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Advances in internet-mediated collaborative technologies have allowed for a wide
range of "open" and "crowdsourced" approaches. IT-enabled crowdsourcing (referred to
as CS in this dissertation) is defined as technology enabled phenomenon of outsourcing
tasks through an open call to the masses via the internet. CS practices have played an
important role in facilitating search for external sources of innovation in online
communities and open platforms. Over the past decade, research and practices on the new
phenomenon of CS enabled by technological advances have continued to grow, evolve
and revolutionize the way work gets done (e.g. Wikipedia, Kaggle, GalaxyZoo, Uber,
Amazon Mechanical Turk, GoFundMe). Although several studies have been conducted in
this area, few of them focused on understanding the interaction and integration of all the
main components involved in the process. The concepts, components, and performance
of IT-enabled crowd-sourced activities are not clear yet. Additionally, the power of (a)
crowd has been largely ignored in idea generation and business consulting activities
where the crowd needs to have specialized skills and high level of creativity to solve
complex business problems.

To address these knowledge gaps, the first section of this study identifies the main
components involved in a CS process by developing a conceptual framework based on
the current literature and applications. The conceptual model presented in this study takes
a holistic view of the CS projects considering all the operations and factors involved. The
framework allows for full, yet parsimonious, consideration of the factors that may affect

the crowd's participation effort and performance. Developing a conceptual framework expands our understanding of this phenomenon and helps to differentiate various cases based on fundamental dimensions and characteristics. The conceptual framework suggests that in order to define the dimensions of any IT-enabled CS process, it is required to answer the following questions: *Who?* (who initiates the process? who benefits from it? who performs the task?) *Why?* (why does the crowd participate in the process?) *What?* (what is the task?) *How?* (how does the crowd perform the task [platform]?). Different combinations of answers to these questions, describe different types of CS processes.

In the second part of this dissertation, a longitudinal study is conducted to investigate the dynamics of the major components involved in the process and their impact on individual participant's effort and level of performance over time. Applying a longitudinal study might be the most appropriate way of studying the CS process which, to our knowledge, has not been reported in the literature before. Data from an open-source community is used to assess the dissertation model. This platform selects and crowd-sources real-life business challenges to thousands of people from around the world. The best solutions are being rewarded by monetary prizes and post-market compensation. By analyzing over 2,500 records of data, it was found that the crowd characteristics (skill level, IT efficacy, international experience), their motivation (learning and direct compensations), task clarity, and communication and collaboration platform's characteristics (ease-of-use, usefulness, media richness) impact the crowd's participation behavior and performance. In the case of this study, since individuals

compete in groups, perception of team's behavior also has correlations with individual effort and performance. Additionally, the longitudinal study verifies that these relationships change throughout the process.

In the third part of the dissertation, a qualitative study is conducted by interviewing some of the individual members of the crowd to further explain the results of the quantitative study. The interviews provide rich insights, help expand our understanding of the process, and better define the characteristics of each component involved in the process. The interpretive study also shows that the relationships between these components and the crowd's participation behavior and performance change over time. A modified version of the CS conceptual framework in a business context is presented at the end of this section.

Overall, this dissertation provides a better understanding of a technology-enabled CS process and examines the characteristics of its main components that might influence crowd's participation behavior and performance in a business context. The results of this study could potentially fill the knowledge gap in the literature on the crowd's performance in an IT-enabled CS process in a business domain. Understanding the crowd's behavior can guide initiators to design proper mechanisms to attract and maintain participation of the right crowd. It provides guidance for organizations to leverage CS for activities such as business consulting, product development, and idea generation in the best possible way. The results of this study make substantial contributions to identifying the main characteristics of a CS process as a legitimate, IT-enabled form of problem solving.

A LONGITUDINAL STUDY OF IT-ENABLED CROWDSOURCING

PERFORMANCE IN A BUSINESS CONTEXT

by

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Dedicated to my husband, the love of my life, Ali,

and my beloved parents Mehri and Mohammad.

APPROVAL PAGE

This dissertation written by Minoo Modaresnezhad has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Social networking systems allow us to connect easily with one another to communicate, learn, educate, conduct business and solve problems. Advances in connective and collaborative technological environment have enabled individuals to get involved in internet-mediated social participation which has transformed users from passive browsers to active contributors (Bennett & Tucker, 2012; Chesbrough, 2003). James Surowiecki (2004) in his book, *The Wisdom of Crowds*, popularized the idea that a crowd can outperform any individual's performance in certain activities (Surowiecki, 2004). Jeff Howe coined the term CS in a *Wired Magazine* article as: "a sourcing model in which organizations use predominantly advanced Internet technologies to harness the efforts of a virtual crowd to perform specific organizational tasks" (Howe, 2006b). Despite a significant increase of effort in CS research and practice, the concepts and components of CS activities are not clear yet.

Information Systems (IS) research has been traditionally situated around people, organizations, and technology (Benbasat & Zmud, 2003; Hevner, March, Park, & Ram, 2008; Orlikowski & Iacono, 2001; Pavlou, 2012). IT artifacts have been consistently evolving; thus, changing and forming new social phenomena. CS is an emerging IT artifact and a new frontier for IS research that has reached out beyond the traditional

1

boundaries to a much broader context (Agarwal & Lucas, 2005; Zhang & Wang, 2012).

In the literature, three distinct perspectives of CS have been considered: a process that

involves several key actors and operations (Stewart, Lubensky, & Huerta, 2010; Whitla,

2009), a paradigm that provides principles to real world problems (Albors, Ramos, &

Hervas, 2008; Brabham, 2008a, 2010; Hetmank, 2014; Kazman & Chen, 2009; Vukovic

& Bartolini, 2010), or a platform with specific functions and features which can

implement the paradigm and support the corresponding processes (A. Kittur, Nickerson,

& Bernstein, 2013; Schenk & Guittard, 2011; Vuković, 2009). In this dissertation, CS is

studied as a process. In the first part of this study, a conceptual framework will be

developed in an effort to identify the main components involved in the process.

Conceptual frameworks and taxonomies, according to Geiger et al. (2011), help in

organizing knowledge in the IS field (Geiger, Seedorf, Nickerson, & Schader, 2011).

Developing a CS conceptual framework expands our understanding of this phenomenon

and helps to differentiate various cases of CS based on some fundamental dimensions. In

order to improve the CS performance, an understanding the process characteristics and

their possible combinations is necessary.

In the second part of this dissertation, the conceptual framework developed will

be employed to evaluate the factors influencing CS performance in a specific case of IT-

enabled CS project. In the literature, CS process has been studied from three

perspectives: the initiator, the platform, and the crowd (Zhao & Zhu, 2012). Studies

focusing on the initiator's perspective mainly deal with the antecedents of CS adoption,

exploring application domains of a CS process, workflow management, and governance

(Afuah & Tucci, 2012; Pénin & Helmchen, 2011; Schenk & Guittard, 2011). Research focused on IT-based CS platforms seek to identify the main features of these platforms and study issues related to the design and maintenance of these systems throughout the process (A. Kittur et al., 2013; Leimeister, Huber, Bretschneider, & Krcmar, 2009; Schlagwein & Bjørn-andersen, 2014). From the crowd's perspective, research examines the behaviors, attitudes, preferences, needs and motivational factors of participants in a CS process (Guo, Straub, Robinson, & Zhang, 2013; Kaufmann, Schulze, & Veit, 2011; Leimeister et al., 2009; Moussawi & Koufaris, 2015; Spiegler, Stöcklin, Interactive, Muhdi, & Michahelles, 2011; Zheng, Li, & Hou, 2011). Kaufmann et al. (2011) and Moussawi and Koufaris (2013) analyzed the relevant aspects motivating people to work on tasks announced in a CS environment. Zheng et al. (2011a) developed a research model to explain participation motivation in CS contests, as well as the effects of task attributes on intrinsic motivation. Guo et al. (2013) studied trust in a CS marketplace setting. Leimeister et al. (2009) reported on the development of an instrument that captured key characteristics of CS web site quality from the user's perspective.

Studies from the crowd's perspective mostly focus on the crowd's behavior related to specific characteristics of the CS process. Employing the comprehensive conceptual framework developed in the first part of the study, provides the leverage of considering all the factors involved while studying the crowd's behavior throughout the process. Since the essence of CS is the crowd's intelligence (Gregg, 2010; Leimeister et al., 2009; Lévy, 1997; Surowiecki, 2004), the successful initialization and sustainable development of CS communities largely depend on the crowd's participation. This

dissertation focuses on studying the behavior and performance of the individual member of the crowd throughout the process and so, the unit of analysis is the individual member of the crowd.

Since CS can be applied in diverse contexts, it is necessary to study participants' behaviors in certain scenarios. CS has been used in both business and non-business domains. The former includes companies, for-profit organizations or marketplaces (Chanal & Caron-Fasan, 2008; Poetz & Schreier, 2012; Vuković, 2009; Whitla, 2009), while the latter includes non-profit institutions, such as public libraries, museums, research centers, government, etc., where mass participation (Holley, 2009), scientific collaboration (Hsueh, Melville, & Sindhwani, 2009; A. Kittur, Chi, & Suh, 2008), or citizen science (Hudson-Smith, Batty, Crooks, & Milton, 2009) take place. In this dissertation, CS is studied in the business domain. In this context, CS processes and practices are being used across a variety of different industries for a variety of different purposes (Andriole, 2012). However, a review of the CS studies shows that only 20% of literature examines the CS processes of complicated problems that need high level of creativity (Zhao & Zhu, 2012). The power of crowds has been largely ignored in business research and business consulting projects. In order to fill this knowledge gap, this dissertation intends to examine crowds' performance to solve complex business problems that need high level of creativity and skill.

In this dissertation, a longitudinal study is conducted based on X-Culture projects which provide a global CS business consulting platform. The X-Culture projects platform selects and crowdsources real-life business challenges presented by its corporate partners

4

such as Mercedes-Benz, the Home Depot, and Louis Vuitton to over 3500 individuals from 40 countries on all 6 continents semi-annually. Each project takes almost 8 weeks. This study is conducted on the project held from February 2016 to April 2016. The intention of the current longitudinal study is to observe the individual member of the crowd's behavior throughout the process and to gain knowledge on influencing factors on their effort and performance. Specifically, this study aims to address the following questions:

RQ1: What are the main components involved in an IT-enabled CS process?

RQ2: What are the factors influencing IT-enabled CS performance in a business context?

RQ3: Do the effects of these factors change over time throughout the process?

1.1 Research Agenda

The remainder of this dissertation proceeds as follows. First, a literature review is provided to support the CS conceptual framework developed in this dissertation. Second, the X-Culture platform' characteristics is discussed. Third, using the conceptual framework, a longitudinal model and hypothesis are presented. Fourth, the methods and results of the quantitative study that were used to test the model are explained. Fifth, the methods and results of the qualitative study that was conducted based on the interviews with the participants in the X-Culture project are discussed. The results of the qualitative study complement the quantitative study results and help to better understand behavior of the crowd. Finally, a discussion of the key findings and potential contributions of the dissertation is provided.

CHAPTER II

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Since the term, CS is used for a wide group of activities that takes on different forms, it is challenging to clearly define what CS really is and what its characteristics are. In order to improve its performance, it is required to understand CS characteristics and the possible combinations of these characteristics that might influence crowd's behavior throughout the process. There has been progress in the literature to understand important characteristics that might impact the crowd's performance. These understandings, however, are currently dispersed across desperate studies. In the following sections, first a brief history of CS is described and the definition of CS used in this study is provided. Next, through excessive study of the literature, components of CS and their dynamics will be brought together in a conceptual framework which provides a single and holistic reference point for part two of this dissertations and studies in the future.

2.1 History and Applications

The concept of seeking assistance beyond one's own capabilities from the 'crowd' is not new. In 1714, the British government asked the crowd to develop a reliable way to compute longitude and offered a monetary prize for the winner. In 1858, a group of scholars created the first Oxford English Dictionary and appealed for volunteers to write entries according to their area of expertise. The dictionary was assembled by a

'crowd'. However, it wasn't until the rise of the Internet that harnessing the power of crowds and the phenomenon that is known now as "CS" really took off. Internet-enabled technologies enable large heterogeneous groups of people from all around the world to communicate and collaborate together and set off a wide range of "open" and "crowd-sourced" practices and approaches (Bennett & Tucker, 2012; Chesbrough, 2003).

Pierre Levy (1995) is among the first scholars who ponder the emergence of a "collective Intelligence" as individuals contribute to the "knowledge community" through the internet: "It has become impossible to restrict knowledge and its movement to castes of specialists . . . Our living knowledge, skills, and abilities are in the process of being recognized as the primary source of all other wealth. What then will our new communication tools to be used for? The most socially useful goal will no doubt be to supply ourselves with the instruments for sharing our mental abilities in the construction of collective intellect of imagination." (Lévy, 1997)

James Surowiecki (2004), in his book *The Wisdom of Crowds*, investigates several cases of crowd wisdom applications where the success of solutions depends on a large body of solvers. He proposed that: "under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them" (Surowiecki, 2004). Further research shows that under the right conditions crowds produce better solutions than those offered by experts; under the right conditions, size and diversity beat ability (Howe, 2006b; Libert & Spector, 2008; Shirky, 2008; Surowiecki, 2004; Tapscott & Williams, 2010).

In 2006, a *Wired Magazine* editor, Jeff Howe coined the term "Crowdsourcing" as

distribution of work to the crowd via internet: "For the last decade or so, companies have

been looking overseas, to India or China, for cheap labor. But now it doesn't matter

where the laborers are - they might be down the block, they might be in Indonesia - as

long as they are connected to the network ... **Technological advances** in everything from

product design software to digital video cameras are breaking down the cost barriers that

once separated amateurs from professionals ... The labor isn't always free, but it costs a

lot less than paying traditional employees. It's not outsourcing; it's CS" (Howe, 2006b). In

his blog, Howe (2006) offered the following definition:

> Simply defined, crowdourcing represents the act of a company or institution taking
> a function once performed by employees and outsourcing it to an undefined (and
> generally large) network of people in the form of an open call. This can take the
> form of peer–production (when the job is performed collaboratively), but is also
> often undertaken by sole individuals. The crucial prerequisite is the use of the open
> call format and the large network of potential laborers. (Howe, 2006a)

Since Howe (2006) popularized the concept of "crowdsourcing", different

terminologies were used to describe the phenomenon, such as collective intelligence,

crowd wisdom, and mass collaboration (Doan, Ramakrishnan, & Halevy, 2011). Other

terms can also be found in the literature; including collective wisdom (Hwang, 2009) and

crowd work (A. Kittur et al., 2013). In this study, the term "crowdsourcing" is used

because this term thoroughly captures the concept and was widely used by many studies

in the field (Estelles-Arolas & Gonzalez-Ladron-de-Guevara, 2012; Howe, 2006b;

Thuan, Antunes, & Johnstone, 2013). One should note that there are differences between

CS and other associated concepts such as outsourcing and open sourcing. While outsourcing allocates work to a defined organizational entity, CS allocates work to an unorganized collection of individuals. It makes it possible to harness volunteers who might not otherwise be able to contribute (Howe, 2006b; Saxton & Kishore, 2013). There are also differences between CS and open sourcing. While open sourcing is about a community sharing code for the common good and therefore involves many contributors and many beneficiaries (Grams, 2010), CS involves many contributors, and few beneficiaries.

In the CS literature, various perspectives of CS have been presented: a process that involves several key actors and operations (Hetmank, 2014; Stewart et al., 2010), a paradigm that provides principles to real world problems (Albors et al., 2008; Brabham, 2008a; Buettner, 2015; Hetmank, 2014; Kazman & Chen, 2009; Vukovic & Bartolini, 2010), or a platform with specific functions and features which can implement the paradigm and support the corresponding processes (Gray, Shoaib, Kulkarni, & Suri, 2016; Hetmank, 2013; A. Kittur et al., 2008; Kucherbaev, Daniel, Tranquillini, & Marchese, 2016; Schenk & Guittard, 2011; Vuković, 2009). In this dissertation, CS is studied as a process. In the last decade, research and practices on crowd-sourced systems have continued to grow, evolve and revolutionize the way work gets done. Table 1 depicts some successful CS applications and descriptions of their processes:

Table 1. Examples of an IT-Enabled CS Applications	
Example	**Description**
Kaggle	A platform that hosts statisticians and data miners from all over the world who compete to produce the best models (founded in 2009).
GalaxyZoo	A crowd-sourced astronomy project which invites public to assist in the classification of large numbers of galaxies (launched in 2007).
Amazon Mechanical Turk	A platform where employers are able to post jobs such as writing product descriptions, or identifying performers on music CDs. Workers can then browse among existing jobs and complete those in exchange for a monetary payment set by the employer (launched in 2005).
GoFundMe	A system that allows people to raise money for events such as celebrations and graduations to challenging circumstances like accidents and illnesses (launched in 2010).

In the first part of this study, based on the literature, a general definition of CS will be provided and a CS process conceptual framework will be developed to better understand the main components involved in the CS process and the interaction and integration of these components throughout the process. Developing a CS conceptual framework expands our understanding of this phenomenon and helps to differentiate various cases of CS based on some fundamental dimensions. In order to improve CS performance, it is necessary to understand the process characteristics and the possible combinations of these characteristics. Without a clear understanding of the CS concept and operations involved in the process, it is difficult to develop mechanisms that maximize the performance of the process.

2.2 Developing the Conceptual Framework

To develop a general definition and a conceptual framework for CS process, first a search of Information Systems literature from 2006 to 2016 was conducted. The article

collection process began by searching the basket-11 journals (J. G. Clark, Au, Walz, Warren, & Guynes, 2011). These journals are identified as high-quality mainstream IS journals. The review also included proceeding papers from three major IS conferences, namely the International Conference on Information Systems (ICIS), the Hawaii International Conference on System Sciences (HICSS), and the Americas Conference on Information Systems (AMCIS). The CS research were collected and initial coding of the articles were conducted using the terms such as: "definition", "conceptual framework", "typology", "taxonomy", "review", along with the keywords: "crowd source", "crowd sourced", and "crowdsourcing".

Many researchers attempt to propose their own definitions for CS (Vukovic 2009; Vukovic et al. 2010, Brabham, 2008a, 2008b, 2013; Howe, 2006, 2009). These definitions are focused on specific aspects of CS applications in particular areas. Estelle and Gonzalez (2012) provide a more general and global definition of CS and establish the basic characteristics of any CS initiative. Estellés-Arolas and González Ladrón-de-Guevara (2012) synthesized 40 definitions extracted from 209 CS articles. As a result, they proposed a definition covering "any given crowdsourcing activity" (p. 190), which was characterized by the following elements: a defined crowd, an outlined task, a clear compensation for the crowd, an identified initiator, defined benefits for the initiator, an online process, the open call, and internet usage:

> CS is a type of **participative online activity** in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task. The undertaking of the task, of variable complexity and modularity, and in which the crowd should participate bringing their work, money,

knowledge and/or experience, always entails mutual benefit. The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowd sourer will obtain and utilize to their advantage what the user has brought to the venture, whose form will depend on the type of activity undertaken. (Estellés-Arolas & González-Ladrón-de-Guevara, 2012)

We agree with the definition proposed and apply the above definition of CS throughout this study. There is existing research that centralizes around the taxonomies, typologies and categorizations of CS. In the table below (Table 2), these studies and a brief description of them are provided:

Table 2. CS Literature Review of Taxonomies and Typologies	
Author	Description
Zhang and Benjamin (2007)	Suggested that in social commerce, the main components are people, information, technology, and organization that can constantly interact and integrate with each other to form a dynamic equilibrium. They present the information-model or I-model based on these components (Zhang & Benjamin, 2007)
Brabham (2008a)	Presented four dominant CS types based on their functions: the knowledge discovery and management approach, the broadcast search approach, the peer-vetted creative production approach, and distributed human intelligence tasking (Brabham, 2008a)
Whitla (2009)	Identified three types of CS activities based on their purpose: product development, advertising and promotion, and marketing research (Whitla, 2009)
Rouse (2009)	Proposed taxonomy of CS along three dimensions: supplier capabilities/nature of the task, distribution of benefits, and forms of motivation (Rouse, 2009)
Malone et al. (2010)	Developed a conceptual framework based on the answers to the following four key questions: What is being done? Who is doing it? Why are they doing it? How is the task performed? (Malone & Laubacher, 2010)
Geiger et al. (2011)	Focused exclusively on an organizational perspective and on the mechanisms available to these organizations. The resulting dimensions are: pre-selection of contributors, accessibility of peer contributions, aggregation of contributions, and remuneration for contributions (Geiger et al., 2011)

Schenk and Guittard (2011)	Characterized the types of tasks concerned by CS along several aspects: cognitive dimension, nature of incentives, benefits of CS (Schenk & Guittard, 2011)
Yuen et al (2011)	Provided taxonomy of CS along four dimensions: application [voting system, information sharing system, game, and creative system]; algorithm; performance [user participation, quality management, cheating detection]; dataset (Yuen, King, & Leung, 2011)
Zhao and Zhu (2012)	Identified the fundamental dimensions of a technology mediated CS process by addressing a set of key questions: Who is performing the task? Why are they doing it? How is the task performed? What about the ownership and what is being accomplished? [Based on the Malone et al. model (Malone et al. 2010)] (Zhao & Zhu, 2012)
Boudreau and Lakhani (2013)	Provided a summary of the four main approaches for CS: contests, collaborative communities, complementors, and labor markets (Boudreau & Lakhani, 2013)
Saxton et al. (2013)	Developed a taxonomy consisting of nine distinct CS models and characterized each model along with the following dimensions: outsourcing area, community user role, level of collaboration, and type and level of managerial control systems (Saxton & Kishore, 2013)
Ye and Kankanhalli (2013)	Identify three main CS approaches: open call for participation, open call for solutions, and open call for candidate approach (Ye & Kankanhalli, 2013)

Although several papers were found on the subject, few of them focused on understanding of the interaction and integration of all the main components involved in CS processes. These papers provide us with an initial set of characteristics which were integrated in order to develop a general conceptual framework for IT-enabled CS process. For defining the dimensions of any CS process, it is necessary to answer the following questions: *Who?* (who initiates the process? who benefits from it? who performs the task?) *Why?* (why does the crowd participate in the process?) *What?* (what is the task?) *How?* (how does the crowd perform the task? [platform]). Different combinations of

answers to these questions, describe different types of CS processes. Figure 1 depicts the conceptual framework.

In the next sections, a comprehensive review of the literature will be conducted to discuss the characteristics of a CS process based on the possible answers to each of these key questions (Who-Why-What-How).
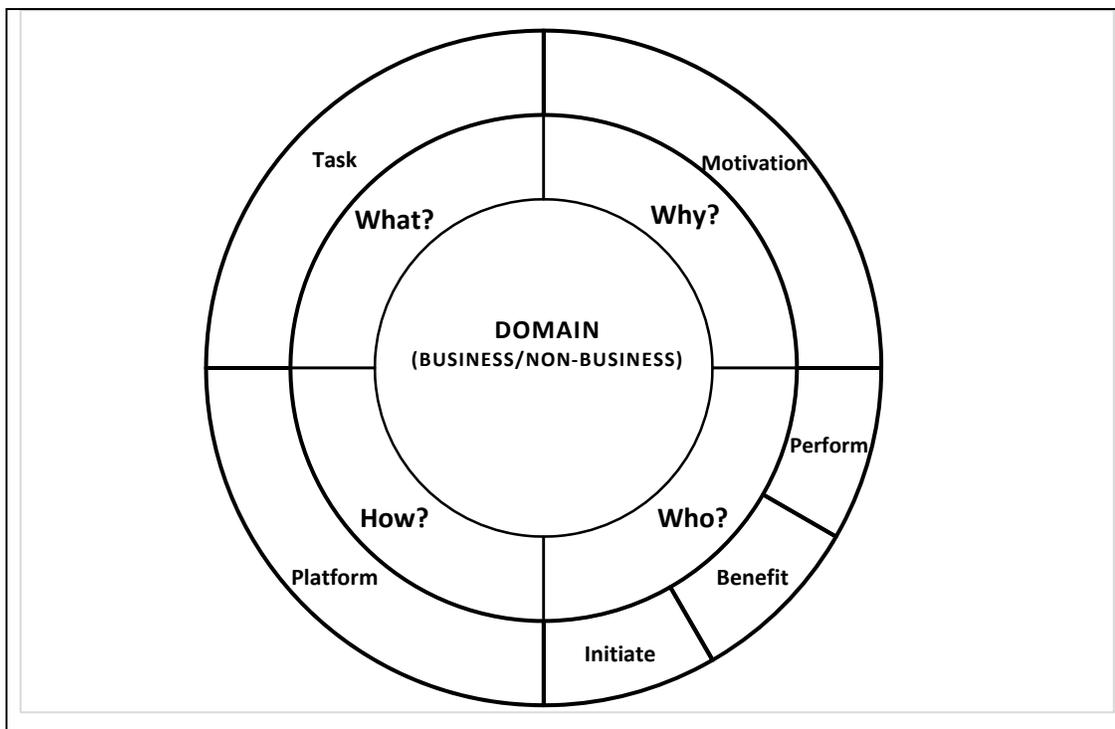
Figure 1. CS Conceptual Framework

2.2.1 Domain

CS can be applied in two contexts: business and non-business. The former includes companies, for-profit organizations or marketplaces (Chanal & Caron-Fasan, 2008; Poetz & Schreier, 2012; Vuković, 2009; Whitla, 2009) and the latter includes non-profit organizations or institutions, such as public libraries or government (Holley, 2009;

14

Hsueh et al., 2009; Hudson-Smith et al., 2009; A. Kittur et al., 2008). CS is a model for problem solving, not merely a model for doing business (Afuah & Tucci, 2012; Doan et al., 2011). Researchers study both business and non-business applications of CS. It is important to identify and clarify the domain for the successful adoption and implementation of CS.

2.2.2 Who?

2.2.2.a Who Initiates the Process?

Perhaps the most important component of a CS process is the initiator (or crowdsourcer) (Alonso & Baeza-Yates, 2011; Berger et al., 2014; Brabham, 2008a; Burger-Helmchen & Penin, 2010; Kleemann, Voß, & Rieder, 2008). The initiator can be a company (e.g. Coca-Cola's "Shaping a Better Future" challenge, Doritos' "Crash the Super Bowl" contest, etc.), or a public organization (e.g. Smithsonian Institution's "Digital Volunteer" program, the Federal Bureau of Investigation's CS website launched in April 2011, etc.). Individuals of any background can also turn to a crowd to solve their problems. For instance, Jeff Howe used CS to design the cover of one of his books (Howe, 2009). CS suggests a business model for companies, but more than that, it is a potential problem solving mechanism (Brabham, 2008a). The initiator of the process can be any entity that is able to carry out the process which could be for-profit or non-profit organizations, a government institution, or an individual.

2.2.2.b Who Benefits from the Process?

In this regards, CS process can benefit three groups (Grams, 2010; Rouse, 2009): processes that clearly provide private benefits to meet the commercial goals of the

initiator(s) (e.g. Amazon mechanical Turk), social projects that are designed to benefit the public or a community of some type that uses the power of crowd in the service of humanity (e.g. Galaxy Zoo, Data Kind, etc.), and projects that provide mixed benefits for both individuals and communities (e. g. customers offering suggestions for product improvement can benefit the firm as well as many customers if the idea is valuable to many customers) (Grams, 2010; Rouse, 2009).

2.2.2.c Who Performs the Task?

The crowd is the dynamically formed group of individuals who voluntarily participate in the CS systems to share their ideas, experiences, knowledge, work, or money (Zhao & Zhu, 2012). Attraction of the right crowd and their sustainable contribution are the keys to CS success and requires understanding of the characteristics of the individual members of the crowd (Doan et al., 2011). In this dissertation, focus is on the crowd's source, heterogeneity, and level of skill.

Source of the crowd: Depending on the initiator's tolerance for risk and the need for diversity, one source of the crowd may be more optimal than the other. Crowd may be found through the following three sources: Existing specific communities where specific knowledge and expertise are needed (Di Gangi, Wasko, & Hooker, 2010; Jeppesen & Lakhani, 2010); General public where any given interested party can participate (Chilton, Horton, Miller, & Azenkot, 2010); combination of the two where an open call is made, but those who can participate are controlled.

As initiators reach into external sources, diversity and size of the crowd increases but so do potential risks and noise. Initiatives who deal with confidential information as

well as large corporations concerned about intellectual property leakage or loss of competitive strategies often prefer internal communities over the external crowd. Additionally, some tasks require the wisdom and creativity of a heterogeneous crowd, where each person brings their personal knowledge. In these cases, the increase in the number of individuals who attempt to solve a problem increases the diversity of the ideas generated by the crowd, which increases the likelihood of getting to a novel, effective, and implementable idea. In other cases, such as in the translation tasks, the heterogeneity will not be so important. In choosing the number of the crowd, initiators should also consider availability of necessary tools and resources to store, filter, evaluate, and analyze the data created through the CS process (La Vecchia & Cisternino, 2010).

Variables related to the crowd's diversity include age, gender, level of education, culture, country of origin, background, etc. Some research studied the effect of the individual's demographic characteristics on the level of effort they show in the process and the task performance and why in some cases it should be defined prior to the start of the process (S. E. Bonner & Sprinkle, 2002; Boudreau & J., 2012; Brabham, 2008b, 2010; Buettner, 2015; Jeppesen & Lakhani, 2010; Poetz & Schreier, 2012; Ye & Kankanhalli, 2013). For instance, Buecheler et al. (2011) demonstrated that the majority of the participants in Starmind, which relates to crowd creativity, are PhD students, post-docs, researchers and professors. Brabham obtained similar results with two CS platforms: iStockphoto (2008) and Threadles (2010). Bonner and Sprinkle (2002) emphasize the need for further research on the relationship between cultural background (and its attendant values) along with other components of CS such as the efficacy of

17

motivations. However, prior research has not examined whether differences in these attributes actually lead to differential effort responses and therefore performance.

Crowd's level of skill: Skill, broadly defined, includes the various capabilities that are relevant to the performance of a task. Skill plays a crucial role in the performance of tasks (S. E. Bonner & Sprinkle, 2002). Depending on the initiator's needs and nature of the task, skills needed to overcome a task could be: general, specialized, or situational. While simple and repetitive work such as tagging an image requires general skills, asking for the crowd's creativity and wisdom may need specialized knowledge. For instance, asking the crowd to suggest improvements to the current product design, require specialized skills about the market, the product, the materials, the manufacturing process, etc. Furthermore, tasks asking for the crowd's evaluations and voting may require the crowd to provide situational skills (e.g., time, place, event) to solve the problem. CS is built based on the access to the Internet, which connects a diverse group of individuals who have many kinds of expertise, abilities, and problem-solving skills (Howe, 2009; Terwiesch & Xu, 2008). In order to improve the task performance, it is important to understand exactly what skills the person brings (or does not bring) to the task in order to suggest solutions for improving performance.

2.2.3 Why does the Crowd Participate in the Process?

Motivation and incentives have been studied in the related areas of open innovation, outsourcing, and open source software (OSS) (Bagozzi & Dholakia, 2006; Hars & Ou, 2002; Krishnamurthy, 2006). However, there are differences between CS and other related areas which emphasize the need for additional studies on motivations in a

18

CS process (Zhao & Zhu, 2012). The voluntarily nature of participation in CS activities may lead the participants of this process to have a vast combination of incentives.

The distinction between intrinsic and extrinsic motivations is the fundamental idea of several psychologists' theories of motivations and incentives (Deci and Ryan's cognitive evaluation theory 1985; Heider's attribution theory 1958; Herzberg's two factor theory 1993). Intrinsic motivation refers to "doing something because it is inherently interesting or enjoyable" (Ryan & Deci, 2000, page 55). It intrigues participants' inner motives such as natural internal feelings of competence, satisfaction, or fulfillment. It occurs when an individual engages in a certain behavior because it is personally rewarding. An intrinsically motivated individual participates in an activity because of the fun and challenge associated with it rather than for external motives. External motivation, on the other hand, refers to "doing something because it leads to a separable outcome" (Ryan & Deci, 2000, page 55). It involves engaging in a behavior because of external incentives, such as recognition by others, or direct or indirect prize or monetary compensation.

Other theories, explore motivation through a smooth transition between internal and external motivations (Rm Ryan & Deci, 2000) . These theories have been developed through a set of five sub-theories: *External motivation (* receiving rewards such as monetary compensation and better job opportunities) (Archak & Sundararajan, 2009; Stewart et al., 2010; Brabham, 2008a, 2012); *Introjected motivation* (getting recognition among peers) (Brabham, 2010); *identified motivation* (feeling of greater freedom and volition since the behavior is more compatible with his or her personal goals and identity)

19

(Ke & Zhang, 2009); *Integrated motivation (a* sense of virtual community where the activities are considered as meaningful and significant) (Brabham, 2010; Jin, Li, Zhong, & Zhai, 2015). *Intrinsic motivation* (facilitating several intrinsic motivations such as perceived enjoyment and fun, curiosity and interest, developing individual skills and self-affirmation, etc.) (Stewart et al., 2010). Depending on the task, CS initiators must distribute the right mix of incentives in order to motivate the right crowd to participate.

2.2.4 What is the Task?

The CS approach can be applied in various contexts and for different reasons. It is important to understand and identify the functions and characteristics of the task. Task characteristics and its attributes shape most of the components involved in the process. CS tasks can be classified into three categories: *Simple*, *Moderate*, *and Complex* (Rouse, 2009; Schenk & Guittard, 2011). Simple tasks are structured tasks that can be broken into a series of steps and often have a single acceptable solution or a defined range of acceptable solutions. These are routine and often time-consuming tasks that can be performed by an individual with low or moderate level of skill and training (Little, Chilton, Goldman, & Miller, 2010). Examples include tagging images, identifying handwriting, and some community research projects. Moderate tasks involve a higher level of difficulty and can be more difficult to evaluate (Brabham, 2012). Examples include designing a T-shirt or logo, user-generated advertisement, photography, or performance of more complex tasks in a shared scientific effort. Finally, complex tasks are less structured, non-routine tasks and can only be performed effectively by the crowd members with deep knowledge and experience and are hard to evaluate (Albors et al.,

20

2008; Bogers, Afuah, & Bastian, 2010; Jeppesen & Lakhani, 2010). Examples include

generating product ideas, predicting market trends, or solving complex problems. Task

complexity is among the most important factors that define a CS process.

Previous research has shown that human decision-making strategies change to

adapt to task requirements (Anderson, 1990; Payne, Bettman, & Johnson, 1992; Simon &

Newell, 1971). Therefore, in order to understand behavior of the crowd in CS process it is

required to understand the nature of the task. Specifically, in the next sections, tasks'

various functions and participation modes will be studied.

2.2.4.a Functions

It is important that the crowd-sourced tasks have clear objectives. The crowd

needs to carry out the resolution of a problem through the process. In CS activities, tasks'

functions seem to gain an unprecedented power due to the fading of time, space and even

organizational boundaries (Brabham, 2008a). There are different classifications of the

functions of CS applications in the literature.

Howe (2006) differentiates between four functions: crowd creation, crowd labor,

crowd wisdom, and crowd funding. Brabham (2012) identifies four different functions

including "knowledge discovery and management, broadcast search, peer-vetted creative

production, and distributed human intelligence" (Brabham, 2012; Howe, 2006b).

Furthermore, Hossain and Kauranen (2015) classify CS applications into six categories of

idea generation, micro tasking, public participation, citizen science, citizen journalism,

and wiki (Hossain & Kauranen, 2014). Zhao and Zhu (2012) classify the business CS

functions into four categories of design and development, idea and consultation, test and

21

evaluation, and others (Zhao & Zhu, 2012). Kleeman et al. (2008) also focus on business application of CS and mentioned several categories: product development and configuration, product design, competitive bids, permanent open calls, community reporting, product rating, and customer-to-customer support (Kleemann et al., 2008). Whitla (2009) surveyed a more specific domain in marketing-related literature and found that there are three areas in which firms actively use CS: product development, advertising and promotion, and marketing research (Whitla, 2009). Based on the literature, in this study, the business and non-business CS functions are classified into four broad categories: crowd creation, crowd wisdom, crowd labor, and crowd funding. Crowd creation refers to contribution via a new design, product, concept, or solution. The output from crowd creation is an end-product, intellectual or physical, that has a tangible value to others. On the other hand, crowd wisdom refers to the cognition, coordination, and cooperation of crowds in order to predict future outcomes or trends (Surowiecki, 2004); groups of people can connect through internet-mediated technologies and form networks of trust without a central system controlling their behavior or directly enforcing their compliance. We incorporate citizen science and citizen journalism under this category. Crowd labor denotes the contribution via activities that range from simple to specialized tasks including voting, judging, or filtering content. And finally, crowd funding refers to asking the crowd to invest in the activities of individuals or groups through online open announcement. It should be noted that CS is a complex mechanism and often involves more than one of these functions.

2.2.4.b Participation Modes

The CS process can either be integrative or selective (Schenk & Guittard, 2011). At one extreme, CS offers access to multiple and complementary information and data (integrative CS). Since the issue is to pool complementary input from the crowd, individual elements have very little value per se but the amount of complementary input brings value to the firm. Since individuals within the crowd are heterogeneous, CS enables initiators to gather a variety of content. The initiator seeking to implement integrative CS should however be aware of integration challenges. Data or information collected from various sources might be incompatible or redundant if no precaution is taken.

At the other extreme, CS gives access to individual problem solving skills (selective CS). The initiator is led to choose an input from among a set of options that the crowd has provided. Selective CS may be a way to find candidate solutions if the initiator has a specific need. For instance, a firm facing an R&D problem may rely on competences from the crowd in order to solve the problem (Raymond, 2001). Selective CS generally implies a winner-takes-all mechanism where only the finder of the "winning" solution is rewarded. The selective or integrative nature of CS is related to the type of tasks under consideration.

2.2.5 How does the Crowd Perform the Task? [Platform]

The internet-enabled technologies allow the crowd to form, facilitate, and optimize the continued interaction and ultimate solution to the CS problem. Brabham (2008a) states that CS is enhanced by several factors relating to today's Internet:

23

increased speed, global reach, anonymity, increased interactivity and collaboration

capabilities, and the ability to carry media from other communication modes (Brabham,

2008a). The initiators of the CS processes can develop their own platform, use a third-

party CS platform, or use free communication and collaboration tools and applications

such as email, Skype, and Dropbox. The required platform and its capabilities differ

based on initiator's goal and the characteristics of the task.

Considering different parts of the process explained above and referring to the

conceptual framework presented in figure 1, figure 2, table 3 shows the elaborated

version of the conceptual framework with detailed possible answers to each of the four

main questions: Who – Why – What – How.
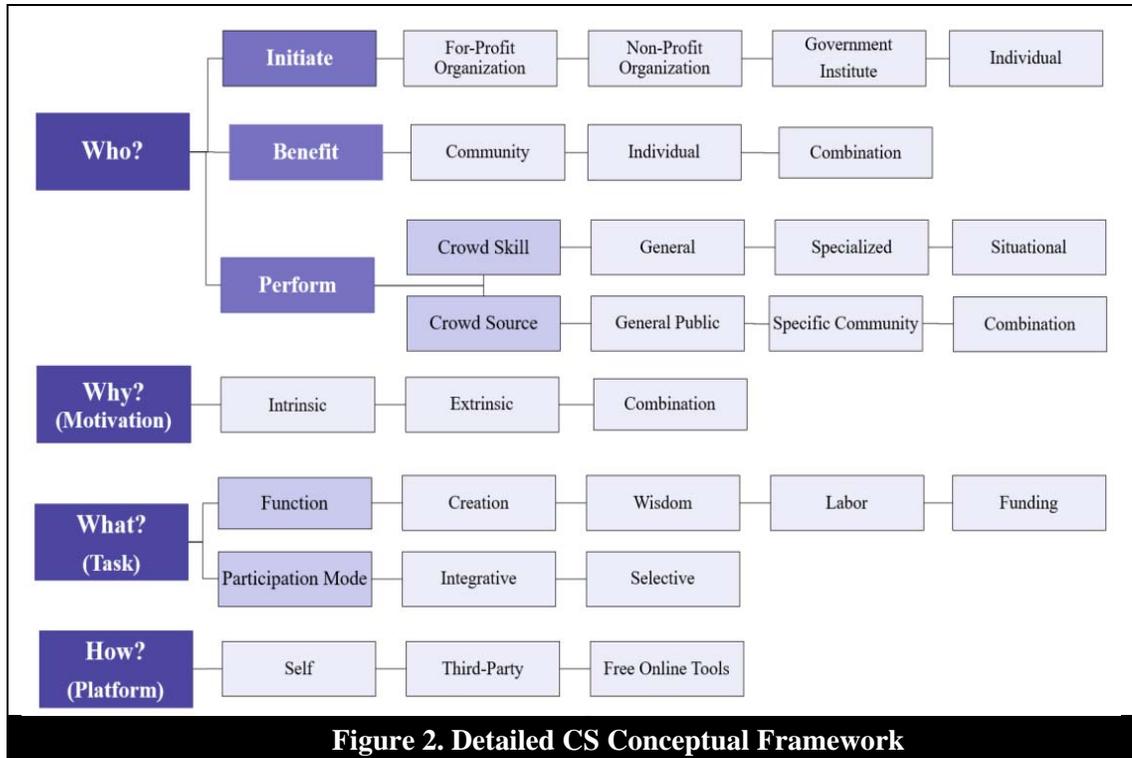
Figure 2. Detailed CS Conceptual Framework

Table 3 shows the characteristics of CS application examples listed in Table 1 using the CS conceptual framework provided.

Table 3. Characteristics of CS Application Examples					
		Kaggle	**Galaxy Zoo**	**Amazon Mechanical Turk**	**GoFundMe**
Who?	**Initiate**	For-profit organizations or individuals	A non-profit organization	For-profit organizations or individuals	Combination
	Benefit	Combination	Community	Individual	Individual
	Perform	Data scientists with high required skill level	Public	Public	Public
Why?	**Motivation**	Extrinsic	Intrinsic	Extrinsic	Combination
What?	**Task**	Function: Creation Participation mode: Selective	Function: Wisdom Participation mode: Integrative	Function: Labor Participation mode: Combination	Function: Funding Participation mode: Integrative
How?	**Platform**	Self	Self	Self	Self

Kaggle is a CS platform for predictive modeling and analytics competitions on which for profit companies and researchers post their data and statisticians and data miners from all over the world compete to create the best models. The initiator offers monetary and non-monetary prizes. Galaxy Zoo is a crowd-sourced project which invites people from all around the world to assist in classification of large numbers of galaxies. This project benefits the community by better understanding of the objects and categorizing them into classifications. Volunteer participants are intrinsically motivated to participate in this project. Amazon Mechanical Turk on the other hand, is a CS

marketplace enabling organizations and individuals to post routine jobs and to use the

crowd as labors to accomplish these tasks in return for money. GoFundMe is a crowd

funding platform that allows users to create their own website to raise money for different

causes. Applying the conceptual model makes it more efficient to describe and

differentiate various types of CS applications.

CHAPTER III

RESEARCH MODEL

In the first part of this study, a general definition and conceptual framework of internet-enabled CS process were presented. The CS literature was analyzed to explore the characteristics of a CS process by discussing the possible answers to each of the key questions: *Who?* (who initiates the process? who benefits from it? who performs the task?) *Why?* (why does the crowd participate in the process?) *What?* (what is the task?) *How?* (how does the crowd perform the task? [Platform]). In the second part, technology mediated CS performance will be explored employing a longitudinal study. The focus of this part of the dissertation will be to study a specific case of CS project in a business context in order to investigate the dynamics of the major components involved in the process and their impacts on individual participant's effort and level of performance.

This chapter will examine various theories surrounding such relationships. In particular, this study will build on previous research that explains crowd's behaviors in technologically mediated CS in order to develop a theoretical foundation for an integrated and holistic examination of crowd's effort and performance in a CS process. A unique aspect of this research is the longitudinal nature of the study which attempts to assess the pervasiveness of the relationships between theories of behavior, culture, motivation, task, and platform on the crowd's effort and performance in a CS environment. In particular,

27

this study attempts to determine if these relationships change over time. This understanding currently does not exist and would be useful to form instructional strategies in this emergent field.

3.1 The X-Culture Project

Since CS is a broad topic, some narrowing is necessary to make the project manageable. This is necessary to maintain the parsimony of the model presented herein. For this study, the focus is on the CS process in the business domain. CS is being applied across a variety of different businesses for a variety of different purposes. However, few studies review the processes of CS idea generation and consulting tasks that needs specialized skills and high level of creativity. To address this gap, this dissertation will focus on understanding the performance of the crowd in a crowd-sourced problem solving process for consulting tasks. The study will be conducted on the X-Culture projects (http://x-culture.org/). The X-Culture provides a global CS platform and gives us an opportunity to explore many of the CS variables discussed in the previous sections. The X-Culture projects platform selects and crowdsources real-life business challenges presented by its corporate partners such as the Home Depot, Polaris, Mercedes Benz and Louis Vuitton. Over 4,000 individuals from 40 countries on all six continents take part and compete in the project semi-annually. There are opportunities for monetary prizes, career advancement, internships, employment, etc.

Volunteers can join individually, with their own team, or they can choose to be placed on an international team with other professionals. Once each participant's name is in the system, they receive an email with a unique link to the project materials and

readiness test. The readiness test includes questions about the project and online collaboration tools, as well as questions about the participant's prior international experience and background. Participants must successfully pass the test (80% or more correct answers) to participate in X-Culture project.

If volunteers choose to be placed on an international team, after successful completion of the test, they receive the names and contact information of the team members who are randomly picked and assigned to them. Each participant is responsible to reach out to teammates immediately to establish contact and start working on the project. By the end of first week, each participant is expected to have exchanged at least a few messages with their teammates. Team members who fail to establish contact with their teams are excluded from the project. Communication starts via email, but once the initial contact is established, the team can use any means of communication.

After each team selects a client company and a business challenge to work on, participants are required to submit a short weekly progress report. A panel of experts provides feedback on the submissions and tips for further improving the work. Also, each participant is asked to fill out a weekly survey to evaluate the performance of the team members. There are several live webinars with the client company, so participants are able to ask questions, receive feedback on their ideas, or request additional information if necessary.

The final report is evaluated by a panel of experts and the client organization. The evaluation score is based on evaluation of the executive summary, analysis of the competition, clients, projects, and market, operation costs analysis, staffing, and

29

formatting and presentation. If volunteers participate with their own team, upon

complication of the project, they receive a *X-Culture Consulting* certificate. If they

choose to be placed on an international team, they also receive a *Global Collaboration*

certificate. The winning teams and participants receive the cash prize.

In short, the X-Culture projects are crowd-sourced business consulting

competitions initiated by for-profit organizations. Individuals from all around the world

participate semi-annually to solve highly complex indivisible business challenges during

an eight-week period. Participants need to have specialized skills and they can join with

their own team or choose to be placed on an international team with other professionals.

The participation mode is selective where the best solutions are awarded intrinsically as

well as externally by monetary prize, certificate, employment networking opportunities,

etc. Initiators communicate with the crowd through webinars posted on the platform

website and emails sent from the platform Admin. Crowds are supposed to use any free/

paid communication and collaboration tools. Figure 3 shows the detailed conceptual

framework for the X-Culture project by combining the answers to the four main

questions: ***Who?*** (who initiated the process? who benefits from it? who performs the

task?) ***Why?*** (why do perform the task?) ***What?*** (what is the task? what is the expected

outcome?) ***How?*** (how do the crowd perform the task? [platform]).

Who?	Initiate	For-profit organizations (The Home Depot, Polaris, Mercedes-Benz, Louis Vuitton, etc.)
	Benefit	Individual organizations
	Perform	Source: combination of general public and specific community (students) 4000+ volunteers from 40+ countries on all 6 continents. Each session takes 8-weeks. Skill needed: specialized and situational
What?	Task	Function: to create solutions to a business consulting problem Participation mode: selective crowdsourcing where the best solutions are awarded
Why?	Motivation	Intrinsic & Extrinsic: Monetary prize, certificate, employment networking opportunities, etc.
How?	Platform	The X-Culture website and emails Free communication and collaboration tools

Figure 3. Characteristics of the X-Culture Business Consulting Competitions

The X-Culture competitions take eight weeks. During this time, data are collected at three points: prior to the start of the process (here after called t_0), at week four (here after called t_1), and at the end of the project before announcing the final evaluations (here after called t_2). Figure 4 shows the CS process in the X-Culture projects.
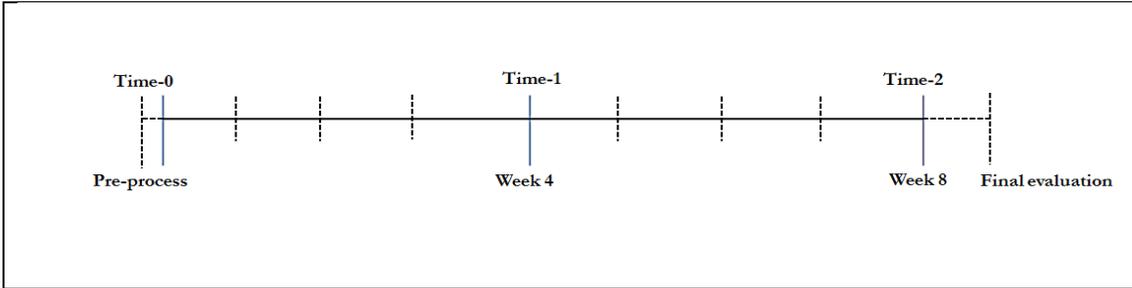
Figure 4. Process of the X-Culture Projects

31

3.2 Theoretical Background

The study will be conducted based on the X-Culture projects and its specific characteristics as discussed in previous section (section 3.1). This part will examine various theories surrounding the relationships between each dimension of CS process identified in the conceptual model and crowd's level of effort and performance in the X-Culture projects. In particular, this study will build on previous research that explains crowd's behaviors in technologically mediated CS in order to develop a theoretical foundation for an integrated and holistic examination of crowd's effort and performance throughout the process.

3.2.1 Hypotheses Related to the Crowd

X-Culture was originally designed for university students. However, now it also allows professionals to participate in the program. With about 4,000 graduate and undergraduate students and non-student participants in each session from over 40 countries on 6 continents, the crowd is huge, demographically diverse, geographically dispersed but all meeting basic business qualifications. In this section, the effect of individual participant's characteristics on their effort and performance behaviors is discussed.

Crowds' variables are those that relate to the individual performing the task. They include attributes that crowd members possess prior to performing a task such as knowledge content, knowledge organization, abilities, cultural values, etc. These variables can affect effort and performance through various cognitive processes while performing a task, such as memory retrieval, information search, and problem evaluation

(S. E. Bonner & Sprinkle, 2002). Prior research informs that individual factors such as knowledge content and knowledge organization (S. E. Bonner & Walker, 1994; S. Bonner & Lewis, 1990; Dearman & Shields, 2001; Frederick, 1991; Hunton et al., 2000) can significantly affect performance of a task. Prior research also documents that various abilities such as confidence (Bloomfield, Libby, & Nelson, 1999; Cote & Sanders, 1997) and cultural values (Harrison, Chow, & Wu, 1999) also can impact performance.

While there are numerous crowd variables that could be studied, our primary attention is devoted to the role of variables that are included under the term ''skill.'' Skill, broadly defined, includes many of the individual's related variables, including knowledge content, knowledge organization, and the various abilities that are relevant to performance in a task (S. Bonner & Lewis, 1990; Libby & Luft, 1993). Besides, in order to suggest solutions for improving crowd's participation and performance, it usually is important to understand exactly what skills a crowd member brings (or does not bring) to the task (S. E. Bonner, 1999). Skill can enhance effort and task performance via several cognitive processes. For example, skill includes knowledge (content) of factual information that can be retrieved from memory and also includes the organization of knowledge around meaningful concepts which can facilitate the initial setup of problems (problem representation) and the generation of initial solutions. All of these cognitive processes have substantial effects on effort and performance. In this study, individual's level of skill is measured as the results of the readiness test that participants take prior to the beginning of the project.

Information about IT efficacy (frequency of using online collaboration and communication tools), and International experience (years of work/study outside the country of origin) are also collected prior to the process. Literature shows that previous experience increase ease of use beliefs in users and therefore impact their participation effort (Lewis, Agarwal, & Sambamurthy, 2003). Additionally, literature noted the relationship between experience and expertise specifically in the case of information-processing tasks; ". . . a primary determinant of improved expertise ... is experience" (Hamilton & Wright, 1982). Bonner and Walker (1994) work, which expands Libby's (1993) model of the knowledge acquisition, states that previous experience is positively related to knowledge acquisition (S. E. Bonner & Walker, 1994; Libby & Luft, 1993). Therefore, it can be hypothesized that prior online experience as well as previous international experience enhance an individual's beliefs about the easiness of the process which might reduce their effort throughout the process. However, it can also be hypothesized that previous experience increase individuals' ability and motivation to participate in a project and have positive relationship with participation effort. The data will examine the nature of the relationship between previous experience and effort.

X-Culture participants include people from over 40 countries on 6 continents, competing to solve real-life business challenges. Each member brings their distinct cultural values to the process and it is important to know how cultural dimensions may impact participation effort and therefore performance. Hofstede's framework is considered the most prominent notion of national culture. Hofstede's cultural dimensions: (1) Individualism (versus Collectivism), (2) Masculinity (versus Femininity), (3) Power

Distance (versus Power Equalization), (4) Uncertainty avoidance (versus Uncertainty tolerance), and (5) Long-term orientation (versus Short Term Normative Orientation) (G. Hofstede, 1984; G Hofstede, 2001). Individualism implies belief in the primary importance of the individual as opposed to the group. Masculinity refers to cultures in which social gender roles are distinct. Power distance in a society refers to the extent to which power is distributed unequally and people accept it. Uncertainty avoidance refers to the degree that people feel threatened by uncertain or unknown situations. Long-term orientation is the degree to which people's efforts are focused towards the future rather than the present.

Prior research indicates that national culture may influence individual behavior and the level of effort members put into project (Chhokar, Brodbeck, House, & Global Leadership and Organizational Behavior Effectiveness Research Program., 2007; G. Hofstede, 1980; G Hofstede, 1984, 2001; Maznevski & Chudoba, 2005). Members of high power distance societies accept status differences and are expected to show proper respect to their superior (e.g. Malaysia). Low power distance cultures such as Denmark are less comfortable with differences in social class and are characterized by more participation in decision-making (Ghemawat & Reiche, 2011). Therefore, it can be hypothesized that people from low power distance culture might be faster to show participation effort compare to members of high power distance cultures.

People from an individualistic culture tend to value flexibility to adopt personal schedules and approaches to their work. In contrast, people from a collectivistic culture tend to value collective identity and the presence of team standards for carrying out their

work. They tent to spend more time on group projects and show higher participation effort intensity (Geert Hofstede, 1991). Individualism/collectivism dimension in Hofstede's research was shown to have a strong correlation with power distance dimension, which means that individualist cultures tend to have a preference for lower power distance. A notable exception is France with relatively high power distance culture where there is a focus on individual rights and personal achievement (Ghemawat & Reiche, 2011). In this study, it is proposed that individuals from collectivist societies tend to have more tolerance of being presented with new ideas and have more inter-member dependencies and may put more effort into tasks which may affect their performance.

Cultures with high levels of uncertainty avoidance such as Greece prefer structure and predictability, which results in explicit rules of behavior and strict laws. Members of these cultures tend to be risk averse towards embracing new approaches, or engaging in group activities. In societies with low uncertainty avoidance such as Singapore there is a preference for unstructured situations and ambiguity, which favors risk, innovation, and the acceptance of different views. It can be hypothesized that individuals from societies with low level of uncertainty avoidance tend to be willing to participate and put more effort into tasks and are more flexible facing the challenges throughout the CS activities.

The fourth dimension Hofstede identified is Masculinity and Femininity. Masculine cultures are thought to reflect a dominance of tough values such as achievement, assertiveness, competition and material success, which are almost universally associated with male roles (e.g. Japan). In contrast, feminine cultures focus on values such as personal relationships, care for others, and quality of life. Additionally,

feminine cultures are characterized by less distinct gender roles (e.g. Sweden). Compared to masculine cultures, individuals in feminine cultures place a relatively stronger emphasis on overall well-being rather than bottom-line performance. Regarding to this dimension for the X-Culture project, individuals from both societies may show higher level of effort for different intrinsic and extrinsic motivations.

In this study, the control values contain demographic characteristics of the crowd including age, gender, and level of education. Individual demographic characteristics and their level of skill are measured prior to the start of the process. Thus, it is proposed:

H1a: an individual's skill is positively related to their effort in t_1.

H1b: an individual's skill is positively related to their effort in t_2.

H1c: an individual's skill is positively related to their level of performance in t_1.

H1d: an individual's skill is positively related to their level of performance in t_2.

H1e: an individual's online experience is related to their effort in t_1 (+/-).

H1f: an individual's online experience is related to their effort in t_2 (+/-).

H1g: an individual's international experience is related to their effort in t_1 (+/-).

H1h: an individual's international experience is related to their effort in t_2 (+/-).

H1i-m: an individual's cultural background is related to their effort in t_1 (+/-).

H1n-r: an individual's cultural background is related to their effort in t_2 (+/-).

3.2.2 Hypotheses Related to Motivation

As it has been discussed in the literature review for developing the conceptual framework, a right mix of incentives is necessary to motivate the right crowd to participate in CS process. Ye and Kankanhalli (2013) suggest that incentives for simple

tasks with low outcome variety are typically non-financial (e.g. Galaxy Zoo) (Ye &

Kankanhalli, 2013). Participation in these tasks is usually voluntary or micro-paid.

Companies rely on other incentives/motivations, such as trying to make the task fun

(Kaufman et al., 2011), fulfilling solvers' needs, and invoking their sense of achievement

by emphasizing the tasks' importance (Kaufmann et al., 2011). To motivate participation

in CS, the fun of task solving is a key criterion for task design. Incentives for crowds to

solve simple tasks with high outcome variety are usually both monetary and non-

monetary. Participants in this type of task are self-motivated to differentiate themselves,

to provide novel solutions, and to protect rather than share their knowledge (E.g.

Wilogo). For complex tasks with low outcome variety, participants are likely to expect

monetary rewards for their efforts and time involved. They are motivated by financial

rewards and peer reputation enhanced by the task completion. Also, solvers' need

fulfillment and autonomy both attract participants to work on these tasks (e.g. TaskCn).

For complex tasks with high outcome variety, it may not be feasible to obtain full

solutions through the CS process but it may be possible to obtain a proposal for solutions

(Morgan & Wang, 2010). These tasks may require reward-winning participants' further

collaboration for proposal implementation. Providing attractive financial incentives for

these tasks is found to motivate the crowd to participate. For example, substantial

financial rewards in Innocentive motivate individuals from different domains to crack the

challenges that cannot be solved by a company's internal talents. However, risks exist in

that the substantial time and effort invested in problem solving may be wasted if the

solution does not win. Enjoyment in solving challenges and a sense of achievement may compensate for the risks involved in participation.

In the X-Culture project, the goal is to solve business consulting challenges that need high level of creativity and specialized skills. Leimeister et al. (2009) investigated the crowd's motivations to participate in complex tasks and propose that participants can get motivated extrinsically by direct compensation, self-marketing, and social motives, or intrinsically by challenges and learning opportunity (Leimeister et al., 2009). Intrinsic motivation exists within individuals; however, it can also exist in the relation between individuals and activities (Amabile & Pratt, 2016; Fleck, Webster, & Williams, 1990; Ghani & Deshpande, 1994). The crowd may participate in the project "for the joy of the process, not the product" (Turkle, 1986). Therefore, in order to test for the influences of the motivations on participant's effort and performance, motivational factors introduced by Leimeister et al. (2009) plus task enjoyment were included in the model.

One of the characteristics of CS that differentiates it from other similar concepts is that the crowd is acting voluntarily and so, they have to be compensated. Direct compensation is an external motivation that drives a participant to work hard in order to get expected rewards such as monetary or financial benefits (Archak and Sundararajan 2009; DiPalantino and Vojnovic 2009; Horton and Chilton 2010; Stewart et al. 2009; Zhong et al. 2011). This is especially so when rewards are performance contingent (Rm Ryan & Deci, 2000). The direct compensation can be of relatively minor value, such as a free product or a small cash prize or payment that is likely to be used by the crowd to make a living (Kazdin and Bootzden 1972). The fundamental hypothesis that predicts a

positive overall relation between the presence of monetary motivations and task performance is that direct compensation increases effort and increased effort leads to improvements in performance (either in the short term or the long term).

Another class of extrinsic activated motives is self-marketing. Leimester et al. (2009) described this motivation as an opportunity for demonstrating capabilities and skills; a form of self-advertising for those seeking new job opportunities (Leimeister et al., 2009). Better job opportunities and signaling capabilities to the potential employees may enhance participation effort and performance (Brabham, 2008a, 2010). Hars and Ou (2002) found self-advertisement as one of the main motivations to participate in open source projects for those seeking new job opportunities (Hars & Ou, 2002). These hypotheses related to self-marketing motives can also be assigned in CS activities.

Learning motivations as well as motivation associated with feelings of personal mastery, gaining additional knowledge or skills, competence, and fulfillment that are often discussed in the open source context, can also be applied to CS activities (Hars & Ou, 2002; Lakhani & Wolf, 2003; Leimeister et al., 2009). Research on intrinsic motivation show that the perceived challenge associated with an activity is one of the key determinants of the experience an individual derives from the activity which influence their participation behavior (Csikszentmihalyi, 2000; Deci & Ryan, 1985). Csikszentmihalyi (1991) argue that "the best moments usually occur when a person's body or mind is stretched to its limits in a voluntary effort to accomplish something difficult or worthwhile" (Csikszentmihalyi, 1991)

Moreover, learning theory asserted that all behaviors are motivated by physiological drives (and their derivatives) and intrinsically motivated activities are the ones that provide satisfaction of intrinsic needs (Hull, 1943). Learning theory proposes that there is a maximum level of challenge for a certain level of skill. If the challenges are too high, the individual feels a lack of control over the environment and becomes anxious and frustrated. If the challenges are too low, the individual loses interest. It can be hypothesized that challenge of the task and crowd's desire to learn might result in spending more time on the task and improvement in performance.

CS process is enabled through a virtual environment, in which social interaction is supported by electronic channels. In one branch of social capital literature - the branch that relates back to Mark Granovetter's 1974 book, *"Getting a Job"*, and was initiated by James Coleman, it is claimed that for human beings in a social structure, social rewards exist in parallel to economic rewards (Benkler, 2006; Coleman, 1988; Granovetter, 1995). As Nan Lin puts it, "both economic and social aspects represent standing—that is, a relational measure expressed in terms of one's capacity to mobilize resources" (Lin, 2001). If this theory of social capital is correct, then sometimes individuals are willing to trade off financial rewards for social capital and social relations can motivate individual to participate in a social structure.

Additionally, the literature shows that, in an online environment, the motivation to build professional and personal relationships among the members will contribute to creating a sense of belonging and therefore increase participant's level of effort. The relationship building is practiced more in an early stage of the process. Established

41

groups spend more time on task-oriented activities (Pauleen, 2003; Warkentin, Sayeed, &

Hightower, 1997). Therefore, it is hypothesized that social motives are positively related

to an individual participant's level of effort.

Some researchers believe that intrinsic motivation exists within individuals, while

others state that intrinsic motivation can also exists in the relation between individuals

and activities. People get motivated with some specific activities and not others. Because

intrinsic motivation exists in the relationship between a person and a task, intrinsic

motivation can both be defined in terms of the task being interesting and in terms of the

satisfactions a person gains from intrinsically motivated task engagement. Operant theory

argued that all behaviors are motivated by rewards which are separable consequences

such as food or money. In this theory, intrinsically motivated activities were the ones for

which the reward was in the activity itself (Skinner, 1953). Thus, researchers discussed

that some task characteristics make an activity interesting. Task enjoyment is considered

to compel the initiation of an activity and increase persistence of task performance

(Bandura, 1978). Individuals usually engage in tasks because for them, the activity is

considered as enjoyable (Richard Ryan & Deci, 2002). In the domain of virtual

innovation, it has been shown that that enjoyment motivates online community members

to contribute to tasks (Richard Ryan & Deci, 2002). Participants who are fueled by

enjoyment experience a rewarding activity.

The enjoyment experienced by participants may increase a person's tendency to

repeat that task and strengthen their feeling of active participation and improve their

performance. Participants were asked about their motivation to participate in this project

at week 4 of the project (t_1), and at week 8 of the project (t_2). The following hypotheses is proposed:

> *H2a: task enjoyment in t_1 is positively related to effort in t_1.*
>
> *H2b: task enjoyment in t_2 is positively related to effort in t_2.*
>
> *H2c: motivation to get direct compensation in t_1 is positively related to effort in t_1.*
>
> *H2d: motivation to get direct compensation in t_2 is positively related to effort in t_2.*
>
> *H2e: self-marketing motivation in t_1 is positively related to effort in t_1.*
>
> *Hy2f: self-marketing motivation in t_2 is positively related to effort in t_2.*
>
> *H2g: learning motivation in t_1 is positively related to effort in t_1.*
>
> *H2h: learning motivation in t_2 is positively related to effort in t_2.*
>
> *H2i: social motives in t_1 are positively related to effort in t_1.*
>
> *H2j: social motives in t_2 are positively related to effort in t_2.*

3.2.3 Hypotheses Related to Task

In this section, the relationships between task's attributes and participation effort and performance are hypothesized. The X-Culture project's function is categorized as "crowd creation" and the process is "selective" where individual members of the crowd participate in competitions to solve a specific problem. The goal is to create solutions to a business consulting problem and the best solution will be awarded. Particularly the effect of task analyzability on effort was looked at. Task analyzability is measured in terms of complexity of the instructions provided (Chang, Chang, & Paper, 2003; Nuñez, Giachetti, & Boria, 2009; Perrow, 1967). Analyzability refers to the availability of concrete knowledge about task activities and the degree of complexity of the search process in

performing the task (Chang et al., 2003; Gelderman, 2002). Task analyzability decreases by increase in complexity. By definition, increases in task complexity lead to increases in the effort required to perform a task (Campbell, 1988; Wood, 1986). However, when a task's effort requirements increase, participants may respond by exerting less absolute effort than they would for a simpler task. Standard expected utility theory and adaptive decision-making theory (Payne et al., 1992) suggest that, before performing a task, individuals consider the related costs and benefits. They weigh the benefits associated with better performance against the effort costs necessary to achieve higher performance. If the costs outweigh the benefits, then participants will trade off a reduction in performance for reductions in effort. This may lead to exerting less effort. For this dissertation, data was used to identify the nature of task analyzability and effort relationship. The analyzability of task was assessed by measuring the clarity of the instructions for participants at two points throughout the process, week 4 (t_1) and at the end of the project (t_2). Thus, it is proposed:

H3a: task analyzability in t_1 is related to effort in t_1 (+/-).

H3b: task analyzability in t_2 is related to effort in t_2 (+/-).

3.2.4 Hypotheses Related to Platform

In this dissertation, focus is on the communication (COMM) and collaboration (COLL) systems' instrumental value, which is typically captured in terms of ease of use and usefulness (Davis, 1989). The theory of Task-Technology Fit (TTF) was also incorporated in our model (Goodhue & Thompson Ronald, 1995). Based on this theory,

IT is more likely to have a positive impact on individual's effort and performance if the capabilities of the IT match the tasks that they perform and thus focus on the usefulness of the communication and collaboration systems to carry out the task.

In the X-Culture project, participants use online communication and collaboration tools. Characteristics of these technologies are included in the model by incorporating theories of media richness which can be defined based on the following core characteristics of technologies: the use of multiple media, feedback immediacy, and multiplicity of cues. Feedback immediacy can be defined as timeliness of providing feedback through media while cue multiplicity is the ability of a media to convey information via multiple cues and channels, including physical presence, voice tones, body gestures, words, numbers, and graphic symbols (Daft & Lengel, 1986; Dennis & Kinney, 1998; Kahai & Cooper, 2003; Lai-Huat & Benbasat, 1992; Lim, Matros, & Turocy, 2014). In order to measure media richness, Clark and Brennan (1991) described several characteristics that determine the nature of communication including copresence (members occupy the same physical location), visibility (members can see one another), audibility (members can hear one another), cotemporality (communication is received at the approximate time it is sent), simultaneity (members can send and receive messages simultaneously), sequentiality (members' speaking turns stay in sequence) (H. H. Clark & Brennan, 1991).

Figure 5 displays the difference between face-to-face and computer-mediated environments according to the communication capabilities that are enabled. In a videoconference setting, distributed members exchange live video as well as audio and

text. On the other hand, in a group communication over computer-mediated electronic dialogue environment, users exchange messages via text in real-time. Members lack the capability to see one another and to hear the tone of the speech. Media richness decreases moving from face-to-face communication to video and to audio and to text communication.

Type of environment	Media characteristics					
	Copresence	Visibility	Audibility	Cotemporality	Simultaneity	Sequentiality
Face-to-face	X	X	X	X	X	X
Real-time audio/video (videoconference)		X	X	X	X	X
Audio-only (telephones, conference calls)			X	X	X	X
Real-time electronic dialogue, text-only (computer chat)				X	X	X
E-mail						

Note. From "Grounding in Communication," by H. H. Clark & S. E. Brennan, in L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on Socially Shared Cognition* (p. 142). Washington, DC: American Psychological Association. Copyright 1991 by the American Psychological Association.

Figure 5. Characteristics of Face-to-Face and Mediated Environments

In this study, the level of media richness is considered for the communication and collaboration tool that participants used most often during the process. Participants were asked about the communication and collaboration tools they use for the project as well as their communication with X-Culture as part of the surveys they took at week 4 of the project (t_1) and at the end of the project (t_2). It is hypothesized:

H4a: platform's ease of use in t1 is positively related effort in t1.

H4b: platform's ease of use in t2 is positively related to effort in t2.

46

H4c: platform's usefulness to carry out the task in t1 is positively related to effort in t1.

H4d: platform's usefulness to carry out the task in t2 is positively related to effort in t2.

H4e: media richness is positively related to effort in t1.

H4f: media richness is positively related to effort in t2.

3.2.5 Hypotheses Related to Feedback

An integral component of a CS that may influence performance is feedback. Feedback can be defined as information provided to a person regarding some aspect of their performance. In organizational context, feedback has been seen as a mechanism by which the organization evaluates the quality of relevant work behaviors (Rosen, Levy, & Hall, 2006). In the organizational setting and studies of human behavior, the importance of receiving feedback and its impact on future behavior has been acknowledged excessively (Briers, Chow, Hwang, & Luckett, 1999; Frederickson, Peffer, & Pratt, 1999). However, the effect of feedback has been largely ignored by IS researchers studying mixed systems, such as CS.

There are debates in literature about the effect of feedback on effort and therefore on performance. The most predicted effect of feedback is that it tends to increase the various dimensions of effort, duration and intensity, and consequently enhances performance (Ashford & Cummings, 1983; Pritchard, Jones, Roth, Stuebing, & Ekeberg, 1988). Psychology research has shown major impact of feedback on an individual's performance (Rosen et al., 2006). Moon and Sproull (2008) find that in crowd-sourced activities, users are more likely to return to the project and to make frequent contributions

47

as more feedback is provided, suggesting that feedback may have relation to the effort

duration (Moon & Sproull, 2008). Kokkodis and Ipeirotis (2014) show evidence that it is

possible to predict a worker's performance by categorizing tasks and using feedback

(Kokkodis & Ipeirotis, 2014). However, some empirical evidence tends to show that

feedback does not interact with task performance (Arkes, Dawes, & Christensen, 1986;

Chung & Vickery, 1976; Hogarth, Gibbs, McKenzie, & Marquis, 1991; Kluger &

DeNisi, 1996; Montague & Webber, Carl E., 1965; Phillips & Lord, 1980; Sipowicz,

Ware, & Baker, 1962; B. Weiner, 1966; M. J. Weiner & Mander, 1978). Even in some

cases feedback is thought to debilitate performance (Jacoby, Mazursky, Troutman, &

Kuss, 1984; Locke, 1967). In this dissertation, it is hypothesized that feedback has

positive impact on both effort and performance. The effect of feedback at t_1 is considered

as the average effect of feedback received from the beginning of the process to week 4

and at t_2 as the average effect of feedback from week 4 to the end of the process. The

following is hypothesized:

> *H5a: feedback at t1 is positively related to effort in t1.*
> *H5b: feedback at t2 is positively related to effort in t2.*
> *H5c: feedback at t1 is positively related to the level of performance in t1.*
> *H5d: feedback at t2 is positively related to the level of performance in t2.*

3.2.6 Hypotheses Related to Effort

The effort - performance relationship is discussed greatly in the literature

(Bandura Albert, 1997; Kahneman, 1973; Ruth Kanfer, 1987; Locke & Latham, 2006;

Navon & Gopher, 1979). Kanfer (1990) emphasized on two components of effort: duration and intensity. Effort duration refers to the length of time an individual devotes cognitive and physical resources to a particular task or activity (how long a person works). Effort intensity refers to the amount of cognitive and physical resources an individual devotes to a task or activity during a fixed period of time (how hard a person works) (R. Kanfer, 1990). The literature shows that increased effort leads to improvement in the task performance. Individual effort is measured as average of peer evaluation score (with respect to quality of ideas, help with writing the report, help with coordinating team efforts, etc.). It is also proposed that the perception of team's effort is positively related to individual effort and performance which has been discussed excessively in the literature (Füller, Bartl, Ernst, & Mühlbacher, 2006; Gibson & Pick, 2000). This construct is measured as average of individual's peer evaluation scores assigned to other team members. The duration and intensity of effort at t_1 is considered as the average measure of effort from week 1 to week 4 and at t_2 as the averages from week 4 to week 8. Performance in t_1 is the average performance from week 1 to week 4 and performance in t_2 is the average performance from week 4 to the end of the project considering the last submission's score. The following hypotheses was proposed:

H6a: perception of team's effort at t_1 is positively related to effort in t_1.

H6b: perception of team's effort at t_2 is positively related to effort in t_2.

H6c: perception of the team's effort at t_2 is positively related to the level of performance in t_2.

H6d: perception of team's effort at t_1 is positively related to the level of performance in t_2.

49

H7a: effort in t_1 is positively related to the level of performance in t_1.

H7b: effort in t_2 is positively related to the level of performance in t_2.

It is also proposed that there are positive relationships between performances during the first half of the process, on the participation behavior and level of performance during the second half. Therefore, the following hypotheses is proposed:

H8a: the level of performance in t_1 is positively related to task enjoyment in t_2.

H8b: the level of performance in t_1 is positively related to motivation to get direct compensation in t_2.

H8c: the level of performance in t_1 is positively related to self-marketing motivations in t_2.

H8d: the level of performance in t_1 is positively related to learning motivations in t_2.

H8e: the level of performance in t_1 is positively related to social motives in t_2.

H8f: the level of performance in t_1 is positively related to task analyzability in t_2.

H8g: the level of performance in t_1 is positively related to platform ease of use in t_2.

H8h: the level of performance in t_1 is positively related to platform usefulness in t_2.

H8i: the level of performance in t_1 is positively related to feedback scores in t_2.

H8k: the level of performance in t_1 is positively related to perception of team's effort in t_2.

H8k: the level of performance in t_1 is positively related to level of effort in t_2.

H8l: the level of performance in t_1 is positively related to performance in t_2.

3.3 Theoretical Model

Figure 6 shows the model at t_1 and t_2 based on the relationships developed in the previous sections. The constructs included in the model at times 1 and 2 are similar but the values are different. It was hypothesized that performance is a function of individual skill level, feedback, their perception of the task clarity, their perception of team's effort, as well as their individual effort. Moreover, individual effort is hypothesized to be related to individual skill level, online experience, international experience and cultural back ground, as well as their motivation, perception of task clarity, platform ease of use and usefulness, feedback, and perception of other team members' effort. Relationships between exogenous and endogenous variables are presented below:

$$Performance$$
$$= f(individual\ skill, feedback, individual\ effort, perception\ of\ the\ team's\ effort,\ t)$$
$$Individual\ Effort$$
$$= g(individual\ characteristics, motivation, task\ clarity, platform\ characteristics,$$
$$feedback, perception\ of\ the\ team's\ effort, t)$$

Figure 6. Research Model Related to the X-Culture Project (t_0, t_1, t_2)
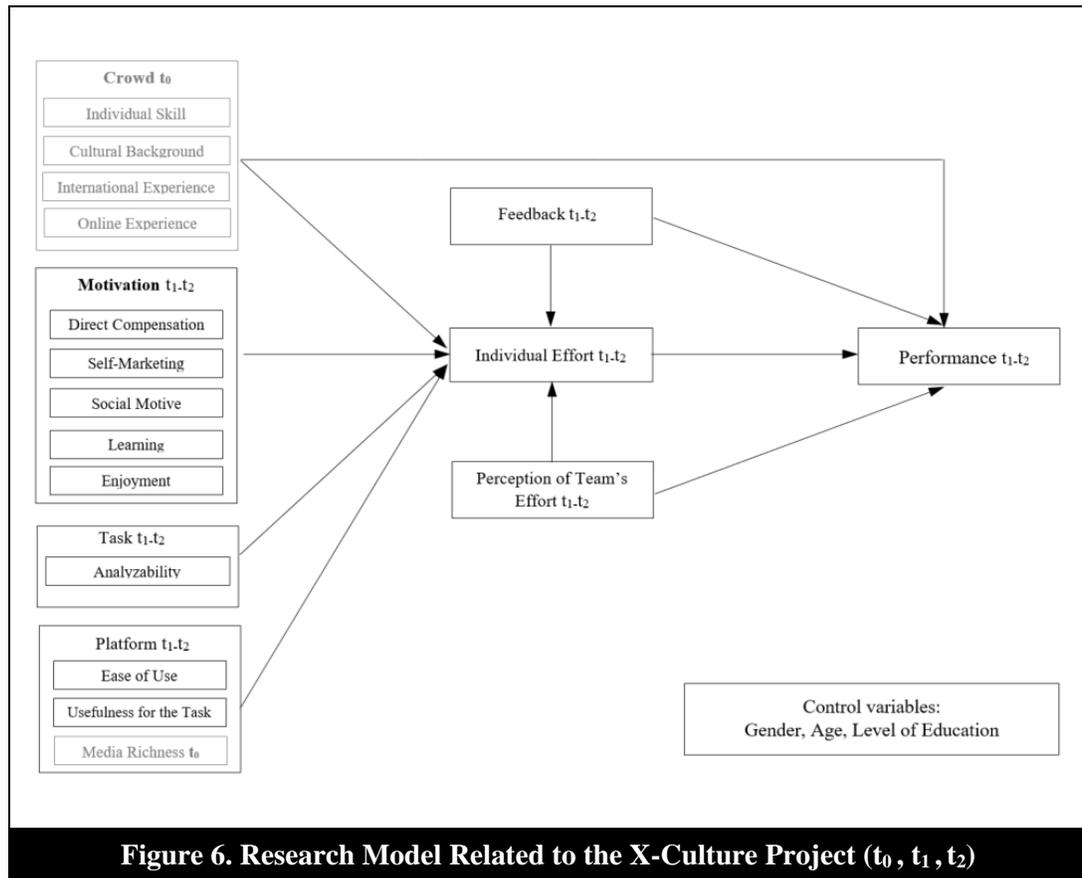
Table 4 summarizes the hypotheses that will be tested in the present dissertation research. CS has become a very important and growing phenomenon. However, scholars know very little about its character and composition. In the first section of the study, a CS conceptual framework was developed to identify the main components of a crowd-sourced problem solving process that might influence participants' behavior and performance. In second part of this study, the following research questions will be examined: What are the dynamics of factors influencing IT-enabled CS performance in business context (case of the X-Culture Projects)? Do these dynamics change over time, throughout the process? The scope of this dissertation is narrowed down to crowd-

sourced projects where the task is to provide a solution to highly specialized business consulting problems. Changes of the effective factors and also their relationships with participants' effort and performance will be explored throughout the process using a longitudinal study.

Table 4. List of Hypotheses			
H1a	Individual skill	+	Effort $_{t1}$
H1b	Individual skill	+	Effort $_{t2}$
H1c	Individual skill	+	Performance $_{t1}$
H1d	Individual skill	+	Performance $_{t2}$
H1e	Previous Online Experience	±	Effort $_{t1}$
H1f	Previous Online Experience	±	Effort $_{t2}$
H1g	Previous International experience	±	Effort $_{t1}$
H1h	Previous International experience	±	Effort $_{t2}$
H1i-l	Cultural background	±	Effort $_{t1}$
H1n-q	Cultural background	±	Effort $_{t2}$
H2a	Task Enjoyment $_{t1}$	+	Effort $_{t1}$
H2b	Task Enjoyment $_{t2}$	+	Effort $_{t2}$
H2c	Direct Compensation $_{t1}$	+	Effort $_{t1}$
H2d	Direct Compensation $_{t2}$	+	Effort $_{t2}$
H2e	Self-marketing motivation $_{t1}$	+	Effort $_{t1}$
H2f	Self-marketing motivation $_{t2}$	+	Effort $_{t2}$
H2g	Learning motivation $_{t1}$	+	Effort $_{t1}$
H2h	Learning motivation $_{t2}$	+	Effort $_{t2}$
H2i	Social motives $_{t1}$	+	Effort $_{t1}$
H2j	Social motives $_{t2}$	+	Effort $_{t2}$
H3a	Task analyzability $_{t1}$	±	Effort $_{t1}$
H3b	Task analyzability $_{t2}$	±	Effort $_{t2}$
H4a	Platform's ease of use $_{t1}$	+	Effort $_{t1}$
H4b	Platform's ease of use $_{t2}$	+	Effort $_{t2}$
H4c	Platform's usefulness for the task $_{t1}$	+	Effort $_{t1}$
H4d	Platform's usefulness for the task $_{t2}$	+	Effort $_{t2}$
H4e	Media richness	+	Effort $_{t1}$
H4f	Media richness	+	Effort $_{t2}$
H5a	Feedback $_{t1}$	+	Effort $_{t1}$
H5b	Feedback $_{t2}$	+	Effort $_{t2}$
H5c	Feedback $_{t1}$	+	Performance $_{t1}$
H5d	Feedback $_{t2}$	+	Performance $_{t2}$
H6a	Perception of Team's Effort $_{t1}$	+	Effort $_{t1}$
H6b	Perception of Team's Effort $_{t2}$	+	Effort $_{t2}$
H6c	Perception of Team's Effort $_{t1}$	+	Performance $_{t1}$
H6d	Perception of Team's Effort $_{t2}$	+	Performance $_{t2}$
H7a	Effort $_{t1}$	+	Performance $_{t1}$
H7b	Effort $_{t2}$	+	Performance $_{t2}$
H8a	Performance $_{t1}$	+	Task Enjoyment $_{t2}$

H8b	Performance $_{t1}$	+	Direct Compensation $_{t2}$
H8c	Performance $_{t1}$	+	Self-marketing motivation $_{t2}$
H8d	Performance $_{t1}$	+	Learning motivation $_{t2}$
H8e	Performance $_{t1}$	+	Social motives $_{t2}$
H8f	Performance $_{t1}$	+	Task clarity $_{t2}$
H8g	Performance $_{t1}$	+	Platform's ease of use $_{t2}$
H8h	Performance $_{t1}$	+	Platform's usefulness for the task $_{t2}$
H8i	Performance $_{t1}$	+	Feedback $_{t2}$
H8j	Performance $_{t1}$	+	Perception of the crowd's effort $_{t2}$
H8k	Performance $_{t1}$	+	Effort $_{t2}$
H8l	Performance $_{t1}$	+	Performance $_{t2}$

A longitudinal study provides data about the same individual at different points in time enabling the underlying understanding of the processes. The longitudinal research approach has the potential to paint a motion picture of the information systems life cycle, to depict changes in user behaviors and attitudes over time (Venkatesh and Vitalari, 1991). It provides the underlying understanding of the processes and shows how events and actions at one point in time can affect outcomes later in the process. Many of the longitudinal research studies that have been done in the information systems field have focused on the adoption and use of information systems at the organizational level rather than at the level of the individual users. Some longitudinal studies in information systems have relied on retrospective interviews or archival data (e.g., Muntonen-Ollila and Lyytinen 2003, 2004; Johnson 1998) while others have been designed using data collected at multiple points in time (e.g., McLean et al. 1996; Newman and Sabherwal 1996; Rutner et al. 2001).

For the quantitative part of this study, data from a crowdsource community, X-Culture, were collected. The data is collected during a session held from February 2016

to April 2016. Further, in order to better understand the behavior of the crowd, a qualitative study was conducted by interviewing some participants of the X-Culture projects during this session. The results of the qualitative study provided rich insight for understanding the crowd's behavior and factors influencing their performance in a crowd-sourced project. The results of the qualitative study may also provide insight to refine the conceptual model for future research. In the next sections, both quantitative and qualitative study designs and data collection procedures will be discussed.

CHAPTER IV

THE QUANTITATIVE STUDY

4.1 Research Design

After refining the model, a preliminary set of questions were developed for each variable to measure it pre-project, post project, and weekly throughout the process. For this study, a combination of primary and secondary data was used. Questions for some variables already exist in the current instruments. For all the other variables, the measurement scales were either taken from existing scales or adapted slightly for this research. In this study, the measurement development method proposed by MacKenzie et al. (2011) are employed (MacKenzie, Podsakoff, & Podsakoff, 2011). Care was taken to select items that had been previously validated using established and rigorous means. According to Straub (1989), instrument validation should take place before any other statistical investigation (Straub, 1989). As a first step towards instrument validation, the instrument was pre-tested with three information systems professors and three information systems Ph.D. students. After making some adjustments to the questions based on the pre-tests, a pilot test of the instrument using a convenience population of graduate students was conducted, all of whom had experience using some kind of CS platforms. Pilot participants were asked to address any

inconsistencies or confusing questions, as well as provide feedback on the nature or wording of questions. This feedback was incorporated, and the instrument was then made available for large scale distribution. The single-indicator constructs are used in the model where the variable is well studied in the literature. Hayduk & Littvay (2012) promoting the use of single indicator variables (Hayduk & Littvay, 2012).

It was attempted to develop reflective measures for latent construct, as formative measurement still exhibits some issues. For example, quality formative measurement requires the inclusion of all dimensions of a particular phenomenon to be represented in the items. Defining all of the possible dimensions of a phenomenon can be a daunting task. Further, formative measurement is subject to interpretational confounding, in which the meaning of a formatively measured construct changes according to the other variables included in the model. Reflective measurement, however, simply requires a sampling of the domain of the phenomenon (Diamantopoulos & Siguaw, 2006; Petter, Straub, & Rai, 2008).

The participants in the X-culture projects completed surveys pre-process, weekly during the process and at the end of the process. In this study, time t_0 refers to the first time the data was collected about the crowd's characteristics (prior to the process), t_1 refers end of week four after the process started, and t_2 was at the end of the term at week 8. This is represented in the schematic shown in Figure. Close working relationship with the director of the X-Culture platform was developed to design and include the new questions in the current questionnaires. Table 5 shows the questions related to the constructs in the model.

Table 5. Construct Definitions and Related Questions		
Constructs	**Definitions**	
Who? Crowd (t_0) t_0: prior to the process	Demographics (Gender, Age, Level of education)	
	Individual Skill	Readiness Test Result which includes questions about the project and participant's research skills (out of 100)
	Online Experience	Frequency of using online collaboration and communication tools (5-scale: 1 no experience; 5 use every day)
	International experience	2-item construct: – Years of work outside the country of origin – Years of study outside the country of origin
	Cultural background	Hofstede's five bipolar dimensions of culture (power distance, uncertainty avoidance, individualism, masculinity, and long-term orientation) based on participants' countries of home (Geert Hofstede, 2011)
Why? Motivation (t_0, t_1, t_2) t_0: prior to the process t_1: at week 4 t_2: at week 8	Direct Compensation	My motivation to participate in X-Culture is to get monetary award and compensation from the project (5-scale: 1 strongly disagree; 5 strongly agree)
	Self-marketing	My motivation to participate in X-Culture is to improve my chances of getting a better job or getting into a graduate program (5-scale: 1 strongly disagree; 5 strongly agree)
	Social Motives	My motivation to participate in X-Culture is to make friends from other countries (5-scale: 1 strongly disagree; 5 strongly agree)
	Learning	My motivation to participate in X-Culture is to get experience and gain additional knowledge or skills (5-scale: 1 strongly disagree; 5 strongly agree)
	Enjoyment	My motivation to participate in X-Culture is enjoyment of the task (5-scale: 1 strongly disagree; 5 strongly agree)
What? Task (t_1, t_2) t_2: at week 4 t_2: at week 8	Perceived analyzability	The instructions are clear to carry out the task (5-scale: 1 strongly disagree; 5 strongly agree)
How? Platform (t_1, t_2)	Ease of use	3-item construct: We are trying to understand how your team members collaborate (working together) and communicate (exchanging information) (5-scale: 1 strongly disagree; 5 strongly agree): – Collaboration tools: In addition to emails, your team probably uses other tools to collaborate (Dropbox, Google Docs, Facebook, etc.). Overall, these collaboration tools are easy to use.

		− Communication tools: In addition to emails, your team probably uses other tools to communicate (Facebook, Skype, Viber, WhatsApp, etc.). Overall, these communication tools are easy to use. − Every week, you received an email with a link to your weekly survey and a review of your performance. The communication from X-culture is easy to use.
t_1: at week 4 t_2: at week 8	Usefulness to carry out the task	3-item construct: We are trying to understand how your team members collaborate (working together) and communicate (exchanging information) (5-scale: 1 strongly disagree; 5 strongly agree): − Collaboration tools: In addition to emails, your team probably uses other tools to collaborate (Dropbox, Google Docs, Facebook, etc.). Overall, these collaboration tools are useful to carry out the task. − Communication tools: In addition to emails, your team probably uses other tools to communicate (Facebook, Skype, Viber, WhatsApp, etc.). Overall, these communication tools are useful to carry out the task. − Every week, you received an email with a link to your weekly survey and a review of your performance. The communication from X-culture is useful to carry out the task.
	Media richness	Richness of communication tool used most frequently during the project [1: text messaging; 2: audio call; 3: video-call; 4: face-to-face conversation]
Perception of team's effort (t_1, t_2) t_1: average from the beginning to week 4 t_2: average from week 4 to week 8	Average individual peer evaluation scores for team members (out of 5)	
Individual Effort (t_1, t_2) t_1: average from the beginning to week 4 t_2: average from week 4 to week 8	Percentage of work by individual based on the average peer evaluation scores (%)	
Feedback (t_1, t_2) t_1: average from the beginning to week 4 t_2: average from week 4 to week 8	Information provided to a member of a crowd regarding some aspect of his or her task performance [5: much better than a typical submission; 4: above average; 3: average; 2: below average; 1: much worse than a typical submission]	

Performance (t_1, t_2)	Proposal evaluation score from the client organizations and X-Culture team of experts (out of 5)
t_1: average from the beginning to week 4 t_2: average from week 4 to week 8 plus final score	

The constructs are presented in Table 6.

Table 6. List of Constructs with Acronyms
Construct
Who? Individual participants (IND) (t_0)
Individual skill (INDSKILL)
Online experience (INDOE)
International experience (INDIE)
Cultural background (INDCUL)
Power distance (INDCULPD)
Individualism (INDCULIC)
Masculinity (INDCULM)
Uncertainty avoidance (INDCULUA)
Long term orientation (INDCULLTO)
Why? Motivation (MO) (t_1, t_2)
Direct compensation (MOD)
Self-marketing (MOSM)
Social motives (MOS)
Learning (MOL)
Enjoyment (MOE)
What? Task (t_1, t_2)
Perceived analyzability (TASKA)
How? Platform (PLAT) (t_1, t_2)
Ease of use (PLATEOU) (t_1, t_2)
Usefulness to carry out the task (PLATU) (t_1, t_2)
Media richness (PLATMR) (t_0)

Perception of team's effort (t_1, t_2) (TEAME)
Individual Effort (t_1, t_2) (INDE)
Feedback (t_1, t_2) (FDBK)
Performance (t_1, t_2) (PER)

4.2 Data Collection

Data collection for this study used an online, web-based questionnaire administered through X-Culture website (http://x-culture.org/). Respondents were the participants of the X-Culture project that occurred during February 2016 to April 2016 (8-week period). Figure 7 shows the scheme of data collection. The sets of questionnaires were distributed pre-project, weekly throughout the process, and at the end of the project. The survey was taken by around 3200 participants of X-Culture during the time of the study. After excluding the individuals who quit before week 2, we arrived at a working sample size of n=2700.

Figure 7. Scheme of Data Collection
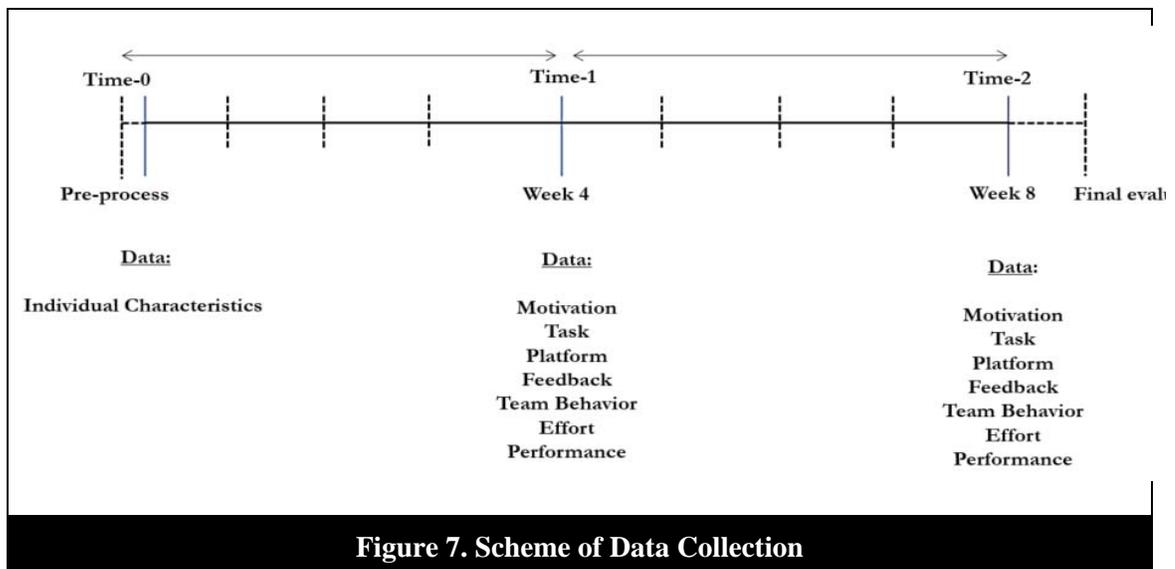
Of these 2,700 participants, 45% were female, and 40% were male and 15% didn't answer the question about their gender. 76% were less than 23 years old, 13% between 23 and 30 years old, 4% more than 30 years old, and 7% didn't answer the question about their age. 21% were MBA students and 79% were under graduate students. The average readiness test scores of participants were 0.87 out of 1 and the average score of their self-reported English was 9.3 out of 10. On average, participants have lived or worked outside the countries of their origin for 4 years. 25% reported that they haven't had any experience with collaboration and communication tools before this project, with 35% reporting that they use these tools a few times a week. 40% of responded reported that they use online collaboration and communication tools every day. Table 7 shows descriptive statistics of the participants in the X-Culture competitions from February to April 2016.

Table 7. Descriptive Statistics of the Sample (n=2700)		
Demographics	Gender	Female: 45% Male: 40%
	Age	<23: 76% 23-30: 13% >30: 4%
	Level of education	MBA:21% Undergraduate: 79%
Skill	Readiness Test Result Self-reported English International Experience IT efficacy	Average: 0.87 (out of 1) Average: 9.3 (out of 10) Average: 4 years Use every day: 40% Use a few times a week: 35% No experience: 25%

CHAPTER V

THE QUANTITATIVE STUDY RESULTS AND ANALYSIS

This chapter presents the results of the data analysis. As mentioned in the previous chapters, participants of the X-Culture projects between April 2016 and May 2016 are asked about their experience and performance using online questionnaires with constructs selected from published research. The purpose of the study is to answer three research questions: What are the main components involved in a technology enabled CS process? What are the factors influencing IT-enabled CS performance in a business context? Do the effects of these factors change overtime, throughout the process? Question one was answered in the first part of this dissertation by developing a conceptual CS framework. Questions two and three will be answered in this chapter using appropriate statistical data analysis methods. Question three will be answered by analyzing any differences in the constructs and relationships between times 2 and 3.

The conceptual model that has been designed earlier in this dissertation (see Figure 6), is simply a conceptual means to say that performance is a function of crowd's skill, feedback, perception of the crowd's effort, and individual effort which in turn is the function of the characteristics of the crow, task, platform, and individual motivation as well as feedback and perception of the crowd's effort. The descriptions of constructs were discussed in Table 5.

Partial Least Square Path Modeling (PLS-PM) was used to develop the analyses that will help us answer research questions two and three. This study uses R-studio version 0.99.902 (https://www.rstudio.com/) to identify relationships among the latent and objective variables/constructs by estimating coefficients of the paths as well as the relationships between variables (Hubona, 2009). A variety of statistical techniques were employed to answer these questions. Structural equation modeling (SEM) was used to test for significant factors and relationships among constructs within the research domain of interest. T-tests are an appropriate method to use to determine if changes over time are due to a significant relationship and construct change. PLS-SEM tests and estimates relationships and can be used in exploratory or confirmatory modeling. SEM allows the user to construct latent variables and calculate weights, loadings and factor scores using a least squares minimization algorithm. The weights and loadings of a model with latent variables comprise the outer model, and the path coefficients among the latent variables make up the inner model. The outer model confirms that the items measure the constructs appropriately while the inner model focuses on identifying the paths or relationships between the constructs in the model. The outer model provides evidence of significant factors in the learning environment while the inner model indicates which relationships are significant. Together, they provide an appropriate analysis technique to answer questions two and three.

The following section presents the results of the PLS-PM analysis of the research model (as presented in Figure 6) with constructs at different times (t_1 and t_2) to test the hypothesis listed in Table 6. Then, the results of paired sample t-tests of the construct

scores will be presented. A multi-group analysis was conducted to compare the path coefficients of the models at time 1 and 2. The last stage is to test how individual performance during the first half of the project is related to their behavior and performance during the second half.

5.1 PLS Models at Time 1 and Time 2

In this section, the goal is to compare the model at week 4 (time1) with the model at the end of the process (time2) and to investigate whether the relationships between the constructs have changed throughout the project. Based on the conceptual framework a path model is built in R-studio using *plspm* package. A full path model is comprised by two sub-models: the structural model also known as inner model and the measurement model also known as outer model. The inner model is the part of the model that has to do with the relationships between variables. The outer model is the part of the model that has to do with the relationships between each latent variable and its block of indicators.

5.1.1 Data Preparation: Missing Data Imputation

Since the missing data is more that 2% (around 10%), and *plspm()* works in a limited way with missing values, other imputation techniques should be implied to handle missing values. There are various R packages for missing values imputations such as *mice, Amelia, Hmisc, mi, missForest, missMDA*, etc. In this dissertation, *missForest* package was employed. The method is based on the publication by Stekhoven and Bühlmann (2011), where the function missForest is used to impute missing values particularly in the case of mixed-type data. It uses a random forest trained on the observed values of a data matrix to predict the missing values. It can be used to impute

continuous and/or categorical data including complex interactions and non-linear

relations. Missforest runs iteratively, continuously updating the imputed matrix variable-

wise, and assesses its performance between iterations. This assessment is done by

considering the difference(s) between the previous imputation result and the new

imputation result. As soon as this difference (in case of one type of variable) or

differences (in case of mixed-type of variables) increase the algorithm stops. It can be run

in parallel to save computation time and provides high level of control on imputation

process. Missforest provides the user with an estimate of the imputation error. This

estimate is based on the out-of-bag (OOB) error estimate of random forest. Stekhoven

and Bühlmann (2011) showed that this estimate produces an appropriate representation of

the true imputation error.

missing<- read.csv ("data",header=TRUE)

data.imp<- missForest (missing, verbose = TRUE)

After running the dataset by *missForest* algorithm, the imputed data matrix can be

called upon by typing *data.imp$ximp* which can be used for subsequent analysis.

Additionally, *missForest* provides an OOB imputation error estimate which can be

extracted using the same *$* notation as with the imputed data matrix

[*data.imp$OOBerror*]. The OOB imputation error supplies two values for the result of

the imputation (default setting). The first value is the normalized root mean squared error

(NRMSE) for the continuous part of the imputed data set (Oba et al., 2003). The second

value is the proportion of falsely classified entries (PFC) in the categorical part of the

imputed data set. Good performance of *missForest* leads to a value close to 0 and bad

performance to a value around 1. In the case of this study, it can be seen that the error is

small (NRMSE= 0.027).

The next sections go over the steps needed for initial assessment of PLS-SEM

model at time 1, week 4 of the process, and time 2, at the end of the process.

5.1.2 Measurement Model at Time 1

The diagnosis of a PLS path model begins with assessing the quality of the

measurement model. Manifest variables (MVs), also known as indicators or items are

assumed to contain information that reflect or indicate one aspect of the latent variable

(LV). In the models, the quality of the reflective scales was assessed by examining

reliability, convergent validity, and discriminant validity. The sample at Time 1 exhibited

high composite reliabilities (also known as the Dillon-Goldstein's ρ values) for all

reflective scales. Composite reliabilities should exceed 0.70 (Fornell & Larcker, 1981).

Reflective indicators should also be homogeneous and unidimensional. In PLS-PM there

are three main indices to check uni-dimensionality: the Cronbach's alpha, the Dillon-

Goldstein's ρ (D.G.'s ρ), and the first eigenvalue of the indicators' correlation matrix

(Table 8). As a rule of thumb, a Cronbach's alpha and D.G.'s ρ larger than 0.7 and the

first eigenvalue greater than one are considered acceptable (Chin 1998; Fornell &

Larcker, 1981). Looking at the table 9, almost all the blocks seem to have acceptable

values (greater than 0.7) for the Cronbach's α and D.G.'s ρ and for the first eigenvalue

(greater than 1) except for *International Experience* which presents low alphas of 0.54.

However, since its D.G.'s ρ value is greater than the acceptable value of 0.7, all the

indicators related to *International Experience* in the model were kept. The D.G.'s ρ is considered to be a better indicator than the Cronbach's α because it takes into account to which extent the latent variable explains its block of indicators.

Table 8. Reliability and Uni-Dimensionality at Time 1						
LV Name	# of MVs	D.G.'s ρ	Cronbach's α	Eigenvalue.1st	Eigenvalue.2nd	AVE
INDIE	2	0.76	0.54	1.55	0.74	0.63
PLATEOU	2	0.97	0.95	1.91	0.09	0.88
PLATU	3	0.96	0.94	2.70	0.20	0.86

To do a more careful inspection of indicators, loadings and communalities need to be checked. The loadings value greater than 0.7 and indicator communality values greater than $0.7^2 = 0.49$ are considered as acceptable (Hulland, 1999). All of the indicators have individual indicator reliability (communality) values that are much larger than the minimum acceptable level of 0.4. As listed in Table 9, all of the indicators have individual indicator loading values around 0.7 and reliability (communality) values larger than the minimum acceptable level of 0.4.

Convergent validity was assessed by ensuring that all factor loadings exceeded 0.70 and that the average variance extracted (AVE) exceeded 0.5 (Fornell & Larcker, 1981; Gefen & Straub, 2005). The model at Time 1 exhibited high factor loadings as depicted in Table 8. AVE was also above 0.5 for all constructs as depicted in Table 9. The values suggest that the sample at Time 1 exhibits convergent validity.

Table 9. Loadings and Communalities at Time 1			
LV Name	MVs	Loading	Communality (i.e., loadings^2)
INDIE	Working abroad (years)	0.88	0.78
	Member of international institution (years)	0.70	0.48
PLATEOU	Communication tools ease of use	0.88	0.77
	Collaboration tools ease of use	0.99	0.99
PLATU	X-Culture emails usefulness	0.98	0.96
	Communication tools usefulness	0.88	0.78
	Collaboration tools usefulness	0.92	0.85

Discriminant validity was assessed by ensuring that the square root of AVE for each construct was greater than the corresponding latent variable correlations for construct (W W Chin, 1998), and that factor loadings were greater than cross loadings by at least 0.1 (W Chin, 2010; D'Arcy, Herath, & Shoss, 2014). Results show that for all the latent constructs at time 1, this value is larger than other correlation values among the latent variables.

5.1.3 Structural Model at Time 1

After assessing the quality of the outer model, the quality of the inner model needs to be checked (Table 11). The structural model was assessed in R-Studio using plspm() function. Since for PLS-PM, distributional assumptions are not necessary, resampling procedures are used to obtain information about the variability of the parameter estimates. Function plspm() provides bootstrap resampling to get confidence intervals for evaluating the precision of the PLS parameter estimates. Figure 8 presents the results of the model during the first half of the process (time 1). Only significant relationships are presented in the figure.

Figure 8. Results of Model at Time 1
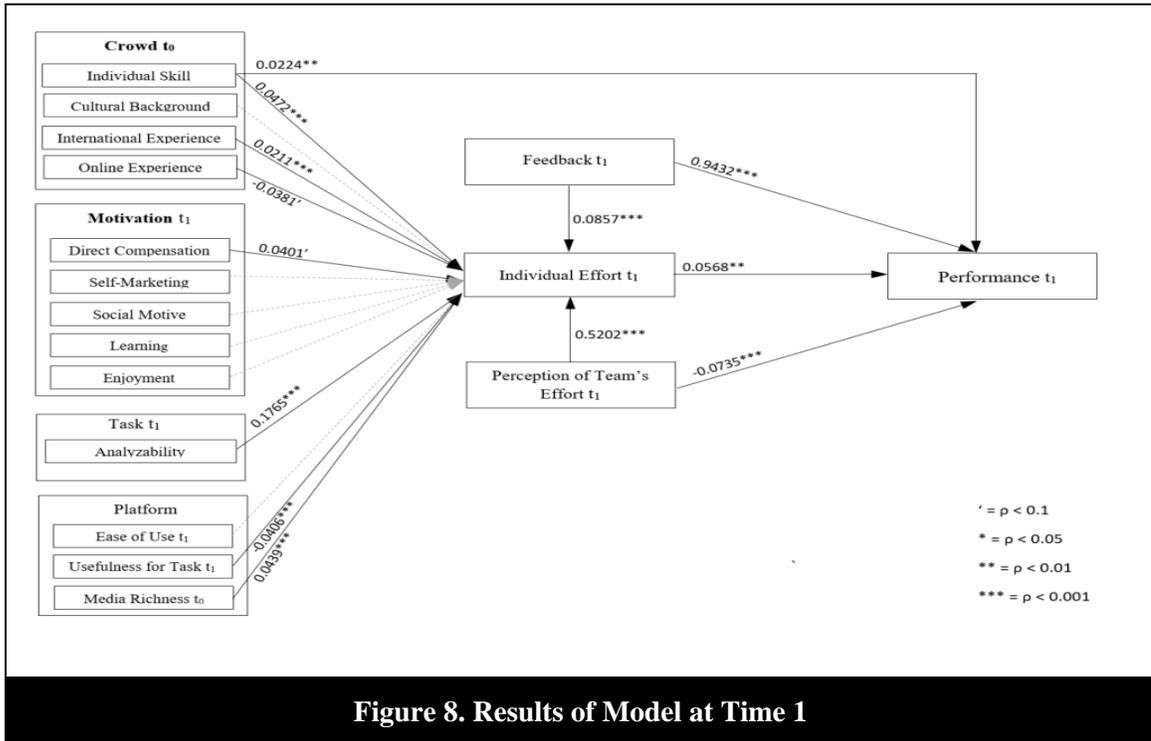
Table 10 presents each relationship with its estimate, the p-value, and whether the hypothesis was supported by the data.

Table 10. Inner Model Path Coefficient at Time 1			
Relationships	Estimate	ρ-value	Supported
$\rightarrow$ Individual Effort t_1			
H1a: INDSKILL $\rightarrow$ INDE	0.0472	< 0.0001	Yes
H1e: INDOE $\rightarrow$ INDE	0.0211	< 0.1	Yes
H1g: INDIE $\rightarrow$ INDE	- 0.0381	< 0.0001	Yes
H1i: INDCULPD $\rightarrow$ INDE	- 0.0030	> 0.1	No
H1j: INDCULIC $\rightarrow$ INDE	- 0.0272	> 0.1	No
H1k: INDCULM $\rightarrow$ INDE	- 0.0025	> 0.1	No
H1l: INDCULUA $\rightarrow$ INDE	- 0.1295	> 0.1	No
H2a: MOE $\rightarrow$ INDE	- 0.1358	> 0.1	No
H2c: MOD $\rightarrow$ INDE	0.0401	< 0.1	Yes

71

H2e: MOSM → INDE	0.3251	> 0.1	No
H2g: MOL → INDE	- 0.3686	> 0.1	No
H2i: MOS → INDE	0.3950	> 0.1	No
H3a: TASKA → INDE	0.1765	<0.0001	Yes
H4a: PLATEOU → INDE	- 0.0071	> 0.1	No
H4c: PLATU → INDE	- 0.0406	<0.0001	Yes
H4e: PLATMR → INDE	0.0439	<0.0001	Yes
H5a: FDBK → INDE	0.0857	<0.0001	Yes
H6a: TEAME → INDE	0.5202	<0.0001	Yes
→ Performance t_1			
H1c: INDSKILL → PER	0.0224	< 0.01	Yes
H5c: FDBK → PER	0.9432	< 0.0001	Yes
H6c: TEAME → PER	0.0735	< 0.0001	Yes
H7a: INDE → PER	0.0568	< 0.01	Yes

The data suggests that individual participants' level of skill (knowledge about the client, the project, English proficiency, etc.) increases the level of effort individuals put into the process (β=0.0472; p-value < 0.001). One percent increase in readiness test results leads to 4.7% increase in participation effort. The data provides support for hypothesis 1a. Participants with related skill sets might be more motivated to become involved and engage in the process. Similarly, individuals' experience of using online environment increases the level of effort individuals put into the process (β=0.0211; p-value < 0. 1). The data provides support for hypothesis 1e. The data provides evidence that from week 1 until week 4 into the process, participants' prior knowledge of working in international environment reduces participant's effort in the process (β=-0.0381; p-value < 0.001). The data provides support for hypothesis 1g but shows that at the beginning of the process, individual's previous experience with international settings

reduces their effort. Participants with prior experience may find it easier to overcome the challenges in a global setting and feel that they don't need to spend time facing new conflicts, which may explain the decrease in the level of effort. The data also suggests that individuals' motivation to get direct compensation (monetary or non-monetary prize) increases their level of effort during the first half of the process (β=0.0401; p-value < 0.1). The data provides support for hypothesis 2c. Similarly, analyzability and clarity of the task instructions increase individual's engagement during the first half of the process (β=0.1765; p-value < 0. 001). The data provides support for hypothesis 3a. The data provides evidence that from week 1 to week 4, usefulness of the communication and collaboration tools to carry out the tasks decreases the amount of time participants spend on the process since individuals might find these tools efficient to finish the task which reduce the level of effort needed to finish the task (β= -0.0406; p-value < 0. 001). The data does not support hypothesis 4c. Additionally, the data suggests that increase in media richness (from text messages to audio calls and then to video calls), increases the level of effort (β= 0.0439; p-value < 0. 001). The data provides support for hypothesis 4e. The data provides evidence that getting a higher feedback score increases motivation of individuals to put more effort into the process (β= 0.0857; p-value < 0. 001). The data provides support for hypothesis 5a. Similarly, during the first half of the process, the perception of team members' effort motivates participants to increase their level of engagement in the process (β= 0.5202; p-value < 0. 001). The data provides support for H6a.

The data suggests that individual participant's level of skill increases performance during the first half of the semester (β= 0.0224; p-value < 0. 01). One percent increase in readiness test results leads to about 0.45 % increase in performance. The data provides support for H1c. The data provides evidence that the higher feedback scores received by participants increases their level of effort (β= 0.9432; p-value < 0. 001). One percent increase in feedback leads to about 0.94 % increase in performance. The data provides support for H5c. Perception of the team's effort increases performance during the first half (β= 0.0735; p-value < 0. 001). The data support hypothesis 6c. Individual effort has a positive relationship with the level of performance (β= 0.0568; p-value < 0. 01) which supports hypothesis 7a. One percent increase in effort leads to about 1.12 % increase in performance.

The model explained 50 percent[1] of the variance in Individual Effort and 86 percent of the variance in Performance. For each regression in the structural model the R^2 is interpreted similarly as in any multiple regression analysis. R^2 indicates the amount of variance in the endogenous latent variable explained by its independent latent variables.

GoF index is a pseudo Goodness-of-Fit measure that attempts to account for the overall quality at both the measurement and the structural models. GoF assess the overall prediction performance of the model by taking into account the communality and the R^2 coefficients. A GoF value of 0.60 for the current model could be roughly interpreted as if

[1] In Information Systems research, R^2 of 0.75 is substantial, 0.50 is moderate, and 0.25 is weak.

the prediction power of the model is of 60%. The naive rule of thumb is: the higher, the better. GoF values around 0.6 are considered as "good" within the PLS-PM community.

Gender, age, and level of education, were used as control variables. The data provide evidence that education decreases level of effort put into the process by individuals (β= -0.0270; p-value < 0. 1). Educated individuals may feel that they possess sufficient knowledge and do not need to work hard on the project, which may explain the decrease in the level of effort. This finding should be explored further in future research. All other control variables were statistically insignificant. Table 11 presents the coefficient, p-value, and whether the relationship was supported for each control variable.

Table 11. Inner Model Path Coefficient for Control Variables at Time 1			
	Estimate	ρ-value	Supported
Individual Effort t_1			
Gender (1=male; 2=female)	0.0066	> 0.1	No
Age	0.0078	> 0.1	No
Level of Education	-0.0270	< 0.1	Yes
Performance t_1			
Gender	-0.0002	> 0.1	No
Age	-0.0061	> 0.1	No
Level of Education	-0.0074	> 0.1	No

In the next sections, the PLS model at time 2 is investigated (at the end of the process). Inner and outer model will be tested and path coefficients will be validated by bootstrapping.

5.1.4 Measurement Model at Time 2

In the models, the quality of the reflective scales was assessed by examining reliability, convergent validity, and discriminant validity. The sample at Time 2 exhibited high composite reliabilities (also known as the Dillon-Goldstein's ρ values) for all reflective scales. Composite reliabilities should exceed 0.70 (Fornell & Larcker, 1981), Reflective indicators should also be homogeneous and unidimensional. In PLS-PM there are three main indices to check unidimensionality: the Cronbach's alpha, the Dillon-Goldstein's ρ (D.G.'s ρ), and the first eigenvalue of the indicators' correlation matrix (table 12). As a rule of thumb, a Cronbach's alpha and D.G.'s ρ larger than 0.7 and the first eigenvalue greater than one are considered acceptable. Looking at the Table 12, almost all the blocks seem to have acceptable values (greater than 0.7) for the Cronbach's α and D.G.'s ρ and for the first eigenvalue (greater than 1) except for *International Experience* which presents low alphas of 0.53. However, since its D.G.'s ρ value is greater than the acceptable value of 0.7, all the indicators related to *International Experience* in the model are kept. The D.G.'s ρ is considered to be a better indicator than the Cronbach's α because it takes into account to which extent the latent variable explains its block of indicators.

Table 12. Reliability and Uni-Dimensionality at Time 2						
LV Name	# of MVs	Cronbach's α	D.G.'s ρ	Eigenvalue. 1st	Eigenvalue. 2nd	AVE
INDIE	2	0.53	0.76	1.55	0.74	0.50
PLATEOU	2	0.77	0.85	2.69	0.86	0.63
PLATU	3	0.97	0.98	4.49	0.27	0.89

To do a more careful inspection of indicators, loadings and communalities need to be checked. The loadings value greater than 0.7 and indicator communality values greater than $0.7^2 = 0.49$ are considered as acceptable. All of the indicators have individual indicator reliability (communality) values that are much larger than the minimum acceptable level of 0.4 except for X-Culture emails usefulness in platform block. This indicator from the block of platform variable was deleted and the model was rerun. Table 13 illustrates the results. As listed in this table, all of the indicators have individual indicator loading values around 0.7 and reliability (communality) values larger than the minimum acceptable level of 0.4.

Convergent validity was assessed by ensuring that all factor loadings exceeded 0.7 and that Average Variance Extracted (AVE) values exceeded 0.5. The model at Time 2 exhibited high factor loadings as depicted in Table 14. AVE was also above 0.5 for all constructs (Table 12). The values suggest that the sample at Time 2 exhibits convergent validity.

Table 13. Loadings and Communalities at Time 2			
LV Name	MVs	Loading	Communality (i.e., loadings^2)
INDIE	Working abroad (years)	0.90	0.81
	Member of international institution (years)	0.68	0.46
PLATEOU	Communication tools ease of use	0.87	0.77
	Collaboration tools ease of use	0.70	0.50
PLATU	Communication tools usefulness	0.91	0.84
	Collaboration tools usefulness	0.86	0.73

Discriminant validity was assessed by ensuring that the square root of AVE for each construct was greater than the corresponding latent variable correlations for construct, and that factor loadings were greater than cross loadings by at least 0.1. Results show that for all the latent constructs at Time 2, this value is larger than other correlation values among the latent variables.

5.1.5 Structural Model at Time 2

After assessing the quality of the outer model at time 2, the quality of the inner model needs to be checked (Table 15). The structural model was assessed in R-Studio. Since PLS-PM does not rest on any distributional assumptions, resampling procedures are used to obtain information about the variability of the parameter estimates. plspm() provides bootstrap resampling to get confidence intervals for evaluating the precision of the PLS parameter estimates. Since the results of the outer and inner models make sense, we can proceed with the bootstrap validation. Figure 9 presents the results of the model during the second half of the process (time 2). Only significant relationships are presented in the figure.

Figure 9. Results of Model at Time 2
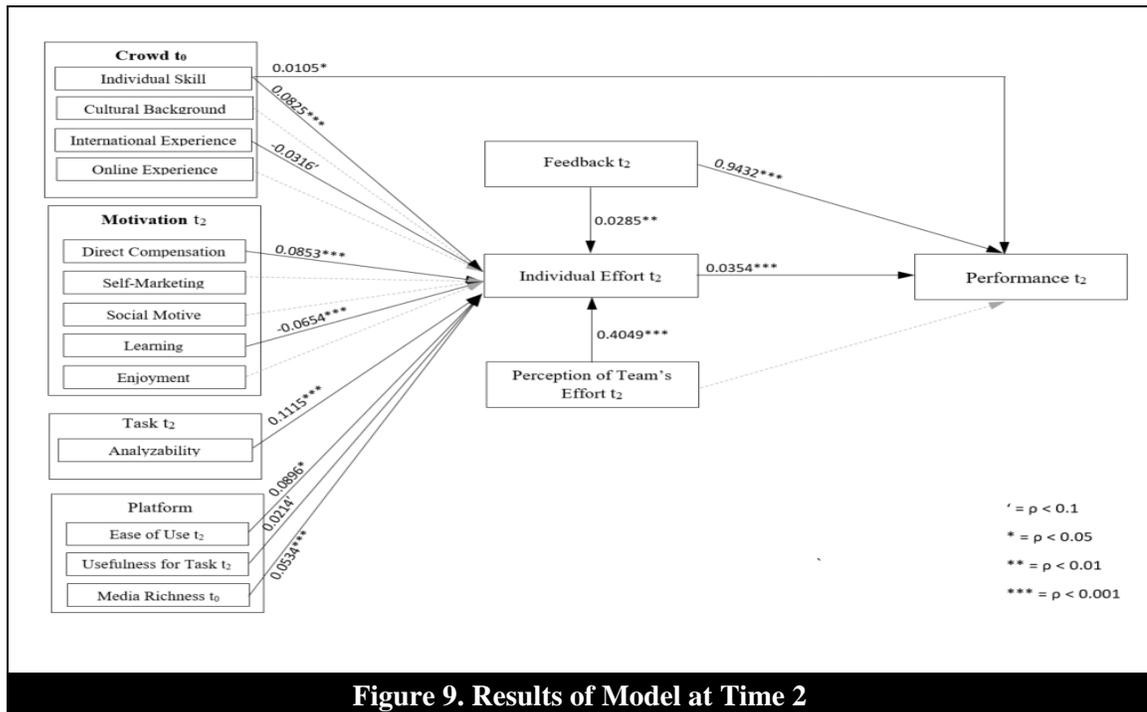
Table 14 presents each relationship with its bootstrap estimate, the p-value, and whether the hypothesis was supported by the data.

Table 14. Inner Model Path Coefficient at Time 2			
	Estimate	ρ-value	Supported
➔ **Individual Effort t₂**			
H1b: INDSKILL ➔ INDE	0.0825	< 0.0001	Yes
H1f: INDOE ➔ INDE	0.0040	> 0.1	No
H1g: INDIE ➔ INDE	-0.0316	< 0.1	Yes
H1n: INDCULPD ➔ INDE	0.0125	> 0.1	No
H1o: INDCULIC ➔ INDE	- 0.0311	> 0.1	No
H1p: INDCULM ➔ INDE	- 0.0085	> 0.1	No
H1q: INDCULUA ➔ INDE	- 0.0039	> 0.1	No
H2b: MOE ➔ INDE	- 0.0063	> 0.1	No

H2d: MOD → INDE	0.0853	< 0.0001	Yes
H2f: MOSM → INDE	- 0.0195	> 0.1	No
H2h: MOL → INDE	- 0.0654	< 0.0001	Yes
H2j: MOS → INDE	- 0.0310	> 0.1	No
H3b: TASKA → INDE	0.1115	< 0.0001	Yes
H4b: PLATEOU → INDE	0.0896	< 0.0001	Yes
H4d: PLATU → INDE	0.0214	< 0.1	Yes
H4f: PLATMR → INDE	0.0534	< 0.0001	Yes
H5b: FDBK → INDE	0.0285	< 0.01	Yes
H6b: TEAME → INDE	0.4049	< 0.0001	Yes
→ Performance t_2			
H1d: INDSKILL → PER	0.0105	< 0.05	Yes
H5d: FDBK → PER	0.9610	< 0.0001	Yes
H6d: TEAME → PER	- 0.0056	> 0.1	No
H7d: INDE → PER	0.0354	< 0.0001	Yes

The data suggests that individual participants' level of skill (knowledge about the client, the project, English proficiency, etc.) increases the level of effort individuals put into the process (β=0.0825; p-value<0.001). The data provides support for H1b. Participants with related skill sets might be more motivated to become involved and engage in the process. The data also provides evidence that individuals' prior international experience decreases the level of effort they put into the process (β= - 0.0316; p-value <0.1). The data provides support for hypothesis 1h. The data suggests that individuals' learning motivation decreases their level of effort they put in the project (β= -0.0654; p-value<0.1). The data provides support for hypothesis 2h. The data also suggests that individuals' motivation to get direct compensation (monetary or non-monetary prize) increases their level of effort during the first half of the process

(β=0.0853; p-value<0.1). The data provides support for hypothesis 2d. Similarly, analyzability and clarity of the task instructions increase individual's engagement during the second half of the process from week four to week eight (β=0.1115; p-value<0.001). The data provides support for hypothesis 3b. The data provides evidence that ease of using the communication and collaboration tools increases the percentage of work done by each individual (β=0.0896; p-value<0.1). The data provides support for hypothesis 4b. Similarly, from week four to week eight, usefulness of the communication and collaboration tools increases the percentage of work done by each individual (β=0.0214; p-value <0. 001). The data provides support for hypothesis 4d. The data suggests that increase in media richness (from text messages to audio calls and then to video calls), increases the level of effort (β= 0.0534; p-value <0.001) The data provides support for hypothesis 4f. The data provides evidence that receiving a higher feedback score increases motivation of individuals to put more effort into the process (β=0.0285; p-value<0.001). The data provides support for hypothesis 5b. During the second half of the process, the perception of team members' effort motivates participants to increase their level of engagement in the process (β= 0.4049; p-value<0.001). The data provides support for H6b.

The data suggests that participant's level of skill increases level of performance (β=0.0105; p-value <0.05). One percent increase in readiness test results leads to about 1.05 % increase in performance. The data provides evidence that the higher feedback scores received by participants increases their level of effort (β=0.9610; p-value<0.001). One percent increase in feedback leads to about 0.96 % increase in performance. The data

81

provides support for hypothesis 1d. The data from the second half of the process shows that individual's level of effort has a positive relationship with the level of performance (β=0.0354; p-value <0. 01). One percent increase in effort leads to about 0.7 % increase in performance. The data provides support for hypothesis 7b.

The model explained 50 percent of the variance in Individual Effort and 88 percent of the variance in Performance. For each regression in the structural model we have an R2 that is interpreted similarly as in any multiple regression analysis. R2 indicates the amount of variance in the endogenous latent variable explained by its independent latent variables.

GoF index is a pseudo Goodness-of-Fit measure that attempts to account for the overall quality at both the measurement and the structural models (Tenenhaus, Amato, & Vinzi, 2004). GoF assess the overall prediction performance of the model by taking into account the communality and the R^2 coefficients. A GoF value of 0.68 for the current model could be roughly interpreted as if the prediction power of the model is of 68%. The naive rule of thumb is: the higher, the better. GoF values around 0.7 are considered as "very good" within the PLS-PM community.

Gender, age, and level of education, were used as control variables. The data provide evidence that education decreases percentage of work by individuals (β= -0.0138; p-value<0.1). Educated individuals may feel that they possess sufficient knowledge and do not need to work hard on the project, which may explain the decrease in the level of effort. This finding should be explored further in future research. All other

control variables were statistically insignificant. Table 15 presents the coefficient, p-value, and whether the relationship was supported for each control variable.

Table 15. Inner Model Path Coefficient for Control Variables at Time 2			
	Estimate	ρ-value	Supported
Individual Effort t_1			
Gender	0.0041	> 0.1	No
Age	-0.0138	> 0.1	No
Level of Education	-0.0124	< 0.1	Yes
Performance t_2			
Gender	0.0003	> 0.1	No
Age	0.0127	>0.1	No
Level of Education	0.0011	> 0.1	No

5.2 Longitudinal Study

In the previous sections, separate PLS models were tested at times 1 and 2. This chapter investigates the relationships between the significant factors in a crowd-sourced business consulting project to determine if they change over time. It will coalesce all the data and run a partial least square model with robust random sampling to establish the significance of the factors across the eight weeks. The results of hypotheses testing to examine significant changes in relationships over the project term will be presented. R-Studio is used to conduct the analysis and compute these findings. The chapter concludes with a discussion of the hypotheses testing results.

5.2.1 Comparing Groups: Bootstrap t-test

The research model created in Chapter 4 and presented in Figure 6 has 22 paths. These path coefficients depict the strength of the relationship between the two constructs.

There are various multi-group analyses to test the changes in the path coefficients over time (e.g., Parametric approach; Permutation-based approach; Confidence set approach; Henseler's approach; Omnibus test of group differences (Sarstedt, M., Henseler, J., and Ringle, C. M. 2011)). In this study, the parametric approach was applied where the analysis is carried out by running the PLS path modeling algorithm for both groups, and using a bootstrap t-test to compare the path coefficients of the multi groups. Table 16 shows the change of path coefficients from time 1 to time 2, and the statistic of the t-test with the associated p-value. It also depicts whether the difference in path coefficients is significant at the 5% level.

Table 16. Comparison of Path Modeling Between Time 1 and Time 2			
Relationships	Path coefficients (Time 1 – Time 2)	ρ-value	Sig 0.05
INDSKILL → INDE	(0.0472 – 0.0825)	> 0.1	No
INDOE → INDE	(0.0211 – 0.0040)	> 0.1	No
INDIE → INDE	(- 0.0381 – -0.0316)	> 0.1	No
INDCULPD → INDE	(- 0.0030 – 0.0125)	> 0.1	No
INDCULIC → INDE	(- 0.0272 – - 0.0311)	> 0.1	No
INDCULM → INDE	(- 0.0025 – - 0.0085)	> 0.1	No
INDCULUA → INDE	(- 0.1295 – - 0.0039)	> 0.1	No
INDCULLTO → INDE	(- 0.0032 – - 0.0156)	> 0.1	No
MOE → INDE	(- 0.1358 – - 0.0063)	> 0.1	No
MOD → INDE	(0.0401 – 0.0853)	0.0004	**Yes**
MOSM → INDE	(0.3251 – - 0.0195)	> 0.1	No

MOL → INDE	(- 0.3686 – - 0.0654)	> 0.1	No
MOS → INDE	(0.3950 – - 0.0310)	> 0.1	No
TASKA → INDE	(0.1765 – 0.1115)	> 0.1	No
PLATEOU → INDE	(-0.0071 – 0.0896)	0.0016	**Yes**
PLATU → INDE	(- 0.0406 – 0.0214)	> 0.1	No
PLATMR → INDE	(0.0439 – 0.0534)	> 0.1	No
FDBK → INDE	(0.0857 – 0.0285)	0.0067	**Yes**
TEAME → INDE	(0.5202 – 0.4049)	0.0000	**Yes**
INDSKILL → PER	(0.0224 – 0.0105)	> 0.1	No
FDBK → PER	(0.9432 – 0.9610)	> 0.1	No
TEAME → PER	(0.0735 – - 0.0056)	0.0001	**Yes**
INDE → PER	(0.0568 – 0.0354)	> 0.1	No

The data suggests that the impact of direct compensation on the percentage of work individuals invest in the process increases significantly from time 1 to time 2 (p-value<0.001). We find support from the data that ease of use of the tools participants used for communication and collaboration had negative impact at the beginning of the process and positive impact at the end of the process. The change in this relationship is significant from time 1 to time 2 (p-value<0.05). The data also provides evidence that feedback influence individual level of effort and this impact decreases significantly from the beginning to the end of the process (p-value<0.05). Individual perception of the team's effort increase an individual's effort at both time 1 and time 2 but this impact significantly decreases from time 1 to time 2 (p-value<0.001). There is evidence in the data that the perception of the team members' effort increases performance at the

85

beginning of the process but has a negative impact on the performance over time. This change is significant (p-value<0.001). This finding should be explored further in future research.

5.2.2 Performance at Time 1 on Behavior at Time 2

The impact of performance at time 1 on individuals' participation effort and performance at time 2 was also examined. Table 17 shows the results of the study.

Table 17. Inner Model Path Coefficient Sizes and Significance of Performance at Time 1 on Behavior Time 2			
	Estimate	ρ-value	Supported
H8a: PER t_1 →MOE t_2	0.1532	<0.0001	Yes
H8b: PER t_1 →MOD t_2	0.0925	<0.0001	Yes
H8c: PER t_1 →MOSM t_2	- 0.0277	> 0.1	No
H8d: PER t_1 →MOL t_2	- 0.0324	< 0.1	Yes
H8e: PER t_1 →MOS t_2	- 0.0092	> 0.1	No
H8f: PER t_1 →TASKA t_2	0.1655	<0.0001	Yes
H8g: PER t_1 →PLATEOU t_2	0.1562	<0.0001	Yes
H8h: PER t_1 →PLATU t_2	0.0602	<0.001	Yes
H8i: PER t_1 →TEAME t_2	0.2379	<0.0001	Yes
H8j: PER t_1 →FDBK t_2	0.4861	<0.0001	Yes
H8k: PER t_1 →INDE t_2	0.1684	<0.0001	Yes
H8l: PER t_1 →PER t_2	0.5060	<0.0001	Yes

The data points out an interesting relationship that participants who get higher performance scores during the first half of the process, are more motivated for direct compensations during the second half (β= 0.0925; p-value<0.0001) and enjoy the task more (β= 0.1532; p-value<0.0001). The data provides support for hypotheses 8a and 8b.

The study shows that performance at time 1 impact negatively on motivation to learn at time 2 (β= -0.03324; p-value<0.1). The data provides support for H8d.

The data also provides evidence that for participants with higher level of performance at time 1, the task instructions are significantly more analyzable at time 2 (β= 0.1655; p-value<0.0001). The data provides support for hypothesis 8f. the data shows that respondents who got higher performance scores during the first half of the process believe that online communication and collaborations applications are easier to use (β= 0.1562; p-value<0.0001) and more useful to carry out the task (β= 0.0602; p-value<0.001) compare to those who get lower performance scores. The data provides support for hypotheses 8g and 8f. Additionally, the data shows that higher level of performance at the beginning of the process significantly relates to higher perception of team's effort at the end (β= 0.2379; p-value<0.0001). The data provides support for hypothesis 8k. The study shows that participants with better performance scores during the first half of the process, get higher feedback scores during the second half which supports hypothesis 8i (β= 0.4861; p-value<0.0001). The data provides evidence that higher level of performance at the beginning of the process leads to higher level of effort during the second half (β= 0.1684; p-value<0.0001), and also results in higher score levels at the end of the process (β= 0.5060; p-value<0.0001). The data provides support for hypotheses 8k and 8l.

5.3 Summary of the Quantitative Results

A longitudinal study was conducted in this dissertatin to assess performance at week 4 (time1) and at the end of the process (time2), to compare the model at time1 with

the model at time2, to investigate whether the relationships between the constructs have

changed throughout the project, and to investigate whether the performance at time 1 has

impacted the participants' participation effort and performance at time 2. The summary

of the results is presented in table 18.

Table18. Summary of the Quantitative Results				
Hypotheses		**Statement of Relationships**	**Results**	**Comment**
Individual Participants characteristics	H1a	Individual skill has a significant positive influence on Effort at t_1.	Supported	• The impact of skill on effort increases over time and the change is not significant. The impact of skill on effort decreases over time and the change is not significant. • These results complement previous studies that implies role of expertise and relevant knowledge on participation effort and performance (S. Bonner & Lewis, 1990; Libby & Luft, 1993).
	H1b	Individual skill has a significant positive influence on Effort at t_2.	Supported	
	H1c	Individual skill has a significant positive influence on Performance at t_1.	Supported	
	H1d	Individual skill has a significant positive influence on Performance at t_2.	Supported	
	H1e	Previous online experience is related to Effort at t_1.	Mildly Supported	• Previous online experience has a partially significant positive influence on Effort at t_1 and a non-significant positive influence on Effort at t_2 • The impact decreases over time and the change is not significant. • Libby's (1993) model of knowledge acquisition states that over time previous experience becomes expertise which might motivates individuals to participate and improve participation effort.
	H1f	Previous online experience is related to Effort at t_2.	Not-Supported	
	H1g	Previous international experience is related to Effort at t_1.	Supported	• Previous international experience has a significant negative influence on Effort at t_1 and a partially significant negative influence on Effort at t_2 • The negative impact decreases over time but the change is not significant. • Literature shows that prior experience influences ease of use beliefs which might decrease the individual's effort (Lewis, Agarwal, & Sambamurthy, 2003).
	H1h	Previous international experience is related to Effort at t_2.	Mildly Supported	

88

	H1i-m	Cultural background is related to Effort at t_1.	Not Supported	• That data shows that Cultural Background didn't have impact on effort. • These results are not consistent with the findings of most other previous investigations and should be studied further in the future.
	H1n-r	Cultural background is related to Effort at t_2.	Not Supported	
Motivation	H2a	Task Enjoyment at t_1 has a significant positive influence on Effort at t_1.	Not Supported	• Task enjoyment motivation at t_1 has a non-significant negative influence on Effort at t_1. • Task Enjoyment motivation at t_2 has a non-significant negative influence on Effort at t_2. • The negative impact decreases over time but the change is not significant. • Performance at t_1 has a significant positive influence on task enjoyment motivation at t2.
	H2b	Task Enjoyment at t_2 has a significant positive influence on Effort at t_2.	Not Supported	
	H2c	Direct Compensation at t_1 has a significant positive influence on Effort at t_1.	Partially Supported	• The positive impact increases over time significantly. • Performance at t_1 has a significant positive influence on direct compensation motivation at t2. • These findings complement CS literature. One of the characteristics of CS that differentiates it from other similar concepts is that the crowd is acting voluntarily. As it has been shown in the CS literature, direct compensation is an external motivation that drives a participant to work hard in order to get expected rewards. As the semester progresses, those users that find it more likely to get the final rewards, might put more effort into the process and work harder to get the final compensations.
	H2d	Direct Compensation at t_2 has a significant positive influence on Effort at t_2.	Supported	
	H2e	Self-marketing motivation at t_1 has a significant positive influence on Effort at t_1.	Not Supported	• The data shows a non-significant positive impact at the beginning and a non-significant negative impact at the end. The change is not significant. • These results are not consistent with the findings of most other previous investigations of the motivation theory.
	H2f	Self-marketing motivation at t_2 has a significant positive influence on Effort at t_2.	Not Supported	

	H2g	Learning motivation at t_1 has a significant positive influence on Effort at t_1.	Not Supported	• Learning motivation at t_1 has a non-significant negative influence on Effort at t_1. • Learning motivation at t_2 has a significant negative influence on Effort at t_2. • The negative impact decreases over time but the change is not significant. • These results are not consistent with the findings of most other previous investigations of the motivation theory. • Performance at t_1 has a partially significant negative influence on learning motivation at t2. • Research on intrinsic motivation shows that perceived challenge of an activity is one of the key derivative for an individual to participate in an activity (Csikszentmihalyi, 1975; Deci & Ryan, 1985). Learning theory proposes that there is a maximum level of challenge for a certain level of skill. As the semester progresses and tasks get too complicated, the challenges might be too high and participant might feel a lack of control over the environment and become anxious and frustrated. This finding should be explored further in future research
	H2h	Learning motivation at t_2 has a significant positive influence on Effort at t_2.	Not Supported	
	H2i	Social motives at t_1 has a significant positive influence on Effort at t_1.	Not Supported	• The data shows a non-significant positive impact at the beginning and a non-significant negative impact at the end. The change is not significant. • These results are not consistent with the findings of most other previous investigations of the motivation theory.
	H2j	Social motives at t_2 has a significant positive influence on Effort at t_2.	Not Supported	
Task	H3a	Task analyzability at t_1 is related to Effort at t_1.	Supported	• The positive impact decreases over time but the change is not significant. • Performance at t_1 has a significant positive influence on Task clarity at t2.
	H3b	Task analyzability at t_2 is related to Effort at t_2.	Supported	
Platform	H4a	Platform's ease of use at t_1 has a significant positive influence on Effort at t_1.	Not Supported	

90

	H4b	Platform's ease of use at t_2 has a significant positive influence on Effort at t_2.	Supported	• The data shows a non-significant negative impact at the beginning and a significant positive impact at the end. • The change over time is significantly. • Performance at t_1 has a significant positive influence on Platform's ease of use at t2.
	H4c	Platform's usefulness for the task at t_1 has a significant positive influence on Effort at t_1.	Not Supported	• Platform's usefulness at t_1 has a significant negative influence on Effort at t_1. • Platform's usefulness at t_2 has a partially significant positive influence on Effort at t_2. • These results are not consistent with the findings of most other previous investigations. • Performance at t_1 has a significant positive influence on Platform's usefulness at t2.
	H4d	Platform's usefulness for the task at t_2 has a significant positive influence on Effort at t_2.	Partially Supported	
	H4e	Media richness has a significant positive influence on Effort at t_1.	Supported	The positive impact increases over time but the change is not significant.
	H4f	Media richness has a significant positive influence on Effort at t_2.	Supported	
Feedback	H5a	Feedback at t_1 has a significant positive influence on Effort at t_1.	Supported	The positive impact decreases significantly over time.
	H5b	Feedback at t_2 has a significant positive influence on Effort at t_2.	Partially Supported	
	H5c	Feedback at t_1 has a significant positive influence on Performance at t_1.	Supported	• The positive impact of feedback increases slightly over time but the change is not significant. • Performance at t_1 has a significant positive influence on feedback level at t2.
	H5d	Feedback at t_2 has a significant positive influence on Effort at t_2.	Supported	
Team Behavior	H6a	Perception of team's effort at t_1 has a significant positive influence on Effort at t_1.	Supported	The positive impact decreases significantly over time.
	H6b	Perception of team's effort at t_2 has a significant positive influence on Effort at t_2.	Supported	
	H6c	Perception of team's effort at t_1 has a significant positive influence on Performance at t_1.	Not Supported	• Perception of the team's effort at t_1 has a significant negative influence on Performance at t_1.

	H6d	Perception of team's effort at t_2 has a significant positive influence on Performance at t_2.	Not Supported	• Perception of the team's effort at t_2 has a non- significant negative influence on Performance at t_2. • The change over time is significant. • Performance at t_1 has a significant positive influence on perception of the team's effort at t2. At the beginning, the perception of team members' effort might motivate participants to engage in the process and increases their performance. However, over time, perception of team effort reduces individual effort due to free riding.
Effort	H7a	Effort at t_1 has a significant positive influence on Performance at t_1.	Partially Supported	• Performance at t_1 has a significant positive influence on individual effort at t2 and a significant positive influence on performance at t2.
	H7b	Effort at t_2 has a significant positive influence on Performance at t_2.	Supported	

CHAPTER VI

THE QUALITATIVE STUDY

6.1 Research Design

The CS conceptual framework developed in the first part of this dissertation (presented in Figure 1) tries to define the dimensions of a CS process by answering the questions related to the following factors: *the initiator, the crowd, motivation, task, and platform*. The theoretical model was developed and tested to examine the various theories surrounding the relationships between characteristics of each of these factors and individual crowd's level of effort and performance over time through the process. The scope of this study is the CS projects with characteristics similar to the X-Culture projects where the task is complex and the crowd needs to have specialized skill and knowledge to carry out the task.

In the next step, an interpretive study was conducted using semi-structured interviews to explore extensively individual participants' experiences; factors that impact their behavior and performance, as well as possible approaches to improve performance in the future. This part's approach is interpretive in the sense that it involves analyzing texts which reflect the interviewees' experiences. The results of the qualitative study will provide rich insight to discuss the results arrived from the quantitative analysis and to understand crowd's behavior and factors influencing their performance in a crowd-

sourced project. The results of the qualitative study may also provide insight to refine the conceptual model for future research.

The CS conceptual framework was used as a baseline for the qualitative study and the questions were developed based on the key components presented in the framework. Besides, in developing the interview questions, the theories were considered which were examined and discussed in chapter three of this dissertation. Examining and considering the current literature helps explain the effective factors that influence participation effort and performance of the crowd over time in a CS process and sensitizes researchers to a variety of perspectives. This sensitization process helps to minimize potential bias and one-sided perspectives during data collection and analysis, and provides a greater number of codes to consider while analyzing qualitative data (Glasser, 1978, 1992). Additionally, some codes might emerge from the interview transcripts that might be unrelated to any of the aforementioned topics in the literature. Thus, we are open to new concepts derived from the respondents' perceptions as well.

Before collecting data through interviews, the interview questions were pre-tested with a panel of three information systems professors to ensure the questions were understandable and likely to elicit relevant information. Based on the review by the panel, some changes were made to the initial set of questions. After pre-testing the survey questions, a set of three pilot interviews were also conducted with previous participants of the X-Culture projects to ensure that the questions elicit pertinent information. After conducting the three pilot interviews, some new questions pertaining to topics were added that were not considered. Respondents directed our attention to different explanations of their

beliefs and behaviors. To allow each respondent to direct the conversation toward new topics, each interview was started and ended with a broad question asking the respondents about their experience with the CS process and factors impacting their performance and how their effort and performance developed over time. Because a semi-structured interview was used, it was possible to explore some of the novel perceptions the interviewees, while still maintaining consistency in the topics that were discussed.

6.2 Data Collection

Initially, a question was sent out during the X-Culture projects held in the spring 2016 and asked participants whether they would volunteer to participate in an interview after the end of the process. From those who agreed to do the interview, 12 individuals from 10 different countries were interviewed. Creswell (2007) provides practical guidance for estimating sample sizes necessary for conducting quality research. He suggests that saturation occurs within the first twelve interviews. The participants were selected to highlight a diverse set of perspectives. To explore factors influencing individual performance throughout the process, interviewees were selected based on the percentile rank of their overal performance through the process: high (more than 85%), medium (50% to 85%) and low (less than 50%). Table 19 presents the number of interviewees.

Table 19. Number of Interviewees Based on Level of Performance	
Level of Performance	Number of Interviewees
Low (less than 50%)	3
Medium (50% to 85%)	5
High (more than 85%)	4

Interviews lasted between 45 to 70 minutes. Interviews were conducted by phone and via Skype. The interviews were transcribed using the Express Scribe transcription software. The questions listed were just used to start the conversation. Table 20 presents the semi-structured interview questions asked to participants, along with some common follow-up questions that were asked.

Table 20. Semi-Structured Interview Questions	
Interview Question	**Purpose**
1. Did your previous experience with the online collaboration tools, if you had any, influence your performance in this project? Please explain how. 2. Did your prior international experience, if you had any, influence your performance in this project? Please explain how.	To understand the effect of individual skill, background and experience
3. Why did you choose this specific company and task? 4. What do you think of the tasks and the instructions? Please explain in terms of clarity, complexity, enjoyment, etc. 5. How did your perception of the tasks and the instructions change over the session?	To understand the role of task characteristics
6. Why did you choose the communication and collaboration tools that you used for this project? (we know from the surveys what tools each team used) 7. Tell me about your experience using the communication and collaboration tools that were available to you and how did they work? Were there any problems? What worked and what did not work. Please explain. 8. How did your experience using the communication and collaboration tools change over the semester?	To understand the role of information technologies

9. What do you think of the feedback provided by X-Culture? Did that help you carry out the task? Please explain.	
10. What do you think of the training and webinars that have been provided by X-Culture? Did that help you carry out the task? Please explain.	To understand the role of X-Culture website and emails
11. Do you have any suggestions in terms of the services that can be provided by X-Culture to improve your performance? Please Explain.	
12. What was your motivation to participate? Did your motivation change over the session? Are you satisfied with the process? Please explain.	To understand motivation
13. What was your team's plan to work on this project? [Backup questions: How did you divide the task and roles? Did your team have a leader? What was your role in the team? How did your team leverage diverse skills and knowledge? What would you do differently?]	
14. Tell me about your experience working on a global team. [Backup questions: Did cultural difference, language barriers, time differences effect the performance? how? Please explain if they were other problems. Did you develop an informal relationship beyond the project? Were you able to ask questions if you had a problem? What would you do differently?]	To understand team dynamics
15. How did your team dynamics change over the session?	
16. CS is a problem-solving model that asks a crowd of anonymous individuals through the internet to work on a task or solve a problem. The X-culture Project is a CS project. Will you participate in similar projects in the future individually or in a team? Why or why not? Please explain.	General questions
17. Overall, based on your experience, what were the main factors that influence your performance over the session? Please explain. Do you want to add any other points?	

CHAPTER VII

THE QUALITATIVE STUDY RESULTS AND ANALYSIS

Open coding (Corbin & Strauss, 1990) was used to determine the emergent, low-level codes in the interview transcripts. Axial coding (Corbin & Strauss, 1990) was then used to determine how the low-level codes related to form higher-level themes. Axial coding was also used to determine how the different themes relate to one another. We embrace the methodological guidelines summarized by Klein and Myers (1999) which recommend sense-making by interpreting data via the hermeneutic circle, using constant comparative analysis to tease out initial concepts, linking evolving concepts to higher level categories, and identifying potential linkages between the categories themselves where appropriate. As patterns emerged, every effort was made to situate them in the context of extant literature and to develop a broader understanding of the conceptual framework presented to answer the research question. This approach afforded us a contextually-rich understanding of how individuals perform in a crowd-sourced business consulting process and advance our understanding of the research model. Interviewees include participants of the X-Culture project held in the spring 2016. Data from interviews was collected to construct a suitable resource for interpretation. To the extent possible, our interpretation was situated in existing literature. Results of the qualitative data analysis are employed to explain the results of a survey-based analysis of around

2500 participants of a crowd-sourced business consulting platform, X-Culture. The

insights gained from the open-ended interviews were used to explain and extend our

understanding of the CS process and dynamic interactions of the effective factors

involved in the process. Dedoose 7 was used to code the interview transcripts and combine

the low-level codes into larger themes.

7.1 Qualitative Themes and Codes

Through open coding, 65 different codes were identified. Through axial coding,

the 65 codes were grouped into eight high level themes. The eight themes include:

individual's level of skill, experience, and background, motivation, task characteristics,

platform features and characteristics, feedback and peer evaluation system, webinars and

training sessions, team behavior, and change over time. Each of the eight major themes is

described briefly in the following sections. Following the description of each theme, the

manner in which the themes relate to one another and to the crowd's performance is

considered later. Table 21 presents the major qualitative themes.

Table 21. Major Qualitative Themes
Individual Crowd's skill, experience, and background
Motivation
Task characteristics
Platform features
Feedback and peer evaluation system
Webinars and training sessions
Team behavior
Change over time

7.1.1 Individual Level of Skill, Experience, and Background

The X-Culture platform selects and crowd-sources business challenges presented

by its corporate partners to individuals from all around the world. Participants take part

and compete in the projects individually, or they can choose to be placed in a randomly

assigned international team. Participants are usually undergraduate or MBA students;

however, they possess different levels of English proficiency, prior experiences, and

skills. Qualitative data shows that skill impacts individuals' effort and performance.

Cultural background, challenges associated with it, and its impact on participation effort and

performance are also among the factors that were mentioned repeatedly during the

interviews. For example, one respondent noted:

> To improve the process, crowd should have knowledge about the location of the
> project and a good level of English speaking and writing skills.

Prior experience and knowledge such as previous international experience and

experience with online communication and collaboration tools were also cited as factors

related to the performance. Those respondents with previous experience felt that it was

easier for them to adopt the technology, to access the task documents, to interact and

cooperate with people from other cultures, and manage working with people from

different time zones. For example, one of the respondents described the effect of his

previous international experience as following:

> I already had experiences working in a global team so I didn't have any struggles
> when talking or having discussion with team members. I just feel that I am really
> familiar with people from different countries, and honestly, I don't think it's too

complicated to work with them. In my opinion, not only when working but also communicating with people from different culture in the daily life, the most important thing should be respect. Respect others ideas and the differences then everything would not be too difficult.

However, one of those participants who haven't had prior knowledge and experience found the instructions provided by the X-Culture platform very helpful to carry out the task:

> Overall, although I haven't had international experience before, I found the instruction very clear with well details and it was open-ended so we could interpret it and discuss what we want to do with it. I appreciate the directions; specific deadlines were very helpful for scheduling. As the time went on, I got into the routine to work on the project, and schedule accordingly.

There was an interesting debate between the respondents regarding their perception of their team members' levels of skills and experience and its impact on the team performance. Some found it difficult to work with individuals with different levels of skill and believed that adding additional screening steps at the beginning of the process would make the crowd works more efficiently, limit free riding, improve individual motivations, and develop team performance. For instance, one of the interviewees made the following note about adding more filters at the beginning of the process:

> Cultural conflicts were expected but sufficient level of language is very important to communicate and work on tasks. Students had different English abilities and research skills. Having a filter (as a survey at the beginning of the process) for crowd to only include those who are best of the best and have motivation would limit free riding.

101

On the other hand, other respondents believed that team members' different

background and prior knowledge gave their team the opportunity to discuss about the

new ideas and learn from each other which improve their performance. one respondent

noted that they had difficulties working with people from different background but over

time they discuss the tasks with each other, learn from each other, and eventually found

the X-Culture projects as a great learning experience:

> Each member has different background and knowledge and we did face difficulties
> when giving our ideas. But we learnt from each other and we discussed about every
> ideas or suggestions from anyone to see if the information is valuable for us. This
> improved the creativity of our submissions at the end and I really enjoyed the
> process.

Dividing tasks based on each individual skill and background is shown to have a

positive impact on the performance. Table 22 presents the codes related to the

individual's skills, prior knowledge and previous experiences.

Table 22. Codes for Individual Skills, Prior Knowledge and Previous Experiences	
Code	Quote
Skill	– To improve the process, crowd should have knowledge about the location of the project and should have had the same level of skill set and motivation and a good level of English speaking and writing skills. – Students had different English abilities and research skills. So having a filter (as a survey at the beginning of the process) for crowd to only include those who are best of the best and have motivation would limit free riding. – In Colombia, the English level is not very good, I had the opportunity to take some English courses during my high school and also, I was working in a call center as part of a company

	here in Colombia which was an American company's customer service and that improves my English skills.
	– I think I need more time to do the report better since my major is not in International business, and I need more reference resources than others.
	– There is a Chinese member he didn't contribute much; the reason could be his English ability is not good enough. But anyway, we'll try our best to work on the next task.
	– I watched the recordings and it was helpful but I couldn't understand some questions from students since English is not my native language and they were talking very fast so, it would be helpful if X-Culture provide some subscription on the video or provide descriptions of the question and answers after the webinars
	– The only thing we did was: we put English speakers in one group to do part of the work and non-English speakers in another group so they worked on the writing of the reports and checked the grammar.
	– Cultural background was expected but sufficient level of language is very important to communicate and work on tasks
	– One of our team members still seems to have issues with communication and his poor level of English is showing more and more. To me personally he is very confusing most of the time, not providing any sort of appropriate answers to simple, clear-cut questions
	– It would have been better to divide tasks based on individual Skills
	– We could have done better with the reference section; my group members didn't have prior knowledge about the formatting and that's why we lost grades
	– Each member has different background and knowledge so we did face difficulties when giving our ideas. But we learnt from each other and we discussed about every ideas or suggestions from anyone to see if the information is valuable for us.

	– It would have been better to divide tasks based on individual Skills and if we could have collaborated better; I would say better organization and collaboration
Previous experience	– I have worked with global team in Berlin, so I am used to work in 11pm or very early morning.
	– I already had experiences working in a global team so I didn't have any struggles when talking or having discussion with team members. I just feel that I am really familiar with people from different countries, and honestly, I don't think it's too complicated to work with them. In my opinion, not only when working but also communicating with people from different culture in the daily life, the most important thing should be respect. Respect other ideas, the differences then everything would not be too difficult.
	– My previous experience working in a global environment gave me confidence to manage conflicts and time gap
	– I was working in a call center as part of a company here in Colombia which was an American company's customer service...I learned about different cultures and languages and what I can talk about and not talk about. I think it is very important to know who you are working with, their cultural background, know the differences and social structure of where they come from, and even time zone difference in order to have an efficient communication
	– Overall, although I haven't had international experience before, I found the instruction very clear with well details and it was open-ended so we could interpret it and discuss what we want to do with it. I appreciate the directions; specific deadlines were very helpful for scheduling. As the time went on, I got into the routine to work on the project, and schedule accordingly
	– My job is IT training, so I am super familiar of IT tools, that help us to communicate easier

7.1.2 Motivation

Finding a right incentive is a major issue in designing a CS process. Respondents spoke frequently about their motivations, which can be categorized as learning, social motives, self-marketing, direct compensation, task enjoyment, working for a major company, being in a global environment, and word of mouth (WOM). For some respondents, getting the certificate and learning were even more interesting than monetary compensation. They participated in the X-Culture process to challenge themselves, to gain knowledge, to experience, and to learn. For example, one of the interviewees stated that:

> I will jump on any opportunity like this because I learned a lot during the process. To me money is not very important, the certificate and the knowledge I gain is more interesting than money.

Social motives and the desire to find friends as well as the idea of working in an international setting have been attractive to some respondents. They believe that this is a great opportunity to find friends from other nationalities and learn more about other cultures. One of the interviewees stated:

> Meeting and working in an international setting despite all the challenges were very satisfying and make me very proud.

The example was not singular:

> I learned about people and also how to interact with other people. I would participate on projects such as X-Culture in the future.

Also:

> I am a very talkative person and I really do love to interact with different cultures cause I think that everyone has his own perception of the world and the more I can get in touch with them, the better I will understand.

Additionally, some respondents mentioned that participating in projects like X-Culture could have been a great resume builder, and two of the interviewees mentioned that it already helped them to find new jobs and to get scholarships. Most of the participants in the X-Culture project are students, which might explain their self-marketing motivations. Followings are some of the respondents' notes related to their self-marketing motivations:

> The opportunity to network with professional businesses and clients was also motivation for me.

And:

> It is a great resume builder, great experience and would have participated even if it wasn't required.

For some interviewees, winning the competition and getting the monetary or/and non-monetary rewards were the main motivations to participate. Non-monetary prizes such as attending the X-Culture symposium and get the compensation from the client company were mentioned repeatedly through the interviews. One of the interviewees stated:

[My motivation] would be the rewards from X-culture (honestly, I always think that I'll never get it because there are thousands of students around the world joining the project and I am not smart enough, my English is not good enough, I don't have enough experiences…). Even I know it's hard to get to the reward and it somehow depends on luck but I still had a bit hope about that.

Interviewees further mentioned the task enjoyment and experience of working for a major company as their main motivations to participate. Enjoying the task was also cited as an incentive for participants to put effort into the process. The interviewees mentioned their excitement of working for these major companies as well as the enjoyment of working on the projects. For instance, one of the respondents stated that: "I was very interested in the task and the challenge that we had to accomplish". Some respondents claimed that these motivations helped them to overcome difficulties and even enjoy the challenges throughout the process.

Word of mouth was also mentioned as a factor that motivated individuals to participate. Some of the interviewees stated that they had heard about this project from their friends and were planning to discuss their experiences with their friends and classmates. It should be noted that respondents mentioned that participating in this project was mandatory for some of them; however, almost all of them stated that even if it were optional, they would have participated. They will participate in projects like this in the future. Table 23 shows the codes representing the individual's motivations and some of the related quotes from the interviews.

Table 23. Codes for Motivation	
Code	Quote
Learning Experience	– I will jump on any opportunity like this because I learned a lot during the process. To me money is not very important, the certificate and the knowledge I gain is more interesting than money. – I could learn lots of valuable things from the project or people I got to know from joining the project – I'm learning a lot and that makes me feel good about the project and the future development. – I learned about people and how I interact with other people. I would participate on projects such as x-culture in the future. – I wanted to do the experience; it is an international experience and was excited to work on a cloud-based project – Great to learn from others and working with my group mates. – My motivation was the desire to do a project like x-culture and to challenge myself – This process has been having very "educative" for me – I consider this project very interesting and very useful form many points of view, intercultural, academic, research, leadership, willingness to cooperate. I'm glad to be part of one of the group
Social motives and being in a global environment	– I always like to work with people from different cultures – I'm very looking forward to collaborating with people from all over the world – I am a very talkative person and I really do love to interact with different cultures cause I think that everyone has his own perception of the world and the more I can get in touch with them, the better I will understand. – I am interested to know how people live in different parts of the world and learn from different cultures – I love to make friends from the whole world, but I do want to work with people who also work hard. – It's interesting to cooperate with many people from different countries. Thank X-Culture to create this platform

	– I would like to get more global collaboration experience, so I join X-Culture
	– I am looking forward to this project with hopes of assisting these companies to gain value in our ideas and to working with people across borders
	– It was very interesting to know about the social norms in other countries and it was very interesting to work in a multi-cultural environment
	– These kinds of collaborations can help since if you get to gain the skills to chat with people from other countries. I shared experiences and research other countries in order to do this project and found that we have more in common than differences. Also, in the case of crowd funding projects, you will see the reality of the world.
	– Meeting and working in an international setting despite all the challenges were very satisfying and make me very proud
	– The idea of working in an international setting attract me
	– My motivation is to know how I can manage a global team and work professionally in a global team
	– The opportunity to find out about different ways to communicate with people from other countries
	– Really enjoy it and make global friends
	– I really hope this would be a good chance for me to learn from friends who's from different nations in the world when working with them as a team.
	– We became good friends and we talked informally and they provided feedback and we help each other to improve)
	– Talk to people from other countries; Socializing and finding friends from other countries were my main goals
	– I am the person who loves making new friends from different countries
Self-Marketing	– I just think that this will be my great experience ever, not only helping me improve my knowledge, my communication skills but also good for my future career.
	– My motivation is to gain a new social/professional experience since Italian universities are too theoretical and I really miss this sort of team works in my CV
	– It was helpful and I put it on my CV

	– It is a great resume builder, great experience and would have participated even if it wasn't required
	– It already helped me get new job interviews
	– I got the attention in my University from students and my professor; They are asking about my experience in X-Culture Projects
	– I already put it in my resume and it helped me to get a scholarship
	– To make a bit of networking.
Direct compensation	– My motivation was the compensation from the company
	– It could be the rewards from X-culture (honestly, I always think that I'll never get it because there are thousands of students around the world joining the project and I am not smart enough, my English is not good enough, I don't have enough experiences…). Even I know it's hard to get to the reward and it somehow depends on luck but I still had a bit hope about that
	– Going to the cruise
	– Getting certificate or any sort of prize
	– Monetary, prize or/and internship and job opportunity; and also, offering part of the benefit would be the best incentives
	– The monetary prize would be an extra motivation but I was already motivated to work hard
	– My motivation was not the price
	– Winning the prize was not my main motivation
Task Enjoyment	– It was exciting for me that we are working with this organization and I enjoyed the task
	– I was very interested in the task and the challenge that we had to accomplish
	– The company was very interesting in terms of product and the project was related to my research and work interest
	– I´m used to give my one hundred percent when doing the stuff that I enjoy the most
Working for a major company	– The opportunity to network with professional businesses and clients was also motivation for me
	– Also, it's really interesting to work on the real business problem with a real client.
	– I am looking forward to this project with hopes of assisting these companies to gain value in our ideas and to working with people across borders

	– The experience has been great so far apart from difficulties on reaching some team members and some poor job but in general my team and I are working well and we are starting to come up with new ideas. We sometimes feel part of the company and the Mobius SLIP team already even without knowing it
Word of Mouth	– I have friends who took this course before me and they always shared their experiences with us and one of my friends won the prize and went to Savannah. So the motivation was to figure out what that was about – The X-Culture project should not exclude people because they would be disappointed in the future; They will talk about their experience to next year students and disappoint them from participating
Course requirement	– It was the requirement for me and I was motivated to get a good grade in my course – It was required in our marketing class – Required but I would have participated if it was not for the grade – Actually, X-culture project was one part in our International Human Resource management course, and it covered 20% of our grade in that course. So, it was a requirement for us when taking this course. But after the briefly introduction of our instructor about X-culture project I was really excited to be participating the project.

7.1.3 Task Characteristics

One of the factors that respondents felt had an impact on their experience and progress throughout the process was related to the characteristics of the tasks and task instructions. Specific characteristics related to the task were cited as task clarity, analyzability, and complexity. Most of the respondents found the task instructions very clear but felt that as the semester continued, tasks got more complex. They felt that the process would have been less challenging if the instructions were stricter and focused on specific conditions. For example, one of the interviewees mentioned that:

The task was complex but it was clear enough to be able to solve it; but it was time consuming to do the research and find the right resources and the right information to solve the task; we were not sure if we are looking at the right information; to make it simpler, I would make the task stricter and more specific to a specific region and country for example for marketing tasks.

Another respondent stated:

The task was very clear but there are too many guidelines, so we didn't have time to cover all the points in the assignments. Many of the points were difficult to find. Fewer steps for each week and more freedom to prepare the report would have been useful.

Some respondents found that receiving weekly guidelines was helpful for team members and improved creativity of the reports: "Every week we had a new task to do and so you try to think more creativity." Table 24 presents the codes and some of the quotes related to the task instructions.

Table 24. Codes for Task Characteristics	
Code	Quote
Task Clarity	– In my opinion, the tasks and the instructions for each task were clear and gave us the right direction to work on each task. – The instructions were clear enough and pretty simple and helped to do the task – The instructions were very clear and interesting – Task instructions were quite clear, it was clearly explained – Overall, although I haven't had international experience before, I found the instruction very clear with well details and it was open-ended so we could interpret it and discuss what we want to do with it. – Think the tasks are reasonable, weekly check, peer evaluations, and give us some feedback from external experts

Task Complexity	– The task was very clear but there are too many guidelines, so we didn't have time to cover all the points in the assignments. Many of the points were difficult to find and useless for the final report. Fewer steps for each week and more freedom to prepare the report would have been useful
	– For the complexity, it would be depended on the choices of each team in term of the company, the business strategies or the role for each team members, or the people in the team. Those will lead to the different level of complexity and enjoyment during the project.
	– The task was pretty complex but it was clear enough to be able to solve it; but it was time consuming to do the research and find the right resources and the right information to solve the task; we were not sure if we are looking at the right information; to make it simpler, I would make the task stricter and more specific to a specific region and country for example for marketing tasks
	– I didn't imagine everything would be that hard from beginning of the project. I thought I could easily find any information I need from internet, book, then combine with what I learnt from college then I'll be fine and the project would go smoothly. But I was totally wrong about that. I really experienced the difficulties, the stuck when facing a hard task. I couldn't find what I want from internet. All of the information from book or college was quite general; I can't apply them for a specific business situation like in the X-culture project. Additional instructions might help me to have the better direction, better understanding about what we were doing
	– At the beginning, it was easier but as the process continued, the steps in the task description became more complex
	– Because each task was getting harder after each week so I felt that my team member paid more effort and we had more discussions when the tasks got more complicated.
	– Every week we had a new task to do and so you try to think more creativity

7.1.4 Platform Characteristics

Throughout the interviews, respondents brought up features of the X-Culture

platform and the communication and collaboration tools they have used and explained

how these features influenced their performance and experience throughout the process.

The most frequently cited feature of the communication and collaboration applications

was familiarity with the tool. Team members usually agreed to use a device if they had

previous experience using that device and if they were familiar with its features. One of

the respondents noted that:

> In Oman, thy have Google hangouts and had experience using Google products.
> And I personally use Google products to do my homework. Also, the girl from
> Oman was familiar with Whatsapp and we used it to chat about the task we were
> about to do, but the girls from the USA were not familiar with it. Also, they had
> Google docs connected to their university email so they already knew how to use
> that; but not very well…as a result, in the first day I had to take a screenshot to
> show them how G-docs works…which was very frustrating at the beginning.

Respondents also noted that ease of use was an important factor for them to pick

communication and collaboration applications. They also cited that they picked tools that

were effective and useful for them to carry out the task; tools that helped them organize

the work and keep the team on track. For instance, one of the interviewees stated:

> We used Whatsapp and Google docs a lot. These tools are pretty easy to use and
> good enough for the task we were working on.

Another respondent also described ease of use as her main reason to pick a

communication or/and collaboration tools:

Actually, from my perspective, the best collaboration tools should be Slack. It is easy to share files, easy to separate discussion topics, and easy to create private talk groups.

Respondents pointed out flexibility as another important criterion to choose an application especially with the time zone differences. Providing instant contact with other team members, accessibility, and time efficiency are other features cited by the interviewees. For example, one of the interviewees mentioned:

At first, we tried using Skype once, but it was time consuming and was not effective and useful and we were not used to using Skype, so our team decided not to use Skype. So, we opened the Google docs, and we were able to work on a document considering our different time zones.

Another respondent stated:

Whatsapp was the fastest tool to get contact with each other because they were Google docs was the best for editing the documents, everybody could have access to the document at the same time. Using G-Docs, you could edit at the same time and the document is always up to date.

Interviewees used all formats of communication: text messages, audio calls, and video conversations. Some respondents felt that the video communications they had with each other via applications such as Skype felt more real and helped them develop a good report and improved their overall performance. For example, one of the interviewees said:

Communication should be real if we want to have a good report, it would have been better to talk through Skype.

On the other hand, others believed that voice messages through apps such as Whatsapp were enough for their professional communications. Some respondents chose text messages as the most efficient medium of communication and collaboration. Language proficiency also was mentioned by some respondents as a major factor to choose the tool for team communications; while some team members avoid text messages to limit the misunderstanding and misinterpretation caused by grammar errors and tones, some preferred text messages over voice calls because of the lack of language fluency and therefore lack of confidence. The followings are examples of these statements related to the media richness as a factor to pick a communication medium:

> Audio calls were sufficient for the purpose of this project; it was very important to talk but personally I prefer texting because English was not every body's native language and we had hard time understanding it through audio calls.

And:

> We just used text and messaging, but we had problem interpreting texts and it would have been better if we would have used other forms of communications to see each other.

One of the respondents made a point about information privacy in the case of Facebook, which she believed was not an appropriate platform to share professional documents. Since X-Culture is a global platform, issues related to specific countries

might also impact a user's performance, issues such as Internet connectivity, censorship

and filtering, natural disasters, etc. Respondents suggested that some additional training

might reduce the impact of these country-related factors on effort and performance. Table

25 presents the codes related to the platform features and characteristics.

Table 25. Codes for Platform Characteristics	
Code	Quote
Familiarity	– We decided on Facebook because we all had Facebook account – In my previous experience, I used a software (base camp) that was very helpful but we couldn't use it since not everybody was familiar with the software; they were younger and they felt comfortable using Facebook – In Oman, thy have Google hangouts and had experience using Google products. And I personally use Google products to do my homework. Also, the girl from Oman were familiar with Whatsapp and we used it to chat about the task we were about to do, but the girls from the USA were not familiar with Whatsapp; they don't know what Whatsapp is and, they were not used to other research sources. They had Google docs connected to their university email so they already knew how to use it. But not very well, as a result, in the first day I had to take a screenshot to show them how G-docs works and my previous experience using G-docs help me with the performance. – Unfortunately, most of my team members don't like to use tools they never used before – It was my first time using Google docs and it got better through the process
Ease of Use	– We used Whatsapp and Google docs a lot and Skype and Facebook occasionally. These tools are pretty easy to use and good enough for the task we were working on. – Google docs are easy to use and the only requirement is having a Google account – Sometimes when I use Whatsapp, I want to use it in my Mac, but it need to connect to smartphone and also it disconnected very often.

	– From my perspective, the best collaboration tools should be Slack. Easy to share files, easy to separate discussion topics, and easy to create private talk groups.
Usefulness for task	– Basecamp is helpful in keeping the project to be organized, it's easy for the team to look at all the documents, keep the team on the progress. – At first, we tried using Skype once, but it was time consuming and was not effective and useful and we were not used to using Skype, so our team decided not to use Skype. So, we opened the Google docs and we worked on documents at different times. – And also, we used the same platform for communication and collaboration which was sometimes hard to organize so; I wish we would have used a separate tool like Google docs that we could use to organize our folders.
Media Richness	– Communication should be real if we want to have a good report, it would have been better to talk through Skype – I wish we used different ways of communication like video chats so that we could have been more comfortable talking to and communicating with each other – Audio calls were sufficient for the purpose of this project; it was very important to talk but personally I prefer texting because English was not every body's native language and we had hard time understanding it through audio calls – I personally think culture and language didn't play a role on the performance the only issue was on the understanding of our text messaging where sometime how things have said might come across as if we are attacking sometimes, because it was just text. (Grammar errors and tones were misunderstood able and annoying) – We just used text and messaging, but we had problem interpreting texts and it would have been better if we would have used other forms of communications to see each other. – We hardly ever used Whatsapp voice we just used texting to communicate and it worked pretty fine. I think if we did have more regular communications maybe that would have been better but we all had busy schedule. – Whatsapp was amazing since you could have group text discussion and see what each person is doing. – G-docs are easy to use and the only requirement is having a Google account. The information is safe because of the auto save option

Flexibility	– It was better for us to use Whatsapp because it doesn't require everyone to be present at the same time. – At the beginning, we used FB to find each other but after that we just used Whatsapp: it works well since you don't need to be connected all at the same time. – A good part of the Skype is that you get direct feedback, so it was definitely better than Whatsapp. – It allows members to work on a document at same time. It is similar to working face-to-face. – Google docs was the best for editing the documents, everybody could have access to the document at the same time. – Using G-Docs, you could edit at the same time and the document is always up to date
Time saving	– Whatsapp and FB did not work for me and they are not efficient ways of communication for me, because it was time consuming to type when you can just talk through Skype – From beginning, I wanted to use Facebook Messenger because I feel it's fast and convenient for me and everyone if we just normally want to talk or having short discussions at any time. – Whatsapp was the fastest tool to get contact with each other because they were not always available through FB and Skype – Basecamp is too slow for me compare to the other apps that I've been using. At first, we tried using Skype once, but it was time consuming and was not effective and useful and we were not used to using Skype, so our team decided not to use Skype. So, we opened the Google docs, we worked at different times.
Information Safety	– For me Facebook privacy settings and rules are not proper in a professional setting.
Country-related Issues	– We were in 4 different time zones, so we couldn't communicate live; we decided to have live chat once a week but the quality of internet connection was challenging. – We used FB since it is allowed in most countries – We were communicating through Facebook because Skype is not allowed in Oman. – There were another Pakistani guy and he did not have internet connection in his village and I communicated via cellphone with him – The chines guy did not have FB and he had to use proxy website to open FB in his area – There are students in my school that don't know how to use FB or YouTube or Whatsapp and they don't have proper access to the

| | internet to use these platforms; it will be helpful to make it easier to access to the necessary files and give them more time to fill the surveys |
| | – The team members didn't read the task instruction; they didn't know how to open the task instruction and find the password from the email. The training about how to access to the task instructions would be helpful. One way is to track and see how many students download the tasks |

7.1.5 Feedback and Peer Evaluation Systems

Another major theme arose from the interviews was the feedback and peer evaluation systems and their relationships with the individual motivation and progress throughout the process. Respondents expressed that the weekly feedback provided from the X-Culture experts helped them prepare for the process and motivated them to continue throughout the semester. However, there are some factors mentioned during the interviews that impact the effectiveness of these weekly feedbacks. These factors include lack of originality and uniqueness as well as ambiguity of the feedbacks provided by the system. These respondents weren't sure if the feedback that they received from the X-culture was a pre-fixed message or it was written for them and they believed these general comments did not really help them to improve their performance. They suggested that more concrete and individualized messages with specific directions about each submission might motivate the crowd to try harder and may improve their progress throughout the process. Following are two of the statements that interviewees mentioned about the feedback system:

The feedback was not very specific and we didn't know if it was pre-fixed message or it was written for us; it was just good enough.

Also:

I think....it only helps a little bit. Because the external expert usually only tells us how our summary compare to others is above, average or low. But not mentioned what problems are in our summary. Maybe we need more concrete advice.

Few of the participants also benefited from a mentor and coach during their experiences and based on their experience, believed that having a mentor will improve the performance of the crowd. There were also some errors in the peer evaluation systems that concern the respondents. They implied that improvement in the peer evaluation systems would improve the whole experience. Table 26 presents the codes and statements of the respondents about the feedback and peer evaluation systems.

Table 26. Codes for Feedback and Peer Evaluation Systems	
Code	Quote
Usefulness/ Originality/Ambiguity	- The weekly feedback was helpful and helped me realized that people are working on things differently - If I knew my report was that good, I would have put even more effort to make it perfect. - I think....it only helps a little bit. Because the external expert usually only tells us how our summary compare to others is above, average or low. But not mentioned what problems are in our summary. Maybe we need more concrete advice - I feel that the feedback that we got from X-culture on each task was general, we didn't really know what we should improve for the next tasks or for the final report. - I think that for the evaluation for the teams for the task every week X-culture can provide them in more specific way with more detail information so that the teams can fix them in the final report. - Feedbacks were short and not very specific; I preferred receiving feedbacks every three weeks but with more detail - The feedback provided showed the direction but I would have liked to have more detailed and specific comments about the submission; it would have motivated us to go back and improve our submissions - The feedback was not very specific and we didn't know if it was pre-fixed message or it was written for us; it was just good enough. So, we were not that motivated to do more. If we had feedback that could motivate us to do better would have been better.
Mentor or coach	- Feedback email was pretty OK, we had a mentor which was very helpful but because of my workload I didn't check emails daily and missed some instructions - It was my first time working in an international group, our instructors talked to us before the process about the difference on Language and background differences so; I was prepared about the process - I feel that the feedback that we got from X-culture on each task was general, we didn't really know what we should improve for the next tasks or for the final report. But during the project, our team was lucky to have a coach to review and gave us lots of useful evaluation for what we did each

	week as well as many good suggestions that helped us keep on right direction and made the right choice for the business strategies
Format and errors in the system	– Peer evaluation was also motivating to see other team members like the way I work – Frustrated because I expected to receive information from the X-culture through software but it was primarily email and that turned me off however I appreciated the format of the survey – The unpleasant situation that happened this week was not related to the team and its work or dynamic, it was more related to the incident with the wrong results of the peer evaluation. The whole situation was unpleasant and lead to wrong conclusions, I hope it doesn't happen again – One person used to behave very bad and still get high peer evaluation scores and it was very difficult to talk to the instructors. He used to speak Hindi and I used to translate. I would have changed the peer evaluation system – I would have changed the peer evaluation system

7.1.6 Webinars and Training Sessions

Respondents spoke frequently about the webinars and training sessions held by X-Culture. Overall, they felt that the training sessions at the beginning of the program were very helpful and gave them a good understanding about working as a group in a global setting and also helped them with writing a business report. Interviewees also stated that the webinars and discussions held throughout the process by the client companies and previous participants of the X-Culture projects were very useful in understanding the clients' strategies and needs. Respondents proposed suggestions about the format of webinars; they felt that the sessions were long especially for those participants who were not motivated enough to follow through the whole session. Also, since English is not everyone's first language, respondents suggested that it would be helpful if X-Culture

provided transcripts under the videos or prepared a booklet with frequently asked

questions and answers after each webinar. Additionally, few respondents had conflicts

with the schedules of the webinars' live sessions. The time zone differences made it very

hard for them to watch the webinars live, and even for those who planned to participate,

they would get the notification emails late at night and would forget about it the day after.

They suggested a repetitive notification system to reduce these scheduling problems.

Table 27 presents the codes and some selective quotes related to the webinars and

training systems.

Table 27. Codes for Webinars and Training Sessions	
Code	Quote
Trainings' Usefulness	– The training at the beginning of the process was good and it gives you the idea how to work in a group and how to solve problems so, you go into the project with open mind – The training document is awesome, – The training and instructions at the beginning about the process were enough
Webinars' Usefulness	– I think that the training and webinars did help me a lot to carry out the task. All the discussions and opinion from all the experts or people who has lots of experiences joining X-culture before. Different people suggested different ideas and views gave me and my team members came up with more ideas about what we should do next or what we should have for the final report to make it as good as we can. – The webinars were very helpful to understand the client needs and also the seminar on APA style and report writing was very helpful. – The Webinar was very helpful and it was pretty effective because it helped us understand the company needs – Webinars with the clients and videos posted from the clients were very direct and helpful. More videos would have been helpful, also videos from pervious X-Culture projects about the formatting of the X-Culture was helpful

	– We had an opportunity to live chat the clients which was very helpful. – Webinars were really helpful to understand the client's strategy and what they are looking for – They were very clear and motivated me to continue and approve that I am working in a right direction
Format	– The Webinar were a bit long especially If you were not enough motivated – I did watch the webinars recordings which were helpful in certain ways; they had information about the background of the client companies but they were very long and I lost track – The webinars on the structure of the reports were helpful and had some good points but it was again long – Thanks for X-Culture. They really did hard work about the webinars. But sorry for my bad, I checked the webinar a little bit but feel bored, so I turn it off. – It would have been useful to collect all the questions from the entire participant, and answer them on live webinar and then share the recording – I watched the recordings and it was helpful but I couldn't understand some questions from students since English is not my native language and they were talking very fast so, it would be helpful if X-Culture provide some subscription on the video or provide descriptions of the question and answers after the webinars
Schedule	– Online Webinars help me but the time zones made it difficult for me to listen to it, I would go to school in the mornings and I would forget; one night, I stayed up all night for the webinar and after few hours, I got an email that it got postponed – We didn't attend the webinars since I used to see the mails regarding to that late at night and I would go to school and forget about it
Additional Training	– People would not have time to attend training but it would have been beneficial to include additional webinars, booklets, or presentations on different the communication and collaboration software, cultural awareness, etc. – Every kind of additional training and tool – A training about the report writing would be helpful

7.1.7 Team Behavior

Another major topic discussed during the interviews was the individual perception of other team members' behaviors and motivations and its impact on their performance of the tasks. For instance, one of the respondents mentioned that he was very motivated at the beginning of the process, but eventually the lack of cooperation and responsiveness of the team members reduced his motivation and satisfaction with the process. Respondents felt frustration during the project when one or few members of the team did not put equal effort on the project as all the other team members (free riding). For instance, one of the interviewees explained how his motivation decreased through the process seeing others weren't as motivated as he was:

> I was really excited about the task at the beginning but nobody else were excited and I lost my enthusiasm.

The example was not singular:

> At the beginning, we were more motivated at the end since we saw two were not collaborating and we had free riding challenges; everybody was concerned with that one person that didn't do her job; not everybody spend equal time on the project.

And:

> At the beginning, I was really excited; we had free riders in a group and we had trouble because of him and I was disappointed; but others jointly work very hard to rescue that section.

Also:

> My motivation was to challenge myself. The fact that people are not doing their part of the project frustrated me and reduced my enjoyment of the process. But at the end it is a learning experience which I really appreciate it.

Additionally, leadership and having an organized, structured plan were cited as factors that improved team performance. Informal communication and knowing the team members outside of the work environment were also implied as factors that improved communication and therefore task efficiency through the project. Several respondents stated that video communication using applications such as Skype improve their dynamic and mutual understanding which in turn improved the process of working on the tasks. One of the respondents mentioned that through their informal conversations, they had a chance to discuss the ideas about the project which enhanced their performance at the end. She stated:

> We became good friends and we talked informally and they provided feedback and we help each other to improve.

The same person suggests that it would be very helpful to have a time at the beginning of the process to interact with team members before starting the project:

> What I can offer as a suggestion is to give the teams a little more time to get to know each other, just as in real teams there is an acclimation and team-building period.

However, there was one interviewee who believed that for her team, professional communication was enough and more efficient to carry out the task. Cultural background, attitude, and age differences were among the other challenges of working in groups in a global setting that brought up by respondents. Table 28 depicts the codes along with the related quotes from the respondents.

Table 28. Codes for Perception of Team's Behavior	
Code	Quote
Team members' level of effort and motivation to effort	– The most important motivation factor is to know that everybody is working hard – Motivation of Team members are also important; If you message the group members and they don't respond because they said they are busy you would become disappointed – After the training, I was very motivated and was looking forward to start the process and started to look at the challenge and companies. But during the process the motivation has a little bit decreased because not everyone was motivated to collaborate and was able to meet on a weekly basis and was not putting the same effort level as me, so my motivation decreased at the process – Not every team member is interested in developing a good project. – I was really excited about the task at the beginning but nobody else were exited and I lost my enthusiasm – Some conflict has arisen, especially due to people don't want to work that much and are not interested as others in the project and in doing a great job – Every conversation we talked about how to divide the task but since most of the members didn't have enthusiasm and motivation to work on this project, so we divide the projects based on each point and match it together and not integrate it. Everybody wrote their piece and I tried to correct it and match it together but it was just me and we couldn't do it properly; we never

	clearly define roles; it would have saved time and resources and it was counter productive
	– It looks like the US members are just doing their job "just because". Despites the time zone I'd say the partner from Oman is trying to do his/her best what is really important for projects like this
	– I love to make friends from the whole world, but I do want to work with people who also work hard. Some students join X-Culture only because their teacher force them to join, so you can find out they only want to make the least effort on the project, it's not good for interactive and share experience because they don't want to use their time on this.
	– At the beginning, we were more motivated at the end since we saw two were not collaborating and we had free riding challenges; everybody was concerned with that one person that didn't do her job; not everybody spend equal time on the project
	– Some conflict has arisen, especially due to people don't want to work that much and are not interested as others in the project and in doing a great job.
	– I was not really satisfied with the process. There are too many reasons for that. I feel myself didn't pay enough time and effort for this project just after the first week. It could be the feeling that I was really excited from beginning but my teammates that time were not. And then everyone got busier because of exams, homework, part-time jobs…including me. And then I got problem with my messy schedule, really frustrated when I couldn't find any good ideas for the tasks sometimes. And because we worked virtually so it was hard to know how other members felt when we were having discussions.
	– The fact that people are not doing their part of the project frustrated me and reduced my enjoyment of the process. But at the end it as a learning experience which I really appreciate it
Team members' Cooperation/ Mutual understanding/ Positive dynamics	– The project looks great and my teammates look smart so I'm very looking forward to continue the project.
	– I am having a good experience so far. We are progressing nicely. No conflict so far. The project is

| | going on well and we are looking forward towards the following weeks ahead.
– Everything is going along quite good
– We are working together, and cooperating well and improving on work as we continue.
– We have very well gelled together and found our dynamic.
– Working with the ladies is a pleasure as usual, we have really gelled as a team and discussions, brainstorming and assignments are easy
– We are going on quite well. Not everyone is working; nonetheless we never had any conflicts. We have a lot to do before we submit next week. We are quite capable of pulling of a quality paper
– The group is working a lot. We get along well and I believe we can do a great job even though we sometimes mess up with that does what.
– I'm still enjoying working on this project. Of course, we have some small conflicts among group member when having discussion but I think that's totally fine!
– Our group is finally working in harmony apart from one of the team members that has never been very in touch with group.
– Because tasks were getting harder after each week so I felt that my team member paid more effort and we had more discussions when the tasks got more complicated. Overall, the member who is from US still in charge of editing for our reports but we did help him to do that sometimes if that week he was too busy or didn't show up. And at the end of the project, everyone seems too busy with exams, activities in school, earthquake in Ecuador so the rest of the team needed to work harder when others couldn't contribute much for the task of that week and the final report as well.
– The time zone differences that we faced and that fact that not everyone put the same effort into the project, our team had never worked together in the same time. Also, we were not really clear about which one would in charge of what job, only the member from US, Mark, he always helped us to gather all the information from team members for each task and revised the writing. |

	– For me, I tried my best to contribute in each task, even I was stuck sometimes but at least I did give any ideas I have for every task – The experience has been great so far apart from difficulties on reaching some team members and some poor job but in general my team and I are working well and we are starting to come up with new ideas. We sometimes feel part of the company and the Mobius SLIP team already even without knowing it – Our main challenge was Team Work. We didn't have a structure, we were very flexible. We would chat about how much each student could spend time on which part each week. I would have done it differently now, by putting deadlines and dividing the tasks from the beginning between the students – I have had high expectation, but unfortunately because of the non-responsiveness, we are behind the schedule. – Some of the group members apparently were not working too hard on the document, but at the end of the week they apologized with the rest of the group because due to personal situations they were not able to work it as they were used to. – After a couple of weeks working together I think each member has learned about the way the rest of the team works. It is wonderful cause there no longer misunderstanding or useless discussions – Communication with our other team member is still somewhat hindered and difficult but hopefully after a talk this week, the issues would be resolved.
Free riding	– I think our group isn't organized and a particular student isn't giving the amount of effort that is needed in this project. These past weeks have not been fun due to some team members lack of contributions – The experience was very good, only one team member was usually off for the whole week and at the end she would ask about the deadlines to submit. We try to speak to her but it didn't help – We had lot of problems, some people has chosen specific topic, but when the time comes to that week, he says he is too busy to write the draft, so we need to assign to another guy

	– At the beginning, I was really excited; we had free riders in a group and we had trouble because of him and I was disappointed; but others jointly work very hard to rescue that section – The only problem is getting in contact with one of our members. – It is kind of frustrating that some of the group members only write a couple of lines as part of its job.
Leadership	– We don't need a leader just guidance is enough, but I was disappointed, at the end I became the leader and I organized a lot of amount the work that the group have done. And my survey grade and score didn't reflect the work we have done. My group didn't communicate as they should – There is lot of problems, especially in communication and culture. Our team doesn't have a confirmed leader, but I think I am the most active member in our team, so you can consider me as a virtual leader. – I asked my group member to be the leader since I read all the instructions provided by the X-Culture prior to the process; but nobody follow up with me; they replied after 5 or 6 days; The chines guy and the Italian girl did not participate and reply to me – We didn't have a formal leader, I had to organize all the duties and write to them to schedule because they were not that motivated – We didn't have a former leader but we had more structures towards the end of the project and we started to divide the project – We didn't talk about the leader formally, but we talked about strengths and weaknesses of each member. – I was the informal leader of the group, I the one that always talking first and American girl was also very responsible, and everybody else was also very responsible and participates
Informal communication	– We never had any informal conversation; it was strictly professional; I believe it was not necessary to have casual conversation – We became good friends and we talked informally and they provided feedback and we help each other to improve

	– We still talk to each other; we were really attached as a team and that helped us work efficiently
	– We are still talking a lot via FB that was really nice
	– It would have been nice to have time at the beginning of the process to interact with each other before going into the process
	– Knowing my teammate not only as people who I am working with, but also more personal would have helped with the efficiency of the communications.
	– Also, I wish we used different ways of communication like video chats so that we could have been more comfortable talking to and communicating with each other
	– Making informal communications as part of the project would help
	– Communication is the most important part but we didn't have the opportunity and time to do it
	– Team members were busy so we didn't have much time to communicate informally beyond working on the project
	– What I can offer as a suggestion is to give the teams a little more time to get to know each other, just as in real teams there is an acclimation and team-building period
Cultural differences	– Our group is doing a good job in general and I enjoy working with most of them. If only I had to criticize something I would criticize the lack of social boundaries that are normal in this kind of setting
	– I have not ever interacted with people outside of my nationality, but I tried to be more understanding and welcoming
	– Our issues are: free-riding and cultural differences. we can solve the problem by adding filters to limit the crowd
	– Life is a social construction and culture and background is important. This is just my point of view that some Americans are lazy and they rather people are doing things for them and in the way, they want to. Knowing the way, they work, you cannot expect much leadership. They need to know what they have to do and when they have to do it and that are it; they did their job. But for the girls from Oman, it was the opposite; we chatted via Whatsapp about the task assigned and we discussed

133

	about each requirement, brain storm and if we weren't sure we would talk to our professor and research about it and then just tell the results of our conversation to the US girls and see if they agree or not and they would do the rest of the homework. – It's really good concept of X-Culture, let me meet many foreign people, I think I am still enjoy the process in X-Culture
Age differences	– Most college students don't come to the meeting on time; sometimes I wait for more than 1 hour. – The coordination was difficult and makes it inefficient. But it was normal, because students were young, with different level, different English abilities and research skills. So, having a filter (as a survey at the beginning of the process) for crowd to only include those who are best of the best and have motivation would limit free riding – The age range was a mismatch: one guy in his 50 and four girls with average age of 27 which was a serious issue at the beginning; during our next conversations, we talked about it and discussed it so I suggest that a certain level of adjustment would be beneficial
Attitude	– First challenge was attitude (your country is poor) second communication; third time issues; they are not interested in the project. They asked for a good peer evaluation in exchange for full credit but they did not provide any work – Attitude and personality of one of the Italian girl in my group; They had problem with my nationality (Pakistani) – Communication with our other team member is still somewhat hindered and difficult but hopefully after a talk this week, the issues would be resolved.

7.2 Summary of the Qualitative Themes' Characteristics

The previous sub-sections described the major themes that arose during the coding process and their characteristics. Figure 10 shows the themes which are categorized based on the CS conceptual framework and the theoretical research model developed based on that.

134

These categories are related to the scope of this study which is a specific application of CS activities where the initiators are for-profit organizations, the tasks are business consulting problems, and the crowd needs to have specialized skills and high level of creativity to solve the tasks. The characteristics described in previous section and categorized here can be used as a guidance to improve participation effort and performance in a CS mechanism.
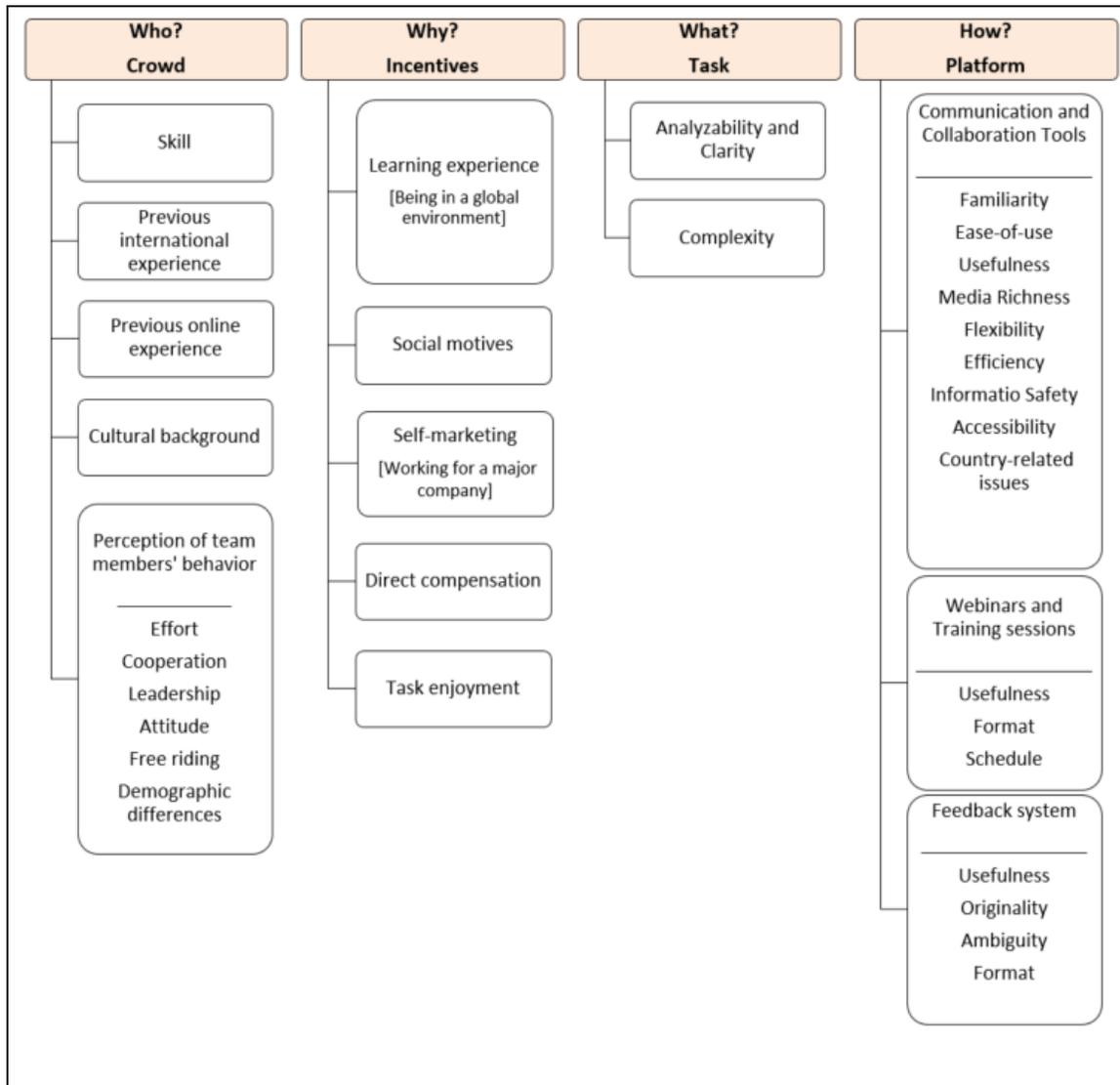
Figure 10. Summary of the Themes Arrived from the Qualitative Study

7.3 Change Over Time

Based on the responses from the participants, individual behaviors and factors

involved in the CS project were not completely stable across time. They develop and

change as the process progresses. Especially, interviewees mentioned that their

experience has evolved along the following criteria: the task complexity and clarity,

136

platform characteristics, feedback and webinar systems, motivation, and their perception

of the team's behavior. For example, one of the interviews described their confusion with

the task instructions and task submission system at the beginning which has changed after

few weeks:

> Initially, I was unsure of how to find the instructions and how we submit assignments for X-Culture. I have a better understanding, now that I've completed the first week.

The same person also stated that as the semester went on she felt the task got

more complex. However, she worked with other team members and they found the

routine that worked for them. He said the following of this transition:

> At the beginning, it was easier but as the process continued, the steps in the task description became more complex. However, after a couple of weeks working together I think each member has learned about the way the rest of the team works. It is wonderful cause there no longer misunderstanding or useless discussions. I enjoyed working on this project!

There were other interviewees that felt the frustration with the complexity of the

tasks as the time went on but they looked at it as a learning experience and it got them

motivated to challenge themselves and work harder which they claimed resulted in more

creative results. When asked about the task instructions' clarity and complexity over

time, the respondent noted:

I was really excited from beginning but then because tasks were getting harder after each week, I felt that my team member paid more effort and we had more discussions when the tasks got more complicated.

This example is not singular.

I took it more seriously because when the tasks got more difficult I realized that I might have to face this kind of situation in the future when doing my own business. So, I felt that this could be a great opportunity for me to learn, to train myself to get a better critical thinking and I took the project more seriously.

Many respondents mentioned that at the beginning they had problems with communication and collaboration platforms. They stated that it took time for them to find efficient and effective ways of communicating and collaborating. For example, one of the respondents stated:

At the beginning, we used Facebook to find each other and tried using Skype once, but it was time consuming and was not effective and useful and we were not used to using Skype, so our team decided not to use Skype. So, we opened the Google docs. We worked at different times.

Other interviewees also described how their motivation has evolve through the process. For instance, one of the respondents noted that he was very motivated at the beginning, prior to the start of the project, but after a few weeks lack of engagement from other team members disappointed him. However, at the end of the process, he noted that his team found a harmony in working on the task instructions and the whole experience was a great learning process for him. The respondent stated:

At the beginning, I didn't know what to expect. After the training, I was very motivated and was looking forward to start the process and started to look at the challenge and companies. But during the process the motivation has a little bit decreased because not everyone was motivated to collaborate and was able to meet on weekly bases and was not putting the same effort level as me, so my motivation decreased at the process. We started to use Whatsaap chat, Facebook, email, Skype, at the beginning but we were confused so we stopped using FB. We first tried to create a FB group but it didn't work so we mostly used Google Docs to share documents and to collaborate; It was also confusing to switch from FB and G-Docs; but (in G-Docs) you could edit at the same time and the document is always up to date. These tools are pretty easy to use and good enough for the task we were working on. Another challenge at the beginning was time differences: at the beginning, it was a problem but we proposed a time frame so we could schedule each week for the entire week and it got better. Our group is finally working in harmony.

Additionally, there were also many instances in the interviews where interviewees mentioned the impact of the perception of the team's efforts and attitude on their motivation to work. They noted that free riding and the fact that not everyone was as excited as them reduced their enjoyment of the process. Based on the interviews, the change in the behavior and feeling of the respondents over time was observed. Based on the open comments that respondents provided throughout the semester, the change was demonstrated by analyzing the qualitative data over time. Participants' open comments during four periods throughout the process were analyzed: pre-project, from week1 to week4, from week4 to week8 in addition to the interview data which provides information about post-project. The frequency of the times interviewees talked about their motivation throughout the process how their motivation transitioned through the

process was visualized and tracked. Figure 11 shows the cumulative number of times that

interviewees talked about their motivations over time:

Figure 11. Respondents Motivation Over Time
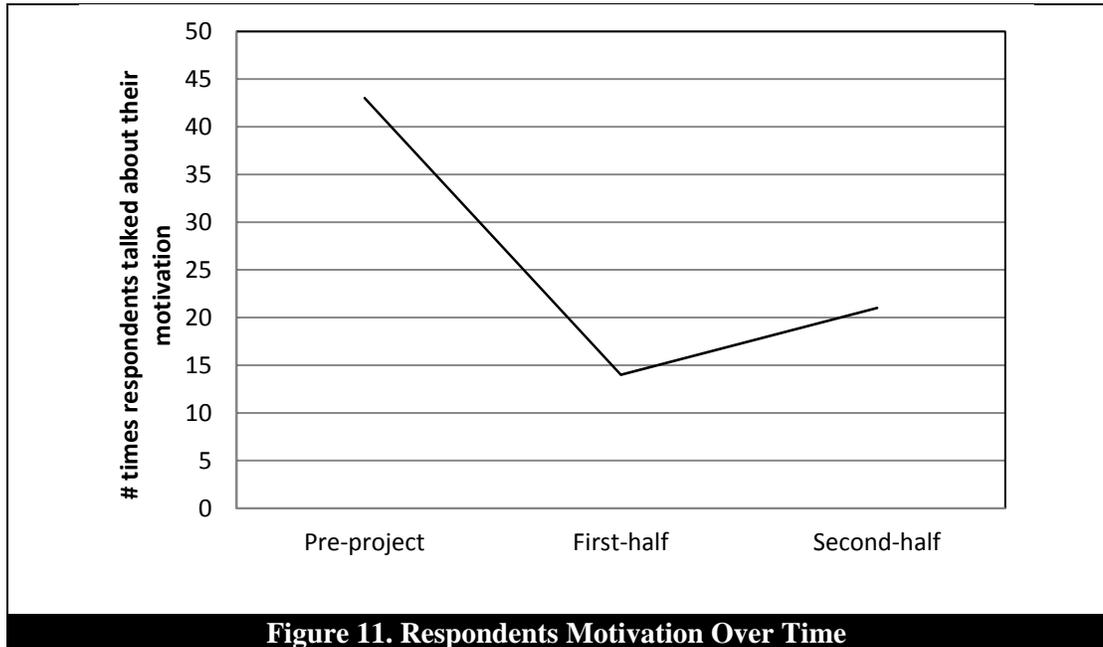
As figure 11 depicted, participants were very motivated at the beginning and this

has changed through the process and overall decreased over time.

CHAPTER VIII

DISCUSSION: CONTRIBUTIONS, IMPLICATIONS, LIMITATIONS AND FUTURE RESEARCH

8.1 Discussion

This dissertation offers several important findings about the new and interesting phenomenon of CS in the business context. These findings were validated with a survey-based longitudinal analysis of over 2,500 participants of a global crowd-sourced business consulting platform which took place during spring of 2016. Individuals with needed highly specialized skills participate semi-annually in these projects to solve highly complex indivisible business challenges during an eight-week period. The research conducted was further strengthened by analysis of the interviews conducted with twelve participants in the CS projects of this platform during the same time. The findings provide novel insights that enrich our understanding of the crowd's behavior and performance throughout an IT-enabled crowd-sourced business consulting process. This dissertation also provides guidance for organizations to leverage IT-enabled CS for activities such as business consulting, product development, idea generation in the best possible way.

To answer research question one, the first section of this study focused on identification of the main components involved in an IT-enabled CS process by

developing a conceptual framework based on the current literature and applications. The

conceptual model presented in this study takes a holistic view of the CS projects

considering all the operations and factors involved. It allows for a full, yet parsimonious,

consideration of the factors that may affect the crowd's performance throughout an IT-

enabled CS process. The conceptual framework suggests that in order to define the

dimensions of any IT-enabled CS process, the following questions need to be answered:

Who? (who initiates the process? who benefits from it? who performs the task?) ***Why?***

(why does the crowd participate in the process?) ***What?*** (what is the task?) ***How?*** (how

does the crowd perform the task [platform]?). Different combinations of answers to these

questions, describe different types of IT-enabled CS processes.

In the second part of this dissertation, and to answer research questions two and

three, we focused on IT-enabled CS in the business domain where the tasks involve idea

generation and business consulting and the crowd needs specialized skills and high level

of creativity and knowledge to solve them. The study was conducted based on the X-

Culture projects, a global IT-enabled CS platform that crowdsources real-life business

challenges to individual participants from all around the world. The conceptual

framework, developed in section one, was applied to this specific case of IT-enabled CS

activity to develop a theoretical model based on the main components that might impact

the crowd's participation behavior and performance throughout the process. Various

theories surrounding the relationships between each dimension of CS process identified

in the conceptual framework and crowd's level of effort and performance in the X-

Culture projects over one semester were examined. Crowd's characteristics and their

motivations, task properties, and features related to the communication and collaboration platform are included in the model. The X-Culture platform provides feedback to participants throughout the process, which was also included in the model in order to examine its impact on the crowd's effort and performance. In the X-Culture project, a participant competes individually or as part of a randomly assigned team to solve business consulting problems. Therefore, individual perception of team behavior was also included in the model as an effective factor on their effort and performance.

A longitudinal study was conducted to investigate the dynamics of the major components involved in the IT-enabled CS process and their impact on individual participant's effort and level of performance over time. Applying a longitudinal study might be the most appropriate way of studying the process which to our knowledge has not been reported in the IT-enabled CS literature before. Analyzing over 2,500 records of data, it was found that the crowd's characteristics (skill level, IT efficacy, and international experience), their motivation (learning and direct compensations), task clarity, and communication and collaboration platform's feature (ease of use, usefulness, and media richness) impact the crowd's participation behavior and performance. The study also showed that feedback and individual perception of team's behavior also have correlations with individual's effort and performance. Additionally, the longitudinal study verifies that these relationships change throughout the process.

In the third part of this dissertation, the results of the quantitative study were complemented by a qualitative study that was conducted by interviewing the individual participants of the X-Culture projects throughout the same period of time. This

interpretive study was conducted to further explore the process of this specific type of IT-enabled CS process and to better understand the factors that influence users' experience and performance over time. The results of interviews confirmed and complemented the quantitative study by expanding our understanding of the process and defining the relationships between the components of the IT-enabled CS process and the crowd's participation behavior and performance. A modified version of the IT-enabled CS conceptual framework in a business context is presented at the end of this section. This modified conceptual framework further clarifies the possible combinations of answers to the main questions of **Who?** (who performs the task?) **Why?** (why does the crowd participate in the process?) **What?** (what is the task?) **How?** (how does the crowd perform the task [platform])? in a business context. The contributions of the study are now discussed.

8.2 Contributions and Implications for Theory

The dissertation stands to make several contributions to the CS literature. Identifying the main characteristics of CS processes as a legitimate, IT-enabled form of problem solving helps to better understand this new phenomenon. Additionally, since the essence of the CS process is the "crowd", studying this process from the crowd's perspective sheds light on influencing factors that affect the participation behavior and performance. In this dissertation, a longitudinal study is applied to the CS process which might be the most appropriate way of studying this process and to our knowledge has not been reported in the CS literature before. The longitudinal study made it possible to learn more about the crowd's performance over time and its connections to different

144

components involved in a CS process. The followings are the most notable findings of the quantitative and qualitative studies that were conducted in this dissertation.

First with respect to individual characteristics, through the quantitative study, it was found that participants' skill sets have a positive impact on their effort and performance. These results confirm previous findings that emphasize the role of expertise and relevant abilities on performance in a task (S. Bonner & Lewis, 1990; Libby & Luft, 1993). Participants with related skill sets might be more motivated to engage in the process. Previous online experience has a partially significant positive influence on effort at t1 and a non-significant positive influence on effort at time 2. This impact decreases over time and the change is not significant. Participants with previous experience might be motivated to spend more time on the project. Previous international experience, however, has a significant negative influence on effort at t1 and a partially significant negative influence on effort at t2. The negative impact decreases over time but the change is not significant. Literature shows that prior experience influences ease of use beliefs which might decrease the individual's effort (Lewis, Agarwal, & Sambamurthy, 2003). It might be easier for participants with prior international experience to overcome any conflicts during the process and so they need to spend less time on the project. Additionally, through qualitative study, it was shown that individual expertise and experience, cultural differences, and knowledge of the process are the main factors that impact effort and performance.

Through the quantitative study, the impact of motivation on participation effort was investigated. Direct compensation was shown to have a positive impact on effort

during the process and this impact increases significantly over time. These findings are consistent with the existing CS literature. One of the characteristics of CS that differentiates it from other similar concepts is that the crowd is acting voluntarily and so, they have to be compensated with monetary or non-monetary rewards. As it has been shown in the CS literature, direct compensation is an external motivation that drives a participant to work hard in order to get expected rewards (Archak and Sundararajan 2009; DiPalantino and Vojnovic 2009; Horton and Chilton 2010; Stewart et al. 2009; Zhong et al. 2011). As the semester progresses, those users that find it more likely to get the final rewards, might put more effort into the process and work harder to get the final compensations. Additionally, data shows that learning motivation has a non-significant negative impact at the beginning and a significant negative impact on an individual's effort during the last part of the process. Research on intrinsic motivation shows that perceived challenge of an activity is one of the key derivative for an individual to participate in an activity (Csikszentmihalyi, 1975; Deci & Ryan, 1985). One explanation for this behavior is that these participants might find learning from the experience and challenges associated with working in a global environment more interesting than spending time on the project and therefore reduce their level of effort. Another explanation would be through learning theory which proposes that there is a maximum level of challenge for a certain level of skill. As the semester progresses and tasks get too complicated, the challenges might be too high and participant might feel a lack of control over the environment and become anxious and frustrated. This finding should be explored further in future research. Motivations such as learning experiences, being in a

146

global environment, social motives, self-marketing, working for a major company, direct compensation, and task enjoyment were also highlighted during the qualitative study.

The quantitative study shows that task analyzability has positive impact on participation effort which support the related hypotheses. In this study, analyzability refers to the availability of concrete knowledge about task activities and the degree of complexity of the search process in performing the task. The results are in agreement with the literature (Campbell, 1988; Wood, 1986) and shows that task analyzability and clarity of task instructions can motivate participant to work on an activity and significantly increases participation effort over time. Task clarity, analyzability, and complexity are characteristics of the task instructions that may impact individuals' participation effort and performance.

Additionally, the quantitative study shows that communication and collaboration systems' ease of use has a non-significant negative impact on effort at the beginning of the process and a significant positive impact during the last period of the process which can be explained by users' acceptance theory (Davis, 1989). The data shows that the change is significant over time. At the beginning, ease of use beliefs might decrease individual's participation. However, as the tasks get more complicated, ease of use increases users engagement and improve their participation effort. Furthermore, platform's usefulness has a significant negative impact on effort at the beginning and partially significant positive impact during the last period of the process. At the beginning, platform's usefulness and efficiency decreases the amount of time participants need to spend on the process to finish a task. However, as the task gets more complicated

147

and based on Task-Technology Fit (TTF) theory (Goodhue & Thompson Ronald, 1995), if the capabilities of the technology match the tasks, technology usefulness is more likely to have a positive impact on individual's effort. The results support the hypotheses that media richness has a positive impact on effort at time 1 and time 2 (Media richness decreases moving from face-to-face communication to video and to audio and to text communication).

Data also shows that feedback has a positive impact on participants' effort and performance. There are debates in literature about the effect of feedback on effort and therefore on performance. Moon and Sproull (2008) found that in crowd-sourced activities, users are more likely to return to the project and to make frequent contributions as more feedback is provided (Moon & Sproull, 2008). Our results are in agreement with the view that feedback tends to increase the various dimensions of effort, duration and intensity, and consequently enhances performance (Ashford & Cummings, 1983; Pritchard et al., 1988). However, the positive impact of feedback on effort significantly decreases over time. This is an interesting finding which should be explored further. Through the qualitative study, it is illustrated that weekly feedback provided from the X-Culture experts helped them prepare for the process and motivated them to continue throughout the semester. However, there are some factors mentioned during the interviews that could improve the effectiveness of these weekly feedbacks. These factors include originality, uniqueness, and clarity. It is suggested that more concrete and individualized messages with specific directions about each submission motivate the crowd to try harder and improve their progress throughout the process.

148

Additionally, the results of the quantitative study show that perception of team's effort has a significant positive influence on effort during the process but the positive impact decreases significantly over time. In addition, perception of the team's effort has a significant positive influence on performance during the first half and it has a non-significant negative impact at the end. The change is significant. At the beginning, the perception of team members' effort might motivate participants to increase their level of engagement in the process and increases their performance. However, over time, participants might assume that other team members finish the task and due to free riding, they might reduce their effort which influences performance negatively. Findings of the qualitative study also suggest that perception of team members' behavior including effort, cooperation, leadership, attitude, and free riding impact individuals' participation effort and performance.

Overall, this dissertation provides a better understanding of a technology-enabled CS process and examines the characteristics of its main components that might influence crowd's participation behavior and performance in a business context. This dissertation could potentially fill the knowledge gap in the literature on the crowd's performance in a business consulting IT-enabled CS process. The results of this study make substantial contributions to identifying the main characteristics of a CS process as a legitimate, IT-enabled form of problem solving in a business context.

8.3 Contributions and Implications for Practice

In the business context, CS processes and practices have been used across a variety of different industries for a variety of different purposes. Applying CS in a

business context is a source of competitive advantage for organizations and it suggests a model of opening up the boundaries of an organization to tap into knowledge of external entities. However, few studies examine the processes of CS of complicated business problems that need high level of creativity and skill to be solved. This dissertation provides novel insights to address this knowledge gap.

The findings suggest that participants with high level of expertise and previous experience show a higher level of participation effort and they perform better. The results also show that, since users work in groups, adding additional screening steps at the beginning of the process and having members with almost homogenous level of skill (English proficiency, research skills, etc.) would make the crowd works more efficiently, limit free riding, improve individual motivations, and develop team performance. On the other hand, team members' different background and prior knowledge give their team the opportunity to discuss about the new ideas and learn from each other which improve their performance by improving the creativity of the solutions. Dividing tasks based on each individual skill and background is shown to have a positive impact on the performance.

Finding a right incentive is a major issue in designing a CS process. This dissertation focuses on CS of complex business consulting problems. It is shown that direct compensation (monetary and non-monetary) has a significant positive effect on performance which increases significantly through the process. These findings are compatible with findings presented in CS literature for complex problems. Furthermore, considering the demographics of this research study (76% undergraduate and MBA

150

students), providing networking opportunities also motivate the crowd to work harder and therefore improve their performance.

Results show the importance of task analyzability on individual performance. A structured and clear instructions improve participants' engagement and therefore their performance. The qualitative results show that as the semester goes on, the ask might get more complicated. Having a strict, focused, and clear instructions would improve motivation of the crowd to participate and could improve creativity of the reports.

The qualitative study expands our understanding of the characteristics of a CS platform. These characteristics include familiarity, ease-of-use, usefulness, media richness, flexibility, time efficiency, information privacy/safety, and accessibility and their influence on participation effort. For instance, the results show that media richness and having real and informal conversation improves participation effort. Therefore, it might be helpful to provide an opportunity for team members at the beginning of the process to interact and get to know each other before starting the project. Overall, these characteristics provide guideline for designing of a CS platform.

The results show that providing feedback improve participation effort and behavior. The results also suggest that originality, uniqueness, and clarity of the feedback improve the effectiveness of feedback. More concrete and personalized messages with specific directions about each submission motivate the crowd to try harder and improve their progress throughout the process. Training sessions and webinars are also useful to carry out the task and improve performance. The results show that training sessions at the beginning of the program provide a good understanding of virtual environment, dynamics

151

of working in a group, and business report writing. Results also stated that the webinars and discussions held throughout the process by the client companies and previous participants of the X-Culture projects were very useful in understanding the clients' strategies and needs. Since English is not everyone's first language, it would be helpful if transcripts are provided under the videos or a booklet is prepared with frequently asked questions and answers after each webinar. Additionally, the time zone differences made it hard to schedule and watch the webinars live. Therefore, a repetitive notification system may reduce these scheduling problem.

Based on the responses from the participants, individual behaviors and factors involved in the CS project were not completely stable across time. They develop and change as the process progresses. Especially, interviewees mentioned that their experience has evolved along the following criteria: the task complexity and clarity, platform characteristics, feedback and webinar systems, motivation, and their perception of the team's behavior. For example, the results illustrate that participants' motivation evolve through the process; one might be very motivated at the beginning, prior to the start of the project, but after a few weeks lack of engagement from other team members or other factors might impact on motivation negatively. Additionally, the data shows that positive impact of direct compensation increases significantly throughout the process. This dissertation enhances understanding of these changes and inform designing of a CS system based on these longitudinal dynamics in order to optimize participation effort and performance. Table 29 summarizes characteristics of the main feature of a CS process

including participants, motivation, task, and platform. These characteristics can be

applied to improve the design of a CS mechanism.

Table 29. Best CS Design Practices Based on its Features	
Features	Characteristics

Choosing the Right Crowd (Individual Characteristics)	– Individual expertise, experience, and background influence participation effort and performance
	
	– For CS project where individuals work in groups:
	   o Same level of skill: additional screening steps at the beginning would make the crowd works more efficiently, limit free riding, improve individual motivations, and develop team performance.
	   o Different background: team members' different background and prior knowledge give their team the opportunity to discuss new ideas and learn from each other which improve their performance by improving the creativity of the solutions.
	
	– Having informal conversation at the beginning of the process might improve engagement and participation effort

Perception of Team Effort	Perceptions of team' behavior (effort, cooperation, leadership, attitude, free riding, etc.) influence participation effort and performance.
Incentive Mechanism Design (Motivation)	Learning experiences, social motives, self-marketing, direct compensation, and task enjoyment are among intrinsic and extrinsic motivations that influence participation effort and performance. – Direct Compensation (monetary or non-monetary) has a positive impact on effort and this impact increases significantly over time. One of the characteristics of CS that differentiates it from other similar concepts is that the

	crowd is acting voluntarily and so, they have to be compensated with monetary or non-monetary rewards.
	− Learning Motivations (maximum level of challenge): Learning motivations enhance participation effort. However, there is a maximum level of challenge; as the semester progresses and tasks get too complicated, the challenges might be too high and participant might feel a lack of control over the environment and become anxious and frustrated.
Task Design	Analyzability and clarity of task instructions influence participation effort and performance.
Platform Design	Familiarity, ease-of-use, usefulness, media richness, flexibility, efficiency, information privacy/safety, and accessibility influence participation effort and performance. − Feedback System: Originality, uniqueness, and clarity − Training Sessions and Webinars o Transcripts (if the required language is not everyone's first language) o Repetitive notification system (in case of time zone differences)

Understanding the crowd's behavior throughout an IT-enabled CS process in a business domain can guide the design of a proper mechanisms in order to attract the right crowd and help to improve participation and performance throughout the process. Findings of this dissertation could also provide guidance for organizations to leverage IT-enabled CS for complex activities such as business consulting and idea generation in the most effective and efficient way.

8.4 Limitations and Future Research

Although the study was designed to provide high quality results, every study exhibits some limitations. The focus of the current study was individual members of the crowd. In CS projects where individual participants work in a team to overcome a task, another possible approach would be to look at the team's characteristics and team dynamics more carefully which was not related to the scope of our study. For future studies, interdependence among team members which might provide additional motivation, as well as interaction among team members and the added social element can be studied further.

Additionally, since part of our data set contains secondary data, the flexibility to edit and modify some of the pre-defined indicators did not exist. CS is a new and broad phenomenon. Our direction for future research is to refine the conceptual framework by classifying further applications of CS. The study was conducted based on the X-Culture project where participants are mostly undergraduate students or MBA students. Also, X-Culture projects were first designed for university students and therefore participation is mandatory for some of the members. This limited the demographics examined in this dissertation and therefore our ability to generalize the results. For future studies, a more diverse group of participants may be analyzed.

This study focuses on the crowd-sourced projects in the business domain where tasks are highly complex indivisible business challenges and participants need to have specialized skills to solve them. Participants join with their own team or choose to be placed on an international team with other professionals. For future studies, the

conceptual framework can be applied and tested for other business and non-business CS applications. In this dissertation, the unit of analysis is the crowd and we focus on the crowd's perspective. The performance can also be studied from the initiator's or the platform's perspectives. From the initiator's perspective, adoption, implementation, and governance issues also can be studied further. From the platform's perspective, technology issues in the process design such as technology selection and technology-driven process innovation can be studied further. There are major opportunities for research at the nexus of people, information, technologies, and organization/society in open sourcing and CS systems.

8.5 Conclusion

CS is defined as an IT- enabled phenomenon of outsourcing tasks through an open call to the masses via the internet. The rise of IT-enabled CS systems has allowed for a wide range of open practices and approaches to be developed specifically to innovate and solve problems. This research presents a holistic view of IT-enabled CS by exploring its key components and investigating the effects of these components on crowd's performance in a business context over time. In doing so, first various components involved in technology enabled CS process were examined and a conceptual framework for IT-enabled CS activities was developed. In addition to providing a conceptual framework, a new and exciting phenomenon worthy of the attention of the IS community, the dissertation's quantitative and qualitative studies also make important contributions by applying and examining the IT-enabled CS framework in a business context.

This dissertation aims to explore behavioral and economical aspects of the open communities. Specifically, the study was focused on the dynamics of an open community, considering characteristics of its main features including initiator, crowd, task, incentive mechanism, and platform. Data from an open-source community were used to assess the dissertation model. The study will be of interest to behavioral and economic researchers. Technology developers may also be interested in the conclusions outlined in this study. This study, in general, is relevant to a growing area of IS researchers interested in open or/and CS processes.

Additionally, practitioners should find plenty of value in the methods and conclusions offered by this dissertation project. Technology-enabled CS designers continue to wrestle with questions of what factors influence the crowd's performance and which methods and designs are most useful to attract the right crowd and maintain their contributions throughout the process. This dissertation examines different components involved in an IT-enabled CS process and offers answers to the question of how best to leverage CS technology in a business context as a source of competitive advantages.

The primary goal of this dissertation research was to provide a better understanding of the characteristics of an IT-enabled crowd-sourced process and the possible combinations of these characteristics to improve crowd's behavior and performance throughout the process. It is our hope that the dissertation project will inform research and practice around the performance of technology enabled CS activities. As technology-based CS applications continue to gain in popularity and prominence, the

findings of this dissertation should remain relevant and interesting to the IS community

for quite some time.

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178

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