Enterprise wikis as a means of creating business value: The impact of the CIO
Abstract

Mass collaboration has been made possible through social networking tools like wikis. With features that support the principles wikinomics, wikis are enabling large number of people to participate in the production process without necessarily being at the same physical location. Organizations and IT managers are beginning to harness this new technology in a way that will create business value for their companies, helping them to produce goods and services that are valuable for their customers.

This research sets out to explore the business values of using wikis in enterprises, and how the CIOs and other IT managers who are responsible for handling the IT/IS resources of their firms leverage wikis to create business value. This was accomplished by examining collaborations on wikis from two different perspectives: Firstly, from the CIO or IT manager’s perspective where we gathered their own views about the business values of wikis and also assess their own impact on creating those business values. Secondly, we examined the business values of wikis from the user’s perspective by gathering the views of different wiki users.

The main contribution of this research is to identify if any, the business values that are obtained from using wikis in enterprises and to ascertain the impact of the CIO on the business values that are being created.

Keywords

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I Introduction

Overview

In the past decades, economic activities began to emerge following the creation of the world wide web (www) that gave rise to a new phenomenon widely referred to as ‘Wikinomics’. Wikinomics is a term that describes the effects of extensive collaboration and user-participation on the marketplace and corporate world. The term wikinomics was made popular by Don Tapscott and Anthony D. Williams in their book, Wikinomics: How Mass Collaboration Changes Everything, published in December 2006. The word ‘Wikinomics’ is constructed from the two words, ‘Wiki’ (a server program that allows users to collaborate on a web site) and ‘Economics’ (a social science that studies the production, distribution and consumption of goods and services).

A CIO Chief Information Officer is a senior IT/IS executive in an enterprise, responsible for the information technology and computer systems that support the enterprise goals (Chun & Mooney, 2009; Hunter, 2010). The roles and responsibilities of CIOs have evolved from merely IT service providers in the early days, today CIOs are highly regarded among top business executive-leaders, they are involved in making strategic business decisions in today’s business organizations (Chun & Mooney, 2009; Sobol & Klien, 2009; Peppard, 2009). As organizations strive to stay ahead of competition, CIOs are constantly exploring creative means of increasing their firm’s efficiency and strategic growth, by leveraging the use of new technologies, such as wikis.

The evolving role of the CIO

The role of the senior IS executives before the 1990s, were limited to helping their organizations in acquiring, implementing and maintaining the technical infrastructure to process and store necessary information within the firm (Chun & Mooney, 2009). In the 1990s, IS Executives began to assume a more important role in their organizations, handling their firms’ entire Information resources. Their roles in the organization have evolved from mere technical managers to that of technical and business managers; capable of leading efforts to deploy IS in ways that generate value-adding information for the firm (Chun & Mooney, 2009).

The CIO role in the 2000s became more strategic in nature, initiating and provoking businesses to change processes and strategies through the use of IT (Cherinka, Miller & Prezzama, 2009). To be able to take on this role in their organizations, CIOs must have not only technical skills, but also skills in business areas (Chun & Mooney, 2009). CIO’s major task today entails the use of IT resources to achieve strategic business objectives for their organizations (Chun & Mooney, 2009; Sobol & Klien, 2009; Peppard, 2009).
Wikis and Mass collaboration

The ability for many people to work independently on a single project through the Internet, gave rise to the concept of “Mass collaboration”. Mass collaboration is gradually displacing the traditional corporate structures as the economy’s primary engine of wealth creation in certain enterprises (Tapscott & Williams, 2006). Employees drive performance by collaborating with peers across organizational boundaries, creating what is now referred to as “wiki workplace”. Consumers become “Prosumers” by being involved in the production process rather than simply consuming the end product (Macann, Kramnik, Shen, Varadarajan, Sobulo & Doan, 2005; Tapscott & Williams, 2006). Social networking helps people stay connected and also exchange information through the Internet. In the past decade, there has been a tremendous increase in the number of communities online. These communities are created by people with similar interest.

Mass collaboration facilitated through wikis is increasingly being adopted in the traditional business settings. Many organizations have changed some of their business process and have either partially or totally adapted to the new concept of “Wikinomics”, practicing the principles of wikinomics which are (1) being open (2) peering (3) sharing and (4) acting globally (Tapscott & Williams, 2006). Many corporations now have wiki platforms where their employees or users collaborate on various projects. Examples of such companies are: SAP, Pixar, Sony Ericsson, IBM, Sun Microsystems and Rent Ant (elevatorview).

The position of CIOs in today’s organizational structure is very significant in using technology to drive the activities of their organizations into achieving greater efficiency and strategic growth (Chun & Mooney, 2009), and research has shown that mass collaboration and wikinomics principles have been used as major tools for gaining strategic advantage by many wise corporations (Chesbrough, 2003; Tapscott and Williams, 2006). Past studies have shown how CIOs have been able to combine their IT competencies with other contemporary non-IT strategic resources and capabilities to create new strategic opportunities and business innovations (Chun & Mooney, 2009; Peppard, 2009; Chen, Preston, and Xia, 2010). They have helped to transform the way business processes are being conducted, increasing social interactions across the entire organization, putting more focus on the consumer.

1.1 Problem Area

Despite the rapid growth of wikinomics, there have been skepticism about whether wikis can provide any value in business settings (Silvius, 2006; Soto-Acosta & Meron’o-Cerdan, 2007). While “some predict that value will emerge, others predict the opposite” (Kettles & David, 2008, p. 1). The business value of using wikis to a large ex-
tent still remains unclear. Therefore, we will investigate the business values that are obtained from using wikis and also the impact of the CIO on the business values created.

Similarly, there have been quite a number of studies conducted within the Information management field to investigate the influence of CIOs strategic decision-making on IT contribution (Chen & Preston, 2008; Chen, Preston & Xia, 2010; Peppard, 2009). Studies have also been conducted to examine the performance of CIOs and factors influencing their performance. Sobol and Klein (2009) conducted a research study that attempt to link CIO characteristics, IT investments and financial performance. They found out that there is a significant relation between CIO’s characteristics, IT investments and the financial performance of their organizations. Chen, Preston and Xia (2010) has laid a foundation for understanding the nature of CIO leadership, the individual and organizational factors that facilitate the CIO’s leadership capacity, and the organizational outcomes of such leadership. Chen, Preston and Xia (2010, p. 262) however acknowledged that further research is needed in order to “examine how CIO leaders are developed and how these leaders can influence organizational outcomes”.

1.2 Purpose

The purpose of this thesis is to explore the benefits that enterprise wikis offers and the role that the CIOs or IT Managers play in ensuring that wikis create benefit for their businesses (Hevner et al. 2004; Melville et al. 2004). In trying to achieve that, we will first understand what benefits are derived from using wikis. Our research is therefore focused on the business values that organizations obtain from mass collaborations via wikis and the role of CIOs in obtaining these outcomes. We hope that this effort will provide a better understanding of the subject and also contribute to the entire body of knowledge.

1.3 Research Questions

Our research hope to further investigate the business values of wikis in business settings and also the impact of the CIO in obtaining those business values. Therefore we will answer these questions:

1. What are the business values obtained from using wikis in organizations?

2. What is the impact of the CIO in creating these business values?

1.4 Perspective

We have approached our research from the CIO’s and the wiki users’ perspective. There are certain antecedents that directly influence the CIO’s managerial capabilities and
productivity, such as the CIO human capital attributes, CIO supply-side leadership and CIO demand-side leadership. The degree to which IT investments create value for an organization, depends on how IT is being deployed and managed by the organization (Chen et al., 2010). The CIO is hereby responsible for making IT deployment and operations, ensuring that the firm derives business value from its IT investments, therefore, the ability of the CIO to effectively deploy and manage IT investments will consequently determine the business value being derived from the IT investment (Chen et al., 2010).

The collaboration on wikis is carried out by large number of users within an organization and in some cases external users are also involved in the collaboration processes. We collected data from both internal and external wiki users in order to assess the business values of wikis from the user’s perspective.

1.5  Delimitation

We have approached our research from the CIO’s and other wiki users’ perspective. There are so many factors that influence the CIO’s ability to effectively deploy and manage IT resources (in this case, wikis); some factors have a direct influence while other factors do not directly influence the CIO’s capacity such as organizational and environmental factors. Our research therefore, does not focus on such factors but rather, we focus on the CIO’s competencies such as being a Leader, Visionary, Strategic Thinker, Relationship Builder, Diplomat, Deliverer, Reading the Market (Peppard, 2009). We also did not focus on the architectural or technical aspects of wikis but rather the business values or benefits of using wikis.

1.6  Definitions

This section contains definitions of the basic concepts that are used in this thesis.

Business value is an informal term that includes all forms of values that determines the health and well-being of the firm in the long-run. It includes both tangible and intangible resources. These resources could be said to be valuable when they are rare, difficult to imitate by other firms and maybe a source of competitive advantage (Soto-Acosta & Meronò-Cerdan, 2007).

Wikinomics is a concept that describes the effects of extensive collaboration and user-participation on the marketplace and corporate world. The concept describes but not limited to all of the following: open source, social networking, crowdsourcing, smart mobs, and crowd wisdom. The principles of wikinomics are openness, peering, sharing and acting globally (Tapscott & Williams, 2006).
Mass collaboration describes a collaborative action that occurs when large number of people work independently on a single project through an Internet based server (wiki). Users can add, modify and delete contents (Abrahamson, 2009).

Wiki in our understanding, is a web platform that has collaborative features, users can add, delete or modify its contents (Wagner, 2004).

Web 2.0 is the term given to describe the second generation of the World Wide Web that is focused on the ability for people to collaborate and share information online (Webopedia).

CIO (Chief Information Officer) is a senior IT executive that is responsible for managing the firms entire Information resources. The role of the CIO is more strategic in nature, requiring not only technical skills but also skills in business areas (Chun & Mooney, 2009; Anderson, 2006).

CIO human capitals are those attributes that influences a manager’s capabilities and productivity. For example, education, work experience, etc. (Chen et al., 2010).

CIO supply-side leadership supply-side leadership can be viewed as a CIO’s capability to exploit existing IT resources and competencies to improve the efficiency of the firm’s operations (Chen et al., 2010).

CIO demand-side leadership relates to the CIO’s capability to lead the organization to explore new IT-driven business opportunities that will lead to organizational innovations and business growth (Chen et al., 2010).
2 Frame of Reference

This research has taken its foundation from literatures which have set the stage for the field of Information Technology. The major areas relevant for this research are ‘Wikinomics’, ‘CIO Performance’, ‘Social Networking Technologies’ and ‘Business Value Creation’. We are investigating these areas in order to understand the business values of wikis and the impact of the CIO in creating business value for their organizations.

2.1 Wikinomics

In simple words, the concept of wikinomics describes all social and economic activities taking place on the Internet. The research done by Tapscott and Williams (2006) brought to light the concept of wikinomics and the principles of wikinomics which are namely: openness, peering, sharing and acting globally. Mass collaboration describes the ability for many people to work independently on a single project through an Internet based server (wiki). Tapscott and Williams (2006) research also illustrated cases where companies have used mass collaboration as a strategic tool to gain competitive advantage, changing the way they have previously been doing business.

2.1.1 Principles of Wikinomics

*Openness:* One of the dynamics of the new information era is that increasingly, more companies are beginning to embrace the idea of openness, giving outsiders access to information that in the past would have been kept a secret. Tapscott and Williams (2006) see openness as associated with transparency, candor, freedom, flexibility, expansiveness, engagement and access. Openness encourages the use of external ideas as well as internal ideas and the removal of all restrictions that formally inhibits doing so (Chesbrough, 2003). A wiki is a tool that has the capacity to enable large number of people to collaborate and exchange ideas using the same platform and therefore, supports openness.

*Peering:* Peering supports a new form of horizontal organization that has the capacity to create information-based products and services, and in some cases, physical products. This new form of organization does not classify people in hierarchies, i.e. there are no superiors or subordinates (Tapscott & Williams, 2006). In peering, individuals are valued based on their ability to contribute to the greater good (Ripplingpond, 2007). The more useful a person’s contributions are, the more value is being ascribed to that person.

*Sharing:* Many corporations in the past have held on to their knowledge or intellectual properties with the fear that giving this away might cost them their competitive advantage and returns on investment (Chesbrough, 2003). But this idea of being closed according to Tapscott and Williams (2006, p. 26) restricts “access to the essential tools of a knowledge-based-economy”. They added that “customer-driven innovation and creativity that could spawn new business model and industries” (p. 26), will not be realized as a result of being closed. Procter & Gamble is an example of a company that im-
implemented an online platform “InnovationNet” to enable information sharing between thousands of its employees distributed around the world (Dodgson, Gann & Salter, 2006).

**Acting globally:** Due to the increasingly changing economic climate, a new economy of global capabilities is emerging which includes a “truly global workforces, unified global processes, and a global IT platform” where collaborations takes place within companies and their external partners (Tapscott and Williams, 2006, p. 29). Tapscott and Williams (2006, p. 29) defined a truly global company as one that “has no physical or regional boundaries”. This however, implies that a company that is acting globally does not restrict its operations to include only certain regions/parts of the world while excluding others, but rather, a global company thinks of the entire world as its market place.

### 2.1.2 The Wiki Workplace

Web 2.0 technologies have helped to transform the Internet into an interactive medium. People are now able to connect with others irrespective of their location to exchange information in a more interactive manner (Schmölders, 2009). Wiki is an example of Web 2.0 technology as it enables its users to add, edit and manage the same content. The most noticeable wiki on the Internet today is the “Wikipedia”. Increasingly, today more CIOs are beginning to see the importance of wikis in the workplace, hence embracing the tool and adopting it into their various organizations. For instance, when JP Rangaswami, CIO of a Europe-based investment bank- Dresdner Kleinwort (DKW) came across his employees using wikis, it stated from the IT department by employees for documenting new software in an informal pilot. Within a short period of time, other departments began using it to collaborate on projects. Soon wiki became the primary tool for collaboration at DKW, gaining more traffic than the entire DKW intranet in about six months of usage (Tapscott & Williams, 2006).

Since the adoption of wikis, organizations have reported a decrease in the volume of email exchange and also meeting time (Tapscott & Williams, 2006). The figure below shows the difference between email and wiki collaboration. This means that with wiki, people working on the same projects will no longer have to wait in order to receive feedback via email from their project group members about the progress of their project, since they can all view and edit the same documents at the same time and they do not have to be at the same physical location at the same time in order to execute a task. This will save a tremendous amount of time, which is one determinant factor of efficiency. Project leaders can be able to better manage the activities of the project when they can see the working progress of their project immediately.
2.2 CIO (Chief Information Officer)

A CIO (Chief Information Officer) is a senior IT/IS executive in an enterprise. They are mainly responsible for the information technology and computer systems that support the enterprise goals (Chun & Mooney, 2009; Hunter, 2010). The roles and responsibilities of CIOs have evolved from merely IT service providers in the early days, today CIOs are highly regarded among top business executive-leaders, they are involved in making strategic business decisions in today’s business organizations (Chun & Mooney, 2009; Sobol & Klien, 2009; Peppard, 2009). The CIO bridges the gap between organizational and information strategies (Hunter, 2010).

Research done by (Chen and Preston, 2008; Chen, Preston and Xia, 2010; Peppard, 2009) to name a few, all provided the background about the CIO, describing the roles and responsibilities of the CIO in the organization. The study conducted by Chen, Preston and Xia (2010) enriches our understanding of the nature of CIO leadership, the individual and organizational factors that facilitate the CIO’s leadership capacity, and the organizational outcomes of such leadership. The subsequent sub sections explore more about CIO leadership and their contributions to organizations.
2.2.1 CIO IT contributions to Firm Efficiency

CIOs can influence value creation in different ways. There are two stages identified by previous research in which CIOs are classified based on their ability to influence value creation in the organization. The model presented by Chen et al., (2010) shows how the two stages of CIO leadership (supply-side and demand-side) have different levels of impact on the IT function’s contribution to firm efficiency and strategic growth. Figure 1 (Research Model), which is Chen et al., (2010) proposed research model, shows seven variables and their relations while Figure 2 (Structural Model) based on their findings, further shows the degree to which variables on the model are influenced by others.

The CIO human capital as shown in the model, has a significant influence on the CIO supply-side leadership. This means that those individual attributes of the CIO, such as educational background and work experience, contributes greatly to the CIO supply-side leadership capacity, providing the necessary foundation for the CIO supply-side leadership. Similarly, the CIO supply-side leadership has a significant influence on the IT contribution to firm efficiency. This implies that the competencies that enables the CIO to manage IT functions in a way that it delivers cost-effective IT support, have consequences on the IT contribution to firm efficiency (Chen et. al., 2010).

![Figure 2.2: Research Model, Chen et. al., (2010)](image)

2.2.2 CIO IT contributions to Firm Strategic Growth

All the variables in this model have some influence on the IT contributions to a firm’s strategic growth, but the variable with the most influence is the CIO demand-side leadership. The flow of influence goes further as the CIO supply-side leadership shows a significant impact on the CIO demand-side leadership. CIO supply-side leadership ca-
pacity which mainly contributes to the organizational efficiency (e.g. cost savings, operating efficiency, and process improvement), but not strategic growth (e.g., return on investment, sales revenue increase, and market share growth), impacts greatly on the CIO demand-side leadership. Finally, CIO demand-side leadership is the attribute that has a significant effect on CIO IT contribution to strategic growth (Chen et. al., 2010).

Figure 2.3: Structural Model, Chen et. al., (2010).

2.2.3 CIO Competencies

A study conducted by Peppard, (2009) highlight the various skills that a CIO needs to have in order to take on the role. The CIO competencies includes Leadership, Visionary, Strategic Thinker, Relationship Builder, Diplomat, Deliverer and Reading the Market (Peppard, 2009).

Leadership: This entails the CIO’s ability in: 1. Driving the organization forward in the use of IT, 2. Creating a set of value expectations shared across all areas of the business in relation to IT, 3. Influencing key stakeholders 4. Growing and developing own leadership team (Peppard, 2009).

Visionary: Being a visionary means having the ability to: 1. Envisioning options and opportunities (both operational and strategic), 2. be an advocate for new technology (Peppard, 2009; Chun & Mooney, 2009).
Strategic Thinker: Strategic thinking ability enables the CIO to have: 1. a Holistic view of business, 2. Contributing to strategy discussions (Peppard, 2009; Chun & Mooney, 2009).


Deliverer: What defines a deliverer is: 1. Achieving credibility with both business and technical people through successful delivery of projects and programs, Maintaining cost efficient IT operations and services, 2. Meeting expectations (Peppard, 2009; Chun & Mooney, 2009).


2.3 Business Value of Social Networking Technologies

Melville, Kraemer & Gurbaxani (2004) propose a general Business Value Model of IT. The model shows how IT resources together with other complementary organizational resources directly affect organizational performance, such as increasing sales or reducing cost, when used efficiently during executing business processes. This model conceptualized the role of IT in the firm, showing how IT adds value to the firm by improving efficiency and reducing cost. However, it is also argued that this model shows an incomplete conceptualization of IT in a firm, because research has shown that IT does not only improves efficiency, but can drive businesses into achieving strategic growth. It is however true that a firm’s efficiency also has substantial impact on its competitive advantage. Figure 4. describes the Business Value Model of IT.
The study done by Melville et al. (2004) presented the business value model of IT from which Kettles & David (2008) derived the Business value of Social Network Technologies. Kettles & David (2008) study shows how Social Networking Technologies directly affects organizational performance when used to carry out business processes (see Figure 5: Business Value Model of Social Networking). This model provides a guide for our research as we assess the business values of wikis and the CIO’s impact on creating those business values.

Wiki is an example of social networking technologies; therefore, we interpreted this model as representing the business value of wikis. As wiki users collaborate on the platform to work on projects or tasks, this indicates that some business processes are being performed using the wiki platform. Performing business processes using wiki therefore have an impact on the business process performance of the firm and ultimately the overall organizational performance.
2.3.1 CIOs and Business Value Creation

CIOs have the crucial role of managing the IT/IS infrastructure of their firms, which in most companies, cost a lot in financial terms, to deploy and maintain. Their major task is to ensure that “IT is deployed for strategic advantage and that the IS functions delivers value” (Earl & Feeny, 1994, p. 11). Consequently, most IT investments are made with the belief that IT can “create competitive advantage and enable business transformation” (p. 11) but rather, many businesses have “experienced IS project failures, unre- lenting hype about IT and raising information processing cost” (Earl & Feeny, 1994, p. 11). This issue has caused a major concern for the CEOs as they do not know how to “evaluate the IS function’s performance and the CIO’s contribution”. While some CEOs see IT as a strategic resource, others see IT as a cost (Earl & Feeny, 1994). For this rea- son, there is a mounting pressure on the CIOs from their CEOs to prove in financial terms, the business value that will be derived from their IT investments.

For most companies, knowledge is one of the most essential tools that they need in order to produce the kind of goods and services that can create value for their customers. Wiki is a platform that has the capacity of bringing together both from within and outside of the firm, people capable of contributing a tremendous amount knowledge that is needed to create new products and services (Tapscott & Williams, 2006). Companies that have implemented wikis in their intranet as a means of knowledge sharing includes
Daimler-Chrysler, Disney, Microsoft, Motorola, Sun Microsystems, Kodak, Dresdner Kleinwort Wasserstein Bank, and Ziff Davis Publishing (microengagement, 2009).

2.3.2 Communicating IT business values to the CEO

It is very important that the CIO effectively communicate to the CEO ways that IT investments, for example implementing a new wiki platform, will create business value for the firm. It is hard to estimate or quantify the benefits to be derived from IT investments. Therefore, the CIO must be able to convince the CEO that by implementing certain IT/IS infrastructure or by making certain IT investments in the firm, the firm stands to gain certain benefits. By doing so, the CIO is also contributing to the firm’s business strategy which will result to driving fundamental business change. This will further demonstrate the CIO’s personal ability to contribute to business thinking, having the vision for change, and also the ability to manage the change process (Earl & Feeny, 1994).

2.3.3 How CIOs can deliver and add value

Even though some CEOs perceive IT as an asset that will potentially help to drive their business in the direction of their vision, it is actually the ability of the CIO to successfully carry out the necessary action and also achieve the expected results that ultimately counts (Earl & Feeny, 1994; Sobol & Klein, 2009). The CIO must be able to use technology to drive revenue growth and competitive advantage. This means that the CIO must be very innovative, having the ability to quickly respond, adapt and innovate within a short timeframe, to meet the demand of the highly competitive business environment. CIOs can also add value by looking outside their industry for successful IT stories, and also think of ways that those past success stories could be applicable to their own business (Earl & Feeny, 1994).
3 Methodology

In this chapter, we present the methods used for collecting and analyzing empirical data. First we describe the research approach and research processes. This chapter aims to give an explanation of the methods and processes we used during gathering and analyzing data.

3.1 Research Approach

There are two main research approaches used in scientific research: quantitative research and qualitative research (Hara, 1995; Oates, 2006). To enable us collect enough data in order to investigate the business values of wikis and the impact of the CIO, we conducted a mixed-method research by combining qualitative method and quantitative methods (Oslen, 2004; Bryman, 2006). We applied mainly the qualitative research approach as it is best suitable for studying non-numeric data such as data generated by interview, while we applied quantitative approach to study numeric data such as the data generated by survey (Oates, 2006). Furthermore, mixed method supports a data collection technique known as triangulation. In triangulation, data can be collected and analyzed by using a mixture of techniques, for example, mixing survey data with interviews or mixing interviews and questionnaires (Oslen, 2004; Harris & Brown, 2010). The major strength of implementing the triangulation technique is that we can collect more reliable data and analyze them to have a more valid result.

3.2 Data Collection

Since this research aims to investigate the business value of enterprise wikis and the impact of the CIO in creating those business values, we collected data using two main techniques, ‘interviews’ and ‘questionnaires’. Qualitative data was gathered for analysis from CIOs and other IT managers through interviews, while quantitative data from various users of enterprise wikis was collected by means of questionnaires. Questionnaires are best used to collect evidence of patterns amongst large populations, whereas qualitative interview is best used for collecting in-depth insights on participant thoughts and experience (Oates, 2006; Harris & Brown, 2010). The descriptions of these two methods and their implementing processes for collecting data are discussed in detail in the sub-sections.

3.2.1 Semi-structured Interview

There are three different types of interviews, structured interview, unstructured interview and semi-structured interview. The difference between these three types is whether or not the interview questions are predefined (Kvale, 1996). Semi-structured interview
combines the structured and unstructured interview types. This means that there are some questions that are predefined before the interview, and other questions arise during the interview, where there is a need for the respondent to clarify or elaborate on an idea. In semi-structured interviews, participants are being asked open-ended questions where their response usually gives rise to follow-up questions, the participants are then asked to expatiate on some questions that are not clear (Harris & Brown, 2010). Semi-structured Interviews gives interviewers the chance to ask the participants questions that will generate answers based on the participant’s own perspectives and in their own words (Oslen, 2004; Bryman, 2006; Harris & Brown, 2010). Collecting empirical data through semi-structured interview will enable us achieve two objectives.

1. To assess the business values of wikis from the CIOs’ and IT Managers perspectives.
2. To examine the impact of the CIOs and IT Managers in obtaining business value from wikis.

Table 3.1: Interview Respondents

<table>
<thead>
<tr>
<th>Respondent Number</th>
<th>Respondents Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mark Lines</td>
<td>Canadian based software developer, a delivery agile coach, an author and the co-founder of UPMentors (Unified Process Mentors). UPMentors is a company that helps businesses to align IT with their business needs. He is also a major contributor and moderator for the IBM developerworks forum, he also owns and manage his own blogs one of which is <a href="http://www.DisciplinedAgileDelivery.com">www.DisciplinedAgileDelivery.com</a>. He is a graduate of Brandon University, Canada.</td>
</tr>
<tr>
<td>2</td>
<td>Ben Kus</td>
<td>Ben Kus is the Chief Architect for IBM’s Endpoint Management Solution, a product with about 20 different sub-products. Endpoint Management builds software products for large companies and his responsibility at Endpoint Management is to make sure that they build products with the right quality and design and that their customers are happy with the product. He is a graduate of the University of California, Berkeley.</td>
</tr>
<tr>
<td>3</td>
<td>Martin Christensen</td>
<td>He is the Wiki Master of PrintVis Wiki. He works for a company called NovaVision Software, the company specializes in making IT Systems for the printing business. PrintVis Wiki is owned by NovaVision Software located in Denmark. His is re-</td>
</tr>
</tbody>
</table>
3.2.1.1 Planning and Conducting the interview

We used semi-structured interview to collect evidence from the CIOs and senior IT Managers (Laforest, 2009). This enabled us to gather enough useful information as we assess the business values of enterprise wikis and the CIO’s impact in obtaining business value from using them. Before conducting the interview, we carefully planned the interview by creating an interview guideline and we thought about the various ways to present the questions (Laforest, 2009). We began the interview with an introductory section where we (interviewer) introduced ourselves to the interviewee, describe the purpose of our study and what we hoped to achieve by it (Laforest, 2009). We asked the interviewee whether or not he or she would like to be anonymous and the measures taken to protect their confidentiality and anonymity. Then we also asked for permission to take notes or record the interview (Laforest, 2009).

At the start of the interview, we asked a few background questions such as the interviewee’s educational and professional background, job title and responsibilities, this served as a “warm-up” to get the interviewee in a good state of mind and also creating a good atmosphere at the beginning as well as getting to know more about the interviewees’ human capital attributes.

The questions that focus on the research topic followed shortly after the “warm-up”. At this point, we asked the questions in an open-ended manner that the interviewee is able to construct the answer solely in their own words. Where there was a point that needs clarity, we took notes in order not to interrupt the interviewee while making a response and afterwards, we asked for clarifying in-depth answer.

At the end of each interview, we gave the interviewee a chance to add any other comments that they might want to (Kajornboon, 2005). Semi-structured interview is a flexible interview that interviewers can talk about matters related the interview topic (King &Horrocks, 2010). Finally, we thanked them for their time and for sharing their views with us and also if we can contact them later in case we have additional questions.

3.2.2 Questionnaire

The interview method is most suitable for collecting qualitative data from individuals, while the questionnaire method enables researchers to collect data from larger number of respondents. There are many ways to perform questionnaires such as online, telephone survey, postal questionnaire and so on (Barnes, 2001). Compared to interviews, questionnaires enables one to collect a lot of data from more people and with different
perspectives in a shorter time. It is a collection method that saves not only time and
money but it’s also an efficient one to get objective data.

Most often, the target respondents for questionnaires are a particular group of people
(Barnes, 2001). Here the respondents are the users of enterprise wikis in companies. Be-
cause we cannot physically contact the respondents to hand in the questionnaires, we
chose to post the questionnaire online as it is the most feasible means to contact them
(Barnes, 2001). We also considered this questionnaire type as it supports the question
types organized in the questionnaire.

There are four different types of questionnaires, structured non-disguised questionnaire,
structured disguised questionnaire, non-structured non disguised questionnaire and non-
structured disguised questionnaires (Burns, 2010). We make comparisons among
these four types and organized them in the table 1 below.

Table 3.2: Four different types of questionnaires

<table>
<thead>
<tr>
<th>Questionnaire types</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structured non disguised</td>
<td>• Questions are listed in a pre-arranged order</td>
</tr>
<tr>
<td></td>
<td>• Respondents are told about the purpose of collecting information</td>
</tr>
<tr>
<td>Structured disguised</td>
<td>• Questions are listed in a pre-arranged order</td>
</tr>
<tr>
<td></td>
<td>• Respondents are not told about the purpose of conducting survey</td>
</tr>
<tr>
<td>Non structured non disguised</td>
<td>• Questions are not structured.</td>
</tr>
<tr>
<td></td>
<td>• Researcher is free to ask questions in any sequence he/she wants.</td>
</tr>
<tr>
<td></td>
<td>• Respondents are told about the purpose of collecting information</td>
</tr>
<tr>
<td>Non structured disguised</td>
<td>• Questions are not structured.</td>
</tr>
<tr>
<td></td>
<td>• Researcher is free to ask questions in any sequence he/she wants.</td>
</tr>
<tr>
<td></td>
<td>• Respondents are not told about the purpose of conducting survey</td>
</tr>
</tbody>
</table>

The purpose of using a questionnaire in this research is to collect data about business
values obtained from enterprise wikis. Furthermore, we want to get the views and ideas
of different people who use enterprise wikis at their workplace. We used structured non
disguised questionnaire to perform this.
The questionnaire questions are structured in a way that will enable us collect quality data about the collaborative activities on the platform and the business values that users derive from using wikis at their various business places. The questionnaire focuses on asking questions about the basic tasks that the users perform on their wiki platforms, their contributions to the wikis and the benefits that they derive from using wikis. The questions therefore, are mainly behavioral questions (Barnes, 2001) to get unique information regarding each participant’s views and contributions to the wiki platform. Collecting empirical data through a questionnaire will therefore enable us achieve the following objective:

1. To assess the business value of enterprise wikis based on wiki user’s perspectives.

3.3 Data Analysis

Due to the fact that we used two different data collection techniques ‘semi-structured interview’ and ‘questionnaire’, we therefore used mixed method to analyze them. The data collected from semi-structured interview was analyzed using Interpretative Phenomenological Analysis (IPA) which is an inductive method, widely implemented in qualitative research (Reid, Flowers & Larkin, 2005). Data collected through questionnaire was analyzed using the IPA and descriptive statistics. The following subsections give brief introductions of each analysis approach and a clear explanation of each analysis process.

3.3.1 Data Analysis of Semi-structured interview

The method chosen for analyzing the data collected from the semi-structured interview is Interpretative Phenomenological Analysis (IPA) which was first coined by Jonathan Smith in 1996. Now it has developed into an integrated data analysis method which combines psychological, interpretative and idiographic components. This approach aims to give insights into how participants make sense of a given phenomenon in a given context. Because of this analysis goal, another emphasis of IPA is that the research process should be a dynamic process (Smith & Osborn, 2007), for example an open-ended dialogue between researchers and participants so that researchers can understand the phenomenon from the participant’s perspectives (Smith, Flowers & Larkin, 2009). Semi-structured interview are recommended as data collection method for IPA (Smith & Osborn, 2007).

The whole analysis process can be separated in four phases, we make a summary of the analysis processes and gave brief explanation of each phase in table 2 below.
Table 3.3: IPA analysis phases

<table>
<thead>
<tr>
<th>Analysis Phases</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Data Transcription</td>
<td>Record what interviewee said during interview</td>
</tr>
<tr>
<td>2. Data coding and Themes creating</td>
<td>Organizing different themes based on annotating the recorded text (data coding)</td>
</tr>
<tr>
<td>3. Themes grouping (Optional)</td>
<td>Group and organize themes</td>
</tr>
<tr>
<td>4. Summary of theme set</td>
<td>Make summary of the whole theme set</td>
</tr>
</tbody>
</table>

The IPA begins at data transcription, the recording phase which is done during the interview. We recorded all conversations carried out with the interviewees (Phase 1). After data transcription, we proceeded with the data coding phase. That means we annotated into text what we recorded earlier to ascertain the interviewees’ perspectives and experiences about wikis (Phase 2 data coding). Next we started to find the patterns in the emerging codes. These patterns are usually called “themes”. Themes are different identified patterns, extracted carefully from the text but expressing the same thoughts about an issue. Mostly themes are identifications which concerns participants, or conveys something regarding said issue or concept. Organizing the text into themes will provide a clear structure for the interview data (Phase 2 themes organizing). And if necessary, the extra step is grouping related themes into categories, i.e. superordinate themes (Phase 3). The last step was to summarize the theme set to comprehend the topic from the CIO’s perspective.

3.3.2 Data Analysis of Questionnaire

The analysis of the questionnaire data was carried out using IPA and Descriptive Statistics. Analyzing only by IPA is not sufficient enough because there are two kinds of questions in the questionnaire. One is the open-ended questions which participants answer with their own words while the other kind of question is the close-ended questions where participants choose from sets of answers in the given selections. The analysis for the open-ended questions was done using IPA, while the close-ended questions were analyzed using both IPA and descriptive statistics method.

Descriptive statistics is describing main features of a collection of data (Mann, 1995). It is a qualitative method which is used widely in questionnaires to present statistical results. The difference between Descriptive statistics and IPA is that, descriptive statistics
aims to make summary of the data set rather than learn about what the data set represents. To have a more objective analysis, it is important to also reflect on the close-ended questions, answered by the participants to ascertain its reliability. When implementing descriptive statistics we collected the statistical data in order to analyze the main features. Like the IPA, we present the workflow for doing descriptive statistics. We will use the workflow steps shown in table 3.

Table 3.4: Descriptive statistic workflows (Teknomo, 2007)

<table>
<thead>
<tr>
<th>Descriptive Statistic Steps</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Create table of questionnaire results</td>
<td>Calculate questionnaire results and organize a table for the results</td>
</tr>
<tr>
<td>2. Data coding</td>
<td>Translate nonnumeric data to numeric data</td>
</tr>
<tr>
<td>3. Analyze the results</td>
<td>Analyze and summary the results of questionnaire</td>
</tr>
</tbody>
</table>

The workflow for the descriptive statistic consist of three steps, we explain all the three steps in details. Step 1, in this step, we calculated the questionnaire results and presented them as shown in table 5. Step 2, data coding. Data coding means translating non numeric data to numeric data. There are multiple choice questions were participants had options of selecting more than one option. Also there are true/false questions that provide Yes or No selection options for participant. The nonnumeric inputs were translated into numerical figures in the data coding step. Step 3, in this step we analyzed the results and make summary description of the findings.

3.4 Research Quality

Research is considered to be of good quality when it is trustworthy, which means that the research has exhibited qualities which shows that it is credible, valid and reliable (Seal, 1999). We have rigorously followed the right research standards and procedures to ensure that the research is of good quality. To highlight the attributes that we followed to ensure that our work is of good quality, we have further explained research quality in the following terms:

1. Construct Validity: Burton and Mazerolle (2011) described construct validity as the degree to which an operational measure correlates with the theoretical concept investigated. According to Embertson (1983, p. 197) “construct validation is involve whenever a test is to be interpreted as a measure of some attribute or quality which is not operationally defined.” To ensure that the operational measure of this research correlates
with the theoretical concept, we provide description of how the research questions were broken down into interviews and questionnaires.

First we describe construct validity with regards to the interviews questions. The questions were designed to assess the following questions: 1. What are the business values obtained from using wikis in organizations? 2. What is the impact of the CIO in creating these business values? For question Q1, the questions designed for the interview aims to capture data about the business values derived on wikis from the CIO or IT managers’ perspective. For question Q2, the interview questions designed were aimed to assess the CIOs’ impact on creating business values for the organization through wikis.

Secondly, we describe construct validity with regards to the questionnaire questions. All the questions set in the questionnaire were aimed at collecting data about business values of enterprise wikis from the user’s perspective. In order to collect quality data, we deployed the theoretical concepts of IT business value and then we structured the questions to cover the elements of business value. These will answer the Q2 research question from the wiki user’s perspective.

2. Internal Validity: Lincoln and Guba (1985) described internal validity as the extent to which a causal connection exists between independent and dependent variables. We have strived to achieve internal validity by ensuring that our research findings do not reflect our own views but rather reflect the views and perspectives of the subjects we are investigating. In an effort to achieve trustworthy research, we ensured that all the empirical data collected have undergone thorough and thoughtful analysis before making final conclusions.

3. External Validity: External validity aims to ensure that sample taken is in accordance with the rule that every element of the population has a known probability (not necessarily equal) of being included in the sample (Lincoln & Guba, 1985). This further ensures that the sample took into consideration all segments of the population and therefore, the findings represent the entire population. Our research strived to avoid threats to external validity in order to achieve result that is generalizable to the population.

4. Reliability: Reliability shows the level of consistency of the research. This means that when you use the same variables to test our findings, you should also have a similar result. Therefore, a research is reliable, when it exhibits the same level of consistency; this further shows the quality and the validity of the research (Lincoln & Guba, 1985).

3.5 Research Ethics

Research ethics addresses those rules that researchers must adhere to when conducting a research. There are several important questions that are asked when dealing with ethical issues such as, what moral principles guide your research? How do ethical issues enter into your selection of a research problem? How do ethical issues affect how you con-
duct your research—the design of your study, your sampling procedure, etc.? What responsibility do you have toward your research subjects?

Some moral principles that must be considered when conducting a research include.

1. Confidentiality: Confidentiality has to do with the respect for autonomy. This means that “identifiable information about individuals collected during the process of research will not be disclosed without permission” (Wiles, Crow, Heath & Charles, 2008, p. 417). During our research, we collected interview data from IT managers and also collected questionnaire data from various wiki users. Our obligation is to ensure that we do not disclose any data without the permission of the subject (Callahan & Hobbs, 1998).

2. Voluntary Participation: The principle of voluntary participation requires that people are not forced into participating in research (Trochim, 2006). The participants in this research should be willing to take part in the research to share their experience. They are free of any coercion or promises of benefits unlikely to result from participation (Callahan & Hobbs, 1998). It is necessary and important for us to get accrue data we needed in research. Usually, voluntary participation is related closely with informed consent we talk about next.

3. Informed Consent: It is our obligation as researchers to fully inform the respondents about the procedures and risk involved, and they must give their consent to participate (Trochim, 2006). Ethical standards require that researcher should not subject their respondents to any risk of harm. Risk of harm might be in form of economic losses such as loosing ones’ job, damaging one’s reputation and so on.

### 3.6 Reducing Bias

Sica (2006, p. 780) described bias in his report *Bias in Research studies* “as a form of systematic error that can affect scientific investigations and distort the measurement process”. Bias occurs in a situation where a particular research finding deviates from a ‘true’ finding. This could happen as a result of errors in the manner of interviewing or by errors in sampling. We have strived to reduce bias while conducting our research by considering scenarios where bias might occur such as selection bias (Sica, 2006). For instance, we made sure that all the interview respondents were people who manages IT/IS resources in their respective firms and have had experiences in managing wiki platforms. For the questionnaire respondents, we made sure that they are all user, collaborators or contributors of wiki platforms.

*Selection Bias*: This kind of bias can arise when the samples collected does not adequately reflect the spectrum of characteristics in the target population. This means that the sample does not fairly represent the entire population, which will result to overestimation of some section of the population and underestimation of others (Sica, 2006).
4 Results and Analyses

In this chapter, we present the empirical findings from the interviews and questionnaire data that we have collected, giving our own interpretation of the data. We describe our encounter with the interview subjects presenting their professional views and experiences on collaborations using wikis and the benefits that are derived from it. We also present the data that we have collected from the questionnaires, showing the impacts of using wikis at the workplace.

4.1 Interview Result and Analysis

The Interpretative Phenomenological Analysis (IPA) of the three semi-structured interviews that we conducted resulted in the emergence of five master themes. Listed below, are the five master themes:

• “I have been working with IT my whole life”: Education and Experience of Respondents

• Wikis facilitates communication, documentation and information sharing

• Wikis improves efficiency by speeding up processes, improving quality and reducing cost

• “Everybody can contribute to it in the way they feel is the best”: There is no boss who controls wiki platform

• Some challenges of using wikis

These master themes have been extracted from the interview findings. This chapter will further explore these master themes and their subordinate themes (see table 4).

The themes selected are extracted from specific responses by the participants, and we used these themes due to their relevance to the research question. They do not represent all aspects of the conversation at the time of the interview. While extracting word to word to make meaning of the responses given by the participants about their perspectives on the issue under discussion, some minor moderations were made to improve readability. The table below shows the complete list of the master themes and their subordinate themes.

Table 4.1: Master Themes and related Subordinate Themes

<table>
<thead>
<tr>
<th>Master Themes</th>
<th>Subordinate Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I have been working with IT my whole life”: Education and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Obtains bachelor’s degrees</td>
</tr>
<tr>
<td></td>
<td>● “I have been developing softwares since I</td>
</tr>
</tbody>
</table>
| Experience of Respondents                                                                 | graduated from college”: Have many years of working experience  
  |                                                                                       | - “My responsibilities are for a set of products around large companies”: Responsible for managing major functions in the company  
| Wikis facilitates communication, documentation and information sharing                 | - “We use the wikis quite a bit to help communicate between different developers”: Wiki facilitates communication  
  |                                                                                       | - “You need to be able to constantly be documenting what you are working on”: Wikis facilitates creating and updating documentation  
  |                                                                                       | - “Everybody that wants to know details, the wikis are great places to share those”: Wiki facilitates information sharing  
| Wikis improves efficiency by speeding up processes, improving quality and reducing cost | - “It speeds up the project considerably”: Wikis helps save time on project  
  |                                                                                       | - Wikis helps reduce cost  
  |                                                                                       | - Wikis helps Improve quality of documentation/products  
| “Everybody can contribute to it in the way they feel is the best”: There is no boss who controls wiki platform | - “We don’t try to dictate things as much as possible”: The hierarchies of all the collaborators are on the same level  
  |                                                                                       | - “You can’t segment control who publish or edit else, you lose the benefit of the crowdsourcing approach”: Everyone has equal access and permission  
| Some challenges of using wikis                                                        | - Wiki can be very unstructured as everybody edits content  
  |                                                                                       | - “… But how many of those people actually edit the pages…”: Getting people to contribute as much as possible is a challenge  

4.1.1 “I have been working with IT my whole life”: Education and Experience of Respondents

This master theme aims to ascertain the capabilities of the CIOs and IT managers that were interviewed by capturing their Human Capital Attributes such as, educational background and work experiences (Chen et al., 2010). These human capital attributes contribute to the CIO supply-side leadership capabilities. All the three IT managers that we interviewed stated that they had an educational background and have obtained a bachelor’s degree at recognized universities. They also have many years of working experiences in the field of IT which suggests that they have the competencies to manage IT functions in a way that will create value for their respective firms. Chapter 2.2.1 of the frame of reference discussed about CIO IT contribution to firms’ efficiency in which CIOs’ human capital attributes were explored.

4.1.1.1 Obtains bachelors’ degrees

All three of the IT managers were graduates of some reputable Universities in the world. The first interview we conducted was with Mark Lines, a Canadian based software developer, a delivery agile coach, an author and the co-founder of UPmentors (Unified Process Mentors), who among many Human Capital attributes that he possesses, has a bachelor’s degree (Chen et al., 2010).

“I graduated from Brandon University, Canada”

We also interviewed Ben Kus who is the Chief Architect for IBM’s Endpoint Management Solution, and he is a graduate of Computer Science from the University of California, Berkeley. Similarly, Martin Christensen who is the third IT manager we interviewed, obtained a bachelor’s degree from Aarhus University, Denmark.

4.1.1.2 “I have been developing softwares since I graduated from college”: Have many years of working experience

This subordinate theme presents the ample working experiences that the IT Managers we interviewed have acquired over the years. Mark Lines who graduated from the University in the year 1985, had since been working as a software developer. Experience is one of the CIO supply-side leadership attributes (Chen et al., 2010). This was his response when we asked him the question-- How many years of experience do you have as a software developer?

“I have been developing softwares since I graduated from college”

We asked the same question to Ben Kus who has worked 11 years at BigFix, a very small company in Silicon Valley California until it was acquired by IBM about 2 years ago. And he replied:
Similarly, in the account of Martin Christensen, he recalled that he have been working with IT his whole life, but professionally for about 8 years.

**4.1.1.3 “My responsibilities are for a set of products around large companies”: Responsible for managing major functions in the company**

During our interview with Ben Kus, we tried to understand his job responsibilities as the chief architect of IBM Endpoint Management Solutions, he explained to us that he is responsible for an entire product unit, designing and developing software product, making sure that the products are properly designed and that they suit the needs and requirements of the customers. This subordinate theme shows relation with the CIO IT contribution to firms’ efficiency section (Ch. 2.2.2) of the frame of reference. Below was the response Ben Kus about his job responsibility:

“...My responsibilities are for a set of products around large companies; Endpoint Management is the name of our product and has about 20 sub products. My Job is to make sure that their architect is properly... that the customers like them, that we’re building the products in the right way, and making sure that we have the right quality and design.”

The above subordinate theme aims to present the kind of functions that the respondents are responsible for in their various firms.

**4.1.2 Wikis facilitates communication, documentation and information sharing**

This master theme aims to capture the most important benefits of using wikis. The common benefits as expressed by the IT managers are that wikis facilitates communication, documentation and information sharing. This master theme supports the sharing principle of wikinomics as discussed in Chapter 2. This master theme also supports the “Business Value Model of IT as seen in Figure 2.4 (Melville et al., 2004). Communication, documentation and information sharing are all business processes carried out on wiki platforms. The subordinate themes below will further explore the benefits of using wikis as expressed by the respondents.

**4.1.2.1 “We use the wikis quite a bit to help communicate between different developers”: Wiki facilitates communication**

All three IT managers shared the same views, that one of the benefits of wikis is that it helps to facilitate better communication between the users of the wiki platform.
Ben Kus discussed how wikis helps facilitates better communication between everybody involved in the process of product development at IBM Endpoint Management Solution even across departmental/functional units. This was his remarks:

“...we use the wikis quite a bit to help communicate between different developers, between developers and the sales team, developers and the services team...”

In his views, Mark Lines also talked about wikis fostering better communication between collaborators when we asked him for his thoughts about the benefits of wikis. This was Mark’s statement regarding wiki aiding better communication:

“it increases communication resulting in delivering software faster to customers, so that the increased speed, quality, translates into benefits to the business directly.”

4.1.2.2 “You need to be able to constantly be documenting what you are working on”: Wikis facilitates creating and updating documentation

Wikis has features that enables one to create and update documentation easily. This theme captures the participants’ views about documentation with wikis.

Mark Lines expressed his views about wikis facilitating better documentation:

“...wikis facilitate effective documentation, the result is, you gonna have a better product, more easily supportable product... that translates into business values as well.”

In his account, Ben Kus also talked about wikis as a very important tool that helps in documentation:

“...And when you are developing products, especially complex products, you need to be able to constantly be documenting what you are working on and updating the documentation of the products that you’ve already sent out, because you learn new things as you go...”

According to Mark Lines, the reason why wiki is a useful tool for carrying out collaborative projects is that all the volunteers (collaborators) come with different sets of skills and a wiki platform enables all different kind of professionals to be involved in their various parts of the project at the same time. This was not possible in the old days he recalled:

“so for example in the old days, the traditional way of writing software, it was in a very silo(ed) approach... developers will write their own documentations, the testers their own, the architects their own, the analyst their own, but now a days with agile technique, we collect all the documentations together collectively, we call it collective ownership. It allows us to minimize the bureaucracy around writing the documents for developing software.”
4.1.2.3 “Everybody that wants to know details, the wikis are great places to share those”: Wiki facilitates information sharing

This subordinate theme aims to capture the views of the IT managers about wikis enabling information sharing. Ben Kus explained to us how wikis helps increase the rate at which information is shared between developers:

“it increases the rates at which the developers and internal employees can share information, and because it is easy to share, it is easy to edit...”

During our interview with Ben Kus, we asked him to describe the business values of using wikis, and this was his account regarding the ease of sharing information that wikis provides:

“...basically everybody that wants to know details, the wikis are great places to share those because they are so easier to change and to update...”

He continued:

“The business value there is, that you get better information to your customers without a lot of process or a lot of burden. It is more efficient internally, it saves money that way, and it is better for the customers. They are more likely to keep your product.”

In another account, Martin Christensen explained to us how his company and the owners of “PrintVis Wiki” NovaVision Software, use wikis to share information with their partners. This was his comment when asked to describe the business values that his company derives from using wikis:

“Well, the idea was, as we also have a lot of partners that sell our products, the idea was that they could also contribute to this documentation or point out when something wasn’t right... ”

4.1.3 Wikis improves efficiency by speeding up processes, improving quality and reducing cost

This master theme aims to capture the views of the IT managers about how wikis help them to: (a) speed up their work processes (business processes), (b) improve the quality of their results (products) and (c) reduce the cost of their operations. This theme captures all the elements that defines the term “Efficiency” like increased speed, improved quality, reduced cost, better communication. This master theme supports the Business Value Model of IT (Melville et al., 2004).

4.1.3.1 “It speeds up the project considerably”: Wikis helps save time on projects

We present the views of the IT managers regarding how wikis helps improve the efficiency of their work processes by speeding up their work processes while saving time.
Mark Lines gave his own insight about how wiki improves efficiency by speeding up business processes:

“I think one of the benefits of wiki is ahh... if you open up to a lot of people you can obviously get a lot more work done quickly.”

He continued as he relates how increased speed eventually results into benefit to the company:

“... it (wiki) speeds up the project considerably, and it increases communication, resulting in delivering software faster to customers, so that the increased speed, quality, translates into benefits to the business directly.”

Similarly, Martin Christensen talked about how they use the PrintVis wiki platform for documentation and how they collaborate efficiently to create better documentation at Novavision Software.

“I think we are more efficient at writing with this (wiki), because as I said, it doesn’t have to go through one person... everyone can just go in, type some stuff... we’re definitely more efficient. That’s the main value probably.”

In his account, Ben Kus also discussed how wiki facilitates documentation and talked about efficiency in terms of time saving and reduced cost:

“...by having wikis available that we can update our documentation quickly, it saves a lot of time because if there is a complex product, especially rapidly changing product, it is useful for the most knowledgeable people of the product, the developers or the experts of the product, to go in and quickly update and change that, and wiki is a pretty good format for that. The business value there is that you get better information to your customers without a lot of process or a lot of burden. It is more efficient internally, it save money that way, and it is better for the customers, they are more likely to keep your product”.

4.1.3.2  Wikis helps reduce cost

This subordinate theme aims to capture the views of the IT managers regarding wikis helping to reduce cost of operation.

During our interview with Mark Lines, he talked about how wikis can help software developers reduce cost, he explained how wikis can help reduce the total cost of ownership for software products. This was a statement he made when asked to describe the business values that are obtained from wikis:

“...one of the things that people don’t consider when they build the software solution is the total cost of ownership, that is, it’s not just to deliver the software, it is to support and maintain it afterwards.”
The following remarks was made by Ben Kus when describing the business values of wikis in regards to providing customers with up-to-date information by constantly updating documentation that are useful to the customers which helps reduce cost. This was his comments:

“The business value there is that you get better information to your customers without a lot of process or a lot of burden. It is more efficient internally it saves money that way, and it is better for the customers, they are more likely to keep your product”.

4.1.3.3 Wikis helps improve quality of documentation/products

This subordinate theme aims to capture the views of the IT managers with respect to how they use wikis for documentation or building products.

Mark Lines expressed his own views on how wikis facilitates effective documentation which results in better quality products:

“...So wikis facilitate effective documentation, the result is, you gonna have a better product, more easily supportable product... that translates into business values as well.”

In the same vein, Ben Kus expressed his perspective about how other elements that fosters efficiency like speed and better communication can help improve the quality of the end product:

“It increases the rates at which the developers and internal employees can share information, and because it is easy to share, it is easy to edit... By encouraging better communication, you are encouraging better quality, faster results.”

Martin Christensen also talked about how effective collaboration by the wiki users can help to produce better quality documentation when multiple users combine their intellectual ability to perform the task.

“I think everyone has access to all pages and can edit all information, so that’s pretty good for us, we collaborate on all the documentation, so we can all corporate and quality check”

He continued by talking about how their business partners can collaborate with them to help improve better quality:

“Well, the idea was, as we also have a lot of partners that sell our products, the idea was that they could also contribute to this documentation or point out when something wasn’t right... I guess the best value is better documentation.”
4.1.4  “Everybody can contribute to it in the way they feel is the best”: There is no Boss who controls wiki platform

The aim of this master theme is to discuss the findings about how wiki is being controlled. We gathered the views of the IT managers on how work process is being controlled and how the IT managers exhibit their leadership role to ensure that they obtain the desired results on wikis projects. This theme is related to section (Ch. 2.2) of the frame of reference, where it describes the CIO roles and responsibilities in an organization. The subordinate themes below, further explains the way control is being administered on wikis.

4.1.4.1 “We don’t try to dictate things as much as possible”: The hierarchies of all the collaborators are on the same level

Mark Lines talked about how wiki operates with the peering principle of wikinomics when he described his role as a team leader. He discussed how every member of his team is considered to be of the same hierarchy level, meaning that, no body reports to another as in the case of the traditional business setting, where there are superior employees, C-suite managers like CEO, COO and CFO, and there are subordinate employees who reports to the superior employees. Below is Mark Lines’ remark with regards to this theme:

“.... In spirit of Agile, we don’t try to dictate things as much as possible, the hierarchy of all the team members are on the same level. I am the team leader of my team, but I don’t call myself a project manager, my job is to facilitate and to make my team effective as possible, but I don’t tell them what to do. I tell them what is needed to be done and collectively, we figure out the best way to get it done. The same thing with wiki, I give everybody equal access, and everybody can contribute to it... in the way they feel is the best.”

4.1.4.2 “You can’t segment control who publish or edit else, you lose the benefit of the crowdsource approach”: Everyone has equal access and permission

The wiki platform’s main attribute is that it is built on the principle of openness. This means that people should be able to freely access its content at all times and also contribute to it. Though, at the course of our research, we discovered that there are internal and external enterprise wikis. The internal wikis are mostly created to be used within a firm, with little or no access allowed for external users while the external wikis, are opened to other people outside the host firm such as customers, partners etc.

Here is Ben Kus comment about the openness of wikis:
“It (wiki) typically requires an audience, and you can’t segment control to say who can publish or edit, if you control it too much, then you lose the benefit of the crowdsourcing approach. And so most wikis that we use are pretty open, internally and externally because you want to encourage people to go in and modify and change things.”

Martin Christensen talked about the levels of openness that exist in the PrintVis wikis, due to the fact that Novaision Software uses their wiki platform both for internal and external purposes, there are some restrictions to external users because of the sensitive information that the company wouldn’t like to share with external users:

“we have like three levels of permissions, we have the basic users, and then our partners, they are allowed to upload files and stuff... and then the employees in my company we can of course do whatever we want in there, but actually we have some stuff that our competitors aren’t supposed to find out about us... so the external users don’t have access too much.”

4.1.5 Some challenges of using wikis

We try to capture some of the setbacks of wikis in this master theme. Some IT Managers shared their views with us on the challenges that are encountered on wiki platforms. In order to properly ascertain the upsides of wikis we have to also understand some of its downsides. The following subordinate themes discussed more on the challenges of using wikis.

4.1.5.1 Wiki can be very unstructured as everybody edits content

In Mark Lines account, he described the way that wikis can be very unstructured when many people contribute to the platform and he also suggested the solution to handle the unstructured data by “refactoring”, which means reorganizing or cleaning the data. Mark Lines responds to the challenges of using wikis:

“One of the challenges is that... they can be very unstructured... if you have everybody contributing to it, it can actually become a mess, if you don’t go in and tidy it from time to time. In software we call it refactoring (going back and cleaning our code), to make it easier to maintain in the future, you can use the same term for wikis.”

Similarly, Ben Kus discussed the issue of unstructured data on wikis and another challenge which is, the possibility of losing data since everyone is authorized to add or delete contents. And yet another challenge of concern to some firms as expressed by Ben Kus is, the risk of people publishing secret data or irrelevant data or inappropriate data:

“One of the strengths of wikis is that they are unstructured, that’s also a challenge, it means that people will often not structure their information very well, which makes it hard for other people to consume. And so you will either have to teach people how to do
that or you’ll have to go back and clean up after them, that means that you’ll have to have a wiki editor. If your data is there, that’s good but if the data is not easy to understand or hard to find, then that’s a cost and a problem. Also another challenge is that, people might put up data that is not appropriate or not relevant, you have to worry that people will put up secret data...”

4.1.5.2 “...But how many of those people actually edit the pages...”: Getting people to contribute as much as possible is a challenge

Martin Christensen described the challenge that they are encountering with PrintVis Wiki, where they are not very satisfied with the amount of contributions that the platform’s users generate:

“... the biggest challenge for us is to actually get people to use it as much as possible... you know like Wikipedia, it must have as much as 50,000 visits per day, but how many of those people actually edit the pages or contribute to the content, so that’s our challenge.”

His solution to tackle this issue is to ensure that he makes the platform more user-friendly as it will motivate the users to contribute more:

“Make it easier for people to contribute; you can create a form or something instead of the normal edit page that makes it easier for some people.”

4.2 Questionnaire Result and Analysis

4.2.1 Questionnaire Result

In this section, we present a brief summary of the questionnaire data, while the detailed questionnaire data can be found in the appendix 4. We prepared our questionnaire in the best way that will be able to capture quality empirical data for our research. The questionnaire contains a total of 16 questions which were launched online via a Chinese free website Wenjuanxing (http://www.sojump.com). We targeted some potential respondents who were enterprise wiki users and had experience of using wiki platforms for various purposes. Then we sent the online questionnaire links to them. A total of 16 responses were recorded within a period of days. Out of the total of 16 questions, there is one open-ended question and 15 closed-ended questions which consists of multiple-choice questions, yes/no questions and scaled questions. Question number 15 is a scaled question therefore, it is presented in the appendix 4. Question number 16 is an open ended question and the entire amount of entries can also be seen in the “Appendix” section.
The questionnaire sample and all results of questions had been calculated and are included in the appendix 4.

Table 4.2: Question Results (Q1-Q14)

<table>
<thead>
<tr>
<th>N</th>
<th>Questions</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How often do you visit the (wiki platform)?</td>
<td>Rarely = (25%) Once a week = (19%) couple of times a week = (38%) Daily = (19%)</td>
</tr>
<tr>
<td>2</td>
<td>How many hours do you spend on the (wiki platform) weekly?</td>
<td>Less than 1 hour = (25%) 1 to 5 hours = (50%) 6 to 10 hours = (13%) Above 10 hours = (13%)</td>
</tr>
<tr>
<td>3</td>
<td>What is/are your main purpose for using?</td>
<td>Collaboration = 38% Project Management = 31% Community = 25% Information Sharing = 88%</td>
</tr>
<tr>
<td>4</td>
<td>What are the common functions of wiki at your company?</td>
<td>Collaboration = 50% Project Management = 25% Community = 13% Information Sharing = 88%</td>
</tr>
<tr>
<td>5</td>
<td>Do you take part in collaboration on wiki?</td>
<td>Yes = 56% No = 44%</td>
</tr>
<tr>
<td>6</td>
<td>What roles do you play usually on the wiki platform collaboration?</td>
<td>I am just a spectator and only view others’ collaboration tasks. = 56% I participate in collaboration with other users and provide knowledge or experience on the wiki platform. = 44%</td>
</tr>
<tr>
<td>7</td>
<td>What impact do you think that wiki has on collaboration?</td>
<td>Helps complete task in shorter time = 81% Save extra financial cost = 63% Stronger community between collaborators = 63% Better outcome of projects = 25%</td>
</tr>
<tr>
<td></td>
<td>Others = 19%</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>What do you think are the benefits of using wiki project management?</td>
<td>Encourage everyone to take part in the project process in the company = 81%</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>9</td>
<td>Do you use (wiki platform) to communicate with other colleagues?</td>
<td>Yes = 63%</td>
</tr>
<tr>
<td>10</td>
<td>What other means of communication do you mostly utilize besides Wikis?</td>
<td>Skype = 50%</td>
</tr>
<tr>
<td>11</td>
<td>With whom do you mostly communicate?</td>
<td>Colleagues in same department = 63%</td>
</tr>
<tr>
<td>12</td>
<td>Which group do you think is the most provider of information on wiki platform?</td>
<td>Common employees = 44%</td>
</tr>
<tr>
<td>13</td>
<td>What do you think about the information sharing function on wiki platform?</td>
<td>I do not search for information on the wiki platform = 6%</td>
</tr>
<tr>
<td>14</td>
<td>Which roles do you play on information sharing?</td>
<td>Reader and contributor = 38%</td>
</tr>
</tbody>
</table>

The above table (Table 4) presents the brief summary result that we collected from the questionnaire, detailed result information of each question are put in the Appendix sec-
tion with chart figures. In the next sub section, we will use interpretative phenomenological analysis (IPA) combining with descriptive statistics to analyze the questionnaire results.

### 4.2.2 Analyzing Questionnaire Results

This online questionnaire aimed to investigate the business values of enterprise wikis from the wikis users’ perspectives. So our analysis for the questionnaire is separated in two parts. The first part we analyze 14 close-ended questions, i.e. Question 1 to Question 14 to learn about the user’s collaborative activities on wiki platform. We used these results to understand and assess the potential business value of wikis. The second part is the last two questions Q15 and Q16 which we directly asked for users perspectives about business values of wikis. Finally, we make a conclusion with these two parts of analysis results to get the business values of using wikis in companies.

#### 4.2.2.1 Analyzing closed-ended questions 1-14 (collaborative functions)

In the questionnaire, Question 1 and 2 were designed to learn the about the frequency of visits and the amount of time that each user spend on the platform. Question 1 and 2 were analyzed using the descriptive statistics method.

- **Question 1 and 2**

In the questionnaire, we designed two questions (Q1 and Q2) to learn the frequency of visits and the amount of time that each user dedicates on wiki platform. The result suggests that, half of the participants spend between 1 to 5 hours in a week on the wiki platform. And only 19% of the participants access wiki platform daily. 38% of the participants only access wiki platform a couple of times per week. Analyzing these two questions’ results, we can know the positions of our participants. Most of participants (about 55%) are employees who perform their daily tasks mostly not on wikis. They just search for information or join community on the wiki platform so the time spent on wiki platform is not very much. Of course, there are 19% participants who use wiki platform daily. They need to have a place to work together with others or share information. For example, design team members, IT developers and so on. They spend plenty of time on the wiki platform. So from these two questions, we can deduce that most participants of this questionnaire are common employees who do not spend much time on wiki platform.

- **Analyzing Question 3 - 14**

Question 3 - 14 were designed to find out about the user’s collaborative activities on wiki platform and they were analyzed with IPA. These 12 questions were related to the purpose of using wikis and the functions being performed on the wiki platform. In the
analysis steps of interpretative phenomenological analysis method, we annotated each question and its answers after transcribing them. As the analysis developed, we catalogued all contents in five themes. All themes are listed in the table 4.3 below together with related question number. Detailed discussion of each theme will be analyzed one by one at the next sub section.

Table 4.3: Themes of Questionnaire (Q3-Q14) and Related Question number

<table>
<thead>
<tr>
<th>Themes</th>
<th>Related Question number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Information sharing and collaboration are common purposes for participants to use wiki platform</td>
<td>Q3, Q4</td>
</tr>
<tr>
<td>2. Collaboration can shorten work time, save financial cost and strengthen community</td>
<td>Q5, Q6, Q7</td>
</tr>
<tr>
<td>3. Better communication through wikis</td>
<td>Q9, Q10, Q11</td>
</tr>
<tr>
<td>4. Information sharing improves working efficiency</td>
<td>Q12, Q13, Q14</td>
</tr>
<tr>
<td>5. Using wikis for Project management</td>
<td>Q8</td>
</tr>
</tbody>
</table>

**Theme 1**

Q3 and Q4 aims to research the purpose for which participants access the wiki platform and the common functions participants perform. Both two questions are multiple-choice questions. Options we set were all based on the four basic principles of Wikinomics, i.e. openness, peering, sharing and acting globally. The four options are collaboration, project management, communication and information sharing. Among the answers chosen cumulatively, information sharing (88%) and collaboration (about 44%) are the main and common purpose for most users to access the wiki platform. Furthermore, the result of Q16, the open-ended question for benefit of wiki platform, also suggests the same answers as that of Q3 and Q4. In the Q16 fourteen answers, about seven answers regarded information sharing and four regarded to collaboration as important functions. Obviously, information sharing and collaboration has been the most common function of wiki platform in companies now. The reasons and potential business values of them will be analyzed later.

**Theme 2**

Collaboration is an important feature of wiki platforms. Collaboration means that, employees can work together on the wiki platform irrespective of their different locations at the time. This is a more efficient working method which breaks traditional working method that requires all employees to work in the same place at the same time. Besides,
because everyone can see the work process and changes from colleagues, it helps in avoiding duplications of work. Figure 1 on the Chapter 2 Frame of reference also shows the differences between old and new working methods. This function presents all four principles of Wikinomics, openness, sharing, peering and acting globally. Q5, Q6 and Q7 made a research about collaboration feature. In total 16 participants, there are 9 participants who had taken part in the collaboration on their wiki platforms. And 7 of these 9 participants worked together with other people. Some benefits of collaboration using wiki platform were assessed, saving financial cost, shortening process time and strengthening community between workers appears to be the most important benefits. These benefits suggest the most important business values of collaboration on enterprise wikis.

**Theme 3**

This theme is about another function of wiki platform – communication. From the results of Q9, Q10, Q11, above half of the participants have used wiki platform to communicate with other people. But they also have other methods of communicating. 100% participants were accustomed to use email to communicate. 93% participants liked using telephone to communicate with other people. Analyzing these empirical data, we found that, though users communicate with others via wiki, it is not the most important means of communication by users. There are two reasons for this result. The first one and the most important reason is that other means of communication are generally more developed or utilized for communication at the workplace. Therefore, employees are more familiar with other means of communication with others. The second reason is that most users do not spend a lot of their normal working hours on wiki platforms.

**Theme 4**

Information sharing is the most important function of wiki platform for most participants in this questionnaire. Through analyzing the result of Q12, Q13 and Q14, we found out that although most participants are readers only (56%), they were willing to search needed information on the wiki platform. And two-thirds of participants thought they get useful information from the wiki platform. This is a place to store information, retrieve information and share information, so it also needs information providers. About half of the participants consider the main information providers to be common employees in the company. Above one-third participants thought managers are the main information providers. Also a few number of participants considered that customers can be the information providers. From these results, there is no doubt that information sharing is the most common and popular function of wiki platform used in companies.

Openness, peering, sharing and acting globally, the four basic principles are embodied well in the information sharing. Except saving working time and extra financial cost as well as collaboration, information sharing also has two importance. One is that it provides a place to search and find useful information. And the other one is, it improves the efficiency of searching information. While the first one is easy to understand, we pro-
vide a detailed explanation for second one. Compare with Internet, the range of information on the wiki platform in companies is smaller so that employees can find needed information easily. All information on the wiki platform is mostly directly related to the company in question. Besides, because employees as well as managers can share their experience as examples for others, it shortens work time if other people encounter same or familiar problem. Also because of the openness of wiki platform information part, employees can get market direction on time when reading customer’s feedback on the platform. So it is obvious that information sharing can improve work efficiency.

**Theme 5**

Project management is the last function mentioned in the questionnaire. From Q8 results, we can see that the most benefit of project management by participants is that wikis encourages everyone to take part in the projects’ processes (81%). Next two benefits which both occupied above 50% were ‘allowing employees see the project progress’ and ‘different department can make modification based on the changes’. In fact, project management is like collaboration. The difference is that the former only focuses on project while the later one generalizes on all collaborative activities.

**Themes analysis conclusion**

After analyzing each theme, we make a conclusion of the business values from user’s collaborative activities on wiki platform. There are five main business values from wikis collaboration. They are, shortening work completing time (time saving), saving extra financial cost (reducing cost), facilitating better communication and community, providing a place to search and find information (information sharing) and improving work efficiency. After analyzing the rest part of questionnaire, we make a comparison with them at the section, “Combining closed-ended, open-ended and scaled findings”.

**4.2.2.2 Analyzing scaled & open-ended question 15 & 16 (business values of Wikis)**

Question 15 and Question 16 were designed to investigate the business values from employees’ perspectives directly. Question 15 list six business values we thought about enterprise wikis and let participant to rate scale between 0 to 10 (0: Totally disagree, 10: Totally agreed). And Question 16 is an open-ended question where participants wrote in the benefits they thought of wikis platform. For Question 15, we chose to use descriptive statistics method to make calculation and then analyze it. Question 16 we chose to use IPA as analysis method to discuss data.

**Analysis of Question 15**

For the scale question, there are 11 options (0 to 10) for participants to select. In order to analyze easily, we made data coding first. We separated 11 options in two parts. And we formulated 0 to 5 represent **negative** votes while 6 to 10 represent **positive** votes.
Now for each of the business value, we calculated and summarized the result in table below:

<table>
<thead>
<tr>
<th>Business Values</th>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of response</td>
<td>Proportion</td>
</tr>
<tr>
<td>The wiki platform improves tasks’ efficiency</td>
<td>5</td>
<td>31%</td>
</tr>
<tr>
<td>The wiki platform strengthens social community between colleagues</td>
<td>3</td>
<td>19%</td>
</tr>
<tr>
<td>The wiki platform saves extra financial cost in doing tasks</td>
<td>3</td>
<td>19%</td>
</tr>
<tr>
<td>The wiki platform makes project management easier</td>
<td>2</td>
<td>13%</td>
</tr>
<tr>
<td>The wiki platform provides a number of information and resource to users</td>
<td>1</td>
<td>6%</td>
</tr>
<tr>
<td>The wiki platform improves customers and employees relationships</td>
<td>6</td>
<td>38%</td>
</tr>
</tbody>
</table>

From the above table, the results shows that participants agree **positively** with all of the six questions related to business value of wikis. The positive proportions are all above 60%. It can be concluded that improving task efficiency, providing information and resources (Information sharing), reducing cost, enhancing social community, enhancing project management, and improving customer relationship are valuable features of wikis. Among the six questions, providing information and resources (Information sharing), was rated highest with 94%. While improving customer relationship was rated lowest with 63% scale rating.

**Analysis of Question 16**

Question 16 is an open-ended question to collect participants’ answers. There are 14 answers we collected totally and we analyze them using the IPA. Analyzing these fourteen
answers, we grouped them in different themes. The themes we list are collaboration, information sharing, communication and project management. The collected results are put in the table below.

Table 4.5: Themes Result of Question 16

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Information Sharing</th>
<th>Communication</th>
<th>Project Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Proportion</td>
<td>Number</td>
<td>Proportion</td>
</tr>
<tr>
<td>4</td>
<td>29%</td>
<td>6</td>
<td>43%</td>
</tr>
<tr>
<td>2</td>
<td>14%</td>
<td>2</td>
<td>14%</td>
</tr>
</tbody>
</table>

From this table, we found out that the most important benefit of wiki platform participants considered is *information sharing*. The second one is *collaboration*. The results are almost same with that of the scaled results of Question 15. Business values from information sharing and collaboration also become most important values of wiki platform.

4.2.2.3 Combining closed-ended, open-ended and scaled result findings

In the last two sections, we presented the findings from the two parts of the questionnaire separately. Now we make a conclusion of the whole questionnaire to get a deep understanding of business values from enterprise wikis used in organizations from wikis users’ perspectives. In the wiki platform collaborative functions, we found that information sharing and collaboration were the two most important functions of wiki platforms. Furthermore, business values of wiki platforms are mostly from these two functions. The obvious business values are saving financial cost, shortening work completing time, improving communication, providing a convenient place to search and share information and resource, and improving work efficiency. Comparing these business values to the results of question 15 scaled business value question, we found that almost all elements correlates to the scaled results. Then combing the open-ended question’ (Q16) answers, the results also fit to the former. Finally we can obtain the business values in organizations which use wikis:

1) Shorten work completing time (time saving)
2) Save extra financial cost (reducing cost)
3) Improving communication
4) Provide a convenient place to search and find information (information sharing)
5) Improve work efficiency
5 Conclusions

This chapter presents the summarized outcome of the research study; it attempts to answer the research questions in a comprehensive way.

5.1 The Research Question

At the beginning of this research we set out to investigate the business values of enterprise wikis and the impact of the CIOs in creating those business values. This research question aimed to answer two sub questions which includes; ‘the business values obtained from using wikis in organizations’ and ‘the impact of the CIOs in creating these business values from enterprise wikis’. We approached our research from two different perspectives which are: ‘CIOs or IT managers’ perspective’ and ‘Wiki user’s perspective’. To answer these questions, we applied the Interpretative Phenomenological Analysis method and the Descriptive Statistic method to perform the analysis.

5.2 CIO / IT manager’s perspective

The Interpretative Phenomenological Analysis (IPA) enabled us to investigate in-depth, the business values of wikis from the CIO’s point of view and also, it enabled us to investigate the impact of the CIO in creating business values through wikis. Therefore, we used the IPA to analyze the interview data which resulted in five master themes. The first master theme was “I have been working with IT my whole life”: Education and Experience of Respondents, which explored the educational and professional background of the IT managers. The second master theme was Wikis facilitates communication, documentation and information sharing, this highlights the main functions of wikis. The third master theme, Wikis improves efficiency by speeding up processes, improving quality and reducing cost, this explored the benefits derived from using wiki. The fourth master theme, “Everybody can contribute to it in the way they feel is the best”: There is no boss who controls wiki platform, this theme captured how control is being administered on wiki platforms by CIOs or IT managers. The final master theme was, Some challenges of using wikis. This theme highlights some of the setbacks of using wikis.

The results for the ‘business values of wikis from the CIO’s perspective was found to be consistent with existing theories of “Business Value of IT” and “Business Value of Social Networking Technologies” as we discovered that wikis improves work efficiency by speeding up processes, reducing operating cost, improving quality of products/ documentation, improving communication between users. While the result from the ‘impact of the CIO’, we found that the CIOs or IT managers’ impact solely lies on providing all the resources and the enabling environment needed for collaboration to take place rather than controlling or exhibiting some leadership role. The hierarchy of all team members on wikis is on the same level, this also is in line with the peering principle of wiki-nomics. Therefore, the organizational structural power of the CIO is of no actual significance on the wiki platform.
5.3 Wiki users’ perspective

The findings from the questionnaire data was analyzed by Interpretative Phenomenological Analysis method and the Descriptive Statistic method. The closed-ended questions numbers 3-14 were analyzed with the IPA and classified into six themes (1-5). Theme 1 captures the purpose for which users visit and what function they do perform. Information sharing and collaboration tops the list of functions performed on wikis. Theme 2 concludes that reducing cost, shortening process time and strengthening community between workers are the most important benefits of collaboration. Theme 3 concludes that wikis facilitate better communication between users. Theme 4 concludes that information sharing is one of the most important functions of wikis. Theme 5 concludes that wikis facilitates better project management.

From the overall questionnaire findings, we concluded that the business values of enterprise wikis are: it speeds up processes (saves time), it reduces operating cost, it improves communication between users, it provides a convenient place to search and find information (information sharing), and above all, it improves work efficiency.
6 Discussions

This chapter summarizes the concluding experiences leading to finding the answers to the research questions and the related limitations encountered. We present our reflections, some suggestions and recommendations for future studies.

6.1 Limitations

At the course of this research, we aimed to investigate the business value created by enterprise wikis and the impact of the CIO on the business value created in organizations. We thought about the ways that we can achieve this aim and then proceeded to make discrete plans for achieving this goal. Our original plan was to conduct cases studies of enterprises that have implemented wikis and collect two types of empirical data from these companies. 1. To collect data from CIOs through interview, this will enable us to assess the impact of the CIO on the business value created through wiki platforms. Because the CIO is the top IT executive responsible for deploying and managing IS resources to create value for the company. 2. To collect data through questionnaire from the users of the wiki platforms in the companies. Because these are the people involved in the collaborative activities of the platform and can provide insight from the user’s perspective. These plans did not quite happen as expected as we could not find companies with wiki platforms together with subjects that are suitable for the study as planned. We were however able to interview three IT managers from three different companies and we also collected data through online questionnaire from randomly targeted enterprise wiki users.

6.1.1 Lack of CIO empirical data

The study was aimed at assessing the business value of enterprise wikis and the impact of the CIO on creating business value. However, we were not able to find any CIOs for our study. We contacted several CIOs from companies in Sweden, China, US, the UK and many other countries, but we were unable to secure any to take part in our study. We finally found and interviewed other IT managers to assess the impact of the CIO and also to assess the business value of wikis from the CIO’s perspective. The three IT managers we interview had sound experience in managing IT/IS resources (including wiki) in their respective companies. Though the research was carried out truthfully, the findings would have been more reliable if all the participants were CIOs.

6.1.2 Challenge of getting fixed wiki platform for questionnaire

Another limitation that we encountered was the difficulty in finding the wikis platforms that belongs to companies with a CIO. The questionnaire that we initially designed was intended to collect data from the users of the CIOs’ host companies through ‘postal questionnaire’ where we send the questionnaire directly to the users, but unfortunately we were not able establish all three connections at the same companies. Rather, we collected a small sample of independent data from users of different wiki platforms other
than users from specific wiki platforms. The findings would have been more reliable if the users are homogeneously related to specific wiki platforms being studied.

Although these limitations occurred in our research, we believe that this research was best and truthfully conducted with the option that were available, the concluding findings are trustworthy and there should be a causal connection between the independent and dependent variables when tested.

6.2 Course Experience

This master thesis lasted about six months from the beginning to the end. During this period, we met many difficulties in doing our research work and we had plenty of experience from these difficulties. We learnt many things academically and otherwise. In this section, we make discussion about the experience we had in the thesis work that might not reflect in the research findings.

6.2.1 Team Partnership and Cooperation

This master thesis course was done in groups of two students, so cooperation between two partners was the first thing we should want to learn. Our group was made up of two students from two different countries so there were some challenges with the partnership. One group member comes from China and had just basic English writing skills while the second member of the group come from Nigeria with a more competent writing skills. The cross-cultural difference between members was a great challenge but along the line we learnt to understand and to complement each other in these areas. At the end, it was a golden experience we had during out master thesis study.

6.2.2 Finding Companies for research

Due to the nature of the research question, we needed to find companies that fit the criteria for the research. So we started to find suitable companies on March 2012. This was the most difficult challenge we encountered during our thesis work. We prepared our research/ interview proposal and contacted hundreds local and international of companies to seek for an interview with their CIOs or IT managers. Firstly we searched for companies in Sweden but unfortunately, we had no positive response from any of them. Next we began to search for companies outside Sweden. We searched in China but CIOs or related positions were not popular in Chinese companies. The situation was the same in Nigeria. We actively dedicated more than a month to find companies but it was unsuccessful the we seek for help from the University carrier center, Science Park and our teachers to give us some suggestions for finding companies. At last we found three people in different countries who accepted to grant us interviews. It was unforgettable period for us in finding companies because we didn’t give up, we were finally successful. We should keep this spirit in our future study or work.
6.2.3 Help from Tutors

We had two tutors during our thesis and both of them gave us help and suggestions to do our thesis. Jorgen Lindh was our first tutor, and he gave us many suggestions at the beginning of thesis work. When we started our thesis work, our research area was too broad with no concise research questions. He gave us many suggestions for the research and useful references on our topic to help us specify the detailed research questions. But unfortunately he was ill then we had a new tutor. Christina Keller took over as our new tutor after Jorgen. She gave us some suggestions for finding companies to interview. Furthermore, when we finished collecting and analyzing the interviews and questionnaire, she gave her feedback and we made some changes according to her suggestions.

Though we had just less than one month to collect data, analyze them and make conclusion, we were able to finish our research and report at the last moment. We believe that more help and directions from tutors can support us to work better and complete the thesis in good time.
7 Future Research

CIO and wikis are quite new vocabularies in enterprises today. But both of them have played more and more important roles in organizations, and they have been discussed separately in the past. Our research aimed to establish the relation between CIOs and wikis. Therefore these fields are interesting for research and should be further explored in the future. In this chapter, we make some suggestions for future research of CIO and enterprise wikis.

7.1 Future Research of CIO

For many companies especially those in developing countries, the CIO is a new concept which is different from the traditionally recognized IT directors.

As a new emerging C-level position compare with other positions like CEO or CFO, measuring the performance of the CIO is quite an area of interest for many companies and scholars. We have attempted to assess the impact of the CIO with regards to collaboration on enterprise wiki platforms. Our findings can be further tested and verified to ensure consistency. The findings from this research question 2. “What is the impact of the CIO in creating these business values?” have helped to establish a foundation for future CIO research with relations to enterprise wikis. This relation between CIOs and wikis can further be explored with respect to organizational factors or other external influences. The business value that is being created by wikis is almost entirely related to the firm efficiency. More research is needed, to determine what business value related to firm strategic growth can also be obtained from wikis and how the CIOs impacts on the value creation.

7.2 Future Research of Wikis

Wiki is a tool with features that enables open innovation through peer production; it is a perfect medium for carrying out collaborative activities. While some companies are beginning to harness this tool, wikis are still yet to be fully explored by many enterprises and its potential are yet to be fully uncovered. In our research, we have identified some business values of enterprise wikis and all the business values that are identified are connected to firm efficiency. This is because the enterprise wikis are mostly used to carry out business process in order to improve the efficiency of the firm. More research should be carried out in order to investigate ways that wikis can be explored not only for improving firms’ efficiency but in a way that it can drive strategic growth.

The potential of this social networking tool (wiki) has been unvalued by many enterprises and to fully explore its potential, companies need to utilize this platform more in doing there processes. Firms need to be more open by sharing their knowledge and experiences both with internal employees and also with outsiders. This is a great tool for crowdsourcing and can help drive innovation creating new ideas, products and even new markets.

Finally, the business values of wikis are not limited to improving the efficiency of processes, improving communication between users, reducing operational cost, saving time of projects/ task or providing a convenient platform for information sharing. Wikis has the potential to revolutionize the current global economic scene causing a paradigm shift to the way business is currently being conducted. Therefore more research is needed to further explore the potentials of wikis.
8 References


Williams, Anthonyd. & Tapscott, Don., 2010, *Macrowikinomic, rebooting business and the world,* Portfolio, USA.

Wiki: A technology for conversational knowledge management and group collaboration. *Communication of the Association for Information Systems,* 13 (19), 265-289


9 Appendix

9.1 Appendix 1: Interview Guideline

<table>
<thead>
<tr>
<th>Interview Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewee:</td>
</tr>
<tr>
<td>Interviewer:</td>
</tr>
<tr>
<td>Department of interviewee:</td>
</tr>
<tr>
<td>Position of interviewee:</td>
</tr>
<tr>
<td>Date:</td>
</tr>
</tbody>
</table>

**Interview steps:**

**Step1:** Introduce ourselves to interviewee.

**Step2:** Introduce the purpose of this interview and explain clearly whole interview process.

**Step3:** Explain clearly the confidentiality, recording the thin the interviewers will keep during and after the interview.

**Step4:** Ask the interviewee whether he/she have questions before starting the interview.

**Step5:** Start interview and record related data.

The interview questions can be separated in three parts: CIO’s jobs and responsibilities, CIO’s opinion about enterprise wikis and the business values of wikis.

**Part 1: CIO’s Background Questions**

1. What is your educational background?
2. Tell us about your professional background?
3. How many years of experience do you have?
4. Could you please provide me the background about (company name)?
5. How many departments does (company name) have? And what are their responsibilities?
6. How many employees are currently working at (company name)?
7. What are your responsibilities at (company name)?
8. What is (name of wiki platform)?
9. What are your responsibilities at (wiki platform)?

Part 2: Knowledge Background questions
1. How do you understand the term mass collaboration?
2. How do you understand the term social networking?
3. How do you understand the term wiki?
4. How do you understand the term Business value

Part 3: CIO Performance Questions
1. What is the background of (wiki platform)?
2. How did the idea come about and by whom?
3. When did the project start and when was it launched?
4. For what purpose do you use (wiki platform)?
5. How many users currently contribute to (wiki platform)?
6. How do people react or appreciate using wiki? Was there any resistance by employees at first?
7. How did you communicate the importance of this wiki to the employees?
8. How do you facilitate/ mobilize/ manage the work process taking place on (wiki platform)?
9. How do you evaluate the work of the groups working on wikis?
10. Before implementing wiki, how did you use to mobilize collaboration? Or manage projects?
11. What would u say are the challenges you experienced at the workplace regarding collaborations prior to using wikis?
12. How did the (wiki platform) help your organization to address some of those challenges?
13. What will you say were the challenges you faced during implementing the system and how did you overcome those challenges?
14. What was the vision when you created the wiki?
15. How successful is this vision at the moment?
16. What is the business value does wiki add to your company? Or what business value do you derive from using wiki?
17. Finally, what will you consider as your hobby(s)? what do you love to do for
pleasure?

Part 3: Follow up questions

This part, the interviewers will ask interviewee questions they’ll need more clarity about. Also, the interviewers can ask the interviewee to share any stories of other real experience.

Finally, interviewers should give the recorded content to interviewee to ask whether there is question or comment in this recorded content. Interviewers should make a certain changes of the content based on the requirements of interviewee. If there is no problem, the interview can be ended.
9.2 Appendix 2: Interview Transcription

Interview Transcript

Interview steps:

Step1: We introduced ourselves to the interviewee.

Step2: We introduced the purpose of the interview and explain clearly whole interview process

Step3: Explain clearly the confidentiality,

Step4: Ask the interviewee whether he/she have questions before starting the interview.

Step5: Start interview and record data.

Interview 1:
Interviewer: Gideon Benjamin
Interviewee: Mark Lines, Software developer and co-founder of UPmentors
Type of Interview: Online Interview via Skype
Date: May 6, 2012
Duration: 30 minutes

Part 1

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question/ Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tell me about your educational background.</td>
</tr>
<tr>
<td></td>
<td>I graduated from Brandon University, Canada... a long time ago (1985)</td>
</tr>
<tr>
<td>2</td>
<td>Tell me about your professional background.</td>
</tr>
<tr>
<td></td>
<td>I am a software developer, a disciplined agile coach, an author and the co-founder of UPmentors (Unified Process Mentors).</td>
</tr>
<tr>
<td>3</td>
<td>How many years’ experience do you have as a software developer?</td>
</tr>
<tr>
<td></td>
<td>I have been developing softwares since I graduated from college.</td>
</tr>
<tr>
<td>4</td>
<td>How large is your company? I mean how many employees work there?</td>
</tr>
<tr>
<td></td>
<td>Our company is made up of three partners; we each have associates that we sub-contract projects to. Actually my partners have a couple of full time employees but I personally don’t hire employees right now, I just sub-contract.</td>
</tr>
<tr>
<td>5</td>
<td>What is IBM developerworks?</td>
</tr>
<tr>
<td></td>
<td>The IBM developerworks is IBM’s technical site, just as SAP has a technical site as a resource for information, Microsoft or IBM has the same kind of thing. I have a blog on developerworks, I have a profile there but...</td>
</tr>
</tbody>
</table>
Part 2

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Questions/ Answers</th>
</tr>
</thead>
</table>
| 1               | What do you understand by the term Mass collaboration?  
*I think one of the benefits of wiki is ahh... if you open up to a lot of people you can obviously get a lot more work done quickly, especially based on volunteer ahh... work like Wikipedia is the obvious example right? i use wiki in a much smaller scale basically to run my themes... so for example in the old day, the traditional way of writing software it was in a very silo(ed) approach... developers will write their own documentations, the testers their own, the architects their own, but now a days with agile technique, we collect all the documentations together, we call it collective ownership. It allow us to minimize the bureaucracy around writing the documents for developing softwares.* |
| 2               | What do you understand as the Business Values of wikis?  
*Ahh... a couple of things, one is, it speeds up the project considerably, and it increases communication resulting in delivering software faster to customers, so that the increased speed, quality, translates into benefits to the business directly. Aside benefit is, one of the things that people don’t consider when they build the software solution is the total cost of ownership, that is, it’s not just to deliver the software, it is to support and maintain it afterwards. So wikis facilitate effective documentation, the result is, you gonna have a better product, more easily supportable product... that translates into business values as well.* |
| 3               | What are the challenges of using wikis for collaborations?  
*One of the challenges is that... they can be very unstructured and ahh fortunately most wikis have good... delivery, so you can find what you are looking for. But if you have everybody contributing to it, it can actually become a mess, if you don’t go in and tidy it from time to time. In software we call it refactoring (going back and cleaning our code), to make it easier to maintain in the future, you can use the same term for wikis.* |
| 4               | How do you mobilize or facilitate a project on wiki?  
*It’s actually quite simple, for example we use a tool set called Atlassian, they have a number of tools that help with software development, they have issue management with a very popular tool called Jira, they also have a wiki called Confluence, we use that in mobilizing using of the wikis, we just create a home page, people are free to add their own pages.* |
5. How do you control the activities/process?  
   Well actually, In spirit of Agile, we don’t try to dictate things as much as possible, the hierarchy of all the team members are on the same level. I am the team leader of my team, but I don’t call myself a project manager, my job is to facilitate and to make my team effective as possible, but I don’t tell them what to do. I tell them what is needed to be done and collectively, we figure out the best way to get it done. The same thing with wiki, I give everybody equal access, and everybody can contribute to it ahh... in the way they feel is the best.

The End  
Thank you for your time  
Alright, best of luck

Interview 2:  
Interviewer: Gideon Benjamin  
Interviewee: Ben Kus, Chief Architect of IBM Endpoint Management  
Type of Interview: Online Interview via Skype  
Date: May 10, 2012  
Duration: 25 minutes

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question/ Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre.</td>
<td>Warm-up section</td>
</tr>
<tr>
<td></td>
<td>My role is... im the chief architect of IBM Endpoint, my job is to make new products for enterprise customers (big companies) and I used to work at a small company that was acquired by the IBM... When we are building emerging software products, especially for large enterprises, there’s always a concern that, they could be complicated products. There could be different ways to deploy them, in different network settings, in different companies, there’s always a high rate of change in the products.</td>
</tr>
<tr>
<td>1.</td>
<td>Tell me about your educational background?</td>
</tr>
<tr>
<td></td>
<td>I got my Bachelors in Computer Science at the University of California Berkeley, in 2001</td>
</tr>
<tr>
<td>2.</td>
<td>Tell me about you professional background?</td>
</tr>
<tr>
<td></td>
<td>I got my Bachelors in Computer Science and then I started to work at a small company, a very small company in Silicon Valley California, There, I worked for BigFix for 11 years until it was acquired by IBM about 2years ago.</td>
</tr>
<tr>
<td>3.</td>
<td>How many years of experience do you have?</td>
</tr>
<tr>
<td></td>
<td>About 12 to 15 years</td>
</tr>
</tbody>
</table>
4. Can you please state your current employment and also your job responsibilities?

*Im employed by IBM, im the chief architect of the Endpoint Management Solution. My responsibilities are for a set of products around large companies; Endpoint Management is the name of our product and has about 20 sub products. My Job is to make sure that their architect is properly... that the customers like them, that we’re building the products in the right way, and making sure that we have the right quality and design*

5. How can you describe the term Mass collaboration?

*There is internal collaboration and there’s external data publishing. Internally, we use the wikis quite a bit to help communicate between different developers, between developers and the sales team, developers and the services team... basically everybody that wants to know details, the wikis are great places to share those because they are so easier to change and to update. And when you are developing products, especially complex products, you need to be able to constantly be documenting what you are working on and updating the documentation of the products that you’ve already sent out, because you learn new things as you go, and so you can have an official documentation team, but the wikis is also a great place to do that, it encourages people to keep things up to date because it’s so easier to change.*

6. What do you understand by social networking and how do you relate it to wiki?

*I think that they are mostly separate especially for the way we use them to build products. Internally, when we are using them to build products, it’s mostly private a lot of the stuff is not published. Now there is also the external wiki, which is, we use the same concept to share data with customers. The internal one has nothing to do with social collaboration, it’s not important, because it’s the company’s secrete. Now the external one, is not actually interesting for us because we do enterprise IT products and we are not consumer focused, social networking is pretty consumer focused, it may be interesting for other products, but not for us.*

7. What are the business values of using wikis?

*The business values of using wikis, i will answer internally and externally. Internally is that it increases the rates at which the developers and internal employees can share information, and because it is easy to share, it is easy to edit, by encouraging better communication, you are encouraging better quality, faster results. Externally, by having wikis available that we can update our documentation quickly, it saves a lot of time because if there is a complex product especially rapidly changing product, it is useful for the most knowledgeable people of the product, the developers or the experts of the product, to go in and quickly update and change that, and wiki is a pretty good format for that. The business value there is that you get better information to your customers without a lot of*
process or a lot of burden. It is more efficient internally it save money that way, and it is better for the customers, they are more likely to keep your product

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question/ Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>What are the challenges of using wikis for collaboration?</td>
</tr>
<tr>
<td></td>
<td><em>One of the strengths of wikis is that they are unstructured, that’s also a challenge, it means that people will often not structure their information very well, which makes it hard for other people to consume. And so you will either have to teach people how to do that or you’ll have to go back and clean up after them, that means that you’ll have to have a wiki editor. If your data is there, that’s good but if the data is not easy to understand or hard to find, then that’s a cost and a problem. Also challenge is that, people might put up data that is not appropriate or not relevant, you have to worry that people will put up secret data...</em></td>
</tr>
<tr>
<td>9.</td>
<td>So how do you control who does what on the wiki platform?</td>
</tr>
<tr>
<td></td>
<td><em>It typically require an audience, and you can’t segment control to say who can publish or edit, if you control it too much, then you lose the benefit of the crowdsourcing approach. And so most wikis that we use are pretty open, internally and externally because you want to encourage people to go in and modify and change things.</em></td>
</tr>
<tr>
<td>10.</td>
<td>The End of the Interview</td>
</tr>
</tbody>
</table>

Interview 3:
Interviewer: Gideon Benjamin, Zhou Chenfan
Interviewee: Martin Christensen, Wiki Master of PrintVis Wiki
Type of Interview: Online Interview via Skype
Date: May 11, 2012
Duration: 20 minutes

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question/ Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>What is your educational background?</td>
</tr>
<tr>
<td></td>
<td><em>I graduated from Aarhus University, Denmark</em></td>
</tr>
<tr>
<td>2.</td>
<td>How many years of experience do you have?</td>
</tr>
<tr>
<td></td>
<td><em>Well... I have been working with IT my whole life, professionally making money of it for 8 years</em></td>
</tr>
<tr>
<td>3.</td>
<td>Can you give us the background of PrintVis wiki?</td>
</tr>
<tr>
<td></td>
<td><em>What we do in our company is that, we make a huge IT systems for the printing business, so we want a place to put the documentation or files, so we figured that a wiki will be good for that... then we decided to use it for internal use, for example after every meeting, someone will put up what happened at the meeting, what was agreed... we have all kinds of</em></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Appendix</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>intranet stuff in there just for us.</em></td>
</tr>
<tr>
<td>4.</td>
<td>How large is the Network (how many users)?</td>
</tr>
<tr>
<td></td>
<td><em>Hold on, I can just look it up... I think we have a couple of hundreds, not much... we have about 600 users.</em></td>
</tr>
<tr>
<td>5.</td>
<td>What is your responsibility at the PrintVis wiki?</td>
</tr>
<tr>
<td></td>
<td><em>Right now im responsible for it, at the beginning I was pretty much supervised by my boss in every move, but right now they let go of the responsibilities and if anything goes wrong, then it’s my fault I suppose</em></td>
</tr>
<tr>
<td>6.</td>
<td>How do you mobilize a project on the wiki?</td>
</tr>
<tr>
<td></td>
<td><em>Well I wouldn’t say that im a project manager in that sense... I pretty much maintain the wiki, that’s my project, I don’t start independent projects... we have our intranet site, that’s where all communications in the company goes out... but ahh... new projects aren’t started on a daily basis. That’s kind of hard for me to answer.</em></td>
</tr>
<tr>
<td>7.</td>
<td>What are the benefits of using wikis for your company?</td>
</tr>
<tr>
<td></td>
<td><em>I think everyone has access to all pages and can edit all information, so that’s pretty good for us, we collaborate on all the documentation, so we can all corporate and quality check... so everyone in the company is pretty much involved in making the documentation, rather that it goes through one guy who maintains a word document or something like that...</em></td>
</tr>
<tr>
<td>8.</td>
<td>What are the challenges of collaborating using wikis?</td>
</tr>
<tr>
<td></td>
<td><em>Well, the wikis system works pretty good for us, we can see the history and who’s created what, and the recent changes and such... but the biggest challenge for us is to actually get people to use it as much as possible... you know like Wikipedia it must have as much as 50,000 visits per day, but how many of those people actually edit the pages or contribute to the content, so that’s our challenge.</em></td>
</tr>
<tr>
<td>9.</td>
<td>So how do you motivate people to contribute?</td>
</tr>
<tr>
<td></td>
<td><em>Make it easier for people to contribute; you can create a form or something instead of the normal edit page, that makes it easier for some people.</em></td>
</tr>
<tr>
<td>10.</td>
<td>What are the business values that your company obtains from the wiki system?</td>
</tr>
<tr>
<td></td>
<td><em>Well, the idea was, as we also have a lot of partners that sell our products, the idea was that they could also contribute to this documentation or point out when something wasn’t right... I guess the best value is better documentation.</em></td>
</tr>
<tr>
<td></td>
<td></td>
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</tbody>
</table>
| 11. | Is there any value relating to reducing cost or improving efficiency?  
*I think we are more efficient at writing with this, because as I said, it doesn’t have to go through one person... everyone can just go in, type some stuff... we’re definitely more efficient. That’s the main value probably.* |
| 12. | Do you control who edits what in the wiki platform?  
*Yes definitely, we have like 3 levels of permissions, we have the basic users, and then our partners, they are allowed to upload files and stuff... and then the employees in my company we can off course do whatever we want in there, but actually we have some stuff that our competitors aren’t supposed to find out about us... so the external users don’t have access too much.* |
| The End | Thank you very much for your time, |
9.3 Appendix 3: Questionnaire Sample

Questionnaire of (company name)’s wiki platform

This questionnaire aims to explore the effect of wiki platform to employees in company. The result of this questionnaire will be used directly or indirectly in the master thesis report as empirical data. Thank you for your participation.

Part 1: General questions about (wiki platform) of (company)

*In this section, select one option from each question

1. How often do you visit the (wiki platform)?
   ○ Rarely  ○ Once a week  ○ Several times a week  ○ Daily

2. How many hours do you spend on the (wiki platform) weekly?
   ○ Less than 1 hour  ○ 1 to 5 hrs  ○ 6 to 10 hrs  ○ Above 10 hrs

*Select all options applicable to you in this section

3. What do you do on the (wiki platform) mostly? (You can select more than one options)
   □ Collaboration  □ Project management  □ Community  □ Information sharing

4. What do you think the biggest function of (wiki platform) in company so far?
   □ Collaboration  □ Project management  □ Community  □ Information sharing

Part 2: Questions for each feature of (wiki platform)

*In this section, select one option from each question

Collaboration:

5. Do you take part in collaboration on (wiki platform) to do task?
   ○ Yes  ○ No

6. Which roles do you play usually on the (wiki platform) collaboration:
   ○ I am just a spectator and see others’ collaboration tasks.
   ○ I am a collaboration participant who usually provides knowledge or experience on (wiki platform).
   ○ I am collaboration participant who usually collaborate with other workers to do task on (wiki platform)
Appendix

* Select all options applicable to you in this section

7. Which positive impact do you think the (wiki platform) helps collaboration? (You can select more than one options)
   - Reduce process time
   - Save extra financial cost
   - Stronger community between collaborators
   - Provide a platform between employees and customers
   - Others

8. What do you think are the benefits of using (wiki platform) project management? (You can select more than one options)
   - Encourage everyone to take part in the project process in the company
   - Let employees see the project progress
   - Different departments can make modifications depending on the project progress to fit the project
   - Everyone can see the project and give suggestions to project teams during project implementation.

Community:

9. Do you use (wiki platform) to communicate with other colleagues?
   - Yes
   - No

   * Select all options applicable to you in this section

10. What means of communication do you mostly utilize before having (wiki platform)? (You can select more than one options)
    - MSN
    - Skype
    - Yahoo massager
    - Email
    - Telephone
    - Direct meeting
    - Others

11. With whom do you mostly communicate? (You can select more than one options)
    - Colleagues in same department
    - Colleagues in the whole company
    - Customers of the company
    - Company’s managers

Information sharing:

*In this section, select one option from each question

12. Which group do you think is the most provider of information on (wiki platform)?
    - Common employees
    - Customers
    - Managers
    - Others

13. What do you think about the information sharing function on (wiki platform)?
    - I can get much useful information from the wiki platform and most of them help me to do tasks
    - I can get much information from the wiki platform but most of them are not useful enough
    - I do not search for information on the (wiki platform)

14. Which roles do you play on information sharing?
    - Reader and contributor
    - Reader only
    - Contributor only
    - None
Part 3 Business values created by (wiki platform) to (company)

* Please select from the scale of 0 to 10 the business values obtained from (wiki platform) (0: strongly disagree, 10: strongly agree)

<table>
<thead>
<tr>
<th>Business Value Questions</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>The wiki platform improve tasks’ efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The wiki platform strengthen community between colleagues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The wiki platform save extra financial cost in doing tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The wiki platform makes management easier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The wiki platform provides a number of information and resource to users</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The wiki platform closes the customers and company workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part 4: Answer question of (wiki platform)

What do you consider as the benefit of using the (wiki platform) and why?

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Thank you again for your participation in this questionnaire

Gideon and Zhou
Jonkoping University
9.4 Appendix 4: Questionnaire Result

Questionnaire Result

This is the results of the data we collected from the 16 respondents. We prepared our questionnaire in the best way that will be able to capture quality empirical data for our research. The questionnaire contains a total of 16 questions which were launched online via a Chinese free website Wenjuanxing (http://www.sojump.com). We targeted some potential respondents who are enterprise wiki users and have experiences using wiki platforms for various purposes, then we send the online questionnaire links to them.

Results of selection questions:

Question 1: How often do you visit the (wiki platform)?

Result Table:

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rarely</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>Once_a_week</td>
<td>3</td>
<td>18.75%</td>
</tr>
<tr>
<td>Couple_of_times_a_week</td>
<td>6</td>
<td>37.5%</td>
</tr>
<tr>
<td>Daily</td>
<td>3</td>
<td>18.75%</td>
</tr>
</tbody>
</table>

Effectual answers 16

Question 2: How many hours do you spend on the (wiki platform) weekly?

Result Table:

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>· Less_than_1_hour</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>· 1_to_5_hrs</td>
<td>8</td>
<td>50%</td>
</tr>
</tbody>
</table>
Question 3: What is/are your main purpose for using wikis (You can select more than one option)?

Result Table:

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration</td>
<td>6</td>
<td>37.5%</td>
</tr>
<tr>
<td>Project_management</td>
<td>5</td>
<td>31.25%</td>
</tr>
<tr>
<td>Community</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>Information_sharing</td>
<td>14</td>
<td>87.5%</td>
</tr>
<tr>
<td><strong>Effectual Answers</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

Question 4: What are the common functions of wiki at your company (You can select more than one option)?

Result Table:

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>Project_management</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>Community</td>
<td>2</td>
<td>12.5%</td>
</tr>
<tr>
<td>Information_sharing</td>
<td>14</td>
<td>87.5%</td>
</tr>
<tr>
<td><strong>Effectual Answers</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

Question 5: Do you take part in collaboration on wiki?
Appendix

**Result Table:**

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>56.25%</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>43.75%</td>
</tr>
<tr>
<td><strong>Effectual Answers</strong></td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

**Question 6:** What roles do you play usually on the wiki platform collaboration?

**Result Table:**

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am just a spectator and only view others’ collaboration tasks.</td>
<td>9</td>
<td>56.25%</td>
</tr>
<tr>
<td>I participate in collaboration with other users and provide knowledge or experience on the wiki platform.</td>
<td>7</td>
<td>43.75%</td>
</tr>
<tr>
<td><strong>Effectual Answers</strong></td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

**Question 7:** What impact do you think that wiki has on collaboration (You can select more than one option)?

**Result Table:**

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helps complete task in shorter time</td>
<td>13</td>
<td>81.25%</td>
</tr>
<tr>
<td>Save extra financial cost</td>
<td>10</td>
<td>62.5%</td>
</tr>
<tr>
<td>Stronger community between collaborators</td>
<td>10</td>
<td>62.5%</td>
</tr>
<tr>
<td>Better outcome of projects</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>18.75%</td>
</tr>
<tr>
<td><strong>Effectual Answers</strong></td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>
Question 8: What do you think are the benefits of using wiki project management? (You can select more than one option)

Result Table:

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encourage everyone to take part in the project process in the company</td>
<td>13</td>
<td>81.25%</td>
</tr>
<tr>
<td>Allow employees see the project progress</td>
<td>9</td>
<td>56.25%</td>
</tr>
<tr>
<td>Different departments can make modifications depending on the project progress to fit the project</td>
<td>9</td>
<td>56.25%</td>
</tr>
<tr>
<td>Everyone can see the project and give suggestions to project teams during project implementation.</td>
<td>7</td>
<td>43.75%</td>
</tr>
<tr>
<td>Effectual Answers</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Question 9: Do you use (wiki platform) to communicate with other colleagues?

Result Table:

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>10</td>
<td>62.5%</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>37.5%</td>
</tr>
<tr>
<td>Effectual Answers</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Question 10: What other means of communication do you mostly utilize besides Wikis? (You can select more than one option)

Result Table:
## Appendix

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skype</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>Instant_messaging</td>
<td>8</td>
<td>50%</td>
</tr>
<tr>
<td>Email</td>
<td>16</td>
<td>100%</td>
</tr>
<tr>
<td>Telephone</td>
<td>15</td>
<td>93.75%</td>
</tr>
<tr>
<td>Direct_meeting</td>
<td>9</td>
<td>56.25%</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>6.25%</td>
</tr>
<tr>
<td><strong>Effectual Answers</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

Question 11: With whom do you mostly communicate? (You can select more than one option)

### Result Table:

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colleagues_in_same_department</td>
<td>10</td>
<td>62.5%</td>
</tr>
<tr>
<td>Colleagues_in_the_whole_company</td>
<td>7</td>
<td>43.75%</td>
</tr>
<tr>
<td>Customers/Partners</td>
<td>7</td>
<td>43.75%</td>
</tr>
<tr>
<td>Company’s managers</td>
<td>7</td>
<td>43.75%</td>
</tr>
<tr>
<td><strong>Effectual answers</strong></td>
<td><strong>16</strong></td>
<td></td>
</tr>
</tbody>
</table>

Question 12: Which group do you think is the most provider of information on wiki platform?

### Result Table:

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Common_employees</td>
<td>7</td>
<td>43.75%</td>
</tr>
<tr>
<td>* Customers</td>
<td>3</td>
<td>18.75%</td>
</tr>
</tbody>
</table>
Question 13: What do you think about the information sharing function on wiki platform?

**Result Table:**

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do not search for information on the wiki platform</td>
<td>1</td>
<td>6.25%</td>
</tr>
<tr>
<td>I search for information from the wiki platform but most of them are not useful enough</td>
<td>4</td>
<td>25%</td>
</tr>
<tr>
<td>I get much useful information from the wiki platform and most of them help me to do tasks</td>
<td>11</td>
<td>68.75%</td>
</tr>
<tr>
<td>Effectual Answers</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Question 14: Which roles do you play on information sharing?

**Result Table:**

<table>
<thead>
<tr>
<th>Options</th>
<th>Subtotal</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reader_and_contributor</td>
<td>6</td>
<td>37.5%</td>
</tr>
<tr>
<td>Reader_only</td>
<td>9</td>
<td>56.25%</td>
</tr>
<tr>
<td>Contributor_only</td>
<td>1</td>
<td>6.25%</td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Effectual Answers</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>
Appendix

Question 15.

Scaled Question: Business values from wiki platform:

<table>
<thead>
<tr>
<th>Option</th>
<th>0(0%)</th>
<th>1(6.25%)</th>
<th>2(12.5%)</th>
<th>3(18.75%)</th>
<th>4(25%)</th>
<th>5(31.25%)</th>
<th>6(37.5%)</th>
<th>7(43.75%)</th>
<th>8(50%)</th>
<th>9(56.25%)</th>
<th>10(62.5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The wiki platform improves tasks' efficiency</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>1(6.25%)</td>
<td>1(6.25%)</td>
<td>1(6.25%)</td>
<td>1(6.25%)</td>
<td>2(12.5%)</td>
<td>3(18.75%)</td>
<td>3(18.75%)</td>
</tr>
<tr>
<td>The wiki platform strengthens social community between colleagues</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>1(6.25%)</td>
<td>0(0%)</td>
<td>2(12.5%)</td>
<td>3(18.75%)</td>
<td>2(12.5%)</td>
<td>5(31.25%)</td>
<td>2(12.5%)</td>
</tr>
<tr>
<td>The wiki platform saves extra financial cost in doing tasks</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>2(12.5%)</td>
<td>1(6.25%)</td>
<td>0(0%)</td>
<td>3(18.75%)</td>
<td>4(25%)</td>
<td>5(31.25%)</td>
<td>2(12.5%)</td>
</tr>
<tr>
<td>The wiki platform makes project management easier</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>1(6.25%)</td>
<td>0(0%)</td>
<td>1(6.25%)</td>
<td>0(0%)</td>
<td>3(18.75%)</td>
<td>3(18.75%)</td>
<td>2(12.5%)</td>
<td>2(12.5%)</td>
<td>2(12.5%)</td>
</tr>
<tr>
<td>The wiki platform provides a number of information and resource to users</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>1(6.25%)</td>
<td>1(6.25%)</td>
<td>2(12.5%)</td>
<td>3(18.75%)</td>
<td>2(12.5%)</td>
<td>7(43.75%)</td>
</tr>
<tr>
<td>The wiki platform improves customers and employees relationships</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>0(0%)</td>
<td>2(12.5%)</td>
<td>4(25%)</td>
<td>0(0%)</td>
<td>4(25%)</td>
<td>5(31.25%)</td>
<td>1(6.25%)</td>
<td>0(0%)</td>
</tr>
</tbody>
</table>

Summary of Rating Question:

Question 16: What do you consider as the benefit of using the (wiki platform) and why?

Answers:

1. Wiki platform makes communication between colleagues much easier.
2. It is a place to hold information; it is a place to share information; it is a place to keep information up to date and it is a place to search needed information.
3. There are many resources and information to share to whole company employees.
Appendix

4. I think the biggest benefit of wiki platform is that everyone can see the tasks processes and give their own comments or suggestions for workers. Workers can get information in time so that make modifications to fit changes.

5. I think the benefit of the wiki platform is providing a place to search information and resources on it. It saves our working time and strengthen the work efficiency.

6. Wiki platform provides a place to collaborate with other workers in different departments. This is the most important benefit I think for wiki platform!

7. Easy to access, provide almost all kinds of information that I need, support for different kinds of languages.

8. It boosts enterprises' efficiency while saving a lot time and costs.

9. The wiki platform provides us a place to collaborate. We can see the change all the time so that avoiding duplicate working. It improves working efficiency more and I like this working way.

10. For me I think the benefit is that I can see feedback from my colleagues in time and make associate modifications. It gives us development in a dynamic way.

11. I can get enough useful information in the wiki platform instead of searching on the Internet. It saves more working times for me.

12. The wiki platform is a new way for us to communicate with our colleagues and we don’t need to install extra chatting software on our computers.

13. Information Sharing is the function I use mostly.

14. This is a new one of wiki platform in China and we are testing this. But the positive reflection has been gotten for us. Workers can work together without meeting directly; managers can manage tasks and get dynamic feedbacks and the experience from colleagues can give examples for others as references. I believe this will be a trend in China.
Appendix 5: Data Coding Example in Descriptive Statistics

Data coding example in descriptive statistic:

This appendix aims to give a detailed explanation of data coding in descriptive statistics. Here we give 6 simple questions and do data coding for these questions. The example comes from Data analysis from questionnaire (Teknomo, 2007):

We have the following data from Parks visitors (extracted from several Parks study, the actual data may include hundreds of families and hundreds of variables to more than 10 parks in the city). Here is the meaning of each variable:

Family is the observation number of the questionnaire. One questionnaire was filled by for one family, not for individual.

Time is a quantitative data type, measured in minutes. It is the activity time of the family in the park.

Mode is a nominal data type consisting of four choices of mode to go to park:
1. walk,
2. car,
3. cycling,
4. bus.

The choice is mutually exclusive, that is only one mode for one family.

Activity is a nominal data type consisting of 6 choices of activity in the park:
1. sport,
2. picnic,
3. reading,
4. walk (including with the dog),
5. meditation,
6. jog.

The choices are multiple choices, that one family may have several activities in the park.

Satisfaction is an ordinal scale with 5 values:
- 2 = Very dissatisfied,
- 1 = dissatisfied,
0 = indifference,
1 = satisfied,
2 = Very satisfied.
Appendix

It measures family satisfaction toward the park's services.

Playground is a nominal scale (Yes or No) about the existence of children playground

The data is show in this table:

<table>
<thead>
<tr>
<th>Family</th>
<th>Time</th>
<th>Mode</th>
<th>Activity</th>
<th>Satisfaction</th>
<th>Playground</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>1</td>
<td>1, 2, 3</td>
<td>0</td>
<td>N</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>3</td>
<td>4, 6</td>
<td>1</td>
<td>Y</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>2</td>
<td>1, 2</td>
<td>2</td>
<td>Y</td>
</tr>
<tr>
<td>4</td>
<td>45</td>
<td>1</td>
<td>5</td>
<td>-1</td>
<td>N</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>N</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>Y</td>
</tr>
<tr>
<td>7</td>
<td>30</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>N</td>
</tr>
<tr>
<td>8</td>
<td>45</td>
<td>2</td>
<td>3, 4</td>
<td>-1</td>
<td>N</td>
</tr>
<tr>
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<td>15</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>Y</td>
</tr>
<tr>
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<td>60</td>
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<td>2</td>
<td>2</td>
<td>Y</td>
</tr>
<tr>
<td>11</td>
<td>180</td>
<td>4</td>
<td>1, 2, 3, 4</td>
<td>2</td>
<td>Y</td>
</tr>
<tr>
<td>12</td>
<td>120</td>
<td>2</td>
<td>1, 2, 4</td>
<td>2</td>
<td>Y</td>
</tr>
</tbody>
</table>

Out of six variables in the questionnaire, only variable Activity and Playground need modifications while the others are already in the correct format (i.e. one number for each value). Variable Activities need to be converted to binary format (1 and 0, 1 = chose that activity, 0 = did not do that activity) for each value. Thus, we will convert it into 6 columns according to the number of values in the variable Activity. Variable Playground need to be converted to binary (1 = yes, and 0 = no) so that we can use Data Analysis tool in MS excel that can only accept numerical data. The results is shown in the table below.

<table>
<thead>
<tr>
<th>Family</th>
<th>Time</th>
<th>Mode</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Satisfaction</th>
<th>Playground</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>2</td>
<td>30</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
After data coding, all data has been transferred in numerical data. And we can use this in next descriptive statistics.