifically, it was undertaken to investigate sustainability practitioners' attitudes toward each channel, to evaluate the channel effectiveness, and to explore the drivers of audience engagement in two preselected social networking sites. In this study, audiences' attitudes towards both online (two social networking sites: LinkedIn and Twitter) and offline (conferences) communication channels were first examined. Then, the effectiveness of each channel was compared in pairs. This study employed a quantitative methodology. Overall, survey respondents have positive attitudes towards all three channels, but they held more-positive attitudes towards conferences than two social networking sites (Twitter and LinkedIn). The results indicate that the conference has undeniable advantages in terms of better service quality, word-of-mouth, audience engagement, and message persuasiveness over LinkedIn and Twitter. It was found that survey participants' responses to these two social networking sites—LinkedIn and Twitter—were quite similar; meanwhile, overall, Twitter performs slightly better than LinkedIn in terms of disseminating the same information about implementing sustainable community plans. The results presented here may enhance the understanding of knowledge dissemination in the field of sustainability, providing insights for researchers or scholars about prioritizing communication channels for the purpose of disseminating their research findings. However, this study has some limitations, which are elaborated on in the conclusion section.

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Glossary

Term	Definition
Agents	A group of people who have the ability to shape consumers' purchase decisions (Dye, 2000).
Buzz	Created at a live event, and it triggers something similar to an echo that spread out among consumers (Kimmel, 2015).
Engagement	Audiences' level of involvement with disseminated information.
Knowledge dissemination	The process of transferring academic findings to audiences such as researchers, policy makers and practitioners (Gagnon, 2011).
Online dissemination	The process of transferring knowledge through online communication channels; refers to two social networking sites in this paper.
Online word-of-mouth	Any positive or negative statement made by potential, actual or former customers about a product or a company, which is available to a multitude of people and institutions via the Internet (Hennig-Thurau et al., 2004, p. 39).
Message persuasiveness	Examine how likely the disseminated information affects audiences' behaviors.
Service quality	The level of pleasant regarding the quality of services offered by communication channels. For example, LinkedIn's service quality means the quality of its online environment features.
Social networking sites	Communication platforms for a group of people who share similar interests or backgrounds to build social connections; social networking sites refer specifically to LinkedIn and Twitter in this paper.
Sustainability practitioners	Groups of people who work in sustainability-associated fields or are involved in sustainability-relevant activities.
Traditional word-of-mouth	A non-commercial, unpaid form of advertisement, done by the people who are not a part of the product flow nor get anything in return from the manufacturer or producer (Shaikh, 2014, p. 6).
Word-of-mouth	Work as an indicator of communication effectiveness; audiences' likelihood to spread the disseminated content to someone else.

1.0 Introduction

1.1 Summary of Research Purpose

Sustainable development first captured the attention of scholars, practitioners and policy-makers as a result of the Brundtland Report released in 1987 (World Commission on Environment and Development, 1987). The term and the meaning of sustainable development were initially brought forward as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p. 43). Although the public uses this description of sustainable development as a basic reference, it may be interpreted variously, given different contexts and purposes. Since the release of the Brundtland Report in 1987, scholars and researchers from different disciplines have made efforts to study sustainable development. On one hand, the understanding in regard to sustainable development has evolved over time due to numerous publications in academia. Sustainability originally denotes development that has three domains: environmental, social, and economic (Epstein & Buhovac, 2014). This explanation drives the discussion about the relationship between these three themes, which is embedded in sustainable development. Despite the fact that these three domains are discussed separately, more recent studies reconsider the dynamic relations between them, addressing that both economic and social aspects are restricted by the environment (Doppelt, 2008). On the other hand, non-academic audiences—who are

external audiences in this study—are not involved in or even isolated from the theoretical evolution of sustainable development (Newell & Dale, 2015). External audiences, especially those who are policy-makers and sustainability practitioners, have been interpreting sustainable development theories and gaining practical experience on their own (Newell & Dale, 2015). This inaccessible relation between academia and practitioners triggers the need for knowledge dissemination.

In reference to considering sustainable development as a basic starting point, many scholars have been examining sustainability practices, especially sustainable performance of local communities (Clarke et al., 2014; Royo, Yetano& Acerete, 2014; Newman & Dale, 2005; Catalin, 2014). Individual organizations such as local governments and universities possess limited resources for solving sustainability problems. In practice, sustainable development calls for collaboration within diverse organizations to ensure joint efforts and networks (Clarke, 2014; Clarke & Fuller, 2011). To address problems related to unsustainability, an increasing number of local authorities have sustainable community plans in place (Clarke, 2012). Specifically, sustainable community plans cover a wide range of environmental, social and economic topics, among which the most popular ones are transportation, water, waste, air, energy, climate change, land use, food security, local economy, ecological diversity, civic engagement, social infrastructure, housing, employment, safety (crime) and financial security (Clarke et al., 2014, p. 10). These research findings in terms of sustainability planning enhance the public's awareness, and they are especially important for policy makers, sustainability practitioners, and other researchers. As a result, disseminating

Clarke's research results is worthwhile and beneficial for moving forward the progress of sustainable development theory, as well as for generalizing best practices of sustainability.

Broadcasting ideas and expertise from academia to external audiences accelerates and enhances the understanding of sustainable development. The dissemination of sustainable knowledge is a response to the call for knowledge dissemination (Newell & Dale, 2015). For the sake of spreading research, scholars more likely want to know drivers of audience engagement in dissemination channels, as well as audience attitudes toward communication channels and look for the most effective ways to disseminate knowledge (Castronovo & Huang, 2012; Gagnon, 2011; Jacobson, Butterill & Goering, 2004). Although this study uses sustainability research as a domain, research results are also transferable to other disciplines if applicable. Recognizing the significance of knowledge dissemination, this study aims at exploring attitudes toward preselected communication channels and assessing the effectiveness of communication channels in disseminating sustainability-relevant knowledge. As a result, this study explores the following research questions:

1) What are sustainability practitioners' attitudes towards preselected communication channels for disseminating information about sustainable community plans?
2) Which communication channels are the most effective in disseminating information about sustainable community plans?

3) Whether audiences' engagement in social networking sites—Twitter and LinkedIn—is driven by the same reasons?

1.2 Literature Position

Knowledge dissemination is a relatively new research area as opposed to product promotion (Newell & Dale, 2015; Levin, 2008). Marketing strategies employed for new products aim at raising public awareness and then increasing product sale (Leach, Liu, & Winsor, 2008). Previous studies have explored various platforms for spreading product information among the public, and these methods transfer information through buzz, word-of-mouth, social media, and other internet-based platforms (Castronovo, & Huang, 2012; Hennig-Thurau et al., 2004; Fong & Burton, 2006; East, Hammond & Wright, 2007; Dye, 2000). In addition, the effectiveness of communication platforms has been measured based on audience engagement (Newell & Dale, 2015). These communication platforms—referred to as intermediaries sometimes in this study—have different degrees of impact on audience behaviour. Appropriate communication channels for new products lead to desired purchasing behaviours (Dye, 2000). By analogy, proper knowledge transfer through communication platforms to target audiences—such as policy-makers, practitioners and other researchers—is expected to improve public awareness and subsequently change and improve sustainability practices (Newell & Dale, 2015).

This study first identifies Clarke's sustainable community research findings as knowledge and ideas to be disseminated. Clarke's works have made theoretical contributions to sustainable practices, supporting that collaborative partnership and

governance structures are key to achieving sustainable goals (Clarke et al., 2014; Clarke, 2011; Clarke, 2012). Specifically, this study examines the findings of Clarke's works in recent years, analyzing community sustainable practice in the Canadian context. This paper firstly elaborates on sustainability-relevant terms and then demonstrate research findings or key takeaways from the perspective of external audiences. Before exploring and assessing the dissemination channels for knowledge and ideas, this paper looks at the literature in the communication, marketing, education and health disciplines. Previous studies, with themes of word-of-mouth, social media and marketing strategies, are investigated. Knowledge dissemination is similar to information diffusion in the way media are used (Estabrooks et al., 2006). In order to gain solid understanding of various media channels, previous studies in terms of both online and offline communication channels are examined.

Traditionally, information (either product information or new knowledge) communication channels are in the form of face-to-face communication; for example, information is delivered and shared in workshops, training sessions, or verbal conversations (Min, 2007). Communication methods have been changed dramatically due to the widespread use of the Internet. Internet-based communications have emerged, and common channels include social media platforms, online communities, and online discussion forums (Dessart, Veloutsou & Morgan-Thomas, 2015; Kaplan & Haenlein, 2010). Numerous studies have examined the impact of information on audiences' decision-making processes. More specifically, the decision-making process is affected by several factors, such as previous experience, relationship with information

deliverer, and information features (Shaikh, 2014; Smith & Gallicano, 2015; Sweeney, Soutar & Mazzarol, 2008). These identified factors also determine the effectiveness of information diffusion. More importantly, knowledge dissemination has narrower targeted audiences than information diffusion does. In general, knowledge dissemination targets the group of audiences who shares the same interests and needs, and these audiences proactively receive new knowledge and ideas (Leach, Liu & Winsor, 2008). Due to the growing literature on translating knowledge into action, this research hopes to enhance knowledge mobilization theory, word-of-mouth and communication literature by studying the effectiveness of both online and offline communication channels.

1.3 Methods

In order to answer the specified research questions and achieve the desired research objectives, this study uses a quantitative methodology. A survey was designed to examine audiences' attitudes toward sustainability knowledge and knowledge sources (or channels), to explore the effectiveness of preselected channels, and to investigate main drivers of engagement. These communication channels are conferences, LinkedIn and Twitter. The conference is a representative offline communication channel; whereas LinkedIn and Twitter are two selected online communication channels. Audiences were asked about their interest in and feeling about sustainability-associated information from these communication channels. Each survey question was designed on a Likert scale—from 1 to 7. All survey questions were developed by referring to several marketing books related to marketing scales.

Furthermore, the Independent T-tests, one sample T-tests, descriptive analysis and one-way ANOVA were used to further analyze the data. The limitations of this study are explored.

1.4 Theoretical and Practical Contribution

This study builds on the growing literature about knowledge dissemination and information diffusion. Research results of this study are expected to enhance understanding of how media are utilized, and their aid in sharing knowledge as well as ideas to encourage sustainable practices. Previous studies have focused on one type of communication platform—either online or offline communication channels. This present study compared and contrasted online and offline communication channels. Additionally, the targeted audiences of these platforms in previous research are the general public. However, this research studies the transfer of knowledge in the sustainability field; as a result, targeted audiences (the majority of survey participants) are sustainability practitioners—such as urban policy makers and sustainability leaders. Research results clarify the attitudes toward and the effectiveness of communication media; scholars and researchers may consider the research results useful for prioritizing dissemination methods.

2.0 Literature Review

2.1 Introduction to the Local Agenda 21 Project

Local Agenda 21 project is a research project led by Dr. Amelia Clarke in the School of Environment, Enterprise and Development at the University of Waterloo. The knowledge to be disseminated in this paper is Dr. Amelia Clarke's work in recent five years on sustainable community plans, which is a key component of Local Agenda 21 project. The following section will elaborate on sustainable community plans and highlight the key message disseminated—16 topics covered in sustainable community plans.

2.1.1 The Definition and Importance of Sustainable Community Plans

In order to deal with unsustainability issues, municipal governments initiate sustainable community plans as a means to "address complex social, environmental and economic issues", "plan for community-wide sustainable development in partnership with local organizations" or "respond to municipal concerns" (Clarke, 2012, p. 1). Sustainable community plans, known as Local Agenda 21s as well, have been adapted by an increasing number of communities worldwide (Clarke, 2011). A sustainable community plan is "developed through public consultation, identifies a vision, includes environmental, social and economic goals and sets targets for the community" (Clarke, 2012, p. 1). This definition indicates that initiating and implementing sustainable community plans are the efforts made by joint organizations including municipal

governments, and the goals in these plans can be either short-term or long-term (Clarke, 2012).

Not only municipal governments, but also corporations, universities and non-governmental organizations are participants in sustainable community plans (Clarke, 2012). The incentives for involvement include leveraging organizational resources, enhancing community engagement, and reducing operational costs (Clarke, 2012; Clarke & MacDonald, 2012). Specifically, initiating and implementing sustainable community plans are a governmental response to handle unsustainability problems for the purpose of improving sustainability performance (Clarke & Fuller, 2011). Despite the fact that implementing sustainable community plans leads to mutual benefits for organizations, plan implementation can be restricted by the lack of decision-makers' commitment or lack of sustainability awareness (Clarke, 2012).

2.1.2 Collaborative Community Sustainability Plans

As the definition of sustainable community plan implies, the successful achievement of planned goals is attributed to joint efforts and resources from a variety of organizations. Based on case studies of Canadian communities, Clarke and Fuller (2010) demonstrate evidence of the importance of collaboration in implementing sustainable community plans, for example, through the cross-sector social partnerships developed for solving community-wide problems. In addition, by building on the model of collaborative strategic management (Clarke & Fuller, 2010), authors have been able to prove that a correlation exists between implementation of sustainable community plans and plan outcomes (Clarke et al., 2014).

Furthermore, by surveying and interviewing 37 Canadian municipalities in terms of specific topics covered in sustainable community plans, Clarke et al., (2014) discovered 16 topics that were addressed in plans. Among them, environmentally related topics include transportation, water, waste, air, energy, land use, climate change and ecological diversity; socially related topics consist of food security, civic engagement, social infrastructure, housing and safety (crime); lastly, economically related topics are local economy, employment and financial security (Clarke et al., 2014). Considering many benefits of incorporating partners and implementing sustainable community plans, it would be worthwhile for sustainability practitioners in Canada—and worldwide—to pay adequate attention to Clarke's works.

2.2 Information Marketing and Communication

Quite a few studies on marketing and communication are about product promotion; additionally, an increasing number of publications are on knowledge dissemination. Buzz is created and shared among targeted audiences and utilized to promote product sales (Dye, 2000). In addition, those people, or organizations, or systems that help create buzz or provide purchase guidance are named agents (Gershoff et al., 2001). Agents usually have knowledge in specific field; thus audiences rely on their expertise to make purchase decisions (Castronovo & Huang, 2012). Unlike agents who are part of the product flow, there is a group of people who offer suggestive information on new products or services to others voluntarily. The latter type of communication is termed traditional word-of-mouth. Considering the emergence of the Internet, word-of-mouth starts to occur in online platforms, such as online communities

(Andreassen & Streukens, 2009; Fong & Burton, 2006). The next section will introduce key terms, word-of-mouth in particular. Although most studies are referred to product marketing, they work as an analogy for and provide guidance on knowledge dissemination. More importantly, this paper investigates communication in conferences and two social networking sites, which are typical examples of marketing techniques—traditional word-of-mouth and online word-of-mouth.

2.2.1 Buzz

Buzz is usually created at a live event, similar to an echo, keeping repeating among targeted audiences. Additionally, buzz marketing utilizes actual events to promote products or services through online or offline communication (Kimmel, 2015). Creating and delivering buzz are common strategies used, particularly in the private sector, to reach target customers. Statistics suggest that 67% of America's economic activities are partially or largely affected by buzz (Dye, 2000). The buzz can be found in any industries, including the "agriculture, electronics and finance" industries (Dye, 2000, p. 140). Buzz marketing is a technique to create traditional word-of-mouth as a way to improve audience awareness of brands (Anghelcev, 2015). Although managers know the importance and effectiveness of using buzz in product promotion, they need to understand that "functionality", "ease of use", and "visibility" determine the worthiness and the value of buzz (Dye, 2000, p. 142). Therefore, alternative approaches should be applied to facilitate buzz for a new product or service (Dye, 2000), and they can also be used to accelerate knowledge dissemination. Furthermore, Dye (2000) also stresses that buzz creation requires not only the public advertising, but also incentives for early

adopters' dissemination. Therefore, the successful path for product promotion through buzz can be transferred to knowledge dissemination.

2.2.2 Agents

The agents promoting buzz are defined collectively as the vanguard in Dye's article; these agents, or the vanguard, are a group of people who "have a disproportionate ability to shape public opinion" (Dye, 2000, p. 142). More importantly, members of the vanguards (Dye, 2000) are considered as early practitioners, who play a vital role in attracting new adopters.

Customers tend to make decisions that rely on agents who have expertise (Gershoff, Broniarczyk & West, 2001; Castronovo & Huang, 2012). These agents denote "either paid or unpaid individuals, organizations, or systems that assist consumers in the decision-making process through market simplification and guidance" (Gershoff et al., 2001, p. 418). The consumer agents can be referred to as media for word-of-mouth communication (Gershoff et al., 2001). According to the research findings from Gershoff et al. (2001), sustainability practitioners, who seek for guidance and recommendation about their practices, have demand for agents with expertise in the sustainability field. For example, sustainability-associated conferences have roles to play in disseminating sustainability knowledge and practices because these conferences work as a platform for agents.

2.2.3 Traditional Word-of-mouth

Word-of-mouth communication, or termed off-line word-of-mouth communication, has many definitions. Traditionally, word-of-mouth is person-to-person communication. According to one previous study, word-of-mouth is recognized as "all informal communications directed at other consumers about the ownership, usage, or characteristics of particular goods and services or their sellers" (Hennig-Thurau & Walsh, 2003, p. 51). In addition, a more recent study denotes word-of-mouth as "a non-commercial, unpaid form of advertisement, done by the people who are not a part of the product flow nor get anything in return from the manufacturer or producer" (Shaikh, 2014, p. 6). In general, word-of-mouth is suggestive information delivered among customers and it is related to the extension of satisfaction (East, Hammond & Wright, 2007).

Word-of-mouth is a significant determining factor of consumer behaviour and market success as this communication method is considered as a more creditable information source compared with conventional advertising methods such as television advertising (Huang, 2010; Hennig-Thurau & Walsh, 2003; Andreassen & Streukens, 2009; Sweeney, Soutar & Mazzarol, 2008). Sweeney et al. conclude that the outcomes of word-of-mouth communication can help receivers "[reduce] risk in buying", or "[improve] firm perception", or "[improve] psychological condition", or having "greater likelihood of buying" (Sweeney et al., 2008, p. 358). Word-of-mouth communication is vital when the receivers take risks for decision-making (Sweeney, Soutar & Mazzarol,

2008). Furthermore, Word-of-mouth can also be considered as a way to connect social networks (Barlas & Huang, 2009).

Word-of-mouth can be either positive or negative (East, Hammond & Wright, 2007). Previous studies show that positive word-of-mouth are more in quantities than negative word-of-mouth, and the same group of people endorse and also criticize the brand (East, Hammond & Wright, 2007). To be more specific, content of word-of-mouth can be divided into six categories: "positive"; "negative"; "neutral"; "mixed"; "irrelevant"; and "not sure" (Godes & Mayzlin, 2004, p. 555). In general, positive word-of-mouth contributes to receivers' "a sense of enthusiasm, confidence and optimism" (p. 349); while negative word-of-mouth triggers anger or sympathetic for information providers (Sweeney, Soutar & Mazzarol, 2008). One important takeaway from this research is that follow-up is critical for promoting positive word-of-mouth (East, Hammond & Wright, 2007), which can be referred as one of future recommendations.

2.2.4 Online Word-of-mouth

Given the widespread applications of the Internet, online word-of-mouth has emerged and developed rapidly in the past decades (Andreassen & Streukens, 2009). Online word-of-mouth has been considered as an important source of information (Andreassen & Streukens, 2009). Compared with offline word-of-mouth, online word-of-mouth expands the scale of communication by involving strangers through opinion platforms (Hennig-Thurau & Walsh, 2003; Huang, 2010; Castronovo & Huang, 2012). According to Godes and Mayzlin's study (2004) demonstrating the dynamic relationship between online and offline word-of-mouth, offline-purchasing decisions rely on online

conversations happened through online word-of-mouth. Hennig-Thurau et al. (2004, p. 39) refer online word-of-mouth as “any positive of negative statement made by potential, actual or former customers about a product or a company, which is made available to a multitude of people and institutions via the Internet”. In practice, in order to promote online word-of-mouth, information on certain products or services is reposted on social networking sites (Leung, Bai & Stahura, 2015). For example, Twitter users retweet to attract more attention to their former posts.

Online word-of-mouth differs from traditional word-of-mouth because it has four outstanding features (Andreassen & Streukens, 2009). First, communication takes place in electronic platforms; second, information from electronic word-of-mouth is available to the public; third, electronic word-of-mouth is recorded for future reference; lastly, participants in electronic word-of-mouth are motivated to seek for information, and these participants’ behaviours are for certain purposes (Andreassen & Streukens, 2009). In addition, opinions communicated by electronic word-of-mouth are available to all website users (Hennig-Thurau & Walsh, 2003). Both online word-of-mouth and traditional word-of-mouth have long been employed as marketing promotions (Leung, Bai & Stahura, 2015).

2.2.5 Online Word-of-mouth Platforms

Online discussion board is an emerging vehicle for online word-of-mouth, and this discussion board often offers a platform for a group of people with similar interests (Fong & Burton, 2006). The online discussion board is defined as “online communities organized around interest specific topics because products and brands are typically

discussed on such sites" (Fong & Burton, 2006, p. 147). Specifically, word-of-mouth is communicated through "interpersonal networks" or "online communities" (Sweeney, Soutar & Mazzarol, 2008, p. 118). Research shows that information flows much faster within online communities than across different communities (Godes & Mayzlin, 2004).

2.2.6 Measurement of Word-of-mouth

Many prior studies have focused on the measurement of word-of-mouth and the impact of positive and negative word-of-mouth (East, Hammond & Wright, 2007; Godes & Mayzlin, 2004; Huang & Barlas, 2009). Godes and Mayzlin (2004) also look at the challenges of measuring word-of-mouth, proposing a correlation between consumer behaviour and word-of-mouth. Observing online word-of-mouth overcomes the difficulties in data collection because offline word-of-mouth often takes place in private conversations (Godes & Mayzlin, 2004). Barlas and Huang's study (2009) also indicates that topic features and communicator relationships determine the communication goals.

Huang and Barlas' research (2009) indicates that shared interests often initiate word-of-mouth discussion. Thus, conversations are more likely to occur between people who share the common interests or have similar backgrounds (Huang & Barlas, 2009). Furthermore, research suggests that people exchange common information more frequently than new information in their conversations, highlighting the importance of shared interest towards the same topics in starting a conversation (Huang & Barlas, 2009). The implication of this study is that colleagues are important information sources for sustainability practitioners as they have social networks and are more likely to have shared interests.

2.2.7 Impact of Word-of-mouth

Word-of-mouth communication plays an important role in marketing success, and this communication method effectively affects receivers' attitudes and behaviours (Shaikh, 2014). One study by Leung, Bai and Stahura (2015) found that word-of-mouth performs better than traditional marketing tools in terms of marketing effectiveness. Sweeney et al. (2008) propose three factors associated with the effect of word-of-mouth: 1) "the nature of the sender-receiver relationship"; 2) "the richness and strength of the message and its delivery"; 3) "various personal and situational factors" (Sweeney et al., 2008, p. 344). More specifically, the impacts of word-of-mouth rest with two aspects: how the message is delivered and what types of information that is delivered (Shaikh, 2014). In addition, word-of-mouth is a controlling factor in consumer behaviour by communicating peer recommendations (East, Hammond & Wright, 2007; Fong & Burton, 2006). Specifically, information seekers who act proactively are more likely to be affected by word-of-mouth communication (Sweeney, Soutar & Mazzarol, 2008). For example, participants in workshops are more likely to be influenced by word-of-mouth because they are proactive information seekers (Sweeney, Soutar & Mazzarol, 2008). Previous research findings suggest that online communities can be as effective as face-to-face communication in transferring knowledge and facilitating engagement (Min, 2007). However, one recent study also suggests that prior experience reduces the impacts of both positive and negative word-of-mouth communication (Shaikh, 2014).

2.3 Knowledge Dissemination

Knowledge dissemination is the key theme in this paper; thus, the next section clarifies the evolving definitions or relevant terms in the knowledge dissemination filed such as knowledge translation and knowledge diffusion. Before giving specific examples of dissemination channels, the following section explores theoretical basis for knowledge dissemination, including key players in the process of knowledge dissemination, dissemination approaches, and dissemination channel classifications. The clarification of key terms or theories in the filed of knowledge dissemination works as theoretical foundations of this research. Moreover, this section provides a rationale for channel section in this paper because communication through conferences represents offline knowledge dissemination technique and communication through social networking sites stands for the online one.

2.3.1 Theoretical Evolution

New product promotion can be an analogy with new knowledge dissemination. The terminology in the knowledge dissemination field varies over time, from knowledge management to knowledge transfer, knowledge mobilization, knowledge diffusion, to knowledge dissemination (Levin, 2008).

Estabrooks et al's article (2006) provides an overview of knowledge translation theories studied by researchers in the health field, suggesting translating knowledge is a powerful way to lead new practices. Several knowledge translation theories are introduced (Estabrooks et al., 2006). First, Diffusion of Innovation Theory is the process of "an innovation [that] is communicated through certain channels over time, among

the members of a social system" (Estabrooks et al., 2006, p. 29). At the individual level, knowledge diffusion is characterized as a procedure of four stages: awareness, persuasion, decision implementation and adaption (Estabrooks et al., 2006, p. 29). Another knowledge translation theory is called Promoting Action on Research in Health Services framework (Estabrooks et al., 2006). According to this theory, action, as a result of research, is led by "a relationship between evidence, context, and facilitation" (Estabrooks et al., 2006, p. 30). Furthermore, institutional theory is also used to illustrate the process of institutionalizing a new knowledge or practice (Estabrooks et al., 2006).

Knowledge management is defined as a strategic process of transferring knowledge to targeted audiences at proper timing (Dell & Grayson, 1998). By contrast, knowledge diffusion is "efforts that are passive and largely unplanned, uncontrolled, and primarily horizontal or mediated by peers" (Gagnon, 2011, p. 26). Workshops and training sessions are considered as platforms for knowledge diffusion (Gagnon, 2011). More specifically, disseminating knowledge through presentations in conferences is an example of knowledge diffusion (Gagnon, 2011).

A widespread definition of knowledge translation by the Canadian Institutes of Health Research is "a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services and products and strengthen the health care system"(CIHR, 2004, P.1). Although this definition emphasizes the application of knowledge in health research; the knowledge domain can also be social science, such as

sustainability (Straus, Tetroe & Graham, 2011). According to one study in the science discipline, knowledge translation refers to "the exchange, synthesis and ethically-sound application of knowledge-within a complex system of interactions among researchers and users" (Estabrooks et al., 2006, p. 28). In addition, translation of knowledge often refers to specific knowledge in science (Estabrooks et al., 2006); and transferred knowledge can be either tacit or explicit (Kingston, 2012). Compared with knowledge translation, Estabrooks et al. (2006) favour the term called knowledge utilization, which denotes "research, scholarly, and programmatic intervention activities aimed at increasing the use of knowledge to solve human problems" (Backer, 1991, p. 28).

Knowledge dissemination is defined as the process of transferring academic findings to researchers, policy makers and practitioners (Gagnon, 2011). Knowledge mobilization has very similar description to knowledge dissemination (Gainforth et al., 2015). Knowledge mobilization is defined as the process of "moving research into the hands of research users" (Gainforth, 2015, p. 56). Compared with previous terms used, knowledge mobilization characterizes the multi-line and interactive links between research and practice (Sá, Li & Faubert, 2011). In the Canadian context, knowledge mobilization is often referred to the process of connecting research findings in academia to broader communities (Sá, Li & Faubert, 2011).

This research uses knowledge dissemination as a reference to the practice of transferring academic research to knowledge users. Knowledge dissemination enables new knowledge to be shared among audiences (Murphy & Salomone, 2013). One previous study suggests that knowledge communication enhances participants'

understanding of environmental issues, and these communications foster environmental action (Robelia, Greenhow & Burton, 2011).

2.3.2 Barriers of Knowledge Dissemination

Previous studies have explored barriers for disseminating knowledge (Sá, Li & Faubert, 2011; Manning, Bearden & Madden, 1995, Murphy & Salomone, 2013; Maanen and Barley, 1984). Based on data analysis of 22 faculties, two biggest challenges for knowledge dissemination are "money constraints" and "divided attitudes and research approaches among faculty members" (Sá et al., 2011, p. 507). Specifically, research findings in the field of public services are disseminated mainly because of institutional mission, indicating the significance of academic institutions (for example, universities) in knowledge dissemination (Sá, Li & Faubert, 2011). As academic institutions play a vital role in knowledge dissemination, efforts can be made to create incentives for fostering a link between knowledge and practice (Sá, Li & Faubert, 2011).

When it comes to online dissemination, one challenge of transferring knowledge through social media is the variation in information interpretation (Murphy & Salomone, 2013). As addressed by Van Maanen and Barley (1984), interpretations of the same conceptions may vary due to readers' different occupational or academic backgrounds. Additionally, social media users often adjust received knowledge for their own purposes (Murphy & Salomone, 2013). Furthermore, early adopters are characterized as risk takers because they proactively acquire information for new product (Manning, Bearden & Madden, 1995); by analogy, sustainability practitioners who initially apply new knowledge to practice are viewed as risk takers as well.

2.3.3 Theoretical Knowledge Dissemination Channels

Targeted audiences of knowledge dissemination include scholars, practitioners and policy makers (Estabrooks et al., 2006). According to Milton (2010), knowledge dissemination approach has four broad categories: “informal”, “formal”, “connect” and “collect”. Kingston (2012) concludes that connect approach is supervisor to collect approach with respect to disseminating tacit knowledge. One technique of “informal connect” is termed Communities of Practice—“a group of individuals who share a common interest, a set of problems or a passion and who increase their knowledge and the understanding of these aspects through interpersonal relationships” (Wenger et al., 2002, p. 4). This informal connect transfers knowledge through conversations between knowledge providers and information receivers (Kingston, 2012). In addition, social media is a typical example of “informal connect”, including blogs and wikis (Kingston, 2012). Knowledge portals are considered as one model of “formal connect” (Kingston, 2012). Knowledge portals can be a newsletter or blogs; these platforms provide easy accessibility for public to knowledge (Kingston, 2012). Knowledge codification denotes “knowledge that has been reformatted and/or had additional indexing features added to it”; this dissemination technique is considered as an example of “formal collect” approach (Kingston, 2012, p. 165). The most traditional knowledge dissemination technique is apprenticeship model, which means that knowledge and experience is gained by “working with and being instructed by a skilled craftsman, artisan or tradesman” (Kingston, 2012, p. 166).

Furthermore, Gagnon (2011) proposed two approaches of dissemination include knowledge brokers and networks. Knowledge brokers are intermediary bridges for scholars and audiences, promoting linkages between researchers and non-academic audiences (Gagnon, 2011). Other perspectives of knowledge translation are termed as push, pull and exchange (Gagnon, 2011). Moreover, these three terms characterize the roles of participants in knowledge dissemination (Gagnon, 2011). Push efforts mean that "producers of research knowledge plan and implement approaches to push knowledge toward audience who they believe need to receive it" (Gagnon, 2011, p. 28); Workshops are typical examples of this (Gagnon, 2011). Pull efforts are the process that "knowledge users plan and implement strategies to pull knowledge useful to their own decision making" (Gagnon, 2011, p. 28). Exchanging efforts are strategies or approaches used to facilitate interactions between knowledge producers and users (Gagnon, 2011).

Furthermore, Murphy and Salomone (2013) categorize social media applications into "communicative technologies", "collaborative publishing", "documentative", "generative" and "interactive" (pp. 72-74). The first four categories of applications are relevant to this research. Communicative technologies refer to social media that is used for "sharing ideas and communicating information and new creations" (Murphy & Salomone, 2013, p. 72); for instance, a blog is a typical example of communicative technologies (Murphy & Salomone, 2013). An example of collaborative publishing is wikis, providing a platform for individuals to document and share knowledge (Murphy & Salomone, 2013). Documentative denotes the process of documenting and demonstrating knowledge through external media (Murphy & Salomone, 2013);

examples include blogs, wikis and Google Docs. Generative refers to technologies for the purpose of "[generating] new content and ideas that can be shared with other individuals who can use the new content at their discretion" (Murphy & Salomone, 2013, p. 73).

2.4 Offline Channels and Online Channels

This paper explores knowledge dissemination through online and offline communication channels, thus the important role of channels in promoting communication is highlighted first. Additionally, examples of both online and offline channels are listed. The conference represents one type of offline channel; whereas, online channels, in this paper, refer to two social networking sites—Twitter and LinkedIn.

The deliberation is defined as "the combination of careful problem analysis and an egalitarian process in which participants have adequate speaking opportunities and engage in attentive listening or dialogue concerning public issues" (Min, 2007, p. 1370). The function of deliberation is similar to discussion forms, conferences and even social media, which facilitates participant opinions and develop attitudes (Min, 2007). In a different study, Leach et al. (2008) suggest that conference attendances usually have strong desire to recommend to others through word-of-mouth.

With the rapid development of information technology, knowledge communication has overcome the spatial barriers by utilizing online communication channels (Newell & Dale, 2015; Castronovo & Huang, 2012). As addressed by Castronovo and Huang (2012), online communication platforms offer alternative marketing strategies. Compared with face-to-face discussion, computer-based

communication ensures “online participants remained visually anonymous, even though they used real names…they may have exchanged more candid opinions in the absence of visual cues” (Min, 2007, p. 1381). Furthermore, online word-of-mouth communication has comparative advantages over other traditional marketing channels (Castronovo & Huang, 2012). Online communication platforms are recognized as a cost-effective method of marketing communication (Castronovo & Huang, 2012). Although the previous literature suggests that online communication is inferior to face-to-face interaction, Min (2007) concludes that computer-based discussion is as effective as face-to-face communication as long as the online discussion is rational with formal settings. These online communication platforms are considered as mechanisms for mobilizing knowledge due to the fact that organizations gain and share knowledge through them (Murphy & Salomone, 2013).

2.4.1 Examples of Offline and Online Communication Channels

Social media are online communication channels that are primarily designed for networking. Social media is defined as “a group of Internet-based applications that allow the creation and exchange of user generated content” (Kaplan & Haenlein, 2010). Social media have six categories, including “collaborative projects, blogs and microblogs, content communities, social networking sites, virtual game worlds, and virtual social worlds” (Curran& Lennon, 2011, p. 21). This present study focuses on social networking sites—LinkedIn and Twitter. Leading popular social networking sites based on the number of users in the North America include Facebook, Twitter, LinkedIn, Pinterest, Instagram and so on, among which Facebook, Twitter and LinkedIn are the three most

popular social media sites (EBizMBA Inc., n.d.). Twitter and LinkedIn are both professional sites and also the most popular social media sites in the North America. Specifically, Twitter is more like a means for personal branding; whereas, LinkedIn is often used as an online profile (Dessart, Veloutsou & Morgan-Thomas, 2015). An increasing number of scientific researches have referred data from Twitter (Gelbeck, 2010). Twitter is one of the most popular social networking sites in the North America, with nearly 300 millions active users on a monthly basis (Twitter, n.d). Zubiaga et al. (2015) added detailed description of four outstanding features: 1) user mentions; 2) replies; 3) retweets; 4) hashtags, highlighting that ease of use leads to the popularity of Twitter (p.463).

The literature above investigates both online and offline platforms for information communication. Additionally, audience's attitudes toward disseminated information are influencing factors of subsequent behaviors (Hungerford, 1996). Therefore, it is worthwhile to compare and contrast audiences' attitudes towards preselected communication channels, including conferences and two social media sites.

RQ1: What are sustainability practitioners' attitudes towards preselected communication channels disseminating information about sustainable community plans?

Communication through conference and social media differ in social presence. Social presence is defined as "the degree to which a person is perceived as real in mediated communication" (p.8), and it is a key indicator for participants' satisfaction

(Gunawardena & Zittle, 1997). Information on social media is in a written format and lacks of emotions; meanwhile, conference attendees feel a higher level of social presence (Gunawardena & Zittle, 1997). As a consequence, hypothesis 1a (H1a) suggests that participants (sustainability practitioners in this context) have more positive attitudes towards communication through conference than social media.

***H1a**: In terms of disseminating the same information about implementing sustainable community plans, sustainability practitioners have more positive attitudes towards communication through conference than social media.*

Although online communication, such as social media, has low level of social presence, participants view online communication as interactive and interesting (Lee, 2011; Gunawardena, 1995). Moreover, participants' attitudes towards online communication depend on their sense of online community, which is created through participants' interaction (Gunawardena, 1995). Twitter and LinkedIn are two popular social media in North America, and the former one enables its users to mention followers, reply, retweet and create hashtags as ways to promote interactions (Zubiaga et al., 2015). In contrast, LinkedIn users can publish posts or share others' posts, and LinkedIn tend to have a lower traffic regarding posts than Twitter. Thus, hypothesis 1b is proposed, indicating that participants (sustainability practitioners in this context) have more positive attitudes towards communication through Twitter than LinkedIn.

***H1b**: In terms of disseminating the same information about sustainable community plans, sustainability practitioners have more positive attitudes towards communication through Twitter than LinkedIn.*

2.5 Effectiveness

Castronovo and Huang (2012) conclude that the techniques used to measure marketing effectiveness depend on specific marketing objectives. Newell and Dale (2015) point out the viewership of different media varies over time. For instance, YouTube captures the most audiences in the early stage of release (Newell & Dale, 2015). In addition, four factors determine the effectiveness of knowledge dissemination: dissemination approaches, messages themselves, message providers and dissemination evaluation (Gagnon, 2011).

Strategies employed for knowledge dissemination are usually determined by knowledge content, targeted audiences, dissemination techniques, and dissemination purposes (Sá, Li & Faubert, 2011). Similarly, Kingston (2012) indicates that specific goals determine disseminating techniques. Research findings suggest that "attractiveness", "ease of use", "creditability", "trust and reputation of the originators", and "status" affect the popularity of channels; the popularity determines the effectiveness of transferring knowledge online (Newell & Dale, 2015, p. 15). More importantly, five contributing factors for knowledge dissemination in an institutional perspective include: 1) administrative supports; 2) organizational culture; 3) existing dissemination platforms; 4) incentives; 5) trigger events (Jacobson et al., 2004). In the environment discipline,

adjusted environmental behaviors are attributed to three factors: attitudes towards environmental issues, adequate knowledge, and intention to apply knowledge and skills (Hungerford, 1996). By understanding influential factors for knowledge engagement online, academic scholars are able to incorporate these factors into their disseminating strategies for the purpose of obtaining large attention from targeted audiences, better servicing communication platform users (Swani et al., 2014; Kaplan & Haenlein, 2010).

This present study examines both online and offline platforms for information communication. Online social networks are increasingly important platforms for people communicating and sharing environmental knowledge and behaviours (Robelia, Greenhow & Burton, 2011). Previous research study also found that online communication channels—such as social networking sites—play a facilitating roles in communicating research findings to the broad external audiences (Bik & Goldstein, 2013). However, few studies have examined both offline and online communication platforms, justifying the effectiveness of various marketing communications in knowledge dissemination in academia. Building on marketing communication and word-of-mouth theories, this research looked at preselected online and offline platforms in disseminating new knowledge in the sustainability field, examining how these communication platforms can be used to accelerate knowledge transfer.

Previous studies have examined various aspects to measure the effectiveness of knowledge dissemination. A recent study suggests the characteristics of communication channels, such as service quality or information value, affect the effectiveness of knowledge transfer (Newell & Dale, 2015). Newell and Dale's finding is supported by

Liaw et al.'s research on online learning system, indicating online learning environment features influence knowledge learning (Liaw et al., 2008). Moreover, the goals of advertising are to create conversations and then lead to purchase behaviors (Keller & Fay, 2012), and the conversation is triggered by word-of-mouth. As a result, audiences' willingness to spread the information is also an important indicator of effective dissemination. Another study has also evaluated the role of the Internet in disseminating knowledge in regards of climate change for the purpose of comparing and contrasting the effectiveness of disseminating channels, using audience engagement as an indicator for knowledge sharing (Newell & Dale, 2015). Similarly, high level of audience engagement in social media increases advertising effectiveness, indicating that engagement level is a critical indicator of marketing effectiveness (Calder, Edward & Ute, 2009). Additionally, in previous studies, audience engagement was measured by participants reporting their level of feeling engaged (Paek et al., 2013). Furthermore, audiences' awareness is not enough for an effective marketing (Blair et al., 1987). Instead, targeted audiences should be persuaded by disseminated information (Adetunji, Nordin & Noor, 2014; Blair et al., 1987). Given the prior studies above on marketing effectiveness, this paper will examine 1) service quality; 2) word-of-mouth; 3) audience engagement; 4) message persuasiveness to measure the effectiveness of knowledge dissemination. This present research examines the effectiveness of different communication platforms in disseminating knowledge in the sustainability field.

RQ2: Which communication channels are the most effective in disseminating information about sustainable community plans?

Social media are cost-effective techniques for communication as opposed to traditional marketing tools such as emails or telephones (Lee, 2011). However, the communication for professional purposes on social media has been considered ineffective in general due to the mass of online information and the personal use of social sites (Lee, 2011). In addition, a study by Leach et al. (2008) shows that conference attendees are most likely to share information through word-of-mouth; meanwhile, few studies have examined the impact of online communication on word-of-month. As a result, hypothesis 2a suggests that dissemination through conference is the most effective way to share information about sustainable community plans. Furthermore, although very few research has compared the effectiveness of disseminating information on Twitter and LinkedIn, Twitter provides more functions on its website than LinkedIn. Thus, hypothesis 2b indicates that dissemination through Twitter is a more effective way to disseminate information about sustainable community plans than LinkedIn.

***H2a**: Dissemination through conference, as opposed to Twitter and LinkedIn, is the most effective way to disseminate information about sustainable community plans.*

***H2b**: Compared to dissemination through LinkedIn, dissemination through Twitter is a more effective way to disseminate information about sustainable community plans.*

2.6 Drivers

Researchers use social networking sites as channels for knowledge dissemination; thus, it is essential for them to know the drivers of audience participation and engagement in online channels (Curran& Lennon, 2011). Twitter and LinkedIn are both social networking sites and are utilized for professional purposes. However, it is uncertain whether audience engagement in Twitter and LinkedIn is driven by the same reasons. Thus, the third research question in this paper compares drivers of audience engagement on Twitter and LinkedIn:

RQ3: Whether audience engagement in social networking sites—Twitter and LinkedIn—is driven by the same reasons?

Similar to offline word-of-mouth communication, many studies have been done to examine the motivations for online audience engagement. Drivers for involvement are to reduce purchasing risks, to save search time and to learn new products (Hennig-Thurau & Walsh, 2003). In addition to the incentives of such involvement identified in previous literature, Hennig-Thurau and Walsh concluded five motivating factors: 1) "obtaining, buying related information"; 2) "social orientation through information"; 3) "community membership"; 4) "remuneration"; 5) and to "learn to consume a product" (Hennig-Thurau & Walsh, 2003, p. 64).

Engagement has two main components: behavioral involvement and psychological immersion (Dessart, Veloutsou & Morgan-Thomas, 2015; Smith &

Gallicano, 2015). Smith and Gallicano (2015) described behavior involvement as "viewing, commenting [and] sharing" posts on social networking sites; and they characterized psychological immersion as "a state of mind and emotion" (p. 82). The notion of community engagement was initially proposed in 2005, denoting audiences' internal incentives for participating in communities and engaging with community members (Algesheimer et al., 2005). This definition could also be applied to virtual communities such as social networking sites. The audience engages in social networking sites by learning, sharing, supporting and connecting with other community members (Brodie et al., 2011; Dessart, Veloutsou & Morgan-Thomas, 2015).

Members attributed their engagement in social networking sites to social, brand-relevant and functional reasons (Wirtz et al., 2013; Dunne, Lawlor & Rowley, 2010). Two highlighted drivers of engagement in a different study were interacting with community members and looking for valuable information or knowledge (Dessart, Veloutsou & Morgan-Thomas, 2015). More importantly, communication using electronic platforms enables a wide range of audience members to seek information at any time (Andreassen & Streukens, 2009; Godes & Mayzlin, 2004). Consistent with the previously mentioned study by Smith and Gallicano (2015), information seeking has been viewed as the major reason for joining social networking sites (Dunne, Lawlor & Rowley, 2010; Hennig-Thurau & Walsh, 2003). Similarly, seeking information was seen as the entry level of engagement in social networking sites (Smith & Gallicano, 2015). Additionally, audiences who proactively obtain information are more likely to be affected by information dissemination (Sweeney, Soutar & Mazzarol, 2008).

Furthermore, individuals enaged in online communities because they wanted to learn from other members (Dessart, Veloutsou & Morgan-Thomas, 2015). Previous studies have highlighted that another significant reason that users' participation in online channels is to learn new knowledge (Hennig-Thurau & Walsh, 2003). Lastly, opinion seeking is also a significant driver of engagement in social networking sites (Chu & Kim, 2011). Audiences look for others' advice and then make subsequent decisions (Coiera, 2013; Chu & Kim, 2011). However, whether these initial purposes are achieved is under-investigated. Considering the wide range of driving factors of engagement, this paper will focus on three main reasons for online audience engagement: 1) obtaining information; 2) enhancing knowledge; 3) seeking advice. The review above of previous studies lead to hypothesis 3.

H3*: Obtaining information, enhancing knowledge, and seeking advice about sustainable community plans are the shared drivers for external audiences to engage in using Twitter and LinkedIn.*

3.0 Methodology

This present study employs a quantitative assessment of diverse offline and online communication channels. The research objectives are reemphasized first. Following the objectives, a detailed description of surveys used in this study is elaborated in the survey design. Then, the following sections present the processes of data collection and data analysis. Finally, study's limitations are discussed.

3.1 Research Objectives

This study involves knowledge dissemination through three preselected communication platforms for the purpose of transferring sustainability research findings, accelerating collective learning, and sharing practical experience. The aim is to investigate both offline and online channels as ways to explore how communication platforms help to accelerate the process of knowledge dissemination. Surveying participants in both offline and online media channels clarifies their attitudes towards each media platform. Research questions are reemphasized as follows:

1) What are sustainability practitioners' attitudes towards preselected communication channels disseminating information about implementing sustainable community plans?
2) Which communication channels are the most effective in disseminating information about implementing sustainable community plans?
3) Whether audience engagement in social networking sites—Twitter and LinkedIn—is driven by the same reasons.

3.2 Research Design

Primary and secondary sources of data were used for this study. Literature in the fields of education, health, marketing and sustainability has been reviewed in the interest of obtaining a theoretical foundation. Kozinets (2002) proposed five criteria for selecting online discussion forums, stating that they must 1) be aligned with predetermined objectives; 2) have abundant posts; 3) involve a fair number of participants; 4) have informative content; 5) consist of interactive conversations. This present study has adopted Kozinets' criteria as a basis for selecting online communications channels. This present research disseminates research findings in the sustainability field, targeting sustainability practitioners. Considering the targeted audiences are primarily professionals such as sustainability practitioners, dissemination platforms have to meet the criterion that the communication channel is generally used on professional purposes and is suitable for disseminating sustainability research. As a result, a shortlist of online social media is: LinkedIn and Twitter. What is more, considering targeted message audiences are sustainability practitioners, Twitter and LinkedIn are selected as two represented social media sites because the vast majority of users in LinkedIn and Twitter are professionals, accounting for approximately 70% and 50% respectively of total users (Antheunis et al., 2013). Therefore, this present study involves three channels: conferences, LinkedIn and Twitter. In an effort to evaluate a variety of dissemination media, surveys were distributed to audiences on each communication channel.

Before completing surveys, participants were exposed to sustainability topics in sustainable community plans. These sustainability topics are disseminated through conference presentations, LinkedIn—online blog post, and Twitter—text-based tweet and infographic. In terms of the communication through social media, participants had unrestricted time to read postings from Professor Amelia Clarke's Twitter and LinkedIn accounts. After reading the posts, online audiences were requested to complete a survey anonymously.

In order to testify to channels' effectiveness in sharing information, and to their being drivers of information dissemination, a structured survey has been designed to collect primary data. Three surveys—survey A, survey B and survey C—were utilized in this study, and they were distributed in conferences, on Twitter and on LinkedIn respectively. Survey questions on a 1 (strongly disagree or not interested at all) to 7 (strongly agree or extremely interested) point Likert scale—how strongly do they find topics are interesting, and to what extent do they agree or disagree with outlined statements—were asked to participants involved in predetermined dissemination channels. Specifically, survey A designed for participants in predetermined conferences (Appendix 2) comprise fewer questions than survey B and survey C in online communications channels (Appendix 3). Survey questions for these channels were adapted from books entitled *The Handbook of Marketing Scales: Multi-item Measures for Marketing and Consumer Behaviour Research (3rd edition)*, *Marketing Scales Handbook: Multi-Item Measures for Consumer Insight Research (Volume 5)*, *Marketing Scales Handbook: A Compilation of Multi-Item Measures for Consumer Behavior &*

Advertising Research (Volume 6), and *Marketing Scales Handbook: Multi-Item Measures for Consumer Insight Research (Volume 7)*, by integrating the questionnaire regarding the attitudes toward ad, attitudes toward ad relevant news, attitudes toward online word-of-mouth, and attitudes toward website information value, involvement, engagement, and persuasiveness. The process of research design is summarized in Figure 1.

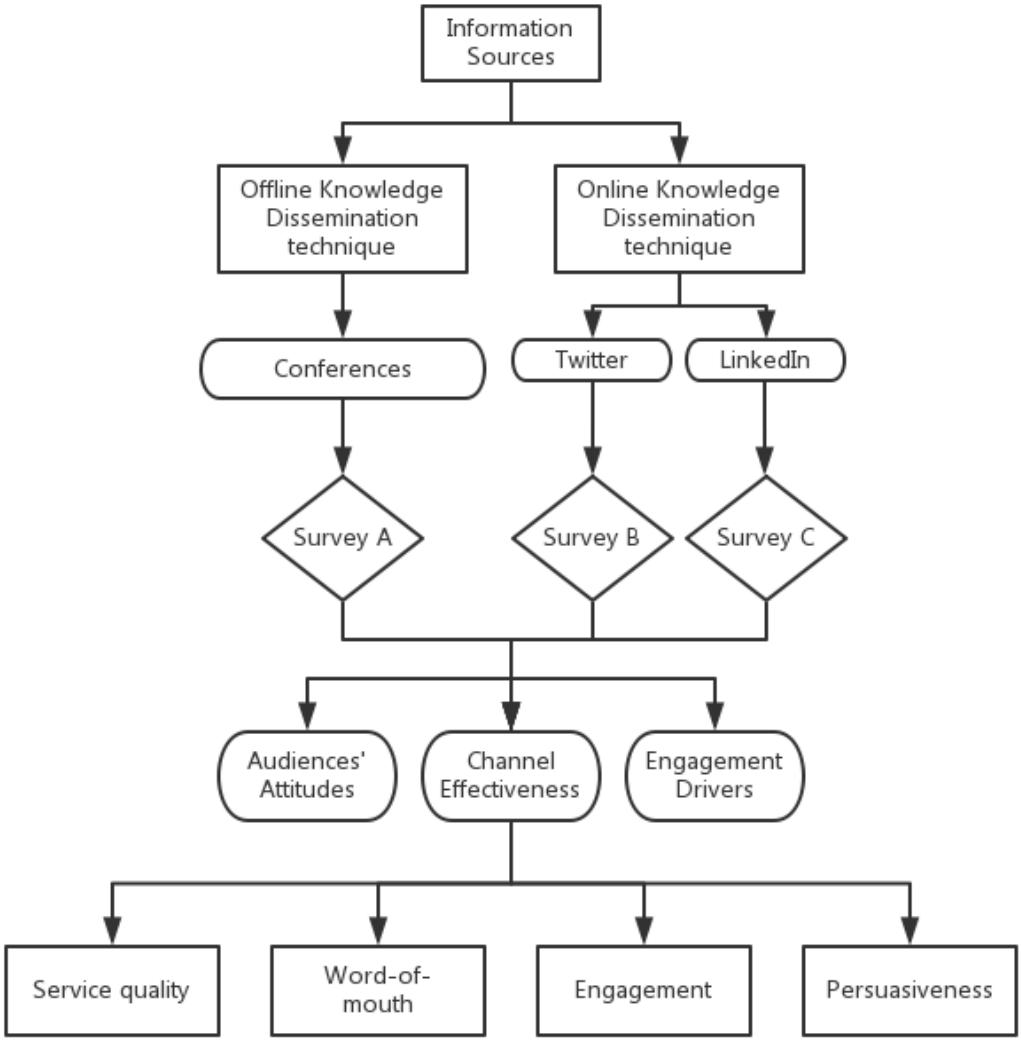

Figure 1: A Conceptual Flow of Research Design

The survey distributed to potential participants consists of two sections. The first section includes information and a consent letter, providing a brief introduction of research objectives and asking for consent to participate in the survey (Appendix 1, Appendix 2, Appendix 3). The online surveys (survey B and survey C) were developed through online survey software named FluidSurvey. Completed online surveys were continuously collected from online communications channels. All survey questions have been approved by the Office of Research Ethics at the University of Waterloo and obtained ethics approval for conducting this survey (Appendix 4).

3.2.1 Survey Design

The surveys used in this present study were developed by the author, the research partner—Natalie Heldsinger and the author's academic supervisors—Dr. Amelia Clarke and Dr. Lei Huang. The second section of survey A includes 22 questions in total: the first asks about the role of individual participants; the next five examine to what extent participants are interested in listed topics; then next 12 were designed to explore participants' general feedback on communication channels; and the last are comprised of four open questions concerning specific topics and end the survey. Specifically, participants were asked about their attitudes toward either online or offline communications channels; for example, how much they consider "the knowledge are memorable"; to what extent do they "have opportunities to learn something from these channels" and other questions. Participants were subsequently asked about their general feedback on these preselected communication channels.

The biggest differences between survey A and survey B (or survey C) are clarified in the following: 1) only offline survey (survey A) asks respondents' interests in specific topics about sustainable community plans; 2) only online surveys (survey B and survey C) have questions regarding respondents' age and education level; 3) only online surveys (survey B and survey C) ask respondents' incentives of engaging in two social networking sites—Twitter and LinkedIn. These differences between surveys are attributed to two reasons. First, presentations in conferences cover a wide range of topics, and offline participants were exposed to the whole session on sustainable community plans; meanwhile, only one LinkedIn or Twitter post was attached to the survey link. Although tweets or LinkedIn posts on sustainable community plans were posted regularly, survey respondents may only see a post with one specific topic. Thus, online survey does not include questions regarding audiences' interests in specific topics. Second, conferences usually come with specific themes, and attendees tend to know what to be expected in sessions. In contrast, the public has an easy access to large amount of information, and people are uncertain about what to encounter on the Internet (Garvey, 2009). Thus, given the uncertainty of the Internet, it is worthwhile to examine the reasons for audience engagement.

The numbers of questions that participants have to fill in are 22 (if they are conference attendees) and 28 (if they use online channels for sustainability related information). Questions 7 to 10 and question 12, 13, 15, 16 in survey A, and questions 2 to 5, question 7, 8, 10, 11, and questions from 13 to 20 in survey B and survey C address the first research question, figuring out sustainability practitioners' attitudes towards

preselected communication channels disseminating information about implementing sustainable community plans. Question 11, 14, 17, 18 in survey A and question 6, 9, 12, and questions from 21 to 24 in survey B and survey C are used to demonstrate the communication channels' effectiveness in sharing information about implementing sustainable community plans. Lastly, questions 25 to 27 in survey B and survey C examine potential driving factors that lead external audiences to disseminate information about implementing sustainable community plans.

3.3 Data Collection

Research data were collected through both online and offline surveys. Conferences held between January of 2015 and July of 2015—with a focus on sustainability—are selected as the main offline disseminating platforms. Given the predetermined targeted audiences—sustainability practitioners, 2015 Sustainable community conference held by the 2015 Federation of Canadian Municipalities (FCM) conference, the ICLEI[1] World Congress 2015, the international Symposium on Corporate Responsibility and Sustainable Development, and the first working meeting of the EU-Canada Urban Policy Cooperation are selected as the four primary offline dissemination platforms.

The first distribution of survey was conducted through the 2015 Federation of Canadian Municipalities (FCM) conference in London, Canada. In total, 28 participants from the FCM conference completed the first round of survey A. These participants included councilors, municipal staff, consultants and others, who were involved in the

[1] ICLEI: International Council for Local Environmental Initiatives, also known as Local Governments for Sustainability.

all-day training session. In addition, the second round of survey A was distributed and collected in the ICLEI World Congress 2015, in Seoul, Republic of Korea. The ICLEI international congress is a platform for councilors, municipal leaders, academics and consultants to share knowledge and experience (ICLEI, n.d.). In the second round of survey distribution, aggregate 7 participants completed survey A. The third conference is the International Symposium on Corporate Responsibility and Sustainable Development, which gathers participants from the private sector, the public sector and Non-Governmental Organizations (NGOs) to address the nexus of responsibility for sustainable development (Ryerson University, n.d.). In total 7 participants completed survey A. The last round of survey distribution was in the first working meeting of the EU-Canada Urban Policy Cooperation in July 2015. This working meeting addressed partnership issues among urban cities. Aggregate 28 participants completed survey A.

Survey B and survey C were designed for and distributed on Twitter and LinkedIn respectively. The post[2] associated with 16 topics, which included in sustainable community plans, was published on LinkedIn on July 2nd, 2015. The main body of the post was an infographic outlining specific 16 topics: transportation, water, waste, air, energy, climate change, land use, food security, local economy, ecological diversity, civic engagement, social infrastructure, housing, employment, safety (crime) and financial security (Figure 2). All topics were presented in an order from the most popular topics in sustainable community plans to the least ones. Similarly, a tweet[3] with the same

[2] The link of LinkedIn post: https://www.linkedin.com/pulse/what-topics-forefront-municipal-sustainability-planning-amelia-clarke?trk=mp-reader-card.
[3] The link of Twitter post: https://twitter.com/DrAmeliaClarke/status/616940797594849280.

infographic was posted on Twitter on July 3rd, 2015. Completed surveys were continually collected throughout the two months after the surveys had been posted. Online participants were invited to fill in the survey through an external link contained in the post.

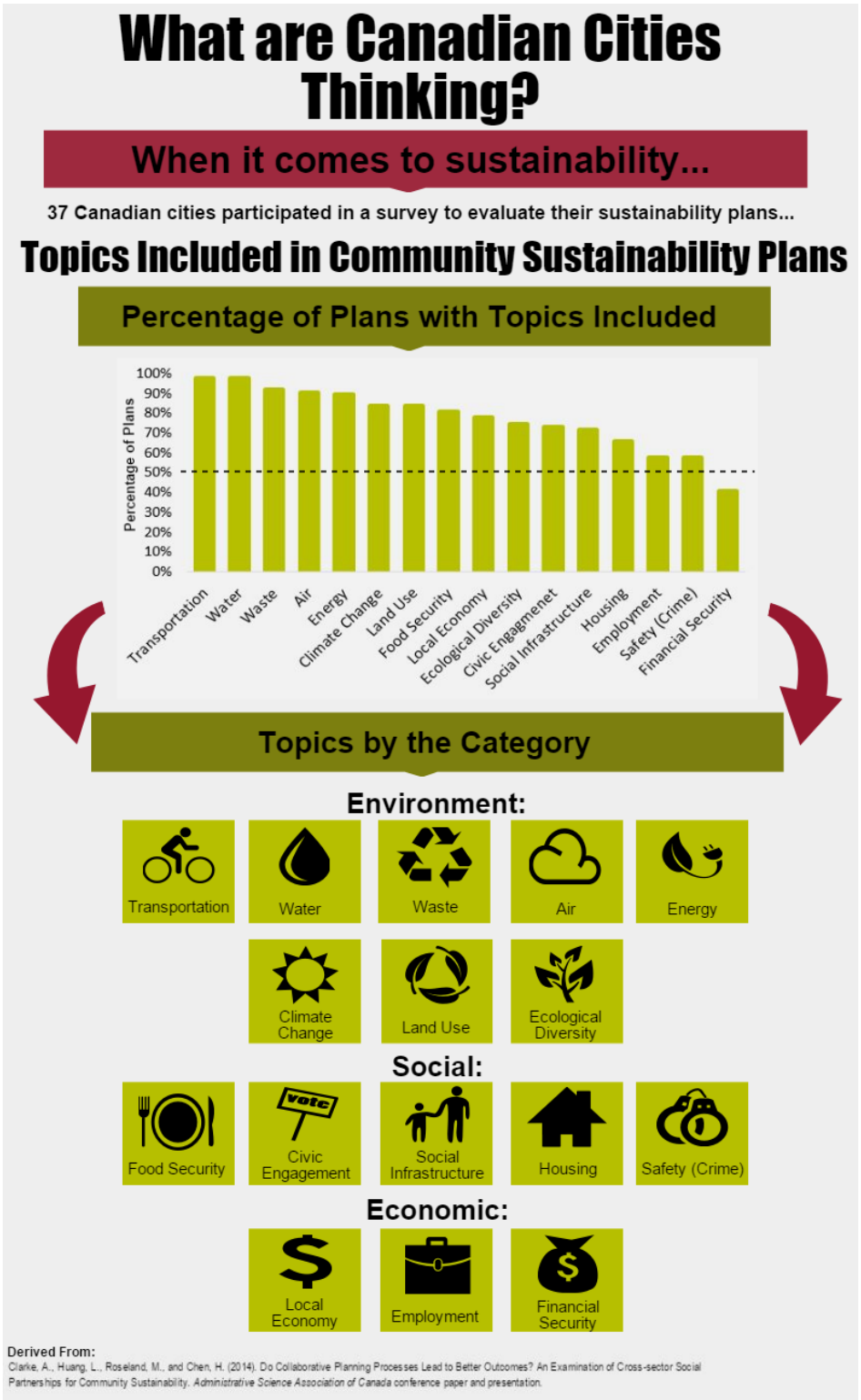

Figure 2: Topics at the Forefront of Municipal Sustainability Planning

3.4 Data Analysis

The procedures for data analysis consist of data cleaning, descriptive analysis, and T testing. The process of data cleaning has two steps. First, respondents who failed to answer over 50% of the total questions are deleted. Second, a value of -99.5 was given to skipped questions. After the data cleaning process, remaining data were checked by running reliability tests.

IBM Statistical Package for Social Science (SPSS) was used to analyze the collected data. Specifically, data analysis tools embedded in SPSS, such as the T-test and descriptive analysis were used. Responses regarding disseminating knowledge are considered independent variables; meanwhile, participants' attitudes and the effectiveness of communication channels are considered dependent variables. By referring to survey questions in different volumes of the *Handbook of Marketing Scales*, questions are categorized into six groups: 1) audiences' attitudes towards ad in general, ad relevant news; 2) word-of-mouth; 3) service quality or website information value; 4) involvement or engagement; 5) persuasiveness; 6) drivers for online engagement. Specifically, survey participants' responses regarding attitudes will be used to explore audiences' attitudes toward each communication channel; the level of audiences' wiliness to share via word-of-mouth, the perceived information value, the level of audience engagement and message persuasiveness work as four indicators for channel effectiveness.

Descriptive analysis was employed to investigate data distribution, central tendencies, and data dispersion. Specifically, the means, and the standard deviations of

responses were tested (Field, 2013). Thus, results of descriptive analysis provide fundamental features of data (Trochim, 2006). The P-P Plot test was used to examine the normality of data. P-P Plot tests were conducted before T tests and one-way ANOVA, making sure that data meet test assumptions for following tests (Field, 2013). T testing is suitable for examining relationships between variables, which is a good fit for exploring the mean differences between survey respondents in conferences, on Twitter and on LinkedIn (Field, 2013). T testing, including independent sample T tests, one-way ANOVA and one-sample T tests, is used to compare the response means of three channels. The means of agreement were used to determine participants' interests and general feedback on both offline and online channels.

3.5 Limitations

This present research has some practical implications in disseminating knowledge to practitioners in the sustainability field. Although this present study provides some insights about knowledge dissemination, it has a number of limitations. First of all, one limitation is that this research only covers data from two social media sites—Twitter and LinkedIn, using one private social media account. The results would be more accurate if more social media accounts were used in the present research. The sample size is small. The completion rate of surveys in regard to Twitter was low, perhaps because online participants are unwilling to disclose their attitudes or feelings towards media platforms. Furthermore, this present research does not take message appeals into consideration. Research finding by Swani et al (2014) point towards the differences in message appeals, which include functional appeals and emotional appeals.

Finally, This study did not consider the effect of media design on participates' attitudes and behaviors. A study by Kietzmann et al. (2011) found that social media sites differentiate themselves in functionality and styles, which potentially affect their utilization. Twitter and LinkedIn have different styles, but their layout style and website features do not count as influential factors.

4.0 Results

The aggregated data from the 189 surveys, collected from February 2015 to July 2015, were analyzed. A Boxplot was first used to identify outliers in the data set. Based on Serbanica's criteria regarding outliers (Standard deviation>2.5), no outliers were found in this data set (Serbanica, 2011). Then, respondents' roles, age, educational levels and their interests in sustainability-associated topics were examined by using descriptive analysis. Later, T-testing (Independent Sample T-testing and One Sample T-testing) was used to examine the proposed research hypotheses. In addition, one-way ANOVA was used to compare three preselected channels (sources of information): 1) The conference was chosen, representing offline communication in the present study; 2) LinkedIn was selected as it is a popular and professional site; and 3) Twitter, another popular site, was included because it is the most-used in North America. Specifically, the dependent variable in this present study is disseminating information; whereas, independent variables consist of respondents' attitudes toward disseminated information, word-of-mouth, service quality, engagement and persuasiveness.

4.1 Descriptive Analysis Results on General Questions

In both online and offline surveys, respondents were first asked to identify their current roles. Since this present study targeted sustainability practitioners, surveys were deliberately distributed in sustainability-themed conferences and to practitioners in the field of sustainability. Table 1 shows the distribution of respondents' roles. In general, the majority of offline participants were municipal staff and students. According to

Table 1, among 70 conference attendees, 25 of them were municipal staff, and 21 were students. The remaining offline participants were consultants (10) or councilors (4). In contrast, students made up over half of all Twitter participants, followed by municipal staff and consultants. Moreover, consultants accounted for the largest number of respondents on LinkedIn, followed by students and municipal staff. Specifically, investigation of specified answers regarding current individual roles showed that most of those respondents were employees in the energy sector or retired from the public sector.

Table 1: Frequency Results by Online and Offline Participants' Current Roles

	Total	Conference Participants	Percent	Twitter Participants	Percent	LinkedIn Participants	Percent
Councilor	4	4	5.7	0	0	0	0
Municipal staff	47	25	35.7	5	12.2	17	21.8
Consultant	44	10	14.3	5	12.2	29	37.2
Student	62	21	30.0	23	56.1	18	23.1
Other, please specify	32	10	14.3	8	19.5	14	17.9
Total	189	70	100	41	100	78	100

4.1.1 Online Survey Results on General Questions

The survey B and survey C (referred to as online surveys in this present study) was distributed on LinkedIn and Twitter, which produced 78 and 41 completed surveys respectively. In addition to identify current roles, only online respondents were asked about their age and educational levels. Table 2 illustrates the results of a descriptive analysis of respondents' age distribution. According to Table 2 shown below, participants who were aged 25 to 34 made up one quarter of all online respondents. In

addition, 35 to 44 year-old respondents accounted for one fifth of all respondents on both online sites—LinkedIn and Twitter.

Interestingly, more than half of online respondents were no more than 44 year-old (65%). By contrast, only around 4% of respondents were over 65 years old, and less than 20% were over 55 (18%). Based on the difference between the number of respondents and age groups, it seems that younger users tend to be more active on the Internet and more willing to participate in online activities.

Table 2: Frequency Results by Age of Online Participants

	Frequency	Percent	Valid Percent	Cumulative Percent
18-24 years old	22	11.6	18.6	18.6
25-34 years old	30	15.9	25.4	44.1
35-44 years old	25	13.2	21.2	65.3
45-54 years old	19	10.1	16.1	81.4
55-64 years old	16	8.5	13.6	94.9
65 years old or above	5	2.6	4.2	99.2
Prefer not to answer	1	.5	.8	100.0
Total	118	62.4	100.0	

Table 3 summarizes the distribution of participant educational levels, which vary from secondary school diploma to a doctorate degree. About 42% of online respondents completed Master's degree. Additionally, almost 30% of online participants possessed a Bachelor's degree, and about 13% of all online respondents have a Ph.D. degree. Based on Table 3, it is therefore calculated that nearly 90% of online respondents had obtained at least a Bachelor's degree (88%).

Table 3: Frequency Results by Highest Level of Education Completed of Online Participants

Educational Levels	Frequency	Percent	Valid Percent	Cumulative Percent
Secondary (high) school diploma or equivalent	6	3.2	5.0	5.0
Apprenticeship or trades certificate or diploma	1	.5	.8	5.9
College, CEGEP or other non-university certificate or diploma	4	2.1	3.4	9.2
University certificate or diploma below bachelor level	3	1.6	2.5	11.8
Bachelor's degree	34	18.0	28.6	40.3
University certificate or diploma above bachelor level	2	1.1	1.7	42.0
Master's degree	50	26.5	42.0	84.0
Professional degree	3	1.6	2.5	86.6
Doctorate degree	16	8.5	13.4	100.0
Total	119	63.0	100.0	

4.1.2 Offline Survey Results on General Questions

The first section of the offline survey was designed using a 7 point Likert scale to measure respondents' extent of interest in three topics covered in the disseminated information: 1) overview of sustainable community plans; 2) implementing sustainable community plans within local governments; 3) partnership, collaboration structures and key features. The choices ranged from 1 (not at all interesting) to 7 (extremely interesting).

Table 4: Offline Respondents' Interest in the Overview of Sustainable Community Plans (on 7-point Likert scale)

	N	Minimum	Maximum	Mean	Std. Deviation
Interests in overview of sustainable commur	68	2	7	5.19	1.136
Interests in implementing sustainable community plans within local governments	68	1	7	5.56	1.164
Interests in partnership, collaboration structures and key features	68	1	7	5.53	1.310
Valid N (listwise)	68				

Overall, offline respondents found that the overview of sustainable community plans was moderately interesting or very interesting (M=5. 19, n=68) (Table 4). Those conference attendees considered the overview of sustainable community plans was at

least slightly interesting. Similarly, offline respondents viewed implementing sustainable community plans as moderately interesting or very interesting (M=5. 56, n=68). In terms of partnership, collaboration structures and key features, these respondents considered this topic as moderately interesting or very interesting (M=5. 53, n=68).

4.2 Attitudes toward Knowledge Dissemination (H1)

In order to examine the proposed research questions and corresponding hypotheses, Independent Sample T-tests and One-way ANOVA were used to compare three communication channels in pairs. Specifically, Independent Sample T-tests were employed in the first round of data analysis to address the first research question and corresponding Hypotheses (H1a and H1b). Furthermore, it is notable that numbers of completed surveys differ in some tables because of missing data or incomplete survey questions. Five questions in both online and offline surveys were associated with respondents' attitudes toward the disseminated information; thus, the mean of the responses was calculated by SPSS, which generated a new independent variable. Both Independent Sample T-tests and One-way ANOVA were used in the second round of data analysis to compare the channels' relative effectiveness in disseminating information. Similar to the first round, four sets of the response means were calculated as new variables: 1) service quality; 2) word-of-mouth; 3) engagement; 4) persuasiveness. The last round of data analysis compared the two online channels: LinkedIn and Twitter. Independent Sample T tests were used to examine factors that drive audiences to engage with the social media sites—Linkedin and Twitter. P-P Plot was used to examine whether the data were normally distributed and suitable for T

testing. Results of P-P Plot (Appendix 5) show that circles in terms of 1) respondents' attitudes, 2) service quality, 3) word-of-mouth, 4) audience engagement, and 5) message persuasiveness toward each channel all lie very close to the line. Although some circles were not typically on the line, they are close enough to the line. Thus, data collected for this study were safely considered normally distributed, and met assumptions for T testing.

4.2.1 Independent Sample T-tests and One-way ANOVA

Conference versus social media (LinkedIn and Twitter) (H1a)

Five survey statements regarding respondents' attitudes were involved in the first round of data analysis: 1) the overall message of the session was important for me; 2) the information delivered in the session is memorable; 3) this session provided relevant information; 4) this session was a valuable source of information about implementing sustainable community plans; 5) this session reminded me of some important information about implementing sustainable community plans. Respondents were asked to indicate the level of agreement in terms of each statement on a 7-point Likert scale (1: not at all; 7: extremely).

Table 5: Group Statistics (Attitudes: Offline versus Online)

	Online or offline	N	Mean	Std. Deviation	Std. Error Mean
Attitudes	Offline	66	5.35	.858	.106
	Online	114	4.65	1.257	.118

The offline channel (that is, conferences in this present study) and online (LinkedIn and Twitter) were first compared. In total, 66 completed surveys were collected at

conferences, as opposed to 114 from social media (76 on LinkedIn and 38 on Twitter) (Table 5).

Table 6: Independent Samples Test (Attitudes: Offline versus Online)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Attitudes	Equal variances assumed	10.503	.001	4.014	178	.000	.700	.174	.356	1.044
	Equal variances not assumed			4.426	173.092	.000	.700	.158	.388	1.012

On average, respondents at the conference had more-positive attitudes toward the disseminated information (M= 5.35, SE=0. 106, n=66), than those on social media (M=4. 65, SE=0. 118, n=114). This difference, 0.7, was significant (one-tailed) t=4. 426, p<0. 0005 (Table 6).

LinkedIn versus Twitter (H1b)

Table 7: Group Statistics (Attitudes: LinkedIn versus Twitter)

	LinkedIn or Twitter	N	Mean	Std. Deviation	Std. Error Mean
Attitudes	LinkedIn	76	4.75	1.090	.125
	Twitter	38	4.46	1.535	.249

Two social media sites were further explored, and respondents' attitudes to LinkedIn and Twitter were compared. As indicated in Table 7, 76 and 38 surveys were collected on LinkedIn and Twitter, respectively (Table 7).

Table 8: Independent Samples Test (Attitudes: LinkedIn versus Twitter)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Attitudes	Equal variances assumed	6.492	.012	1.182	112	.240	.295	.249	-.199	.789
	Equal variances not assumed			1.058	56.243	.295	.295	.279	-.263	.853

On average, respondents on LinkedIn had more-positive attitudes toward the disseminated information (M= 4.75, SE=0. 125, n=76), than those on Twitter (M=4. 46, SE=0. 249, n=38). This difference, 0.7, was not significant (one-tailed) t=1. 182, p=0. 120 (Table 8).

4.2.2 One-sample T-tests

In addition to Independent Sample T-test, one-sample t-tests were run to investigate 1) audience attitudes toward disseminated information; 2) service quality in each channel; 3) audiences' willingness to share the information through word-of-mouth; 4) the extent of audience engagement with information; and lastly, 5) the persuasiveness of the disseminated message. Compared to Independent Sample Test shown above, one sample t-tests were used to investigate how positive survey respondents' attitudes are toward each channel, and how different respondents' scores for communication effectiveness is to neutral (score=4). Results of all three channels were first shown, followed by the measurement of the difference between each channel.

Conference versus LinkedIn versus Twitter) (H1a and H1b)

One-sample t-tests were run to determine whether attitude scores for all communication channels were different to neutral, defined as a score of 4.

The mean attitude score for conferences (M=5. 3545, SD=0. 85847, n=66) was higher than that for LinkedIn (M=4. 7526, SD=1. 09001, N=76) and Twitter (M=4. 4579, SD=1. 53511, n=38) (Table 9). The mean attitude score for conferences was higher than the neutral score of 4, having a statistically significant mean difference of 1.35455, 95% CI [1.1435 TO 1.5656], t (65) =12. 819, P<0.0005 (Table 10).

The mean attitude score for LinkedIn (M=4. 7526, SD=1. 09001, N=76) was higher than that for Twitter (M=4. 4579, SD=1. 53511, n=38) (Table 9). The mean attitude score for LinkedIn was higher than the neutral score of 4, at a statistically significant mean difference of 0.75263, 95% CI [0.5036 to 1.0017], t (75) =6. 019, p<0.0005. The mean attitude score for Twitter was higher than the neutral score of 4, and the mean difference of 0.45789 was not statistically significant, at 95% CI [-0.0467, 0.9625], t (37) =1. 839, p=0.074 (Table 10). According to Table 10, it is concluded that sustainability practitioners have highly positive attitudes toward communication through conferences and LinkedIn. Based on results in Table 6 and Table 10, H1a is supported. However, in terms of disseminating the same information about implementing sustainable community plans, sustainability practitioners have slightly more-positive attitudes towards communication through LinkedIn than Twitter. However, no significant differences were found between attitudes toward communication on Twitter and LinkedIn. Thus, H1b is not supported.

Table 9: One-Sample Statistics (Attitudes: Conference versus LinkedIn versus Twitter)

	N	Mean	Std. Deviation	Std. Error Mean
Conference	66	5.3545	.85847	.10567
LinkedIn	76	4.7526	1.09001	.12503
Twitter	38	4.4579	1.53511	.24903

Table 10: One-Sample Test (Attitudes: Conference versus LinkedIn versus Twitter)

	Test Value = 4					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Conference	12.819	65	.000	1.35455	1.1435	1.5656
LinkedIn	6.019	75	.000	.75263	.5036	1.0017
Twitter	1.839	37	.074	.45789	-.0467	.9625

4.3 Effectiveness in Disseminating Information (H2)

First, due to the various features of information channels, the service quality of these channels—the conference, LinkedIn and Twitter—was first examined. Furthermore, whether the information would be shared through word-of-mouth is an indicator for dissemination effectiveness. In addition, previous studies have suggested that audience engagement and message persuasiveness influence information dissemination. Similar to the first round of data analysis, the means of questions within the same category were calculated as new independent variables, generated by SPSS.

Specifically, two statements regarding service quality were first examined in the second round of data analysis: 1) I learnt something that I did not know before about implementing sustainable community plans; 2) this channel is an effective way to find information about implementing sustainable community plans. The specific statement regarding word-of-mouth was included to determine whether respondents would recommend this session (or LinkedIn or Twitter) to others. Two questions regarding

audience engagement were explored: 1) how motivated were you; 2) how likely are you to show the content to someone else. Two statements regarding message persuasiveness were also explored: 1) this session/post/tweet influenced my opinion about implementing sustainable community plans; 2) the information will affect the implementation of my work on sustainable community plans. Respondents were asked to assign a number from 1 (not at all) to 7 (extremely) to each question/statement.

4.3.1 Independent Sample T-tests and One-way ANOVA

Table 11 presents the results of descriptive statistics for service quality. On average, survey participants tended to favour conferences (M=5. 46, SE= 0.124, n=67) more than Twitter (M=4. 58, SE= 0.257, n=40) and LinkedIn (M=4. 49, SE= 0.164, n=76) in terms of service quality. As shown in Table 12, Levene's test was significant (p<0. 0005). More importantly, Table 13 indicates that the mean scores regarding service quality differed significantly. Based on the results of the post hoc tests in Table 13, the mean response regarding service quality at conferences was significantly different than that on LinkedIn and Twitter (p<0. 0005; p=0. 009). By contrast, the mean difference between LinkedIn and Twitter was not significant (p=0. 961).

Table 11: Descriptives (Service Quality: Conference versus LinkedIn versus Twitter)

					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Conference	67	5.46	1.014	.124	5.21	5.70	2	7
LinkedIn	76	4.49	1.429	.164	4.17	4.82	1	7
Twitter	40	4.58	1.623	.257	4.06	5.09	1	7
Total	183	4.86	1.409	.104	4.66	5.07	1	7

Table 12: Test of Homogeneity of Variances (Service Quality: Conference versus LinkedIn versus Twitter)

Levene Statistic	df1	df2	Sig.
9.026	2	180	.000

Table 13: Multiple Comparisons (Service Quality: Conference versus LinkedIn versus Twitter)

	(I) Conference or Linkedin or Twitter	(J) Conference or Linkedin or Twitter	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Conference	LinkedIn	.962*	.225	.000	.43	1.49
		Twitter	.880*	.268	.004	.25	1.51
	LinkedIn	Conference	-.962*	.225	.000	-1.49	-.43
		Twitter	-.082	.262	.948	-.70	.54
	Twitter	Conference	-.880*	.268	.004	-1.51	-.25
		LinkedIn	.082	.262	.948	-.54	.70
Games-Howell	Conference	LinkedIn	.962*	.206	.000	.47	1.45
		Twitter	.880*	.285	.009	.19	1.57
	LinkedIn	Conference	-.962*	.206	.000	-1.45	-.47
		Twitter	-.082	.305	.961	-.81	.65
	Twitter	Conference	-.880*	.285	.009	-1.57	-.19
		LinkedIn	.082	.305	.961	-.65	.81
Dunnett t (>control)[b]	LinkedIn	Conference	-.962	.225	1.000	-1.40	
	Twitter	Conference	-.880	.268	1.000	-1.40	

*. The mean difference is significant at the 0.05 level.
b. Dunnett t-tests treat one group as a control, and compare all other groups against it.

Table 14 shows the results of the descriptive analysis of responses regarding word-of-mouth for conferences, LinkedIn and Twitter. On average, respondents were more likely to share the information through word-of-mouth at conferences (M=5. 49, SE=0. 157, n=67) than those on Twitter (M=4. 70, SE=0. 289, n=40) and LinkedIn (M=4. 53, SE=0. 195, n=76). The Levene's test result was significant (p=0. 006) (Table 15). Furthermore, the results of post hoc tests in Table 16 suggest that the mean regarding the possibility of word-of-mouth at the conference differed significantly from those for LinkedIn and Twitter (p=0. 001; p=0. 049). Meanwhile, the mean difference was not significant between LinkedIn and Twitter (p=0. 873).

Table 14: Descriptives (Word-of-mouth: Conference versus LinkedIn versus Twitter)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Conference	67	5.49	1.284	.157	5.18	5.81	1	7
LinkedIn	76	4.53	1.701	.195	4.14	4.91	1	7
Twitter	40	4.70	1.829	.289	4.12	5.28	1	7
Total	183	4.92	1.644	.122	4.68	5.16	1	7

Table 15: Test of Homogeneity of Variances (Word-of-mouth: Conference versus LinkedIn versus Twitter)

Levene Statistic	df1	df2	Sig.
5.255	2	180	.006

Table 16: Multiple Comparisons (Word-of-mouth: Conference versus LinkedIn versus Twitter)

	(I) Conference or Linkedin or Twitter	(J) Conference or Linkedin or Twitter	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Conference	LinkedIn	.966*	.267	.001	.34	1.60
		Twitter	.793*	.318	.036	.04	1.54
	LinkedIn	Conference	-.966*	.267	.001	-1.60	-.34
		Twitter	-.174	.311	.842	-.91	.56
	Twitter	Conference	-.793*	.318	.036	-1.54	-.04
		LinkedIn	.174	.311	.842	-.56	.91
Games-Howell	Conference	LinkedIn	.966*	.250	.001	.37	1.56
		Twitter	.793*	.329	.049	.00	1.58
	LinkedIn	Conference	-.966*	.250	.001	-1.56	-.37
		Twitter	-.174	.349	.873	-1.01	.66
	Twitter	Conference	-.793*	.329	.049	-1.58	.00
		LinkedIn	.174	.349	.873	-.66	1.01
Dunnett t (>control)[b]	LinkedIn	Conference	-.966	.267	1.000	-1.48	
	Twitter	Conference	-.793	.318	.999	-1.41	

*. The mean difference is significant at the 0.05 level.
b. Dunnett t-tests treat one group as a control, and compare all other groups against it.

In Table 17, respondents were engaged more at the conference (M=5. 37, SE=0. 136, n=67) than on Twitter (M=4. 56, SE=0. 264, n= 39) and LinkedIn (M=4. 36, SE=0. 153, n=76). Additionally, Levene's test was significant (p=0. 025) (Table 18). The results of post hoc tests indicated that respondent engagement at the conference was significantly different than that on LinkedIn and Twitter (p<0. 0005; p=0. 024).

Furthermore, the mean difference regarding engagement on LinkedIn was not significant compared to that on Twitter (Table 19).

Table 17: Descriptives (Audience Engagement: Conference versus LinkedIn versus Twitter)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Conference	67	5.37	1.110	.136	5.09	5.64	2	7
LinkedIn	76	4.36	1.331	.153	4.05	4.66	2	7
Twitter	39	4.56	1.651	.264	4.03	5.10	1	7
Total	182	4.77	1.403	.104	4.57	4.98	1	7

Table 18: Test of Homogeneity of Variances (Audience Engagement: Conference versus LinkedIn versus Twitter)

Levene Statistic	df1	df2	Sig.
3.783	2	179	.025

Table 19: Multiple Comparisons (Audience Engagement: Conference versus LinkedIn versus Twitter)

	(I) Conference or Linkedin or Twitter	(J) Conference or Linkedin or Twitter	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	Conference	LinkedIn	1.010*	.223	.000	.48	1.54
		Twitter	.802*	.268	.009	.17	1.44
	LinkedIn	Conference	-1.010*	.223	.000	-1.54	-.48
		Twitter	-.209	.262	.706	-.83	.41
	Twitter	Conference	-.802*	.268	.009	-1.44	-.17
		LinkedIn	.209	.262	.706	-.41	.83
Games-Howell	Conference	LinkedIn	1.010*	.204	.000	.53	1.49
		Twitter	.802*	.297	.024	.09	1.52
	LinkedIn	Conference	-1.010*	.204	.000	-1.49	-.53
		Twitter	-.209	.305	.774	-.94	.52
	Twitter	Conference	-.802*	.297	.024	-1.52	-.09
		LinkedIn	.209	.305	.774	-.52	.94
Dunnett t (>control)[b]	LinkedIn	Conference	-1.010	.223	1.000	-1.44	
	Twitter	Conference	-.802	.268	1.000	-1.32	

*. The mean difference is significant at the 0.05 level.
b. Dunnett t-tests treat one group as a control, and compare all other groups against it.

The extent of message persuasiveness in the three channels is presented in Table 20. On average, the level of message persuasiveness at the conference (M=4. 99, SE=0. 143, n=63) was higher than that reported on LinkedIn (M=3. 80, SE=0. 188, n=75) and

Twitter (M= 3. 60, SE=0. 269, n=40) (Table 20). Levene's test was significant (p=0. 002) (Table 21). The mean of message persuasiveness at the conference was significantly different from that on LinkedIn and Twitter (p<0. 0005; p<0. 0005). Additionally, the mean difference of message persuasiveness on LinkedIn and Twitter was not significant (p=0. 815), Table 22.

Table 20: Descriptives (Message Persuasiveness: Conference versus LinkedIn versus Twitter)

					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Conference	63	4.99	1.134	.143	4.71	5.28	2	7
LinkedIn	75	3.80	1.625	.188	3.43	4.17	1	7
Twitter	40	3.60	1.699	.269	3.06	4.14	1	7
Total	178	4.18	1.601	.120	3.94	4.41	1	7

Table 21: Test of Homogeneity of Variances (Message Persuasiveness: Conference versus LinkedIn versus Twitter)

Levene Statistic	df1	df2	Sig.
6.330	2	175	.002

Table 22: Multiple Comparisons (Message Persuasiveness: Conference versus LinkedIn versus Twitter)

						95% Confidence Interval	
	(I) Conference or Linkedin or Twitter	(J) Conference or Linkedin or Twitter	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
Tukey HSD	Conference	LinkedIn	1.192*	.254	.000	.59	1.79
		Twitter	1.392*	.301	.000	.68	2.10
	LinkedIn	Conference	-1.192*	.254	.000	-1.79	-.59
		Twitter	.200	.291	.772	-.49	.89
	Twitter	Conference	-1.392*	.301	.000	-2.10	-.68
		LinkedIn	-.200	.291	.772	-.89	.49
Games-Howell	Conference	LinkedIn	1.192*	.236	.000	.63	1.75
		Twitter	1.392*	.304	.000	.66	2.12
	LinkedIn	Conference	-1.192*	.236	.000	-1.75	-.63
		Twitter	.200	.328	.815	-.58	.98
	Twitter	Conference	-1.392*	.304	.000	-2.12	-.66
		LinkedIn	-.200	.328	.815	-.98	.58
Dunnett t (>control)[b]	LinkedIn	Conference	-1.192	.254	1.000	-1.68	
	Twitter	Conference	-1.392	.301	1.000	-1.97	

*. The mean difference is significant at the 0.05 level.
b. Dunnett t-tests treat one group as a control, and compare all other groups against it.

4.3.2 One-sample T-tests

One-sample t-tests were run to determine whether service quality scores for all communication channels were different to neutral, defined as a score of 4. The mean service quality score for conferences (M=5. 4552, SD=1. 01404, n=67) was higher than that for Twitter (M=4. 5750, SD=1. 62335, n=40) and LinkedIn (M=4. 4934, SD=1. 42944, N=76) (Table 23). The mean service quality score for conferences was higher than the neutral score of 4, having a statistically significant mean difference of 1.45522, 95% CI [1.2079 TO 1.7026], t (66) =11. 747, P<0.0005 (Table 24).

The mean service quality score for Twitter (M=4. 5750, SD=1. 62335, N=40) was higher than that for LinkedIn (M=4. 4934, SD=1. 42944, n=76) (Table 23). The mean service quality score for Twitter was higher than the neutral score of 4, being a statistically significant mean difference of 0.57500, 95% CI [0.0558 to 1.0942], t (39) =2. 240, p=0. 031 (Table 24). The mean service quality score for LinkedIn was higher than the neutral score of 4, showing a statistically significant mean difference of 0. 49342, 95% CI [0.1668, 0.8201], t (75) =3. 009, p=0. 004 (Table 24).

Table 23: One-Sample Statistics (Service Quality: Conference versus LinkedIn versus Twitter)

	N	Mean	Std. Deviation	Std. Error Mean
Conference	67	5.4552	1.01404	.12388
LinkedIn	76	4.4934	1.42944	.16397
Twitter	40	4.5750	1.62335	.25667

Table 24: One-Sample Test (Service Quality: Conference versus LinkedIn versus Twitter)

	Test Value = 4					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Conference	11.747	66	.000	1.45522	1.2079	1.7026
LinkedIn	3.009	75	.004	.49342	.1668	.8201
Twitter	2.240	39	.031	.57500	.0558	1.0942

The mean word-of-mouth score for conferences (M=5. 4925, SD=1. 28362, n=67) was higher than that for Twitter (M=4. 7000, SD=1. 82855, n=40) and LinkedIn (M=4. 5263, SD=1. 8056, N=76) (Table 25). The mean word-of-mouth score for conferences was higher than the neutral score of 4, showing a statistically significant mean difference of 1.49254, 95% CI [1.1794 to 1.8056], t (66) =9. 518, P<0.0005 (Table 26).

The mean word-of-mouth score for Twitter (M=4. 7000, SD=1. 82855, n=40) was higher than that for LinkedIn (M=4. 5263, SD=1. 8056, N=76) (Table 25). The mean word-of-mouth score for Twitter was higher than the neutral score of 4, having a statistically significant mean difference of 0.70000, 95% CI [0.1152 to 1.2848], t (39) =2. 421, p=0. 020 (Table 26). The mean word-of-mouth score for LinkedIn was higher than the neutral score of 4, being a statistically significant mean difference of 0. 52632, 95% CI [0.1668 to 0.8201], t (75) =2. 698, p=0. 009 (Table 26).

Table 25: One-Sample Statistics (Word-of-mouth: Conference versus LinkedIn versus Twitter)

	N	Mean	Std. Deviation	Std. Error Mean
Conference	67	5.4925	1.28362	.15682
LinkedIn	76	4.5263	1.70077	.19509
Twitter	40	4.7000	1.82855	.28912

Table 26: One-Sample Test (Word-of-mouth: Conference versus LinkedIn versus Twitter)

	Test Value = 4					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Conference	9.518	66	.000	1.49254	1.1794	1.8056
LinkedIn	2.698	75	.009	.52632	.1377	.9150
Twitter	2.421	39	.020	.70000	.1152	1.2848

One-sample t-tests were run to determine whether engagement scores for all communication channels were different to neutral, defined as a score of 4. The mean engagement score for conferences (M=5. 3657, SD=1. 10981, n=67) was higher than that for Twitter (M=4. 5641, SD=1. 65107, n=39) and LinkedIn (M=4. 3553, SD=1. 33120, N=76) (Table 27). The mean engagement score for conferences was higher than the neutral score of 4, having a statistically significant mean difference of 1.36567, 95% CI [1.0950 to 1.6364], t (66) =10. 072, P<0.0005 (Table 28).

The mean engagement score for Twitter (M=4. 5641, SD=1. 65107, n=39) was higher than that for LinkedIn (M=4. 3553, SD=1. 33120, N=76) (Table 27). The mean engagement score for Twitter was higher than the neutral score of 4, showing a statistically significant mean difference of 0.56410, 95% CI [0.0289 to 1.0993], t (38) =2. 134, p=0. 039 (Table 28). The mean engagement score for LinkedIn was higher than the neutral score of 4, showing a statistically significant mean difference of 0. 35526, 95% CI [0.0511, 0.6595], t (75) =2. 327, p=0. 023 (Table 28).

Table 27: One-Sample Statistics (Audience Engagement: Conference versus LinkedIn versus Twitter)

	N	Mean	Std. Deviation	Std. Error Mean
Conference	67	5.3657	1.10981	.13559
LinkedIn	76	4.3553	1.33120	.15270
Twitter	39	4.5641	1.65107	.26438

Table 28: One-Sample Test (Audience Engagement: Conference versus LinkedIn versus Twitter)

	Test Value = 4					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Conference	10.072	66	.000	1.36567	1.0950	1.6364
LinkedIn	2.327	75	.023	.35526	.0511	.6595
Twitter	2.134	38	.039	.56410	.0289	1.0993

One-sample t-tests were run to determine whether message persuasiveness scores for all communication channels were different to neutral, defined as a score of 4. The mean persuasiveness score for conferences (M=4. 9921, SD=1. 13412, n=63) was higher than that for LinkedIn (M=3. 8000, SD=1. 62539, n=75) and Twitter (M=3. 6000, SD=1. 69917, N=40) (Table 29). The mean persuasiveness score for conferences was higher than the neutral score of 4, having a statistically significant mean difference of 0.99206, 95% CI [0.7064 to 1.2777], t (62) =6. 943, P<0.0005 (Table 30).

The mean persuasiveness score for LinkedIn (M=3. 8000, SD=1. 62539, n=75) was higher than that for Twitter (M=3. 6000, SD=1. 69917, N=40) (Table 29). The mean persuasiveness score for LinkedIn was lower than the neutral score of 4, and the mean difference of -0.20000 was not statistically significant, 95% CI [-0.5740 to 0.1740], t (74) =-1. 066, p=0. 290 (Table 30). The mean persuasiveness score for Twitter was lower than the neutral score of 4, and the mean difference of -0.4000 was not statistically significant, 95% CI [-0.9434, 0.1434], t (39) =-1. 489, p=0. 145 (Table 30).

Table 29: One-Sample Statistics (Message Persuasiveness: Conference versus LinkedIn versus Twitter)

	N	Mean	Std. Deviation	Std. Error Mean
Conference	63	4.9921	1.13412	.14289
LinkedIn	75	3.8000	1.62539	.18768
Twitter	40	3.6000	1.69917	.26866

Table 30: One-Sample Test (Message Persuasiveness: Conference versus LinkedIn versus Twitter)

	Test Value = 4					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Conference	6.943	62	.000	.99206	.7064	1.2777
LinkedIn	-1.066	74	.290	-.20000	-.5740	.1740
Twitter	-1.489	39	.145	-.40000	-.9434	.1434

As a consequence, it is safe to conclude that dissemination through conference is the most effective way to disseminate information about sustainable community plans. Thus, H2a is supported. Although messages on LinkedIn were perceived more persuasive than those on Twitter (Table 29), dissemination through Twitter is a slightly more effective way to disseminate information about sustainable community plans (Table 23; Table 25; Table 27; Table 29). More importantly, no significant differences were found between these two social networking sites (Table 13; Table 16; Table 19; Table 22). Thus, H2b is not supported.

4.4 Drivers to Participate in Social Media (H3)

The reasons for participating in online communities—LinkedIn and Twitter—were examined. Survey respondents were asked to express the extent to which they agree with the following reasons that they browse or participate in either a LinkedIn or Twitter community: 1) to obtain relevant information about sustainable community plans; 2) to learn more about sustainable community plans; 3) to seek advice on sustainable community plans.

4.4.1 To Obtain Information

Based on 77 surveys collected on LinkedIn and 38 surveys on Twitter. On average, respondents were slightly more likely to participate on Twitter to obtain information (M= 4.00, SE=0. 322, n=38), than LinkedIn (M=3. 70, SE=0. 181, n=77) (Table 31). This difference, -0.299, was not significant t=-0.871, p=0. 386 (Table 32).

Table 31: Group Statistics (Driver: To Obtain Information)

	Linkedin or Twitter	N	Mean	Std. Deviation	Std. Error Mean
Driver: obtaining information	LinkedIn	77	3.70	1.590	.181
	Twitter	38	4.00	1.986	.322

Table 32: Independent Samples Test (Driver: To Obtain Information)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Driver: to obtaining information	Equal variances assumed	2.714	.102	-.871	113	.386	-.299	.343	-.978	.381
	Equal variances not assumed			-.808	61.121	.422	-.299	.370	-1.038	.441

4.4.2 To Learn

On average, respondents were slightly more likely to learn by participating on Twitter (M= 3.97, SE=0. 319, n=38), than LinkedIn (M=3. 62, SE=0. 180, n=77) (Table 33). This difference, -0.350, was not significant t=-1.029, p=0. 306 (Table 34).

Table 33: Group Statistics (Driver: To Learn)

	Linkedin or Twitter	N	Mean	Std. Deviation	Std. Error Mean
Driver: to learn	LinkedIn	77	3.62	1.581	.180
	Twitter	38	3.97	1.966	.319

Table 34: Independent Samples Test (Driver: To Learn)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Driver: to learn	Equal variances assumed	1.327	.252	-1.029	113	.306	-.350	.340	-1.025	.324
	Equal variances not assumed			-.956	61.364	.343	-.350	.366	-1.083	.382

4.4.3 To Seek Advice

On average, respondents were slightly more likely to seek advice from Twitter participants (M= 3.37, SE=0. 310, n=38), than LinkedIn ones (M=3. 31, SE=0. 177, n=77) (Table 35). This difference, -0.057, was not significant t=-0.171, p=0. 865 (Table 36).

Table 35: Group Statistics (Driver: To Seek Advice)

	Linkedin or Twitter	N	Mean	Std. Deviation	Std. Error Mean
Driver: To Seek Advice	LinkedIn	77	3.31	1.550	.177
	Twitter	38	3.37	1.909	.310

Table 36: Independent Samples Test (Driver: To Seek Advice)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Driver: To Seek Advice	Equal variances assumed	4.001	.048	-.171	113	.865	-.057	.332	-.715	.601
	Equal variances not assumed			-.159	61.797	.874	-.057	.357	-.769	.656

According to results in Table 32, Table 34 and Table 36, no significant differences were found between participants' responses to these three reasons for engagement in

disseminating information about sustainable community plans. Thus, obtaining information, enhancing knowledge and seeking advice are the shared reasons for audience engagement on either Twitter or LinkedIn. Thus, H3 is supported.

5.0 Discussion

5.1 General Questions

Survey participants in this present study were either directly or indirectly involved in the field of sustainability. According to Table 1, the majority of surveys collected in conferences were completed by municipal staff. The reason for municipal staff's involvement may be that half of the preselected conferences were held by municipalities. Students made up the majority of total respondents, and those students were also part of the young cohort of participants. In addition, it is notable that over half respondents on Twitter were students. In contrast, nearly half respondents on LinkedIn were consultants. Furthermore, a small number of survey participants did not fit the four listed categories—councilor, municipal staff, consultant and student. This result occurred for several reasons. First, survey participants may not have been certain about their roles. Second, respondents may have more than one role. Moreover, it is apparent that a proportion of participants were from the private sector. Overall, participants in this present study covered all three sectors—public, private and voluntary.

Social networking sites enable community members to create personal profiles and share information with others in the same online community (Boyd & Ellison, 2007). Based on Table 2, as high as 65% of survey participants were less than 44 year-old, among whom the age cohort between 25 and 34 year-old made up one quarter of the total respondents. Although the majority of respondents were relatively young, the age cohort of over 55 year-old accounted for 18% of all participants. The distribution of age

cohorts suggested that the younger people seemed to participate more in online events. In addition, social site users covered all six age groups, indicating the wide range of ages among online users.

The highest level of education completed by online respondents was examined. Participants in the online survey primarily held high levels of educational background. As indicated by Table 3, nearly half these respondents had completed a Master's degree (42%), and 13% possessed a Ph.D. degree. Overall, almost 90% of online survey participants had completed at least a Bachelor's degree. This result is not surprising because most survey participants were probably connections of Dr. Clarke and sustainability practitioners are usually highly educated.

The level of participant interest in the conference was also explored in this present study. Overall, offline respondents were moderately interested or very interested in sustainable community plans disseminated at the conference. Two more survey questions were asked related to the specific two topics covered at the conference: implementing sustainable community plans within local governments (referred to as implementation) and partnerships, collaboration structures and key features (referred to as partnerships). By comparing the participant interest in these two topics, overall, the majority of offline participants considered these topics were moderately interesting or very interesting. Moreover, respondents seemed to be more interested in implementation than partnerships, even though partnerships and implementation are closely related.

5.2 Attitudes toward Information Dissemination

Traditionally, information was disseminated and shared through face-to-face communication, and a typical example is the conference (Huang, 2010). Owing to the rapid development of technologies, emerging ways of advertising and disseminating involve TV and the Internet (Huang, 2010; Andreassen & Streukens, 2009). Online communication channels, for example, social media, are becoming increasingly popular platforms for communicating sustainability information (Robelia, Greenhow & Burton, 2011; Bik & Goldstein, 2013). More importantly, audience attitudes toward disseminated information are influencing subsequent awareness and behaviors (Hungerford, 1996). Researchers' understanding of audience attitudes benefits the selection of dissemination strategies (Swani et al., 2014; Kaplan & Haenlein, 2010). As a result, audience attitudes toward the three channels were first discussed.

5.2.1 Conference versus Social Media (LinkedIn and Twitter) (H1a)

The same information about implementing sustainable community plans was disseminated online and offline. Overall, participants have positive attitudes toward communication in all three channels, and participants have more-positive attitudes toward communication through conference than through social media, which agrees with H1a. In addition, results in this present study also suggest that offline participants have highly positive attitudes towards disseminating information about sustainable community plans in conferences. The overall results seemed to indicate that offline communication was superior to online communication. In general, participants favor conferences more than these two social networking sites; in other words, audiences

tend to have more-positive attitude toward face-to-face than online communication. The above finding may owe to the fact that participants prefer knowledge brokers with physical appearance (Gagnon, 2011). Moreover, the result is consistent with one study by Curran and Lennon (2011), which indicates that person-to-person communication brings more gratification to participants as opposed to communication through social networking sites.

5.2.2 LinkedIn versus Twitter (H1b)

In terms of disseminating the same information about implementing sustainable community plans on LinkedIn and Twitter, the results suggested that online participants had slightly more-positive attitudes toward communication through LinkedIn than Twitter. In addition, participants on LinkedIn have strongly positive attitudes toward disseminating information about sustainable community plans; whereas, participants on Twitter have neutral positive attitudes towards disseminating the same information. Thus, H1b was not supported.

Because participants were unknown about the identities of online users, they may either agree or disagree with opinions displayed on these sites with reservations. One previous study by Curran and Lennon (2011) also looked at influential factors of audience attitudes toward social networking sites. Five factors influenced audience attitudes toward social networking sites: 1) ease of use; 2) usefulness; 3) enjoyment; 4) social influence; and 5) drama (Curran & Lennon, 2011). Additionally, enjoyment was found to be the most significant factor driving word-of-mouth, positive attitudes and participation in social networking sites. Given the wide range of influencing factors of

audiences' attitudes toward social networking sites, the differences between audience attitudes toward communication on Twitter and LinkedIn are worthwhile to be explored in future studies. Even though not all factors were examined in this present study, the following section explains the service quality of each channel in details.

5.3 Effectiveness in Disseminating Information

Presenters at conferences play the role of knowledge brokers, connecting academic researchers and external audiences (Gagnon, 2011). On one hand, researchers make efforts to push knowledge to their targeted audiences; on the other hand, audience attempt to gather knowledge to fit their needs and purposes (Gagnon, 2011). The existing communication channels facilitate the process of knowledge dissemination (Gagnon, 2011).

Measurement of channel effectiveness is influenced by predetermined marketing goals (Castronovo & Huang, 2012; Kingston, 2012). Specifically, audience engagement is an indicator of the effectiveness in online channels (Newell & Dale, 2015). Moreover, characteristics of messages, such as the information providers and message themselves, influence dissemination effectiveness (Gagnon, 2011; Sá, Li & Faubert, 2011). Thus, this paper includes message persuasiveness as an indicator for dissemination effectiveness. In addition, the quality of online services and word-of-mouth are also influential factors of the effectiveness of knowledge dissemination (Liaw et al., 2008; Keller & Fay, 2012). This paper investigated the dissemination effectiveness using four indicators concluded from the literature: service quality, word-of-mouth, audience engagement, and message persuasiveness.

5.3.1 Conference versus LinkedIn versus Twitter (H2a)

Conference and social media are platforms for deliberation that facilitate communication and nurture ideas and opinions (Min, 2007). Social media channels differ in features but are suitable for knowledge dissemination (Murphy & Salomone, 2013).

First, all three channels were compared in pairs. Conferences seemed to provide better service quality for communication than both LinkedIn and Twitter. Additionally, offline participants perceived that conferences provided high-level quality of services. Similarly, compared to users of the two social networking sites, participants at conferences are more likely to recommend and share the information about implementing sustainable community. In general, offline participants strongly agree that they will spread the information to others. This result is consistent with Leach et al.'s study (2008), suggesting that conference participants tend to share information with others via word-of-mouth.

Participants at conferences were more engaged with information about implementing sustainable community plans than those on LinkedIn and Twitter. Additionally, offline participants suggest that they are highly engaged in information about sustainable community plans. Lastly, information disseminated at conferences was viewed as more persuasive than that on LinkedIn and Twitter, and messages delivered in conferences are viewed as strongly persuasive. As a result, it is safe to draw the conclusion that dissemination through conferences, as opposed to Twitter and LinkedIn, is the most effective way to share information about implementing sustainable

community plans, a finding consistent with H2a. However, the above findings in this present study contradict the study by Min (2007), which highlighted that online communication with formal settings is as effective as a person-to-person communication in terms of audience engagement. Although the scale of communication is expanded in social networking sites by involving strangers in conversation, the weakened bonds of relationship may lower the persuasiveness of messages. Furthermore, given the costs of knowledge dissemination in various channels, the previously mentioned study by Castronovo and Huang (2012) indicated online channels such as social networking sites are particularly cost-effective in communicating information.

5.3.2 LinkedIn versus Twitter (H2b)

In contrast to traditional word-of-mouth, electronic word-of-mouth has emerged and is expanding the scale of audiences (Huang, 2010; Castronovo & Huang, 2012). Positive and negative word-of-mouth influences audience response to disseminated information (Sweeney, Soutar & Mazzarol, 2008; Huang & Barlas, 2009). Specifically, positive word-of-mouth encourages audience response (Sweeney, Soutar & Mazzarol, 2008). Based on the results in this present study, no major differences in the effectiveness of sharing information exist on LinkedIn and Twitter.

Specifically, only a slight difference exists between Twitter and LinkedIn in terms of site service quality, audiences' willingness to share, audience engagement and message persuasiveness. LinkedIn and Twitter basically provide the same service quality; their members are equally willing to share the disseminated information through word-

of-mouth, and the extent of audience engagement and message persuasiveness is essentially the same.

In general, both social networking sites provide high quality of services. According to results in this present study, Twitter provided a slightly better service than LinkedIn did. Additionally, chances are high that online participants will introduce the disseminated information on both social networking sites through word-of-mouth. Online participants view themselves highly engaged in the disseminated information and those on Twitter seemed to be slightly more engaged in disseminated information than those on LinkedIn. It is notable that the overall message disseminated on both the social networking sites was viewed as not persuasive. In terms of message persuasiveness, online participants have a neutral perception of disseminated information.

Although a large number of researches have done to investigate users' experience with social networking sites (Lee, 2011; Boyd & Ellison, 2007), very few studies compared Twitter and LinkedIn. According to results in this paper, no significant differences in effectiveness were found between Twitter and LinkedIn. Thus, H2b was not supported. Furthermore, it seems that message on both social networking sites are not persuasive, even though the messages on LinkedIn was slightly persuasive than those on Twitter. Thus, it may not be possible for subsequent word-of-mouth if audiences view messages as not convincing enough. The above findings may attribute to the huge amount of information online, and participants could not tell the reliability of information sources (Garvey, 2009).

5.4 Drivers of Participating in Social Media (H3)

Based on results in the previous chapter, obtaining information, enhancing knowledge, and seeking advice are shared reasons for online participants' engagement in Twitter and LinkedIn. Thus, H3 was supported. However, according to participants' agreement to listed reasons, these site users seemed to engage with social networking sites for other reasons. Previous studies have identified a wide range of reasons for social networking sites' engagement, including wiliness to learn from other members (Dessart, Veloutsou & Morgan-Thomas, 2015) and desire to social networking (Wirtz et al., 2013; Dunne, Lawlor & Rowley, 2010). Seeking information is also considered as the entry level of participation (Smith & Gallicano, 2015; Lawlor & Rowley, 2010). Thus, more efforts are needed in future studies to investigate the drivers of audience engagement in social networking sites.

6.0 Conclusions

This project has assessed how sustainability practitioners obtain the latest research findings in their field. The entire process of testing knowledge dissemination occurred over a period of seven months, starting in February 2015 and ending in August 2015. The same information was disseminated, and channels were designed in the same way. The information disseminated was Dr. Clarke's research findings from the last five years, especially research on the implementation of collaborative sustainable community plans, partnerships in local sustainable development, as well as 16 topics included in sustainable community plans. Surveys were designed for and distributed on each channel to target users and determine their preferred sources of information.

This present study is pilot research for examining both online and offline dissemination channels. Specifically, it was undertaken to investigate sustainability practitioners' attitudes toward each knowledge-dissemination channel, to evaluate the channel effectiveness in disseminating information about implementing sustainable community plans, and to explore the drivers of audience engagement in two preselected social networking sites. Important conclusions drawn from this present study include that: 1) Respondents held more-positive attitudes toward disseminating information about implementing sustainable community plans through conferences than social networking sites; 2) Conferences are the most effective in disseminating information about implementing sustainable community plans; 3) Respondents' engagement in Twitter and LinkedIn is equally driven by obtaining information, enhancing knowledge, and seeking advice about implementing sustainable community

plans. Overall, disseminating knowledge through conferences is the best option among these three channels. In general, communication at conferences is more effective than on social networking sites in terms of delivering service quality, promoting word-of-mouth, improving audience engagement and enhancing message persuasiveness. In practice, knowledge dissemination can adopt mixed channels as a way to meet dissemination goals. For example, the knowledge can be disseminated via conferences, Twitter and LinkedIn all together.

This study encountered some challenges of reaching target audiences on Twitter in the first place. In order to keep the number of following and follower balanced, the number of following target audiences was strictly controlled during the data collection phase. Additionally, efforts were made to search for target audiences on Twitter by investigating practitioners' profiles. Analysis of the computed results regarding knowledge dissemination in social networking sites also shows the following: 1) Responses to these two social networking sites—Twitter and LinkedIn—were quite similar; 2) In general, although respondents have slightly more positive attitudes towards LinkedIn than Twitter, Twitter performs slightly better than LinkedIn in terms of dissemination effectiveness. Implications of the results, limitations and future research directions and presented in the following sections.

6.1 Theoretical Implications

The findings of this present study enhance the understanding of knowledge dissemination in the field of sustainability. Previous studies concentrated on knowledge dissemination in the science discipline; whereas this current study expands the research

domain to social science. The evidence from this study adds to a growing body of literature on knowledge management, and knowledge dissemination theory and other relevant theories, comparing both offline (conferences) and online (social networking sites) communication channels. Although online communication channels expand the scale of audience, offline channels have undeniable advantages in terms of better service quality, audience engagement, and message persuasiveness. Moreover, although previous studies have examined knowledge dissemination through online platforms such as blogs or newsletter, this study has gone some way towards enhancing the understanding of utilizing social networking sites to disseminate information about sustainable community plans.

6.2 Practical Implications

Based on preselected aspects of knowledge dissemination, conferences perform better than social networking sites overall in disseminating information about implementing sustainable community plans. However, when it comes to knowledge dissemination, it is undeniable that conferences and social networking sites have unique features and functions. Because conferences come with specific themes, it is recommended that researchers choose conferences if they wish to target a specific audience. It is also shown that word-of-mouth is more likely to occur if knowledge is disseminated at conferences as opposed to on social networking sites. Additionally, follow-up contact is an effective way to promote positive word-of-mouth (East, Hammond & Wright, 2007). In terms of disseminating the same information, these findings suggest that external audiences are more engaged and messages are more

persuasive if information is disseminated at a conference rather than through social networking sites. Thus, one of the most significant findings to emerge from this study is that disseminating findings through conferences is the better option for researchers. It is notable that it is difficult for researchers to be a speaker at practitioner conferences. In this case, researchers must have a lot of connections and earn a good reputation. In contrast, knowledge dissemination through social networking sites is recommended for sharing information if researchers have well-maintained official accounts and sufficient social connections. Additionally, knowledge dissemination through social networking sites potentially is a way to reach the greatest audiences. Moreover, knowledge dissemination through social networking sites is cost-effective (Castronovo & Huang, 2012). In this present study, obtaining accounts on Twitter and LinkedIn were free of charge, although these two sites provide options of paid service for promoting users' posts as well.

6.3 Limitations and Directions for Future Studies

The sample size for Twitter was smaller than that for conferences and LinkedIn. Posts on social media tend to have the most attraction right after their initial release (Newell & Dale, 2015). The tweet with the invitation to participate in the survey for Twitter was promoted for one month by retweeting; that survey was closed when the number of completed surveys remained stable for three days. The vary sample sizes for LinkedIn and Twitter may be attributed to the fact that online surveys were distributed through Dr. Clarke's accounts, which had different numbers of connections (followers). Dr. Clarke had more than 1000 connections on LinkedIn but only around 200 followers

on Twitter during the survey distribution period. In addition, previous studies have concluded a wider range of factors influencing effective knowledge dissemination than this current study. For example, the appeals of messages and styles of networking sites were not considered. The applied criteria of assessing effectiveness in this present study referred to previous studies in the areas of word-of-mouth, knowledge dissemination and information diffusion. Although indicators of channel effectiveness in this current research referred to numerous prior studies, considerably more research is needed to better understand channels' effectiveness in knowledge dissemination. This present study has used quantitative methods, and research findings indicate that future research should therefore concentrate on investigating drivers of audience engagement using qualitative methodology; for instance, semi-structured interviews could be adopted to examine drivers of audience engagement.

Furthermore, this study relied on mean scores to analyze, which can be problematic. Survey questions are based on a 7-point Likert scale; however, mean scores generated by SPSS were not all integral numbers. For example, in terms of respondents' interests towards specific topics, the mean score of 5.6 cannot fall into the category of moderately interesting (5) nor very interesting (6). Moreover, this study only introduced the distributions of participants' educational levels and ages among all channels. The results did not address the impact of ages and educational levels on responses because no significant influences were found (Appendix 6). However, both message persuasiveness and engagement driver depend on respondents' roles (Appendix 6, Table 43, Table 44, Table 55, Table 56). As a consequence, it is suggested

that future studies further explore the correlations between respondents' roles and dissemination effectiveness, as well as the relationship between respondents' roles and engagement drivers. Additionally, this data source was solely from the survey; as a result, this study was based on subjective data. Thus, it is suggested that future studies incorporate objective data sources, such as the number of retweets on Twitter.

This study has led to some questions in need of further investigation. For one, Twitter and LinkedIn perform very similarly in terms of disseminating knowledge in the field of sustainability. Further work needs to be done to incorporate other popular social networking sites such as Facebook, as a way to compare and contrast individual social networking sites. In addition, online community channels cover a wide range of platforms such as blogs and e-newsletters; thus, more types of online channels would help to establish a greater degree of accuracy on this matter. This present study explored drivers of audience engagement in social networking sites, but it did not examine the reasons for engagement at conferences (the offline dissemination channel). More broadly, previous studies regarding knowledge management or dissemination were mostly in the traditional science discipline. Thus, more research is needed to determine the best option for sharing knowledge in other fields, such as the social science.

This study distinct online and offline channels in knowledge dissemination; however, future studies can investigate the mixed usage of communication channels, such as using social media in conferences. Furthermore, this study could look closer at previous literature on marketing and knowledge dissemination, better addressing the

connections between product promotion and knowledge dissemination. Lastly, it is recommended that future studies highlight the differences between awareness and behaviors because an increased awareness cannot ensure a certain behavior.

References

Adetunji, R., Nordin, S., & Noor, S. (2014). The effectiveness of integrated advertisement message strategy in developing audience-based brand equity. *Global Business and Management Research, 6*(4), 308-318.

Algesheimer, R., Dholakia, U.M. & Herrmann, A. (2005). The social influence of brand community: Evidence from European car clubs, *Journal of Marketing*, *69*(3), 19-34.

Andreassen, T.W., & Streukens, S. (2009). Service innovation and electronic word-of-mouth: Is it worth listening to? *Managing Service Quality, 19*(3), 249-265.

Anghelcev, G. (2015). Unintended effects of incentivizing consumers to recommend a favorite brand. *Journal of Marketing Communications, 21*(3), 210-223.

Antheunis, M. L., Tates, K., & Nieboer, T. E. (2013). Patients' and health professionals' use of social media in health care: Motives, barriers and expectations. *Patient Education and Counseling, 92*(3), 426-431. doi:10.1016/j.pec.2013.06.020

Arndt, J. (1967). *Perceived risk, sociometric integration, and word-of-mouth in the adoption of a new food product*. Boston, MA: Harvard University Press.

Backer, T. E. (1991). Knowledge utilization: The third wave. *Knowledge, 12*(3), 225-240.

Barlas, S., & Huang, L. (2009). What do people talk about in word-of-mouth communications? *Advances in Consumer Research, 36*, 763-764.

Bik, H., & Goldstein, M. (2013). An Introduction to Social Media for Scientists. PLoS Biol 11(4).

Blair, Kuse, Furse, & Stewart. (1987). Advertising in a new competitive environment: persuading customers to buy. *Business Horizons, 30*(6), 20-26.

Boyd, D., & Ellison, N. (2007). Social Network Sites: Definition, History, and Scholarship. *Journal of Computer-Mediated Communication, 13*(1), 210-230.

Briet, J., Hageman, P., Blok, M., & Ring, G. (2014). When do patients with hand illness seek online health consultations and what do they ask? *Clinical Orthopaedics and Related Research, 472*(4), 1246-1250.

Brodie, J.R., Hollebeek, L., Juric, B. & Ilic, A. (2011). Consumer engagement: conceptual domain, fundamental propositions and implications for research. *Journal of Service Research, 14*(3), pp. 252-271.

Brundtland, G. H. (1987). *Our Common Future – Report of the World Commission on Environment and Development*.New York: United Nations Publication.

Calder, B., Edward C., & Ute, S. (2009). An experimental study of the relationship between online engagement and advertising effectiveness. *Journal of Interactive Marketing, 23*(4), 321-331.

Castronovo, C., & Huang, L. (2012). Social media in an alternative marketing communication model. *Journal of Marketing Development and Competitiveness, 6*(1), 117-131.

Catalin, N. (2014). Tourism and sustainable development. implications at local community level. *Acta Universitatis Danubius : Oeconomica, 10*(5), 99-112.

Chu, S., & Kim, Y. (2011). Determinants of consumer engagement in electronic word-of-mouth (eWOM) in social networking sites. *International Journal of Advertising, 30*(1), 47-75.

CIHR. (2014). About knowledge translation & commercialization. Retrieved February 28, 2015, from http://www.cihr-irsc.gc.ca/e/29418.html

Clarke, A. (2011). Key structural features for collaborative strategy implementation: a study of sustainable development/local agenda 21 collaborations. *Revue Management et Avenir,* 2*50*(10), 153-171.

Clarke, A. (2012). *Passing Go: Moving Beyond the Plan.* Ottawa: Federation of Canadian Municipalities.

Clarke, A. (2014). Designing social partnerships for local sustainability strategy implementation.

Seitanidi, M. & Crane, A. (Eds.) *Social Partnerships and Responsible Business: A Research Handbook*. London, UK: Routledge (Taylor and Francis).

Clarke, A. & Fuller, M. (2011). Collaborative strategic management: strategy formulation and implementation by multi-organizational cross-sector social partnerships. *Journal of Business Ethics, 94*(Supplement 1), 85-101.

Clarke, A., Huang, L., Roseland, M., & Chen, H. (2014). Do collaborative planning processes lead to better outcomes? An examination of cross-sector social partnerships for community sustainability. Administrative Science Association of Canada conference paper and presentation.

Clarke, A., & MacDonald, A. (2012). *An extended resource-based view on partner outcomes from large cross-sector social partnerships*. Manuscript in preparation, University of Waterloo, Waterloo, Canada.

Coiera, E. (2013). Social networks, social media, and social diseases. *British Medical Journal, 346*(7912), 22.

Curran, J. M., & Lennon, R. (2011). Participating in the conversation: Exploring usage of social media networking sites. *Academy of Marketing Studies Journal, 15*(1 SI), 21-38.

Dell, C., & Grayson, C. (1998). *If only we knew what we know: The transfer of internal knowledge and best practice*. New York: Free Press.

Dessart, L., Veloutsou, C., & Morgan-Thomas, A. (2015). Consumer engagement in online brand communities: A social media perspective. *Journal of Product and Brand Management, 24*(1), 28-42.

Dunne, Á., Lawlor, M., & Rowley, J. (2010). Young people's use of online social networking sites - a uses and gratifications perspective. *Journal of Research in Interactive Marketing, 4*(1), 46-58. doi:http://dx.doi.org/10.1108/17505931011033551

Doppelt, B. (2008). *The Power of Sustainable Thinking : How to Create a Positive Future for the Climate, the Planet, Your Organization and Your Life*. London ; Sterling, VA: Earthscan.

Dye, R. (2000). The buzz on buzz. *Harvard Business Review,* 139-146.

East, R., Hammond, K., & Wright, M. (2007). The relative incidence of positive and

negative word-of-mouth: A multi-category study. *International Journal of Research in Marketing, 24*, 175-184.

EBizMBA Inc. (n.d.). Top 15 Most Popular Social Networking Sites | May 2015. Retrieved May 14, 2015, from http://www.ebizmba.com/articles/social-networking-websites

Epstein, M. J., & Buhovac, A.R. (2014). *Making Sustainability Work : Best Practices in Managing and Measuring Corporate Social, Environmental, and Economic Impacts*. San Francisco: Berrett-Koehler.

Estabrooks, C. A., Thompson, D. S., Lovely, J. J., & Hofmeyer, A. (2006). A guide to knowledge translation theory. *Journal of Continuing Education in the Health Professions, 26*(1), 25-36.

Falk, J. H., Storksdieck, M., & Dierking, L. D. (2007). Investigating public science interest and understanding: Evidence for the importance of free-choice learning. *Public Understanding of Science, 16*(4), 455-469.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). London: Sage.

Fong, J., & Burton, S. (2006). Online word-of-mouth: A comparison of American and Chinese discussion boards. *Asia Pacific Journal of Marketing and Logistics, 18*(2), 146-156.

Gagnon, M. L. (2011). Moving knowledge to action through dissemination and exchange. *Journal of Clinical Epidemiology,64*(1), 25-31.

Gainforth, H. L., Latimer-Cheung, A., Athanasopoulos, P., & Martin Ginis, K.,A. (2015). Examining the feasibility and effectiveness of a community-based organization implementing an event-based knowledge mobilization initiative to promote physical activity guidelines for people with spinal cord injury among support personnel. *Health Promotion Practice,16*(1), 55-62.

Garvey, J. (2009). Too much information: Meditating on distraction. *Commonweal, 136*(10), 7.

Gershoff, A., Broniarczyk, S., & West, P. (2001). Recommendation or evaluation? task sensitivity in information source selection. *Journal of Consumer Research, 28*(3), 418-438.

Godes, D., & Mayzlin, D. (2004). Using online conversations to study word-of-mouth communication. *Marketing Science, 23*(4), 545-560.

Golbeck, J., Grimes, J., & Rogers, A. (2010). Twitter use by the U.S. Congress. *Journal of the American Society for Information Science and Technology*, 61, 1612-1621.

Gunawardena, C.N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications, 1*(2), 147-166.

Gunawardena, C., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education, 11*(3), 8-26.

Heimlich, J. E., & Ardoin, N. M. (2008). *Understanding behavior to understand behavior change: A literature review* Routledge. , 325 Chestnut Street Suite 800, Philadelphia, PA 19106.

Hennig-Thurau, T., Gwinner, K., Walsh, G., & Gremler, D. (2004). Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the internet? *Journal of Interactive Marketing, 18*(1), 38-52.

Hennig-Thurau, T., & Walsh, G. (2003). Electronic word-of-mouth: Motives for and consequences of reading customer articulations on the internet. *International Journal of Electronic Commerce, 8*(2), 51-74.

Hirschman, E. (1980). Innovativeness, novelty seeking, and consumer creativity. *Journal of Consumer Research, 7*, 283-295.

Huang, L. (2010). Social contagion effects in experiential information exchange on bulletin board systems. *Journal of Marketing Management, 26*(3), 197-212.

Huang, L., & Barlas, S. (2009). When will people tell you something you do not know?*Advances in Consumer Research, 36*, 761-762.

Hungerford, H. R. (1996). *The development of responsible environmental citizenship: A critical challenge, 1*(1), 25-37.

ICLEI. (n.d.). The ICLEI World Congress 2015. Retrieved May 25, 2015, from http://www.iclei.org/our-activities/events/iclei-world-congress.html

Jacobson, N., Butterill, D., & Goering, P. (2004). Organizational factors that influence university-based researchers' engagement in knowledge transfer activities. *Science Communication*, 25(3), 246–259.

Kaplan, A., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, 59-68.

Keller, E., & Fay, B. (2012). Word-of-mouth advocacy: A new key to advertising effectiveness. *Journal of Advertising Research, 52*(4), 1-7.

Kietzmann, J. H., Hermkens, K., McCarthy, I. P., & Silvestre, B. S. (2011). Social media? get serious! understanding the functional building blocks of social media. *Business Horizons*, 54(3), 241–251.

Kimmel, A. (2015). Connecting with consumers via live buzz marketing: Public perceptions and the role of ethical ideology. *Business Ethics: A European Review*, 24(2), 205-220.

Kingston, J. (2012). Choosing a knowledge dissemination approach. *Knowledge and Process Management, 19*(3), 160.

Kozinets, R. (2002). The field behind the screen: Using netnography for marketing research in online communities. *Journal of Marketing Research*, 39, 61-72.

Leach, M. P., Liu, A. H., & Winsor, R. D. (2008). The impact of attitudes, word-of-mouth, and value congruence on conference participation: A comparison of attending and non-attending organizational members. *Journal of Hospitality & Leisure Marketing,*16, 249-269.

Lee, S. (2011). To tweet or not to tweet: an exploratory study of meeting professionals' attitudes toward applying social media for meeting sessions. *Journal of Convention and Event Tourism, 12*(4), 271-289.

Leung, X. Y., Bai, B., & Stahura, K. A. (2015). The marketing effectiveness of social media in the hotel industry: A comparison of facebook and twitter. *Journal of Hospitality & Tourism Research, 39*(2), 147.

Levin, B. (2008). *Thinking about knowledge mobilization*. Paper presented at the Symposium of the Canadian Council on Learning and the Social Sciences and Humanities Research Council of Canada. 15–18.

Liaw, Shu-Sheng, Chen, Gwo-Dong, & Huang, Hsiu-Mei. (2008). Users' attitudes toward Web-based collaborative learning systems for knowledge management. *Computers & Education, 50*(3), 950-961.

Manning, K., Bearden, W., & Madden, T. (1995). Consumer innovativeness and the adoption process. *Journal of Consumer Psychology, 4*(4), 329-345.

McLuhan, M. (1964). *Understanding Media: The Extensions of Man*. New York: NY: McGraw Hill

Midgley, D., & Dowling, G. (1978). Innovativeness: The concept and its measurement. *Journal of Consumer Research, 4*, 229-242.

Milton, N. (2010). *Lessons Learnt Handbook: Practical Approaches to Learning from Experience*. Chandos Publishing: Oxford.

Min, S. (2007). Online vs. face-to-face deliberation: Effects on civic engagement. *Journal of Computer-Mediated Communication, 12*, 1369-1387.

Murphy, G., & Salomone, S. (2013). Using social media to facilitate knowledge transfer in complex engineering environments: A primer for educators. *European Journal of Engineering Education, 38*(1), 70-84.

Newell, R., & Dale, A. (2015). Meeting the climate change challenge (mc^3): The role of the internet in climate change research dissemination and knowledge mobilization. *Environmental Communication*. 9(2), 208-227.

Newman, L., & Dale, A. (2005). The role of agency in sustainable local community development. *Local Environment, 10*(5), 477-486.

Paek, H.J., Hove, T., Jung, Y., & Cole, R. T. (2013). Engagement across three social media platforms: An exploratory study of a cause-related PR campaign. *Public Relations Review, 39*, 526–533.

Robelia, B. A., Greenhow, C., & Burton, L. (2011). Environmental learning in online social networks: Adopting environmentally responsible behaviors. *Environmental Education Research, 17*(4), 553-575.

Roberge, J. (2014). Using data from online social networks in conservation science: Which species engage people the most on twitter? *Biodiversity and Conservation, 23*(3), 715-726. doi:http://dx.doi.org/10.1007/s10531-014-0629-2

Royo, S., Yetano, A., & Acerete, B. (2014). E-participation and environmental protection: Are local governments really committed? *Public Administration Review, 74*(1), 87-98.

Ryerson University. (n.d.). Institute for the study of corporate social responsibility. Retrieved May 25, 2015, from http://www.ryerson.ca/csrinstitute/key_dates/index.html

Sá, C.,M., Li, S. X., & Faubert, B. (2011). Faculties of education and institutional strategies for knowledge mobilization: An exploratory study. *Higher Education, 61*(5), 501-512.

Serbanica, C. (2011). Knowledge circulation between universities, public research organizations and business in the EU 27. Drivers, barriers, actions to be put forward. *European Journal of Interdisciplinary Studies*. 3(2), 43-54

Shaikh, B. (2014). Does prior experience reduces the effect of word-of-mouth communication? an empirical analysis. *The International Journal of Business & Management, 2*(3), 6-11.

Smith, B. G., & Gallicano, T. D. (2015). Terms of engagement: Analyzing public engagement with organizations through social media. *Computers in Human Behavior, 53*, 82-90.

Straus, S. E., Tetroe, J. M., & Graham, I. D. (2011). Knowledge translation is the use of knowledge in health care decision making. *Journal of Clinical Epidemiology, 64*(1), 6-10.

Swani, K., Brown, B. P., & Milne, G. R. (2014). Should tweets differ for B2B and B2C? an analysis of fortune 500 companies' twitter communications. *Industrial Marketing Management, 43*(5), 873-881.

Sweeney, J. C., Soutar, G. N., & Mazzarol, T. (2008). Factors influencing word of mouth effectiveness: Receiver perspectives.*European Journal of Marketing, 42*(3), 344-364.

Trochim, W. (2006). Descriptive statistics. Retrieved December 1, 2015, from http://www.socialresearchmethods.net/kb/statdesc.php

Twitter. (n.d.). What is Twitter? Retrieved May 12, 2015, from https://business.twitter.com/en-gb/basics/learn-twitter?location=na Van

Maanen, J. & Barley, S., 1984. Occupational communities: Culture and control in organizations. *Research in Organisational Behavior*, 6, 287–365.

Wenger, E., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston, Mass.: Harvard Business School Press.

Wirtz, J., den Ambtman, A., Bloemer, J., Horváth, C., Ramaseshan, B., Van De Klundert, J., Gurhan Canli, Z. & Kandampully, J. (2013). Managing brands and consumer engagement in online brand communities", *Journal of Service Management*, *24*(3), pp. 223-244.

World Commission on Environment and Development. (1987). *Our Common Future - Brundtland Report*. Oxford University Press.

Zubiaga, A., Spina, D., Martinez, R., & Fresno, V. (2015). Real-time classification of twitter trends. *Journal of the Association for Information Science and Technology, 66*(3), 462-473. doi:http://dx.doi.org/10.1002/asi.23186

Appendix

Appendix 1: Offline Survey (Survey A)

Introductory and Consent Page

Dear conference attendee:

We are Masters students in the Faculty of Environment at the University of Waterloo. We are currently conducting research under the supervision of Professor Amelia Clarke. The objective of this research project is to assess the effectiveness of disseminating research on sustainable communities to professionals in the field.

This survey is part of a larger study that will be used for Dr Clarke's purposes, as well as for the MES and MAES degrees of the two student investigators, respectively. This survey will provide us with feedback on how the training session went, what approaches worked best, and will allow us to follow-up (should you wish to add your contact details). Because you are a participant of the training session, your opinions are important to this study.

We would appreciate it if you completed the attached survey. Completion of the survey is expected to take about five minutes of your time. The questions are quite general (for example, which topics did you find interesting?). You may omit any questions you prefer not to answer. There are no known or anticipated risks to participating in this study. Participation in this survey is voluntary and confidential. Further, all information you provide will be considered confidential. The data collected through this study will be kept for a period of 10 years in a locked office at the University of Waterloo.

If you are interested in participating in this study, consent to participate is implied by returning the survey to the researchers. If after receiving this letter, you have any questions about this study, or would like additional information to assist you in reaching a decision about participation, please feel free to contact Professor Amelia Clarke (amelia.clarke@uwaterloo.ca), Natalie Heldsinger (nheldsin@uwaterloo.ca) or Wen Tian (wtian@uwaterloo.ca) or our project website (uwaterloo.ca/seed/LA21).

I would like to assure you that this study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. However, the final decision about participation is yours. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Maureen Nummelin in the Office of Research Ethics at 1-519-888-4567, Ext. 36005 or maureen.nummelin@uwaterloo.ca.

Thank you in advance for your interest in this project.

Yours sincerely,
Natalie Heldsinger & Wen Tian

Survey A (Conference)

1. What is your current role?

☐ Councilor ☐ Municipal staff ☐ Consultant ☐ Other (Please specify) _____

Please respond to the following question using this scale:

Not at all interesting	Slightly interesting	Somewhat interesting	Neutral	Moderately interesting	Very interesting	Extremely interesting
1	2	3	4	5	6	7

What topics did you find interesting?	1	2	3	4	5	6	7
2. Overview of sustainable community plans	☐	☐	☐	☐	☐	☐	☐
3. Implementing sustainable community plans within local governments	☐	☐	☐	☐	☐	☐	☐
4. Market-based instruments	☐	☐	☐	☐	☐	☐	☐
5. Partnership/collaboration structures and key features	☐	☐	☐	☐	☐	☐	☐
6. Leading the change	☐	☐	☐	☐	☐	☐	☐

Please respond to the following questions using this scale:

Not at all	Slightly	Somewhat	Neutral	Moderately	Very much	Extremely
1	2	3	4	5	6	7

General feedback on the session:	1	2	3	4	5	6	7
7. The overall message of the session was important for me	☐	☐	☐	☐	☐	☐	☐
8. The information delivered in the session is memorable	☐	☐	☐	☐	☐	☐	☐
9. This session provided relevant information	☐	☐	☐	☐	☐	☐	☐
10. This session was a valuable source of information about implementing community sustainability plans	☐	☐	☐	☐	☐	☐	☐
11. How motivated were you to complete this session	☐	☐	☐	☐	☐	☐	☐
12. I learnt something from this training session that I did not know before about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
13. This session reminded me of some important information about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
14. This session influenced my opinion about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
15. I would recommend this session to others	☐	☐	☐	☐	☐	☐	☐
16. These trainings are an effective way to find information about implementing community sustainability plans	☐	☐	☐	☐	☐	☐	☐
17. How likely are you to show the content from this session to someone else	☐	☐	☐	☐	☐	☐	☐
18. The information from this session will affect the implementation of my work on community sustainability plans	☐	☐	☐	☐	☐	☐	☐

19. What are three key messages you retained from this session?

20. What information from the session do you think you will use?

21. Is there anything in particular that you will share with colleagues / stakeholders?

22. Do you have any other comments?

Thank you for participating in this survey! We really appreciate it!

Appendix 2: Online Survey (Survey B)

Introductory and Consent Page

Dear survey participants:

We are Masters students in the Faculty of Environment at the University of Waterloo. We are currently conducting research under the supervision of Professor Amelia Clarke. The objective of this research project is to assess the effectiveness of disseminating research on sustainable communities to professionals in the field.

This survey is part of a larger study that will be used for Dr Clarke's purposes, as well as for the MES and MAES degrees of the two student investigators, respectively. This survey will provide us with feedback on how online communication channels went, what approaches worked best, and will allow us to follow-up (should you wish to add your contact details). Because you are a participant of online communication channels, your opinions are important to this study.

We would appreciate it if you completed the attached survey. Completion of the survey is expected to take about ten minutes of your time. The questions are quite general (for example, to what extent do you agree the overall message is important to you?). You may omit any questions you prefer not to answer. There are no known or anticipated risks to participating in this study. Participation in this survey is voluntary and confidential. Further, all information you provide will be considered confidential. The data collected through this study will be kept for a period of 10 years in a locked office at the University of Waterloo.

If you are interested in participating in this study, consent to participate is implied by filling the survey to the researchers. If after receiving this letter, you have any questions about this study, or would like additional information to assist you in reaching a decision about participation, please feel free to contact Professor Amelia Clarke (amelia.clarke@uwaterloo.ca), Natalie Heldsinger (nheldsin@uwaterloo.ca) or Wen Tian (wtian@uwaterloo.ca) or our project website (uwaterloo.ca/seed/LA21).

By filling out this survey you have the option to be entered in a lucky draw to WIN one of five, $20 gift cards to either iTunes or Amazon. Your participation in this research, as well as your responses to the questions, will be kept strictly confidential. Only the email address provided will be used for the draw. The contest closes at midnight on August 31st 2015. Results will be announced on September 1st 2015 and winners will be notified via email.

I would like to assure you that this study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. However, the final decision about participation is yours. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Maureen Nummelin in the Office of Research Ethics at 1-519-888-4567, Ext. 36005 or maureen.nummelin@uwaterloo.ca.

Thank you in advance for your interest in this project.

Yours sincerely,
Natalie Heldsinger & Wen Tian

Survey B (Twitter)

1. What is your current role?

☐ Councilor ☐ Municipal staff ☐ Consultant ☐ Student ☐ Other (Please specify) _____

Please respond to the following eleven questions (Q2-Q12) using this scale:

Not at all	Slightly	Somewhat	Neutral	Moderately	Very much	Extremely
1	2	3	4	5	6	7

General feedback on the Twitter:							
	1	2	3	4	5	6	7
2. The overall message of the tweet was important for me	☐	☐	☐	☐	☐	☐	☐
3. The information delivered in the tweet is memorable	☐	☐	☐	☐	☐	☐	☐
4. This tweet provided relevant information	☐	☐	☐	☐	☐	☐	☐
5. This tweet was a valuable source of information about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
6. How motivated were you to read this tweet	☐	☐	☐	☐	☐	☐	☐
7. I learnt something from this tweet that I did not know before about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
8. This tweet reminded me of some important information about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
9. This tweet influenced my opinion about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
10. I would recommend this tweet to others	☐	☐	☐	☐	☐	☐	☐
11. These tweets are an effective way to find information about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
12. The information from this tweet will affect my behaviours on implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐

Please respond to the following eight questions (Q13-Q20) using this scale:

Strongly disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
1	2	3	4	5	6	7

Instructions: based on the reasons you browse or participate in the sustainability online community, please indicate your level of agreement or disagreement with the following sentence:							
	1	2	3	4	5	6	7
13. I am comfortable with obtaining information about implementing community sustainability plans from Twitter	☐	☐	☐	☐	☐	☐	☐

Instructions: In your opinion, to what extend do the following statements about the content and design of the website apply to you?							
	1	2	3	4	5	6	7
14. The information offered from Twitter is useful	☐	☐	☐	☐	☐	☐	☐
15. The information offered from Twitter is understandable	☐	☐	☐	☐	☐	☐	☐
16. The information offered from Twitter is sufficient ☐	☐	☐	☐	☐	☐	☐	

Instructions: based on your opinions of Twitter online community, please indicate your level of agreement or disagreement with the following sentences							
	1	2	3	4	5	6	7
17. Twitter provides efficient updates on hot threads	☐	☐	☐	☐	☐	☐	☐
18. Twitter provides convenient information search	☐	☐	☐	☐	☐	☐	☐
19. Twitter archives useful threads containing rich and concise information	☐	☐	☐	☐	☐	☐	☐
20. Twitter invigilates the postings well to main quality	☐	☐	☐	☐	☐	☐	☐

Please respond to the following four questions (Q21-Q24) using this scale:

Not at all	Slightly	Somewhat	Neutral	Moderately	Very much	Extremely
1	2	3	4	5	6	7

To what extent are you involved in the message?							
	1	2	3	4	5	6	7
21. How likely are you to spread the content from this tweet to someone else	☐	☐	☐	☐	☐	☐	☐
22. Did you think deeply about the information contained in Twitter?	☐	☐	☐	☐	☐	☐	☐
23. How much effort did you put into reading the message from Twitter?	☐	☐	☐	☐	☐	☐	☐
24. How personally involved did you feel with the presented topics?	☐	☐	☐	☐	☐	☐	☐

Please respond to the following three questions (Q25-Q27) using this scale:

Strongly disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat Agree	Agree	Strongly agree
1	2	3	4	5	6	7

Instructions: based on the reasons you browse or participate in the Twitter online community, please indicate your level of agreement or disagreement with the following sentences:							
	1	2	3	4	5	6	7
25. To obtain relevant information about sustainable community plans	☐	☐	☐	☐	☐	☐	☐
26. To learn more about sustainable plan implementation	☐	☐	☐	☐	☐	☐	☐
27. To seek advice on sustainable community plans	☐	☐	☐	☐	☐	☐	☐

28. Do you have any other comments?

Appendix 3: Online Survey (Survey C)

Introductory and Consent Page

Dear survey participants:

We are Masters students in the Faculty of Environment at the University of Waterloo. We are currently conducting research under the supervision of Professor Amelia Clarke. The objective of this research project is to assess the effectiveness of disseminating research on sustainable communities to professionals in the field.

This survey is part of a larger study that will be used for Dr Clarke's purposes, as well as for the MES and MAES degrees of the two student investigators, respectively. This survey will provide us with feedback on how online communication channels went, what approaches worked best, and will allow us to follow-up (should you wish to add your contact details). Because you are a participant of online communication channels, your opinions are important to this study.

We would appreciate it if you completed the attached survey. Completion of the survey is expected to take about ten minutes of your time. The questions are quite general (for example, to what extent do you agree the overall message is important to you?). You may omit any questions you prefer not to answer. There are no known or anticipated risks to participating in this study. Participation in this survey is voluntary and confidential. Further, all information you provide will be considered confidential. The data collected through this study will be kept for a period of 10 years in a locked office at the University of Waterloo.

If you are interested in participating in this study, consent to participate is implied by filling the survey to the researchers. If after receiving this letter, you have any questions about this study, or would like additional information to assist you in reaching a decision about participation, please feel free to contact Professor Amelia Clarke (amelia.clarke@uwaterloo.ca), Natalie Heldsinger (nheldsin@uwaterloo.ca) or Wen Tian (wtian@uwaterloo.ca) or our project website (uwaterloo.ca/seed/LA21).

By filling out this survey you have the option to be entered in a lucky draw to WIN one of five, $20 gift cards to either iTunes or Amazon. Your participation in this research, as well as your responses to the questions, will be kept strictly confidential. Only the email address provided will be used for the draw. The contest closes at midnight on August 31st 2015. Results will be announced on September 1st 2015 and winners will be notified via email.

I would like to assure you that this study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. However, the final decision about participation is yours. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Maureen Nummelin in the Office of Research Ethics at 1-519-888-4567, Ext. 36005 or maureen.nummelin@uwaterloo.ca.

Thank you in advance for your interest in this project.

Yours sincerely,
Natalie Heldsinger & Wen Tian

Survey C (LinkedIn)

1. What is your current role?

☐ Councilor ☐ Municipal staff ☐ Consultant ☐ Other (Please specify) _____

Please respond to the following three questions (Q2-Q4) using this scale:

Not at all interesting	Slightly interesting	Somewhat interesting	Neutral	Moderately interesting	Very interesting	Extremely interesting
1	2	3	4	5	6	7

What topics did you find interesting?							
	1	2	3	4	5	6	7
2. Overview of sustainable community plans	☐	☐	☐	☐	☐	☐	☐
3. Implementing sustainable community plans within local governments	☐	☐	☐	☐	☐	☐	☐
4. Partnership/collaboration structures and key features	☐	☐	☐	☐	☐	☐	☐

Please respond to the following fifteen questions (Q5-Q19) using this scale:

Not at all	Slightly	Somewhat	Neutral	Moderately	Very much	Extremely
1	2	3	4	5	6	7

General feedback on the session:							
	1	2	3	4	5	6	7
5. The overall message of the LinkedIn discussion was important for me	☐	☐	☐	☐	☐	☐	☐
6. The information delivered in the LinkedIn discussion is memorable	☐	☐	☐	☐	☐	☐	☐
7. This LinkedIn discussion provided relevant information	☐	☐	☐	☐	☐	☐	☐
8. This LinkedIn discussion was a valuable source of information about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
9. How motivated were you to visit this LinkedIn discussion	☐	☐	☐	☐	☐	☐	☐
10. I learnt something from this LinkedIn discussion that I did not know before about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
11. This LinkedIn discussion reminded me of some important information about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
12. This LinkedIn discussion influenced my opinion about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
13. I would recommend this LinkedIn discussion to others	☐	☐	☐	☐	☐	☐	☐
14. These LinkedIn discussions are an effective way to find information about implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐
15. How likely are you to spread the content from this LinkedIn discussion to someone else	☐	☐	☐	☐	☐	☐	☐
16. The information from this LinkedIn discussion will affect my behaviours on implementing sustainable community plans	☐	☐	☐	☐	☐	☐	☐

To what extent are you involved in the message?							
	1	2	3	4	5	6	7
17. Did you think deeply about the information contained in LinkedIn?	☐	☐	☐	☐	☐	☐	☐
18. How much effort did you put into reading the message from LinkedIn?	☐	☐	☐	☐	☐	☐	☐
19. How personally involved did you feel with the presented topics?	☐	☐	☐	☐	☐	☐	☐

Please respond to the following thirteen questions (Q20-Q32) using this scale:

Strongly disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Instructions: based on the reasons you browse or participate in the sustainability online community, please indicate your level of agreement or disagreement with the following sentences:							
	1	2	3	4	5	6	7
20. I am comfortable with obtaining information about implementing community sustainability plans from LinkedIn	☐	☐	☐	☐	☐	☐	☐
21. My opinions are respected by members of the community	☐	☐	☐	☐	☐	☐	☐
22. I am a valuable member of the community	☐	☐	☐	☐	☐	☐	☐

Instructions: based on your opinions of LinkedIn online community, please indicate your level of agreement or disagreement with the following sentences							
	1	2	3	4	5	6	7
23. LinkedIn provides efficient updates on hot threads	☐	☐	☐	☐	☐	☐	☐
24. LinkedIn provides convenient information search	☐	☐	☐	☐	☐	☐	☐
25. LinkedIn archives useful threads containing rich and concise information	☐	☐	☐	☐	☐	☐	☐
26. LinkedIn invigilates the postings well to main quality	☐	☐	☐	☐	☐	☐	☐

In your opinion, to what extend do the following statements about the content and design of the website apply to you?							
	1	2	3	4	5	6	7
27. The information offered from LinkedIn is useful	☐	☐	☐	☐	☐	☐	☐
28. The information offered from LinkedIn is understandable	☐	☐	☐	☐	☐	☐	☐
29. The information offered from LinkedIn is sufficient	☐	☐	☐	☐	☐	☐	☐

Instructions: based on the reasons you browse or participate in the LinkedIn online community, please indicate your level of agreement or disagreement with the following sentences:							
	1	2	3	4	5	6	7
30. To obtain relevant information about sustainable community plans	☐	☐	☐	☐	☐	☐	☐
31. To learn more about sustainable plan implementation	☐	☐	☐	☐	☐	☐	☐

32. To seek advice on sustainable community plans	☐	☐	☐	☐	☐	☐	☐

33. Do you have any other comments?

Thank you for participating in this survey! We really appreciate it!

Appendix 4: University of Waterloo Office of Ethics Approval

UNIVERSITY OF WATERLOO

OFFICE OF RESEARCH ETHICS

Notification of Ethics Clearance of Application to Conduct Research with Human Participants

Principal/Co-Investigator:	Amelia Clarke	**Department:**	Environment and Business
Principal/Co-Investigator:	Lei Huang	**Department:**	SUNY - Fredonia
Student Investigator:	Natalie Heldsinger	**Department:**	Environment & Resource Studies
Student Investigator:	Wen Tian	**Department:**	Local Economic Development

ORE File #: 20495

Project Title: Accessing the effectiveness of disseminating research on sustainable community plans to non-academic audiences using social media, websites and survey questions.

This certificate provides confirmation the above project has been reviewed in accordance with the University of Waterloo's Guidelines for Research with Human Participants and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans. This project has received ethics clearance through a University of Waterloo Research Ethics Committee.

***Note 1**: This ethics clearance is valid for one year from the date shown on the certificate and is renewable annually. Renewal is through completion and ethics clearance of the Annual Progress Report for Continuing Research (ORE Form 105).*

***Note 2**: This project must be conducted according to the application description and revised materials for which ethics clearance has been granted. All subsequent modifications to the project also must receive prior ethics clearance (i.e., Request for Ethics Clearance of a Modification, ORE Form 104) through a University of Waterloo Research Ethics Committee and must not begin until notification has been received by the investigators.*

***Note 3**: Researchers must submit a Progress Report on Continuing Human Research Projects (ORE Form 105) annually for all ongoing research projects or on the completion of the project. The Office of Research Ethics sends the ORE Form 105 for a project to the Principal Investigator or Faculty Supervisor for completion. If ethics clearance of an ongoing project is not renewed and consequently expires, the Office of Research Ethics may be obliged to notify Research Finance for their action in accordance with university and funding agency regulations.*

***Note 4**: Any unanticipated event involving a participant that adversely affected the participant(s) must be reported immediately (i.e., within 1 business day of becoming aware of the event) to the ORE using ORE Form 106. Any unanticipated or unintentional changes which may impact the research protocol must be reported within seven days of the deviation to the ORE using ORE form 107.*

Maureen Nummelin, PhD
Chief Ethics Officer

2/9/2015
Date

OR
Julie Joza, MPH
Senior Manager, Research Ethics

Appendix 5: Results of P-P Plot

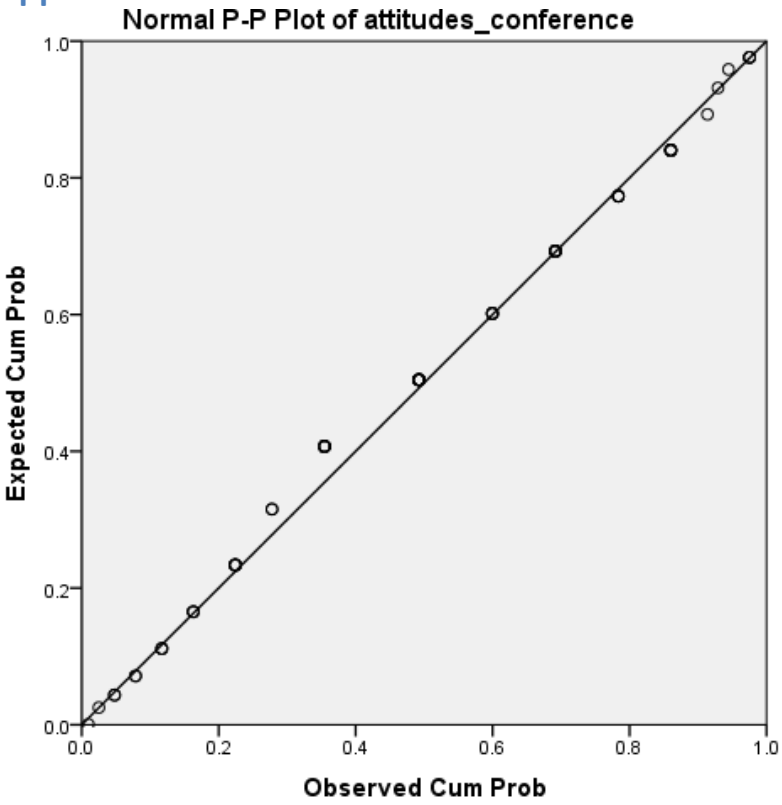

Figure 3: The P-P Plot Result of Respondents' Attitudes toward Conference

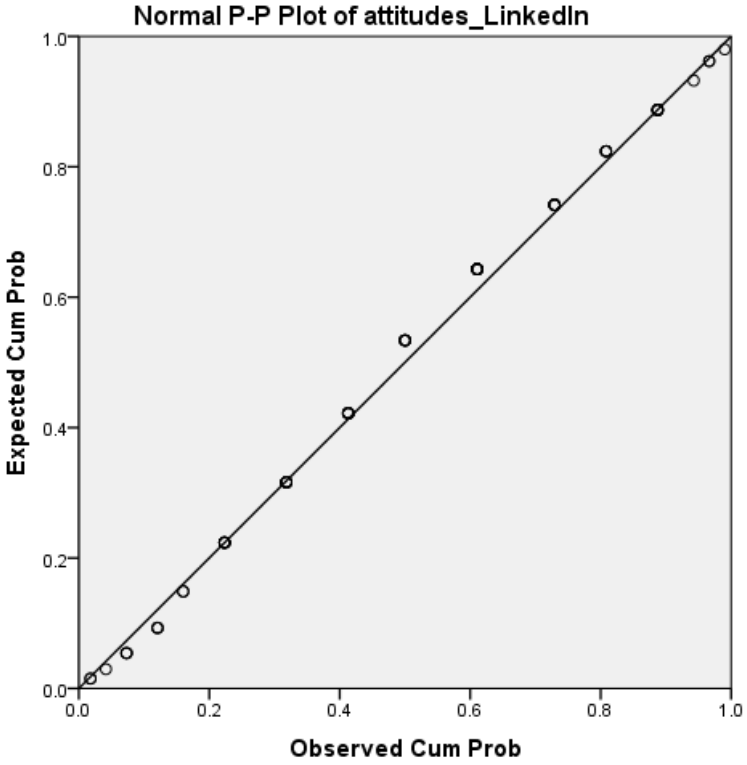

Figure 4: The P-P Plot Result of Respondents' Attitudes toward LinkedIn

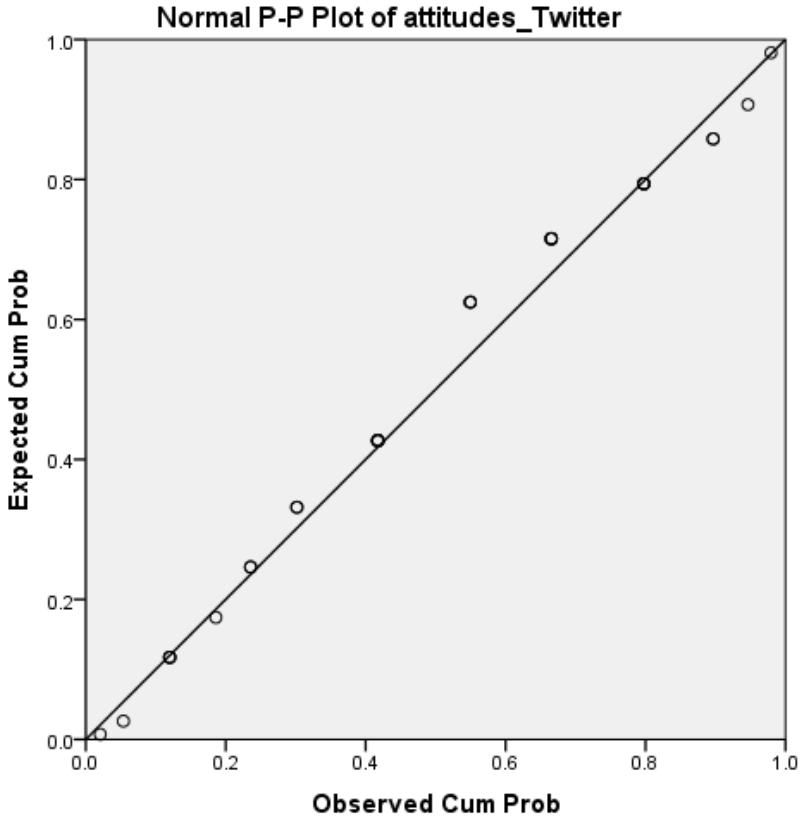

Figure 5: The P-P Plot Result of Respondents' Attitudes toward Twitter

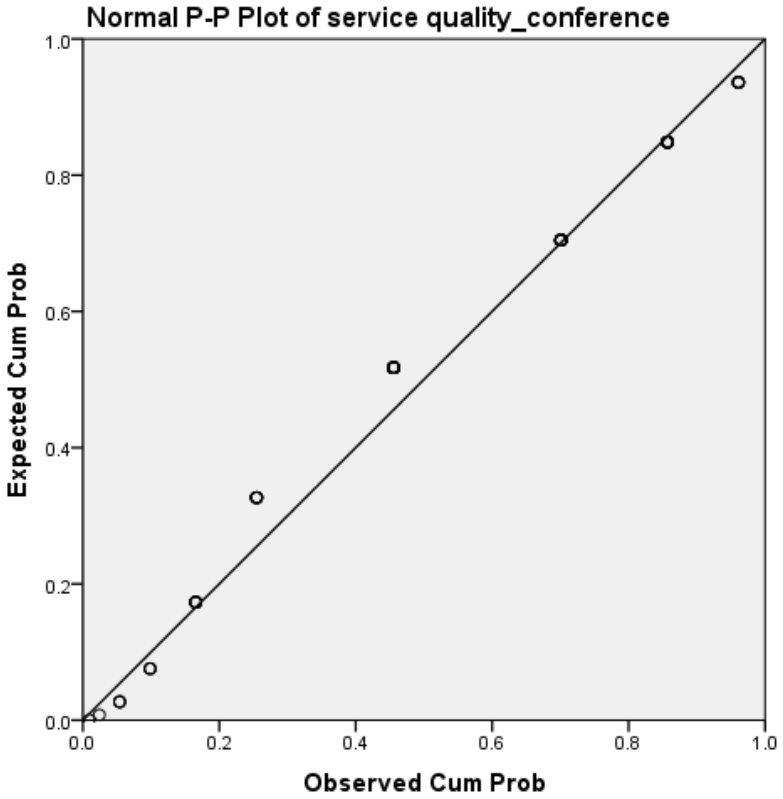

Figure 6: The P-P Plot Result of Conferences' Service Quality

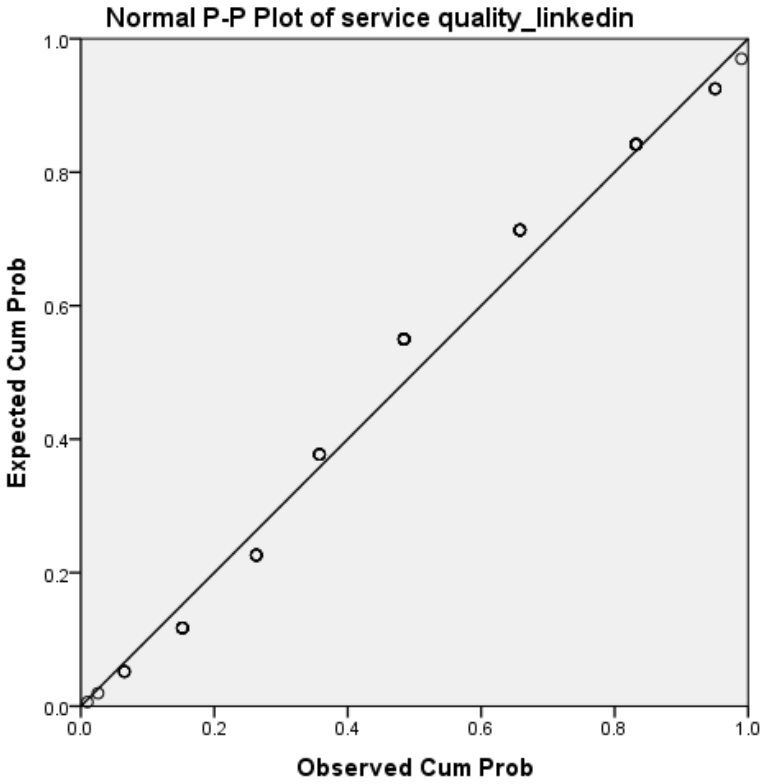

Figure 7: The P-P Plot Result of LinkedIn's Service Quality

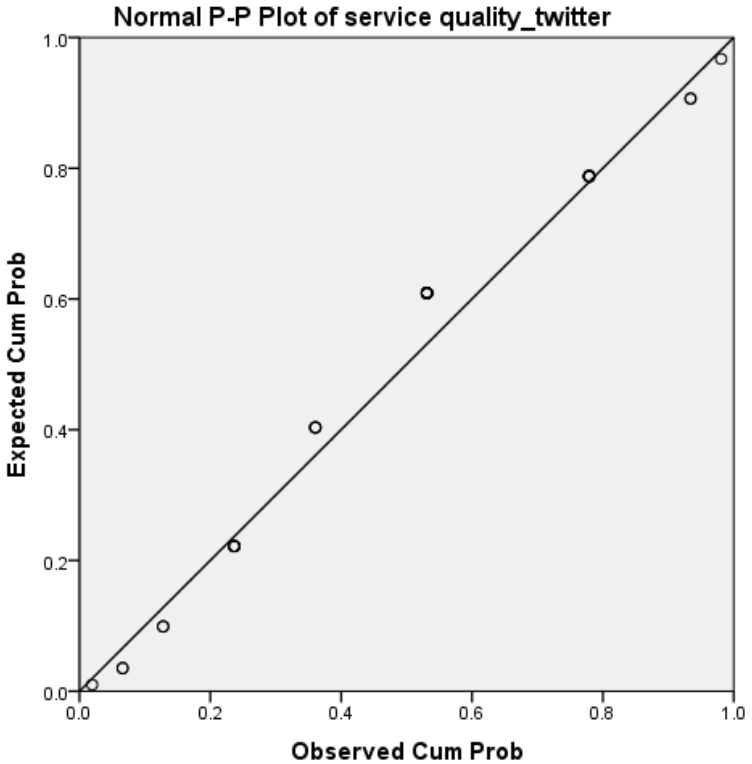

Figure 8: The P-P Plot Result of Twitter's Service Quality

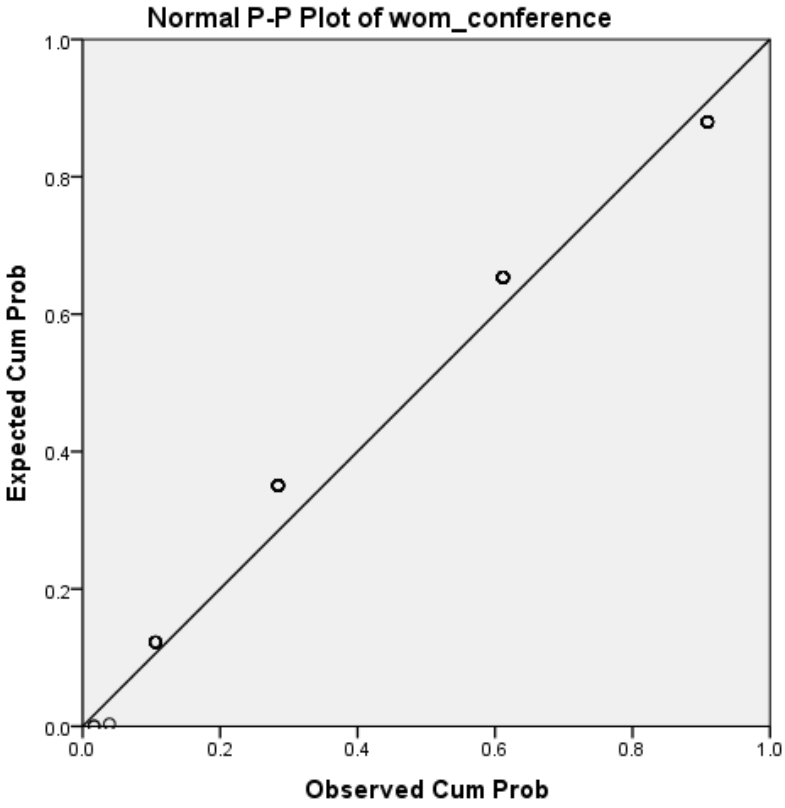

Figure 9: The P-P Plot Result of Word-of-mouth at Conference

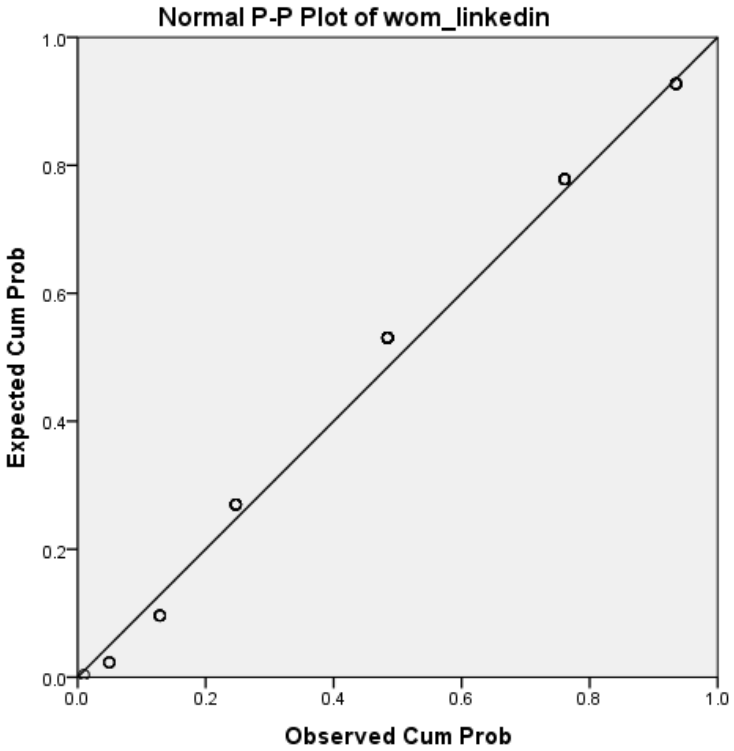

Figure 10: The P-P Plot Result of Word-of-mouth on LinkedIn

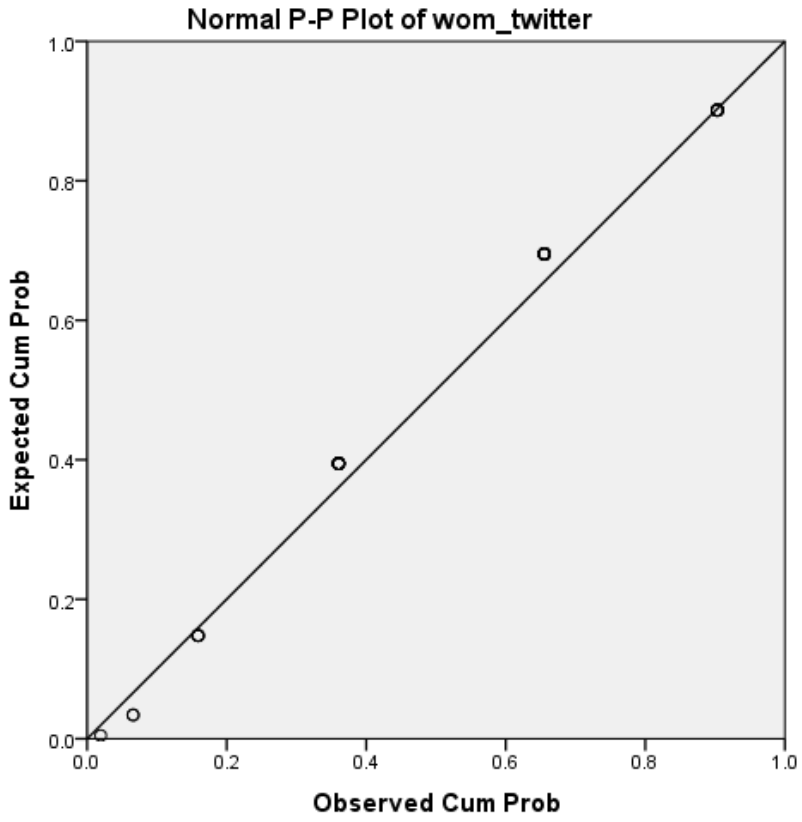

Figure 11: The P-P Plot Result of Word-of-mouth on Twitter

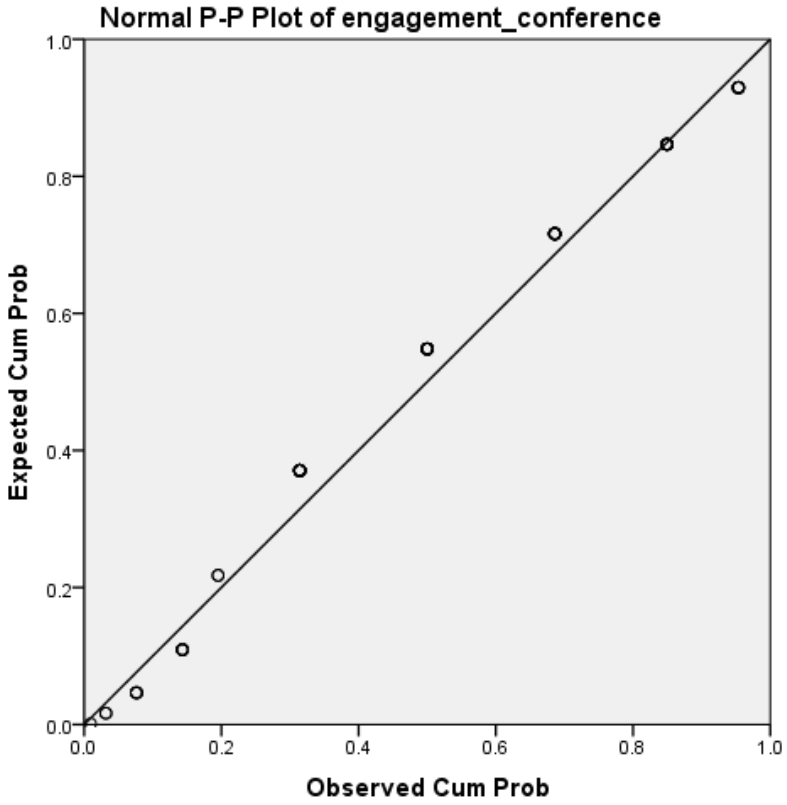

Figure 12: The P-P Plot Result of Audience Engagement at Conference

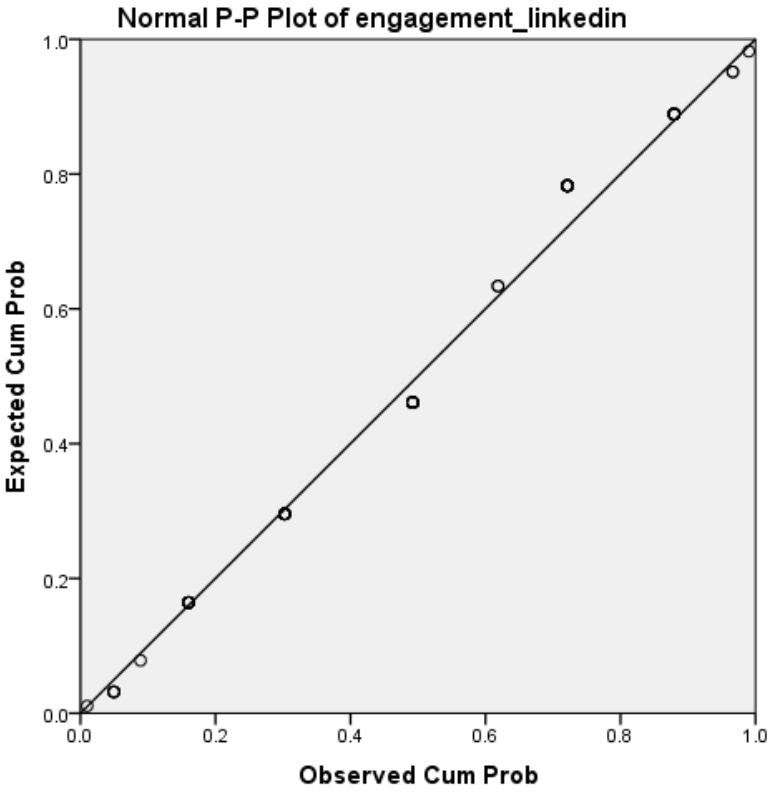

Figure 13: The P-P Plot Result of Audience Engagement on LinkedIn

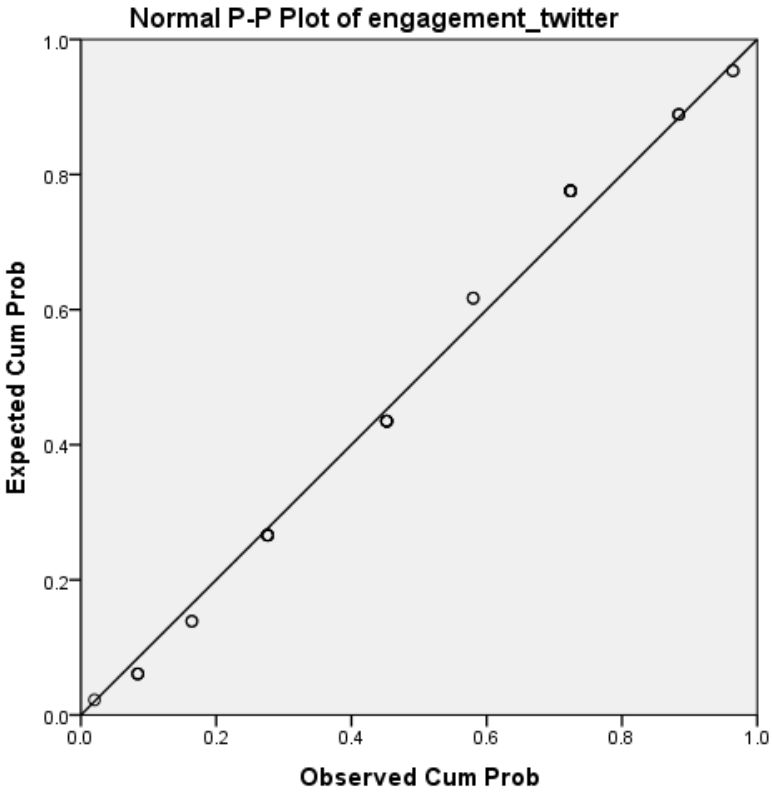

Figure 14: The P-P Plot Result of Audience Engagement on Twitter

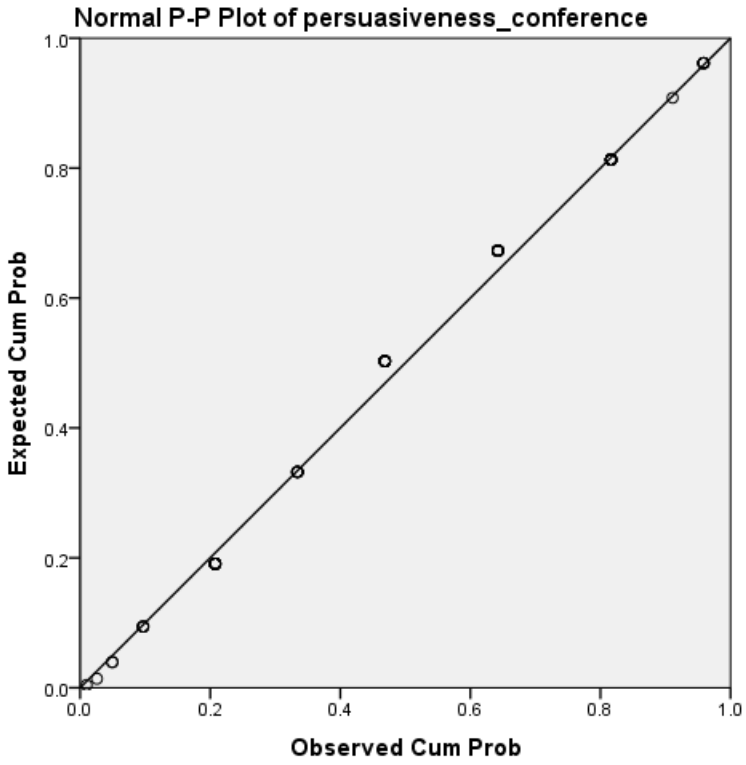

Figure 15: The P-P Plot Result of Message Persuasiveness at Conference

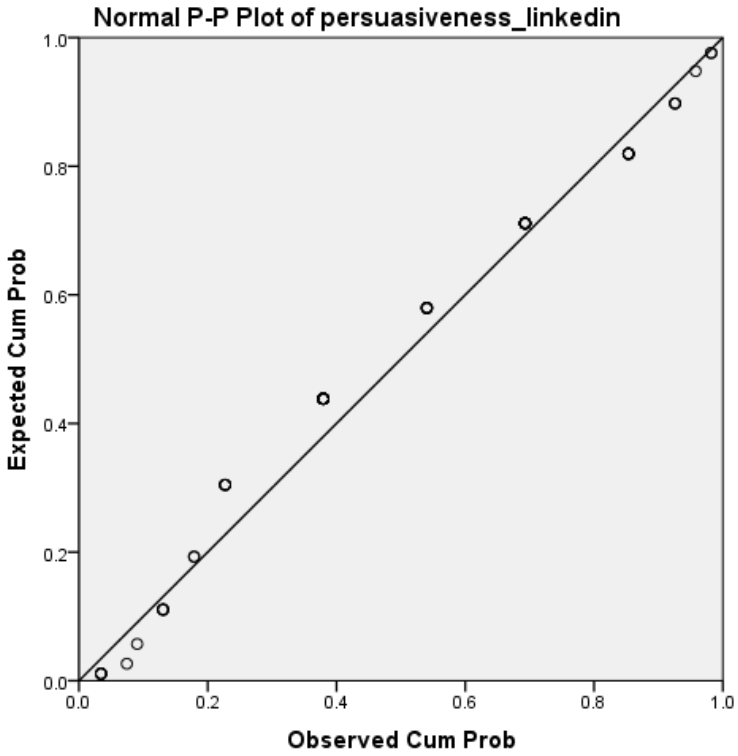

Figure 16: The P-P Plot Result of Message Persuasiveness on LinkedIn

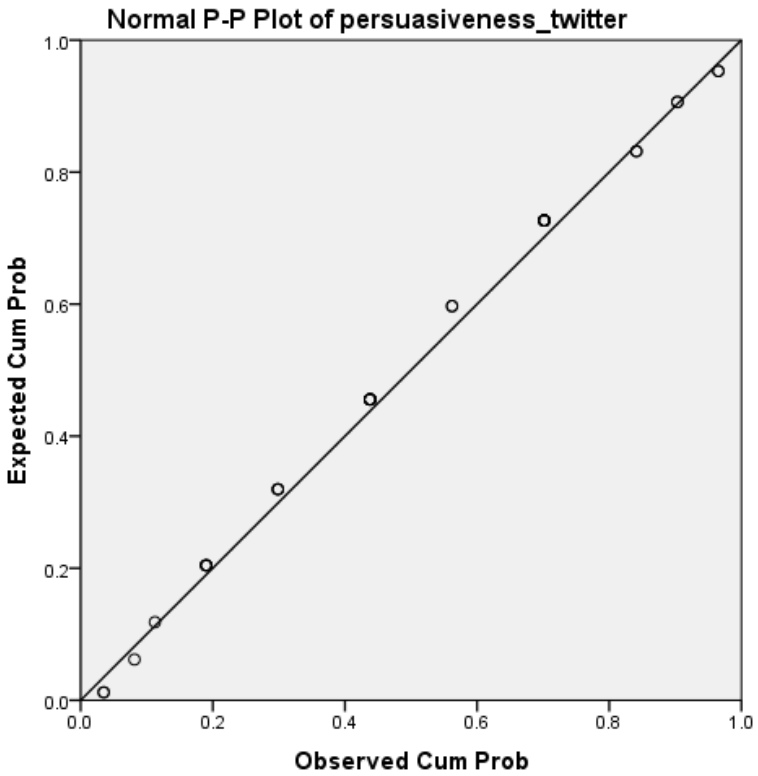

Figure 17: The P-P Plot Result of Message Persuasiveness on Twitter

Appendix 6: Chi-Square Tests Results

Roles vs. Attitudes

Table 37: Chi-Square Tests (Roles versus Attitudes)

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.120[a]	1	.729		
Continuity Correction[b]	.022	1	.882		
Likelihood Ratio	.121	1	.728		
Fisher's Exact Test				.843	.446
Linear-by-Linear Association	.120	1	.729		
N of Valid Cases	189				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.87.

b. Computed only for a 2x2 table

Age vs. Attitudes

Table 38: Chi-Square Tests (Age versus Attitudes)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.142[a]	6	.408
Likelihood Ratio	7.096	6	.312
Linear-by-Linear Association	.021	1	.884
N of Valid Cases	118		

a. 6 cells (42.9%) have expected count less than 5. The minimum expected count is .25.

Educational Levels vs. Attitudes

Table 39: Chi-Square Tests (Educational Levels versus Attitudes)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.403[a]	8	.907
Likelihood Ratio	5.022	8	.755
Linear-by-Linear Association	.254	1	.614
N of Valid Cases	119		

a. 13 cells (72.2%) have expected count less than 5. The minimum expected count is .24.

Roles vs. Service Quality

Table 40: Chi-Square Tests (Roles versus Service Quality)

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.083[a]	1	.774		
Continuity Correction[b]	.014	1	.907		
Likelihood Ratio	.082	1	.774		
Fisher's Exact Test				.865	.451
Linear-by-Linear Association	.082	1	.774		
N of Valid Cases	189				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.16.

b. Computed only for a 2x2 table

Roles vs. Word-of-mouth

Table 41: Chi-Square Tests (Roles versus Word-of-mouth)

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.071[a]	1	.790		
Continuity Correction[b]	.010	1	.921		
Likelihood Ratio	.071	1	.790		
Fisher's Exact Test				.867	.458
Linear-by-Linear Association	.071	1	.790		
N of Valid Cases	189				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 19.21.

b. Computed only for a 2x2 table

Roles vs. Engagement

Table 42: Chi-Square Tests (Roles versus Engagement)

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.735[a]	1	.391		
Continuity Correction[b]	.480	1	.489		
Likelihood Ratio	.744	1	.388		
Fisher's Exact Test				.415	.245
Linear-by-Linear Association	.731	1	.393		
N of Valid Cases	189				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 20.60.

b. Computed only for a 2x2 table

Roles vs. Persuasiveness

Table 43: Chi-Square Tests (Roles versus Persuasiveness)

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.056[a]	1	.014		
Continuity Correction[b]	5.326	1	.021		
Likelihood Ratio	6.148	1	.013		
Fisher's Exact Test				.015	.010
Linear-by-Linear Association	6.024	1	.014		
N of Valid Cases	189				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 30.03.

b. Computed only for a 2x2 table

Table 44: Significance Measurement (Roles versus Persuasiveness)

		Value	Approximate Significance
Nominal by Nominal	Phi	-.179	.014
	Cramer's V	.179	.014
N of Valid Cases		189	

Age vs. Service Quality

Table 45: Chi-Square Tests (Age versus Service Quality)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.174[a]	6	.226
Likelihood Ratio	10.150	6	.118
Linear-by-Linear Association	.199	1	.655
N of Valid Cases	118		

a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .37.

Age vs. Word-of-mouth

Table 46: Chi-Square Tests (Age versus Word-of-mouth)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.032[a]	6	.236
Likelihood Ratio	10.016	6	.124
Linear-by-Linear Association	1.172	1	.279
N of Valid Cases	118		

a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .37.

Age vs. Engagement

Table 47: Chi-Square Tests (Age versus Engagement)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.871[a]	6	.092
Likelihood Ratio	13.343	6	.038
Linear-by-Linear Association	2.432	1	.119
N of Valid Cases	118		

a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .40.

Age vs. Persuasiveness

Table 48: Chi-Square Tests (Age versus Persuasiveness)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.888[a]	6	.129
Likelihood Ratio	12.089	6	.060
Linear-by-Linear Association	.918	1	.338
N of Valid Cases	118		

a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .42.

Educational Levels vs. Service Quality

Table 49: Chi-Square Tests (Educational Levels versus Service Quality)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.699[a]	8	.789
Likelihood Ratio	5.658	8	.685
Linear-by-Linear Association	.001	1	.973
N of Valid Cases	119		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .37.

Educational Levels vs. Word-of-mouth

Table 50: Chi-Square Tests (Educational Levels versus Word-of-mouth)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.632[a]	8	.577
Likelihood Ratio	8.908	8	.350
Linear-by-Linear Association	.001	1	.973
N of Valid Cases	119		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .37.

Educational Levels vs. Engagement

Table 51: Chi-Square Tests (Educational Levels versus Engagement)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.796[a]	8	.454
Likelihood Ratio	10.194	8	.252
Linear-by-Linear Association	.155	1	.694
N of Valid Cases	119		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .39.

Educational Levels vs. Persuasiveness

Table 52: Chi-Square Tests (Educational Levels versus Persuasiveness)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.407[a]	8	.713
Likelihood Ratio	6.490	8	.592
Linear-by-Linear Association	1.030	1	.310
N of Valid Cases	119		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .43.

Roles vs. Driver 1

Table 53: Chi-Square Tests (Roles versus Driver of Obtaining Information)

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.975[a]	1	.085		
Continuity Correction[b]	2.444	1	.118		
Likelihood Ratio	3.046	1	.081		
Fisher's Exact Test				.107	.058
Linear-by-Linear Association	2.959	1	.085		
N of Valid Cases	189				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 22.35.

b. Computed only for a 2x2 table

Roles vs. Driver 2

Table 54: Chi-Square Tests (Roles versus Driver of Learning)

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.963[a]	1	.085		
Continuity Correction[b]	2.440	1	.118		
Likelihood Ratio	3.027	1	.082		
Fisher's Exact Test				.111	.058
Linear-by-Linear Association	2.948	1	.086		
N of Valid Cases	189				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 23.40.

b. Computed only for a 2x2 table

Roles vs. Driver 3

Table 55: Chi-Square Tests (Roles versus Driver of Seeking Advice)

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.509[a]	1	.019		
Continuity Correction[b]	4.807	1	.028		
Likelihood Ratio	5.621	1	.018		
Fisher's Exact Test				.021	.014
Linear-by-Linear Association	5.480	1	.019		
N of Valid Cases	189				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 27.59.

b. Computed only for a 2x2 table

Table 56: Significance Measurement (Roles versus Driver of Seeking Advice)

		Value	Approximate Significance
Nominal by Nominal	Phi	-.171	.019
	Cramer's V	.171	.019
N of Valid Cases		189	

Age vs. Driver 1

Table 57: Chi-Square Tests (Age versus Driver of Obtaining Information)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.671[a]	6	.587
Likelihood Ratio	5.166	6	.523
Linear-by-Linear Association	.011	1	.918
N of Valid Cases	118		

a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .46.

Age vs. Driver 2

Table 58: Chi-Square Tests (Age versus Driver of Learning)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	6.343[a]	6	.386
Likelihood Ratio	6.825	6	.337
Linear-by-Linear Association	1.176	1	.278
N of Valid Cases	118		

a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .43.

Age vs. Driver 3

Table 59: Chi-Square Tests (Age versus Driver of Seeking Advice)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.617[a]	6	.196
Likelihood Ratio	8.784	6	.186
Linear-by-Linear Association	.048	1	.826
N of Valid Cases	118		

a. 4 cells (28.6%) have expected count less than 5. The minimum expected count is .33.

Educational Levels vs. Driver 1

Table 60: Chi-Square Tests (Educational Levels versus Driver of Obtaining Information)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.474[a]	8	.486
Likelihood Ratio	8.680	8	.370
Linear-by-Linear Association	2.652	1	.103
N of Valid Cases	119		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .46.

Educational Levels vs. Driver 2

Table 61: Chi-Square Tests (Educational Levels versus Driver of Learning)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.804[a]	8	.359
Likelihood Ratio	9.950	8	.269
Linear-by-Linear Association	2.248	1	.134
N of Valid Cases	119		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .44.

Educational Levels vs. Driver 3

Table 62: Chi-Square Tests (Educational Levels versus Driver of Seeking Advice)

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.320[a]	8	.137
Likelihood Ratio	12.642	8	.125
Linear-by-Linear Association	4.788	1	.029
N of Valid Cases	119		

a. 12 cells (66.7%) have expected count less than 5. The minimum expected count is .34.