THE PATH TO BENEFITS: INVESTIGATING THE ROLE OF ORGANIZATIONAL CULTURE TOWARD INFORMATION SYSTEM BENEFITS

by

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ABSTRACT

This dissertation investigates how benefits derive from information systems (IS). Using theory and research from multiple disciplines, including psychology, strategy, and IS, I investigated the roles of system use, perceived information quality and the context of organizational culture in the realization of IS benefits.

The productivity paradox (Brynjolfsson, 1993) suggests a consistent positive relationship between IS use and IS benefits has not been established or explained. Understanding, and resolving, the productivity paradox is paramount to the future of IS. A common explanation for this paradox is the mismanagement of IS resources. This means contextual factors within the organization affect the benefits derived from the IS.

Specific guidelines have been recommended to integrate context specific theorizing in IS research (Hong, Chan, Thong, Chasalow, & Dhillon, 2014). Following these guidelines, I investigate the role of organizational culture in the Information Systems Success Model (ISSM; DeLone & McLean, 1992; 2003); a model that predicts a significant relationship between
perceived information quality and net benefits, through the mediator of system use. I have identified two specific facets of organizational culture as meaningful factors influencing the benefits derived from IS, information sharing attitudes and perceptions of IS strategy. I considered not only direct effects of these factors, but also interplay between factors and alternative models through systematic model trimming. I used a survey to measure model variables, along with secondary data collection in the form of system use logs and individual performance scores.

I found the system use variable to be sensitive to measurement. This sensitivity resulted in two separate and meaningful variables: computer-recorded objective system use and self-reported system use. My results indicated the benefits of IS are related directly to objective system use, but objective system use is not related to any other variables in the model. Interestingly, self-reported system use is related significantly to organizational culture and perceptions of information quality but cannot be linked to objective system use or benefits.
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CHAPTER 1

INTRODUCTION AND MOTIVATIONS

In terms of research fields, Information Systems (IS) is a maturing but still relatively new field of study and, as such, is partially focused on resolving early invalid assumptions and misconceptions (Melville, Kraemer, & Gurbaxani, 2004; Kohli & Grover, 2008; Hong, Chan, Thong, Chasalow, & Dhillon, 2014). This applies to definitions of constructs as well as understanding of relationships between and among constructs. Turning first to construct definition, understanding IS use is critical to the field, and some seminal IS literature has assumed self-reported use is a reasonably robust measurement of use (Davis, 1989). More recent literature has indicated this assumption may be inappropriate (Straub, Limayem, & Karahanna-Evaristo, 1995; Devaraj & Kohli, 2003; Petter, DeLone, & McLean, 2013; Johnson, Zheng, & Padman, 2014). Additionally, the knowledge management (KM) research stream has relied on the assumption that information sharing is beneficial (Kogut & Zander, 1992; Grant, 1996; DeLong & Fahey, 2000; Ruppel & Harrington, 2001), and not until recently, has the impact of knowledge sharing been investigated (Lin, 2007).

Finally, another key construct in IS literature in need of further conceptualization is IS strategy, which has several definitions, including the use of the system to support business strategy, the master plan of the IS function, and the shared view of the IS role within the organization (Chen, Mocker, Preston, & Teubner, 2010). Each of these definitions exists at a differing level of development and support. IS strategy as the shared view of the IS role within the organization has been on the periphery of prominent researchers’ agendas (Ward, 1987;
Kaarst-Brown & Robey, 1999; Kanungo, Sadavarti, & Srinivas, 2001; Ragu-Nathan, Ragu-Nathan, Tu, & Shi, 2001). However, the lack of empirical or consistent support in the IS research community around this construct leaves the conception of IS strategy at a less mature level of development than other IS constructs.

Turning next to relationships between and among constructs, one example of a relationship that has received significant attention but is still in need of full resolution, considers the relationship between IS use and benefits for the organization or user. Prominent IS researchers have left unsubstantiated the assumption that improved productivity, a desired benefit of IS, relates to IS use (Bailey & Pearson, 1983; Davis, 1989; Wixom & Watson, 2001; Venkatesh, Morris, & Davis, 2003). When the connection between use and productivity has been investigated, researchers have found a direct relationship cannot be established (Brynjolfsson & Hitt, 1996; Carr, 2003). This is termed the “productivity paradox”, and remains a focus of IS research (Bharadwaj, 2000; Chan, 2000; Devaraj & Kohli, 2003; Fichman, 2004; Setia & Patel, 2013).

Productivity is measured as the ratio of output (what is produced) to input (what is required to produce it). IS investments often are made by organizations to decrease labor effort, therefore reducing input, while still maintaining or increasing output levels. However, the connection between IS investments and measured productivity is not consistently positive. For example, the study that inspired the productivity paradox (Roach, 1987) observed that measured productivity remained unchanged over the 1970s and 1980s, even as the amount of computing power per worker grew dramatically. Similarly, recent research has found the most productive companies spend considerably less on IT than the average company. Carr (2003)
describes that when the IT expenditures and the financial results of large U.S. companies were compared in 2002, the top 25 performers spent on average 0.8% of their revenues on IT, while the typical company spent 3.7%.

Understanding, and resolving, the productivity paradox is paramount to the future of IS. IS investments are costly and risky. Individual organizations spend approximately 2.5% of total revenue annually on all IT spending (Computer Economics, 2015). This figure does not include the disruption of operations the organization may face. A recent study reported that most organizations experienced an operational disruption, such as failure to ship product or close the books, lasting beyond one month while an IS was implemented or updated (Panorama Consulting Solutions, Business Process Management Report, 2014). These massive investments are so substantial for organizations that McKinsey-Oxford has reported 17% of IS project failures threaten the company’s existence (Bloch, Blumberg, & Laartz, 2012). These high costs and considerable risks necessitate that compensating benefits will be derived from the system for the organization. Otherwise, the risk is needless, and the costs are unjustified. The productivity paradox illustrates a disconnect between the IS investments and benefits. Therefore, understanding what enables projected system benefits to be realized is vital for organizational decision makers.

Furthermore, the productivity paradox is particularly a concern for industries embarking on a digital revolution. For example, the healthcare industry is undergoing a regulated digital migration in the U.S. in response to the Electronic Health Records mandate, requiring meaningful use of certified technology by 2016 (HealthIT.gov, 2014). Researchers and practitioners have cited the productivity paradox as a concern as they invest in huge IS projects
for compliance with these regulations (Rivard, Lapointe, & Kappos, 2011; Jones, Heaton, Rudin, & Schneider, 2012; Bilbao-Osorio, Dutta, & Lanvin, 2013; Deidda, Lupianez-Villanueva, Codagnone, & Maghiros, 2014). Because of the fore mentioned costs and risks, as well as external pressures (e.g. regulatory, competitive, economic), understanding the productivity paradox is essential to mitigating losses by realizing benefits from the system that justify the expenditure. For these reasons, IS researchers continue to work diligently to understand and explain the productivity paradox.

Erik Brynjolfsson (1993), a seminal researcher of the productivity paradox, identified four specific reasons for the observation of the productivity paradox:

- **Mismeasurement** – the inputs of a system may be measured incorrectly in academic research. This is supported by more recent literature when measuring system use. Researchers have found measuring system use through actual use logs and self-reported data are not correlated significantly with each other (Venkatesh & Morris, 2000; Devaraj & Kohli, 2003; Johnson et al., 2014). Similarly, the outputs may also be inaccurate or impossible to measure. This issue is compounded by the fact that many of the benefits assumed to be connected to information system use are intangible. For example, the advent of the ATM saved the average banking customer significant waiting times and increased customer satisfaction; however, meaningfully quantifying this benefit is extremely difficult.

- **Lags** – the benefits of IS take significant time to develop and short-term studies will not observe these effects. Bierly, Kessler, and Christensen (2000) suggest IS investment also requires application of wisdom and reconceiving business processes. These activities
require a base of knowledge that must be amassed before benefits may be realized. Therefore, a significant time delay is observed between IS investment and realization of benefits. In a controlled experiment, Desmarais, Leclair, Fiset, and Talbi (1997) found the breakeven-point between system investment and realized benefits ranges between 1 and 18 years, and is most likely to occur after about 4 years. This indicates a serious time delay between investment and positive return on investment. Similar findings are supported by other IS researchers (e.g., Andreu & Ciborra, 1996; Tippins & Sohi, 2003; Devaraj & Kohli, 2003; Gregor, Martin, Fernandez, Stern, & Vitale, 2006).

- Redistribution – profits from IS are earned at the firm level. While market share per firm may shift, the market as a whole remains the same size (Rai, Patnayakuni, & Patnayakuni, 1997; Hebert, 1998). The research study conducted by Roach (1987), that identified the productivity paradox, considered the industry as a whole instead of firm level measures. Stratopoulos and Dehning (2000) posit this is not appropriate, as some firms will implement IS more successfully than other firms, thereby growing their profits at the expense of their competitors resulting in no or little growth at the industry level.

- Mismanagement – contextual factors within the organization, such as response to external pressures, current process or routines, or characteristics of the users affect the extent to which the IS may be used (Damanpour, 1992; Guimaras & Igbaria, 1997; Li & Ye, 1999; Fichman, 2004; Petter et al., 2013).

The first of these explanations all relate to the measurement and observation of inputs and outputs, whereas the final explanation refers to the context and specifics of IS in practice. Previous research has demonstrated significant opportunities in advancing theoretical
understanding by considering context-specific factors (Straub et al., 1995; Straub, Loch, Evaristo, Karahanna, & Strite, 2002; Leidner & Kayworth, 2006; Hong et al., 2014). With this in mind, I select the last explanation, mismanagement issues in IS, specifically contextual factors associated with the management of IS, as the focus of my investigation.

**SOURCES OF MISMANAGEMENT ISSUES**

Mismanagement issues lead to variation between firms in terms of the benefits derived from IS investment. There are three factors cited by researchers regarding mismanagement issues and their effect on the productivity paradox. First, managers may be responding to external pressures when investing in IS (hereafter referred to as the ‘external pressures’ explanation). For example, they may choose a risky and costly IS to stay current with competitors and not because it is necessary or in the organization’s best interest. This is similar to the concept of management fashion. Management fashion means that as other organizations begin investing in a specific type of IS, a trend is started, and other managers follow suit without fully vetting the investments (Abrahamson, 1996; Carson, Lanier, Carson, & Guidry, 2000; Fichman, 2004; Duchin & Schmidt, 2013).

Second, managers may not be using the IS efficiently within the current processes (hereafter referred to as the ‘process alignment’ explanation). Dos Santos and Sussman (2000) explain the users of the system must consider the strategic ramifications and effects for the organization. In mismanaged organizations, the system is introduced and used for the current processes, instead of first looking at how the process could be reengineered for optimal efficiency. Holahan, Aronson, Jurkat, and Schoorman (2004) used Klein and Sorra’s (1996)
model of implementation effectiveness when investigating a computerized inventory system in a manufacturing setting. The manufacturing plant employed unstructured and fluid inventory procedures that allowed employees to elevate certain customer requests above others. This meant the employee was required to pause working on the current order and switch to the elevated order. When a computerized inventory system was implemented, switching from order to order proved cumbersome and time consuming, and in some cases not possible. Therefore, the system did not improve efficiency. In order to reap the benefits of the system, the inventory processes and procedures themselves needed to be re-evaluated and streamlined (Klein & Sorra, 1996; Holahan et al., 2004).

Third, characteristics unique to the organization affect the investment, management, deployment and use of the IS, leading one organization to reap benefits from an IS when another does not (referred to as the ‘organizational characteristics’ explanation). For example, user attitudes have been shown to affect how users will use and benefit from certain IS (Karahanna, Straub, & Chervany, 1999; Agarwal & Karahanna, 2000; Polites & Karahanna, 2012). Delong and Fahey (2000) consider organizational factors that impede or promote intranet use and benefits. They propose favorable shared attitudes toward information sharing within the organization impact the benefits derived from the IS.

The processes alignment and organizational characteristics explanations (discussed above) may be examined further as they relate to a specific contextual organizational characteristic, the organizational culture. Organizational culture is a collection of dominant values that guide behavior in an organization (Leidner & Kayworth, 2006). These dominant values will determine how the organization values the strategic opportunity of the IS, and
whether system processes must be reevaluated to add strategic value. This is consistent with the processes alignment explanation; the culture of the organization contributes to shaping how the information system is considered strategically within the firm. The culture also influences the dominant attitudes in an organization. A culture that values information sharing and collaboration logically will include members who have favorable attitudes toward information sharing. This is consistent with the organizational characteristics explanation; the unique values of an organization are characteristics that may influence the management of the IS. Further investigation is needed to understand the role of organizational culture as an important factor in explaining the productivity paradox through mismanagement.

**PROBLEM STATEMENT**

A primary motivation of this research is to investigate the productivity paradox. Previous research has indicated mismanagement may be an explanation for the productivity paradox (Damanpour, 1992; Guimaras & Igbaria, 1997; Li & Ye, 1999; Fichman, 2004; Petter et al., 2013), and I build upon this finding by specifying how mismanagement impacts the benefits derived from IS. I refer to these benefits as net benefits of the systems, and they are inclusive of specific facets of productivity, such as decreased decision-making time, accurate estimates of risk, and decreasing operating costs (Myers, Kappelman, & Prybutok, 1997; Seddon, Staples, Patnayakuni, & Bowtell, 1999; Petter & McLean, 2009; Petter & Fruhling, 2011). Some studies have postulated IS use influences net benefits (such as the Information Systems Success Model (ISSM; DeLone & McLean, 2003); however, as previously discussed, the link between use and net benefits is supported weakly (Brynjolfsson, 1993; Carr, 2003; Devaraj & Kohli, 2003; Wang & Lee, 2014). Consequently, the factors leading to net benefits, particularly those factors that
affect system use as well as factors that potentially affect the relationship from system use to net benefits, require further investigation. This leads me to the problem statement: Current IS research cannot fully explain the roles use plays toward providing benefits for an organization, as well as how different contexts may affect these roles.

In search of a more complete explanation of the relationship between use and net benefits, I turn to the concepts of organizational culture and perceived information quality. The motivation for choosing organizational culture stems from one of the key proposed explanations of the productivity paradox, mismanagement. As previously discussed, mismanagement issues include several contextual factors present in an organization, such as external pressures, process alignment, and organizational characteristics. The organizational culture is a key characteristic, and resource (Barney, 1991), of an organization that influences the investment, management, and use of IS (Chen et al., 2010). Perceived information quality is a key measure of overall system quality that is especially salient for this research. The two different facets of culture investigated as contexts in this research logically are related to perceived information quality (Molla & Licker, 2001; Wixom & Todd, 2005; Ke & Wei, 2008; Setia, Venkatesh, & Joglekar, 2013). This will be discussed thoroughly after the terms are defined and the contextualization process are introduced in the next section.

**CONTEXTUALIZATION AND DEFINITION OF TERMS**

I will begin by defining the constructs presented in the ISSM (Delone & McLean, 1992; 2003). The ISSM is a seminal theory in IS research and will serve as a backbone for the present research model. It is important to integrate context-specific factors, such as organizational
culture, through a disciplined process to develop rich theories with actionable advice (Weber, 2006). For this reason, I will use the contextualization guidelines presented by Hong and colleagues (2014). I will describe each of these guidelines and present the steps I will follow to apply the guidelines to the present research model. Also, in this section, I will define organizational culture and the specific facets of culture to be investigated. While a more comprehensive literature review and hypothesis development will take place in chapter 2, the research model of this dissertation will be illustrated in figure 1-6.

**ISSM (Information Systems Success Model)**

One of the first research questions IS researchers tackled was the answer to the question “What is the dependent variable” of IS? Should research focus on antecedents of use? User satisfaction? Benefits for the individual (DeLone & McLean, 1992)? The ISSM was introduced to provide a model of IS success measures, and an answer to this question. DeLone and McLean (1992) reviewed the literature available at the time and found the most widely used measures of system success. They then were able to organize these variables into six categories, forming the core constructs of the ISSM, and proposed interdependencies between the constructs.

The original model is depicted in Figure 1-1. The model was updated later to respond to further research findings (DeLone & McLean, 2003) and is shown in Figure 1-2. Additional updates to the model include Seddon’s (1997) extension of the model to include perceived usefulness and expectations as well as the amended model by Rai, Lang, and Welker (2002) to include ease of use and system dependence. The foci of the present research are on three core constructs of the ISSM, information quality, use, and net benefits. These constructs have been
validated in previous research and the relationships supported by empirical studies (Rai et al., 2002; Bhrati & Chaudhury, 2004; Burton-Jones & Straub, 2006; Wang, 2008; Petter & McLean, 2009; Gorla, Somers, & Wong, 2010) and provide a stable framework for investigating an outcome of IS beyond use.

**Figure 1-1. The ISSM (DeLone & McLean, 1992)**

![ISSM Diagram](image1)

**Figure 1-2. The Updated ISSM (DeLone & McLean, 2003)**

![Updated ISSM Diagram](image2)
Perceived Information Quality

The key antecedent in the current research is information quality. DeLone and McLean (1992) define this construct as the quality of the output of the IS. However, Seddon unpacks this construct as a key component of IS in the definition of information quality as the relevance, timeliness, and accuracy of information generated by the system (Seddon, 1997). This means that perceived information quality looks at how users perceive the system’s ability to provide information that is relevant to their needs, be available when they need it, and accurately reflect the real-world scenario. This is the basis of an IS itself, to provide quality information for an individual or organization.

The ISSM presents the relationship between perceived information quality and net benefits to be mediated fully by system use. DeLone and McLean contend the output of the system must be consumed before benefits may be realized. Therefore, use is necessary for the relationship to exist. Empirical research has found support for this mediated relationship. However, in many of the studies, the direct relationship between perceived information quality and net benefits is not reported (DeLone & McLean, 2003; Petter & McLean, 2009; Petter & Fruhling, 2011; Hassanzadeh, Kanaani, & Elahi, 2012).

Some researchers argue a direct effect from perceived information quality to net benefits. For example, Etezadi-Amoli and Farhoomand (1996) found a significant relationship between perceived information quality and net benefits. However, in this study it appears IS use is established, but not measured. Etezadi-Amoli and Farhoomand (1996) measure the user’s performance and perceived information quality formally and mention "Eighty percent of
respondents used their computer more than five times a week... About two-third indicated that they have been using their respective software for more than two years" (Etezadi-Amoli & Farhoomand, 1996, p. 67). In this respect, the relationship between perceived information quality and benefits is established when use is inferred. This appears to be the case with other studies supporting the relationship between perceived information quality and benefits, the use variable is either not measured, or it is assumed (e.g., Teo & Wong; 1998; Wixom & Watson, 2001; Bharati & Chaudhury, 2004; Gorla et al., 2010).

*System Use*

Use of an information system is defined as “a user’s employment of a system to perform a task” (Burton-Jones & Gallivan, 2007; p. 659). The use construct considers a user, the system, and the related task. Use has been measured in a variety of ways: as a function of one-time use or continued use, by one person or a group of people, or through self-reported items or observational data. Researchers typically consider use as a direct antecedent of net benefits in IS research, and/or as a mediator between information quality and net benefits (Straub et al., 1995; Rai et al., 2002; DeLone & McLean, 2003; Melville et al., 2004; Wang, Wang, & Shee, 2007; Kohli & Grover, 2008; Petter & Fruhling, 2011).

*Net Benefits*

Net benefits are the user defined and task specific benefits of the system at both the individual and organizational levels (DeLone & McLean, 2003). Net benefits are difficult to define, as they are user specific, and, therefore, depend on the user’s goals. For example, if an
enterprise resource planning (ERP) system is implemented to support the processing of customer orders, the net benefit of the system may be the reduction of order processing errors.

Prior research has argued that individual net benefits lead to organizational benefits (DeLone & McLean, 1992; Raghunathan & Madey, 1999; Molla & Licker, 2001; Petter & Fruhling, 2011). For example, if IS reduces search time for an employee providing customer service, the employee may be able to assist another customer sooner than he or she would have been without the IS. If the employee’s compensation is based on the number of customers he or she may assist, then the employee benefits from the system in terms of greater compensation. The organization also may benefit from this increase in compensation in terms of in job satisfaction. Additionally, the organization may benefit from the decreased search times in terms of improved customer satisfaction, meaning net benefits may include benefits for the individual and the organization.

Recalling the problem statement, I am investigating the role of use in realizing IS benefits and contextual factors that may affect this relationship. As mentioned earlier, the link between use and net benefits has been supported inconsistently, suggesting the relationship may vary between specific contexts (Brynjolfsson, 1993; Carr, 2003; Deveraj & Kohli, 2003; Wang & Lee, 2014). The ISSM provides a strong backbone for the investigation of the role of use. Through the proposed relationships of the focal constructs of perceived information quality, system use, and net benefits, I am able to consider the role of use as a direct effect of net benefits and a mediator between perceived information quality and net benefits. Also, I can consider the direct effect of perceived information quality on net benefits when still measuring use.
Therefore, the base model, in which I will later add the contextualization of the present research, is presented in figure 1-3.

**Figure 1-3. Extracted ISSM Constructs and Relationships**

![Diagram showing the relationship between Information Quality, Use, and Net Benefits]

**Context**

Previous research literature has looked at organizational contextual factors, such as firm size and nature of the business, when considering the benefits of a system (Fichman, 2004). Damanpour (1992) found the size of an organization significantly influenced a firm’s adopted innovation, which is intended to contribute to organizational performance. Other researchers have suggested the nature of the business has a direct effect on the use and net benefits of an IS. For example, Koch, Leidner, and Gonzalez (2013) considered a knowledge sharing information system used by a high security US government contractor. They found the nature of the business inhibited the sharing of key information throughout the firm and thus limited the benefits derived from the system.

More recently, top management support has been identified as an antecedent to use and realizing the benefits from this use. In a meta-analysis of the antecedents of the ISSM variables, Petter and colleagues (2013) found management support is “probably the most widely studied and best supported organizational characteristic that predicts IS success” (p. 27). Management
support includes the willingness to allocate time, resources, and encouragement for the use of IS in the organization. Guimaraes and Igbaria (1997) found management support to be an important factor in explaining use and the benefits for the individual from this use. As Guimaraes and Igbaria (1997) pointed out, “The willingness of managers to encourage the [IS] use, to have an interest in having employees satisfied with [IS] technology, and provide the necessary help and resources for effective [IS] use are important factors for a positive system impact on end-users’ jobs.” (p. 869).

Management support and processes shape and facilitate the culture of an organization (Heng, Trauth, & Fischer, 1999; livari & Huisman, 2007; Wu, 2008; Rivard et al., 2011; Smit & Dellemijn, 2011; Hu, Dinev, Hart, & Cooke, 2012). This line of reasoning posits human factors, such as willingness and interest, influence the outcome measures of IS, such as use and benefits. With this in mind, I seek to introduce the concept of organizational culture as context to understand how differences in this factor affect the relationships between the extracted ISSM focal factors.

Organizational culture is the context I will use to investigate the relationships between perceived information quality, system use and net benefits of the system. I will follow contextual theory development literature to integrate organizational culture in a way conducive to generalizability (Hong et al., 2014). Context is defined as “situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables” (Johns, 2006, p. 386). Weber (2003) argues richer theories, that provide actionable advice, originate from focusing on context in existing models.
Recent literature has proposed six guidelines for the integration of context-specific factors (Hong et al., 2014). Figure 1-4 presents the guidelines.

**Figure 1-4. Guidelines for Context Specific Theorizing in IS Research (Hong et al., 2014)**

1. **Grounded in general theory**
   - Build a general theory that is applicable to the research design of interest

2. **Contextualizing and refining a general theory**
   - Refine the model to include a minimal set of core concepts relevant to a particular context

3. **Thorough evaluation of the context to identify context-specific factors**
   - Context-specific factors should be identified and tied to core constructs identified in the refined general model

4. **Modeling context-specific factors**
   - Include the context-specific factors on the core constructs in the general model as direct effects on the outcome

5. **Examination of the interplay between the IT artifact and other factors**
   - Interactions among context-specific factors pertaining to the specific technology, user, and user context should be examined

6. **Examination of alternative context-specific models**
   - To examine the indirect influence of context-specific factors, alternative models should be formulated based on the general theory

In accordance with the first guideline, I will use the ISSM (DeLone & McLean, 1992; 2003) as the general theory forming the backbone of the research model. This theory is a seminal theory in the field of IS and specifically considers the benefits of a system and the antecedents of these benefits, including use (Petter & McLean, 2009). Therefore, the theory is established and supported by previous literature, and also is relevant to the current investigation. However, as supported by the second guideline, the core constructs for this
investigation are perceived information quality, use, and net benefits. Few empirical studies of the ISSM validate the model as a whole in a single study (Petter & McLean, 2009), and instead specific constructs and relationships are targeted for researchers to build upon (Jennex & Olfman, 1998; Molla & Licker, 2001; Gorla et al., 2010; Wang & Chiu, 2011; Hassanzadeh et al., 2012; Karahanna, Williams, & Polites, 2013; Setia et al., 2013; Venkatesh & Sykes, 2013).

Continuing to the third guideline, Hong and colleagues (2014) described “If a general model does not fully capture the characteristics of technology, user, and usage context, additional salient factors may be identified and incorporated into the model if they play a major role in characterizing the context.” (p. 119). Although previous research has supported a connection between use and net benefits (Petter & McLean, 2009), it is known from the productivity paradox this is not always the case on a generalized level (Brynjolfsson, 1993). One of the explanations for this variability is the variation in management of the IS, in other words, the situational opportunities or constraints, derived from different management policies.

Revisiting the definition of context (situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables), I find certain facets of organizational culture to be contextual factors. Specifically, two relevant facets of organizational culture, information sharing attitudes and perceptions of IS strategy, are meaningful contextual factors in this investigation. I will briefly define the key terms now, and they will be explained fully in chapter 2 along with the reasoning behind their inclusion in the general model.
Organizational Culture

Culture is defined as “the collective programming of the human mind that distinguishes the members of one human group from those of another. Culture, in this sense, is a system of collectively held values.” (Hofstede, 1980; p. 24). Organizational culture is the culture specific to an organization. It enables “the differentiation of organizations along the lines of dominant values guiding organizational behaviors” (Leidner & Kayworth, 2006; p. 360). This description suggests organizational culture is not only a set of values important to a group, but a combination of these values to distinguish one group from another.

As previously noted, guidelines for incorporating context-specific factors into IS research involve identifying key context-specific factors into general model (Hong et al., 2014). Consistent with this guideline, I have identified two specific facets of organizational culture to integrate in the ISSM, information sharing attitudes and perceptions of IS strategy (Constant, Kiesler, & Sproull, 1994; Kaarst-Brown & Robey, 1999; Ruppel & Harrington, 2001; Jarvenpaa & Staples, 2000; 2001; Gregory, Harris, Armenakis, & Shook, 2009; Chen et al., 2010; Koch et al., 2013). A full discussion of each of these facets, as well as their connection with organizational culture will follow.

Information Sharing Attitudes

I define Information sharing attitudes as an individual’s propensity to evaluate the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies and procedures with some degree of favorability or unfavorability. This definition is derived from the definition of information
sharing and attitude. The definition of information sharing is “the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures” (Wang & Noe, 2010; p. 117). The definition of an attitude is, “an individual’s propensity to evaluate a particular entity with some degree of favorability or unfavorability” (Eagly & Chaiken, 2007; p. 538).

Information sharing involves willingly sharing specific technical know-how, best practices regarding processes and routines, or even decisions and outcomes observed in the past. This means individuals are assumed to be “willing to forego their self-interest and contribute their individual knowledge to the common good” (Husted, Michailova, Minbaeva, & Pedersen, 2012; p. 754). An organization with a culture that values information sharing is one in which individuals freely and consciously distribute information without direct sanctions or policies, leading to positive information sharing attitudes (Constant et al., 1994; Sieloff, 1999; Jarvenpaa & Staples, 2001; van den Hooff & Huysman, 2009). Conversely, an organization with a culture that does not value information sharing is one in which individuals hoard information and do not share information freely, leading to negative information sharing attitudes (Alavi, Kayworth, & Leidner, 2006; King, 2007; Husted et al, 2012; Koch et al., 2013). Recall the definition of context includes situational opportunities and constraints that affect the occurrence and meaning of organizational behavior (Johns, 2006). A culture with positive information sharing attitudes is a situational opportunity where individuals evaluate the behavior of information sharing with some degree of favorability. The occurrence and meaning of system use and reaping net benefits is affected by the presence or absence of positive information sharing
attitudes. I will investigate the influence of information sharing attitudes on both the focal variables and the functional relationships in the ISSM.

*Perceptions of IS Strategy*

A perception of IS strategy is defined as how an individual perceives the organizational perspective on the investment in, deployment, use, and management of IS based on the organization’s culture and other values (Chen et al., 2010; Mintzberg, 1978). Previous literature has referred to IS strategy as being aggressive or conservative (Ragu-Nathan et al., 2008; Chen et al., 2010). If members of an organization perceive the IS strategy as aggressive (resources devoted toward encouraging the use and considering the strategic value of IS), then an organization’s culture may be such that the functions of the IS are valued as an asset aiding in management decision-making. Conversely, if the IS strategy of an organization is perceived as conservative (support resources are not readily available, and risk associated with the system are emphasized), then an organization’s culture may be such that the IS is not valued and is considered a “necessary evil” (Kanungo et al., 2001; Kaarst-Brown, 2008). In this case, the organization may invest in the system, but only out of necessity. The perceptions of IS strategy by organizational members is a situational opportunity or constraint in the organization. If IS is perceived to hold a strategic role in the organization, as opposed to being a necessary evil, then the occurrence and meaning of system use and net benefits of the system will be affected. I will explore the influence of perceptions of IS strategy on the focal variables and relationships of the ISSM.
Modeling Context-Specific Factors

Guideline four describes the process for integrating the context-specific factors into the model. In compliance with this guideline, I will consider the direct effects of information sharing attitudes and perceived IS strategy on the core constructs of perceived information quality, use, and net benefits. The revised ISSM includes three components of quality: information, system, and service quality. I include only the information quality component in this research due to the stronger conceptual connection to IS strategy perceptions and information sharing attitudes relative to systems quality and service quality. While I may not find all of these direct effects to be significant, they are all, at least, conceptually supported (see chapter 2 Hypothesis Development). Without having at least solid conceptual support, an enumerated model testing all possible relationships usually would be considered exploratory. However, as these direct effects will be supported theoretically or empirically, the proposed research will be confirmatory. These direct effects are added to the proposed research model and displayed in figure 1-5 (building upon the ISSM framework presented in figure 1-3).

Figure 1-5. ISSM contextualization with organizational culture direct effects.
I also will consider the moderating effect of the context-specific factors on the relationships between perceived information quality and use, as well as between use and net benefits. Considering these interaction effects is crucial to examining any interdependencies among the core constructs of the general model and is described in guideline five. Again, my proposal of these connections will be supported by literature and conceptual arguments in the literature review and model development in chapter two. The final proposed research model is in figure 1-6.

**Figure 1-6. ISSM contextualization with organizational culture variables.**

Finally, guideline six considers the indirect influence of context-specific factors in the general model (Hong et al., 2014). Specifically, I may find these contextual factors of organizational culture exhibit significant direct or indirect effects on some variables more than other variables.
This means I also will test for mediated moderation and moderated mediation (Muller, Judd, & Yzerbyt, 2005) when fitting the variance model.

**RESEARCH QUESTIONS**

Consistent with my problem statement, I will investigate what factors influence net benefits either directly or indirectly. Following Hong and colleagues (2014), I will design this research to include prominent grounded theory and contextual factors. A review of the literature, where organizational culture is studied in terms of IS (see Chapter 2), leads me to believe that culture is an important construct in understanding system outcomes, particularly benefits from IS (Denison & Mishra, 1995; Straub et al., 1995; Leidner & Kayworth, 2006; Beeler & Saint-Leger, 2014). Gold, Malhorta, and Segars (2001) found a delicate mix of technology, structure, and culture is needed to succeed in data analysis and knowledge management activities, thereby connecting use with IS net benefits. The research by Gold et al. (2001), implies that technology alone will not incite benefits for the organization, but rather a facilitating culture also is needed.

However, organizational culture is a complex construct and is measured in multiple ways in the extant literature. For example, Kanungo (1998) measured organizational culture through person-oriented culture type, where emphasis is placed on interpersonal communication and interaction, versus task-oriented culture type, where emphasis is placed on getting the job done well and on time. Denison and Mishra (1995) use a grounded theory approach to develop four culture traits forming organizational cultures, such as external orientation, internal orientation, change and flexibility, and stability and direction. Ruppel and
Harrington (2001) measure organizational culture in terms of the organization’s foci (internal or external) and values (order or flexibility). The above research indicates the complexity of organizational culture lends itself to multiple operationalizations.

Furthermore, previous research does not point to a consistent role of organizational culture in terms of IS use and net benefits. For example, Ruppel and Harrington (2001) found organizational culture to have a direct effect on IS use, yet Kappos and Rivard (2008) showed organizational culture as a moderator in the relationship between IS characteristics and IS use. These are examples of research illustrating the lack of consistency with regard to the relationship between organizational culture and IS benefits. Thus, investigation of the role of organizational culture in the ISSM is warranted.

One of the purposes of this study is to investigate the contextual role of culture in determining IS net benefits. I will investigate whether specific culture factors impact IS benefits, as well as how these factors affect IS benefits. Do contextual factors influence benefits by affecting net benefits directly? Do the contextual factors affect benefits through other variables such as perceived information quality or system use, suggesting mediation? Do contextual factors affect benefits with other variables, such as perceived information quality and use, suggesting moderation? I have identified two facets of organizational culture that may impact IS benefits, information sharing attitudes and perceptions of IS strategy, and will provide support for a theory-based measurement of these facets. I will investigate the impact of these facets on the focal constructs of the ISSM (information quality, use, and net benefits of a system) and the role of system use in determining benefits of the system. The major research questions underlying this dissertation are as follows:
RQ1: What are the roles of system use in the realization of IS benefits?

RQ2: What are the roles of perceived information quality in the realization of IS benefits?

RQ3: Do the selected facets of organizational culture (information sharing attitudes and perceptions of IS strategy) affect the selected focal constructs (perceived information quality, use, and net benefits) of the ISSM and/or the relationships between them?

**SIGNIFICANCE OF THE STUDY**

The present study should assuage some of the key misconceptions and assumptions present in IS research. System use is an inconsistent variable in IS literature in terms of both conceptualization and measurement (Straub et al., 1995; Venkatesh & Morris, 2000; Johnson et al, 2014). As mentioned, the construct of IS use has been conceptualized and measured in several different ways, particularly through intention and self-reported data. Devaraj and Kohli (2003) suggest actual use, measured through usage logs, may explain some of the links between use and net benefits, but doing so is still very rare in the extant literature. Therefore, I consider actual system use through observation of usage logs as opposed to relying on self-reported use.

In addition, the current research presents a framework for understanding and measuring organizational culture. I complement previous research (Hofstede, 1990; Leidner & Kayworth, 2006) by using a value-based view of the organizational culture to promote a framework for deconstructing this construct consistently. I use a multidimensional view of organizational culture, using the observation of attitudes and perceptions as manifestations of
cultural values. While these two measures are different, both measures are meaningful and can offer interesting insights. In operationalizing the construct, I combine elements of psychology, strategy and IS, to provide a cross-disciplinary investigation. These elements should aid in proliferating the inclusion of organizational culture in IS research, as it offers a framework for investigating other facets of organizational culture.

This study offers specific values for an organization to examine when considering the benefits of IS. While the term “organizational culture” may be discussed freely and frequently among business leaders, I have found this term may be defined and specified differently. I have delineated two specific facets of organizational culture, information sharing attitudes and perceptions of IS strategy. These constructs have been studied in IS research but not in terms of understanding the use \( \rightarrow \) net benefits relationship. While these facets may not completely explain the relationship between use and net benefits, they may add to the existing research investigating the role of organizational culture on IS outcomes.

As with the misconceptions and assumptions surrounding the construct of use in IS, other variables in this study address specific research gaps. One, in particular, is the empirical support for the benefits of information sharing. A common theme in the knowledge management stream of IS research is that information sharing is beneficial for an organization and therefore the factors leading to information sharing should be studied and explained (Kogut & Zander, 1992; Grant, 1996; Wang & Noe, 2010). However, the connection between information sharing and benefits for the organization is not supported empirically consistently (for an exception see Lin, 2007). While studying the antecedents of information sharing is useful, the question of “does it matter” should be addressed.
Another construct needing investigation is perceptions of IS strategy. In a comprehensive review of the history and future research directions of IS strategy, Chen and colleagues (2010) discuss the many definitions of IS strategy in the literature. They mention a particular conception of IS strategy, i.e., the shared view of the IS role within the organization, is rather understudied. While perceptions of IS strategy have been on the periphery of investigation for prominent researchers (Ward, 1987; Kaarst-Brown & Robey, 1999; Kanungo et al., 2001; Ragu-Nathan et al., 2001), it remains at a less mature level of development than other conceptualizations of IS strategy, such as the use of IS to support business strategy and the master plan of the IS function.

By submitting a theory-based integration of organizational culture within the framework of the ISSM, the purpose of this dissertation is to advance and extend IS research. While previous IS research has investigated organizational culture, the focus has been mainly on the impact of organizational culture on system use. I present the possibility of organizational culture influencing the benefits of IS after use as well and also present a further explanation for the relationship between system use and net benefits. Furthermore, present IS research has shown the effect of organizational culture on several factors leading to IS benefits. The present research consolidates these relationships into one study. I follow the guidelines put forth by Hong and colleagues (2014) to integrate systematically the contextual variable of organizational culture into a grounded and robust theory. In this research, I connect specific IS research streams, such as knowledge management, technology adoption, and organizational behavior, to form an integrative view of the role of organizational culture on IS outcomes.
ORGANIZATION OF THE DISSERTATION

This dissertation is based on a traditional five-chapter model and is organized as follows. Chapter 2 presents a literature review expanding on the key terms and constructs defined in this introduction. In particular, I define and measure both information sharing attitudes and perceptions of IS strategy as components of organizational culture. I also define and measure perceived information quality, use, and net benefits. Chapter 2 also presents the theoretical development for the specific facets of organizational culture into the ISSM model, positing direct, indirect, and moderating relationships. Finally, Chapter 2 presents the research model and hypotheses.

Chapter 3 presents the research methodology. The study uses a mixed methodology of both survey with validated measures and scales, and observational and archival data. This mixed design allows for the mitigation of common research questionnaire biases, such as careless responding and common method bias. Furthermore, the research will be conducted in the field, using an actual IS (as opposed to a laboratory system), collecting observational data over several months.

The data analysis and findings of the study are discussed in Chapter 4. I use structural equation modeling (SEM). I test the measurement model, and discuss the reliability, convergent validity, and divergent validity of the measures. Next, I examine the model relationships, considering the sign, size, and significance of the regression coefficients.
Chapter 5 presents a formal discussion of the overall findings of the dissertation. These conclusions include the implications of the research for researchers and practitioners, as well as recommendations for future research.
CHAPTER 2

INTRODUCTION

The focus of the current research is to investigate variables that may yield benefits to the organization from the IS system. As discussed in chapter 1, a positive relationship between system use and net benefits of IS generally is assumed, but cannot be supported consistently (Seddon, 1997; Wixom & Watson, 2001; Carr, 2003; Hitt & Brynjolfsson, 1996; Wang & Lee, 2014). This is the basis of the productivity paradox, which illustrates the disconnect between IS investment and benefits.

Many prominent IS adoption models research the variables leading to system use, and present use as the outcome variable (Bandura, 1977; Davis, 1989; Venkatesh & Davis, 2000, Venkatesh, Morris, Davis, & Davis, 2003). Therefore, the relationship between use and benefits of the system is less researched, suggesting a gap in the understanding of IS benefits. This gap in the research requires thoughtful and careful theory development and advancement. Theory development refers to considering the evaluation, goals and components of theory when selecting the types of concepts and possible relationships among them (Burton-Jones, McLean, & Monod, 2014). IS researchers have called for theory integration (Orlikowski & Barley, 2001; Watson, 2001; Straub, Loch, Evaristo, Karahanna, & Strite, 2002; Weber, 2003; Chaisson & Davidson, 2005; Karahanna, Agarwal, & Angst, 2006; Kohli & Grover, 2008), as opposed to theory extension by adding additional variables to prominent models.
LITERATURE REVIEW

Motivation

The primary motivation for the present research is to shed further light on the productivity paradox (Brynjolfsson, 1993).

Productivity Paradox

The productivity paradox postulates the connection between IS use and productivity has not been supported consistently nor explained (Brynjolfsson & Hitt, 1996; Carr, 2003). Researchers could not support a direct relationship between IS spending and IS benefits (Roach, 1989; Carr, 2003). This is an important issue for IS research, as many researchers have left an unsubstantiated assumption that increased IS use leads to increased benefits (Bailey & Pearson, 1983; Davis, 1989; Wixom & Watson, 2001; Venkatesh et al., 2003). Considering the fact that systems are particularly costly and risky for an organization (Bloch, Blumberg, & Laartz, 2012; Panorama Consulting Solutions, Business Process Management Report, 2014; Computer Economics, 2015), it is paramount an explanation is made for how benefits are realized from IS use and investment.

Several researchers have investigated the productivity paradox (Brynjolfsson, 1993; Bharadwaj, 2000; Chan, 2000; Devaraj & Kohli, 2003; Fichman, 2004; Setia & Patel, 2013) in hopes to explain the phenomenon. Many of the explanations for the productivity paradox focused on the measurement and observation of inputs and outputs. One explanation of the productivity paradox is that measurement of variables may be inconsistent. An example is seen in system use, with research showing both a lack of correlation between self-reported use and
actual use logs (Devaraj & Kohli, 2003; Johnson, Zheng, & Padman, 2014) while other researcher has found consistent relationships between constructs independent of measurement type (Taylor & Todd, 1995). Another explanation has to do with time. There is a time lag between IS investment and realization of net benefits (Desmarais, Leclair, Fiset, & Talbi, 1997; Bierly, Kessler, & Chistensen, 2000). Another explanation involves the level at which benefits are considered, firm or market level. IS investments are made by several companies in an industry, and the revenue for an individual company may increase at the expense of another. Benefits for industry are not observable because the market share per firm changes, but the revenue for the market as a whole remains the same (Rai, Patnayakuni, & Patnayakuni, 1997; Hebert, 1998; Stratopoulos & Dehning, 2000). In this regard, the benefits derived from IS may not be observed at an aggregate level, but instead only at a more granular level.

An alternative explanation for the productivity paradox refers to the context and specifics of IS in practice, often referred to as mismanagement issues. Researchers have identified factors within the organization, such as response to external pressures, current process or routines, or characteristics of the users, that lead to variation between firms in terms of the benefits derived from IS investment (Damanpour, 1992; Guimaras & Igbaria, 1997; Li & Ye, 1999; Fichman, 2004; Petter, DeLone, & McLean, 2013). Some of the sources for these mismanagement issues may include external pressures (Abrahamson, 1996; Carson, Lanier, Carson, & Guidry, 2000; Fichman, 2004; Duchin & Schmidt, 2013), process alignment (Dos Santos & Sussman, 2000; Holahan, Aronson, Jurkat, & Schoorman, 2004), and organizational characteristics (Karahanna, Straub, & Chervany, 1999; Agarwal & Karahanna, 2000; DeLong & Fahey, 2000). Specifically, the processes alignment and organizational characteristics
explanations may relate to a specific contextual organizational characteristic, the organizational culture. The investigation of this context, as it relates to the benefits derived from IS, is the focus of my research.

Theory Contextualization

To investigate the factors influencing the benefits of IS, and to understand further the role of use in relation to net benefits, I will use a context-specific theory development process. Context is defined as “situational opportunities and constraints that affect the occurrence and meaning of organizational behavior as well as functional relationships between variables” (Johns, 2006, p. 386). While previous research considered context when testing theoretical models, the approach is generally inconsistent (Molla & Licker, 2001, Van der Hijden, 2004; Pavlou & Fygenson, 2006; Jang, 2010; Lin, 2011).

To proceed with a systematic approach to theory development, Hong, Chan, Thong, Chasalow, and Dhillon (2014) proposed six guidelines for the integration of context-specific factors (shown in figure 2-1). As I review the literature used for developing the variables and design of the current research, I follow these guidelines to build a theory driven model to better understand the benefits of IS. Therefore, the organization of this literature review with headings derived from these guidelines (e.g. “Guideline 1: Grounded in General Theory”) is unique but provides a logical structure for the discussion of pertinent literature. Each section expands the discussion introduced in chapter 1. In the first section, guideline 1, I discuss, and review select literature associated with the general theory used in the present research, the ISSM (DeLone & McLean, 1992; 2003). In the next section, guideline 2, I discuss research
associated with refining the model by illuminating the focal constructs. In the guideline 3 section, I introduce the context of organizational culture and identify two specific factors for investigation, information sharing attitudes and perceptions of IS strategy. The hypothesis development process begins in the guideline 4 section. In this section, I present a model depicting the context-specific factors by hypothesizing the relationships in the general model, any additional relationships between the general model constructs, and the contextual direct effects. Hypothesis development continues in the guideline 5 section as I explain the rationale behind the contextual moderating effects hypothesized. Finally, the guideline 6 section presents a discussion of the process for examining alternative context-specific models.
Guideline 1: Grounded in a General Theory

The first guideline for context-specific theorizing in IS research is to ground the research model in an established general theory relevant to the domain of interest (Hong et al., 2014).

For this dissertation, the domain of interest is factors affecting IS benefits. Thus, the dependent variable is Net Benefits of IS. DeLone and McLean (1992) presented the ISSM as a synthesis of previous research findings to further the understanding in the field of IS as to what the dependent variable should be in adoption studies. DeLone and McLean followed Mason’s (1978) examination of the Mathematical Theory of Communication by Shannon and Weaver.
(1949) to consider common outcome variables used in IS research. DeLone and McLean (1992) postulated there is no single success measure but instead a series of constructs that are interdependent and interrelated leading to other measures of success, such as IS use and net benefits. Instead of looking at IS use as the only measure of success, DeLone and McLean (1992) argued an IS designed to provide high-quality system components and high-quality information will lead to increased use and user satisfaction. Figure 2-2 presents the ISSM as depicted by DeLone and McLean (1992).

**Figure 2-2. The ISSM (DeLone & McLean, 1992)**

With its focus on benefits of the IS, the ISSM differs from the earlier models of IS success, such as the Technology Acceptance Model (Davis, 1989) and the Technology-Organization-Environment framework (Tornatzky & Fleischer, 1990), both of which depict system use or adoption as the outcome variable. In 2003, the ISSM was revised to incorporate empirical findings (DeLone & McLean, 2003). In the following sections, I describe the theoretical perspective of the ISSM, its constructs and relationships, and the major revision of the ISSM.
**Theoretical Perspective of the ISSM**

A theoretical perspective is the “researcher’s choice regarding basic building blocks of theory and how these building blocks can be assembled” (Burton-Jones, McLean, and Monod, 2014; p. 1-2). Generally, models are divided into two theoretical perspectives, variance models or process models. Variance models support proposed relationships through an analysis of the variance of the concepts and relationships in the model. In other words, “Variance models assert that for some population of interest, if all other things are equal, variance in any one of the independent variables is necessary and sufficient to cause variance in the dependent variables.” (Seddon, 1997; p. 241). Conversely, a process model proposes a probabilistic sequence of events, in which each variable leads to another, to cause a certain outcome. Each of these theoretical perspectives involves different concepts and relationships (Burton-Jones et al., 2014). Burton-Jones and colleagues (2014) described the differences between variance and process models in terms of concepts and relationships.

**Concepts.** A variance model uses the concept of properties of entities, usually called variables. The meaning of a variable is fixed over time, and it is the value of the variable that may change. In contrast, a process model uses the concept of entities participating in sequenced events. As the entity moves through a process, an event may change the entity and the likelihood for the next event (Burton-Jones et al., 2014).

**Relationships.** A variance model considers the variation on each variable to evaluate the relationship between the variables. These relationships are typically assumed to be unidirectional and constant. For example, if \( x \) increases, then \( y \) increases. This is determined
through an analysis of the variance of both variables. This also means the time ordering among independent variables is not important. Conversely, a process model considers the sequences among events to show the changes in entities through events. In this respect time ordering is very important, as each event affects the entity in a way that may lead to another event. This sequence is generally probabilistic. For example, if a company implements a new IS (event 1, E1), and an individual finds it useful (E2), then he or she may (with a degree of probability) have a positive perception of IS (E3). This may also lead to the individual using the IS in daily activities (E4). This example is graphically displayed in figure 2-3. In this model the new IS implementation does not directly cause the use of the system. When the IS is implemented many outcomes are possible, use being just one.

Figure 2-3. Process Model Illustrating IS implementation and Use

E1: Implements new IS → E2: Individual finds IS useful → E3: Positive perception of IS → E4: Uses IS in daily activities

The distinction between variance and process models is important because it affects how a model is applied in the research field. If a model is considered a purely variance model, then time ordering of independent variables does not matter. On the other hand, if a model is considered a purely process model, then time ordering is important. Variance approaches deal with states (i.e., how changes in states of one variable correspond to changes in states of another variable), while process approaches deal with processes that unfold over time (e.g., one event is necessary before another event can occur; Van de Ven, 2007). This distinction is
especially important in the ISSM as some relationships may be considered mediated relationships.

In the variance approach, a relationship of mediation is one in which the mechanism of an observed relationship between two variables is explained as being the result of a third, intervening variable. Using Figure 2-3 as an example, the relationship between perceived usefulness (E2) and use (E4), that is to say the reason that changes in the state of E2 correspond to changes in the state of E4, is explained as being the result of changes to the state of positive perceptions (E3). In the process approach, changes in state do not explain the process. Rather, simple presence explains the process. Before E4 can occur, E3 must be present, and before E3 can occur, E2 must be present.

**The ISSM.** The distinction between theoretical perspectives (variance and process) is important when considering the ISSM because the model is considered a hybrid model containing both variance and process qualities (Burton-Jones et al., 2014; Seddon, 1997.) Burton-Jones et al. (2014) display what the ISSM would look like, in extremely simplified terms, as a pure variance model (figure 2-4) and as a pure process model (figure 2-5).

**Figure 2-4. The ISSM from a purely variance perspective**
In a significant revision of the model (DeLone & Mclean, 2003), DeLone and McLean champion the hybrid theoretical perspective by explaining, “The creation of the D&M IS Success Model was driven by a process understanding of IS and their impacts. This process model has just three components: the creation of a system, the use of the system, and the consequences of this system use. Each of these steps is a necessary, but not sufficient, condition for the resultant outcome(s). For instance, without system use, there can be no consequences or benefits. However, with system use, even extensive use, which is inappropriate or ill-informed, there may also be no benefits. Thus, to understand fully the dimensions of IS success, a variance model is also needed” (p. 16).

As mentioned earlier, the distinction in theoretical perspective (variance or process) affects how a model is applied in the field. Therefore, the hybrid quality of the ISSM might explain why the total effects in the ISSM are not reported consistently. As mentioned in chapter 2, the direct relationship between information quality and net benefits is not reported consistently (DeLone & McLean, 2003; Petter & McLean, 2009; Petter & Fruhling, 2011; Hassanzadeh et al. 2012). This is cited as one of the limitations of the ISSM (Burton-Jones et al., 2014). When the ISSM is considered a variance model, the role of mediators is underspecified. Burton-Jones and colleagues point out one of the problems, due to the lack of specificity, of the ISSM is “the model does not explain why the relationships among concepts are mediated and
linear, that is, why there are no direct or moderated effects” (p. 9). While the research community generally has accepted the ISSM uncritically, in the spirit of refining and advancing the model, researchers should consider both theoretical perspectives, variance and process, and clarify particular combinations to improve the model (DeLone & McLean, 2003; Burton-Jones et al., 2014).

**Constructs**

**System Quality.** DeLone and McLean define system quality as “the measures of the information processing system itself” (DeLone & McLean, 1992; p. 64). This includes a measure of the technical and production level of IS characteristics, for example the response time and reliability of the system. This quality measure considers the usability of the system, for example the consistency of the user interface (Seddon, 1997), as well as the accessibility of the system (Srinivasan, 1985).

**Information Quality.** When originally presenting the ISSM, DeLone and McLean (1992) described the concept of information quality as the output of the information system, generally in the form of reports. After this initial label, researchers have unpacked this construct specifying dimensions of information quality such as relevance, timeliness and accuracy (Seddon, 1997). This re-specification leads to this definition of information quality: “the relevance, timeliness, and accuracy of information generated by an information system” (Seddon, 1997; p. 246). Information quality generally is measured through the perceptions of the users (DeLone & McLean, 1992; 2003; Seddon, 1997; Petter & McLean, 2009).
**Use.** One of the major questions in the IS literature remains, what is use? Initial use? Continued use? Use by management? Use by employees? Use by everyone? Use by most?

Burton-Jones and Straub (2006) contend the use construct must consider a user, the system, and the related task. A succinct definition of use is provided by Burton-Jones and Gallivan (2007) as “a user’s employment of a system to perform a task” (p. 659). While some studies consider “intention to use” as opposed to actual use, DeLone and McLean warn against this specification as the intention may be difficult to measure accurately. DeLone and McLean (2003) advocate collecting actual use over self-reported use whenever possible in ISSM-based research, as these two measures of use do not reliably correlate with each other. If the actual use of the system is the specific variable of a study, not a user’s perceptions of use, then the actual use measure is necessary over the self-reported use measure.

**User Satisfaction.** One of the most common constructs in IS research is user satisfaction. DeLone and McLean define user satisfaction as the “recipient response to the use of the output of an information system” (Delone & McLean, 1992; p. 68). Previous literature has focused on user satisfaction as the dependent variable for technology adoption (Doll & Torkzadeh, 1988; Seddon & Yip, 1992). The construct has been redefined several times with a multitude of dimensions specified. Some dimensions include perceived convenience, perceived reliability, relationship with support staff, and users’ understanding of the system, (Bailey & Pearson, 1983; Ives, Olson, & Baroudi, 1983; Baroudi & Olikowski, 1988). Recently, user satisfaction has been measured through an evaluation of whether the system meets expectations (Wang, 2008) and perceived utility (Wang, Wang, & Shee, 2007). Also, user satisfaction has been measured
simply through a single-item, “How would you rate your satisfaction with [the system]?” (Rai, Lang, & Welker, 2002; p. 58).

**Individual Impact.** Individual impact is defined as “the effect of information on the behavior of the recipient” (DeLone & McLean, 1992; p. 69). While the term “impact” is difficult to define, DeLone and McLean (1992) point to the concept of individual performance as representing individual impact. Measures for individual impact include how the system may enhance individual effectiveness (Petter & Fruhling, 2011), the speed of decision making (Sanders & Courtney, 1985), decision accuracy and decision-making time (Benbasat & Dexter, 1985), or accuracy of problem solution (Luzi & Mackenzie, 1982).

**Organizational Impact.** Organizational impact was defined by DeLone and McLean as “the effect of information on organizational performance” (DeLone & McLean, 1992; p. 74). DeLone and McLean (1992) postulated organizational performance may include many factors, such as reducing operating costs or improving company profits. DeLone and Mclean (1992) also point out the impact of the IS on the organization is a primary concern for practitioners. However, the organizational impact of an IS is difficult to isolate, as other factors that may influence organizational impact likely contaminate the results (Brynjolsson & Hitt, 1996).

**Theory Relationships**

As previously discussed, the ISSM is a hybrid model in terms of theoretical perspective (variance or process). The constructs are considered variables, where the values may change and the definition of the variable remains constant. However, the relationships in the model are sequential steps in a process, lending a process quality to the model. For this reason, mediation
in the model presented by DeLone and McLean (1992; 2003) is under-specified. In fact, DeLone and McLean do not use the term “mediator” in their description of any of the variables or relationships. Instead, they postulate three stages of the process model, creation of a system, use of a system and the consequences of use are “necessary, but not sufficient, conditions” (p.16) for the resultant stage. However, different levels of each of the variables in the stage will impact the next stage, again, adding a variance theoretical perspective component. The model postulates the following relationships.

**Antecedents of Use and User Satisfaction.** In the ISSM, system quality and information quality directly influence system use and user satisfaction. In the case of systems quality, if a user perceived the system to be reliable, accessible, and easy to use, then the user is more likely to use the system and also have a positive user satisfaction. Similarly, if the user perceives the output of the system to be of high quality, in that the information is relevant, timely and accurate, then the user is likely to use the system and feel more satisfied with the system.

User satisfaction is also an antecedent of use. If a user is satisfied with the system, in that he or she finds the functions of the system to meet or exceed expectations, then the user is likely to use the system. Conversely, if a user is unsatisfied with the system, then the user may discontinue use, or refrain from using the system. In much the same way, user satisfaction may be influenced by the use of the system.

**Antecedents of Individual Impact.** Use and user satisfaction are direct antecedents of individual impact in the ISSM. This relationship follows process model properties; use is considered a step necessary to impact the individual outcomes of the system. When
considering the ISSM as a pure process model, use and user satisfaction are considered steps toward the benefits of IS. This means that for an individual to benefit from the system, use of the system must occur, therefore use of the system directly influences the impact on the individual. However, when the ISSM is considered from a variance model perspective, these constructs are considered mediators between the system quality characteristics and individual impact. This distinction is important because, while the model frequently is treated as a variance model, meaning the researchers assess the variance shared by each variable (Seddon, 1997), DeLone and McLean (1992; 2003) never refer to any of the constructs in the ISSM as mediators. This is one of the major criticisms of the ISSM; the lack of explanation as to the relationships among concepts (Burton-Jones et al., 2014)

**Antecedents of Organizational Impact.** The original ISSM presented two outcome variables, individual impact, and organizational impact, with individual impact serving as a precursor to organization impact. Individual benefits (or consequences) are likely to translate into organizational benefits (or consequences). For example, if a particular system helps students learn course material better than without the system, then student learning outcomes may improve. Better learning outcomes are an individual impact of the system. However, increasing the aggregate learning outcomes of students is also a benefit for the school. As another example, a system in a bank may be designed to streamline the loan process by digitizing application forms. However, in reality the system slows the loan approval process significantly. Because of the delay, several loans are not approved in time and the customers instead obtain a loan from another bank. The loan officer working on these loans has lost this potential business, and the potential commissions. Because of the loss of income, the loan
officer decides to resign from the bank and move to another institution. The loss of commission is an individual consequence of the system. Yet, the loss of the loan officer is an organizational consequence of the system. Therefore, even though the consequences or benefits of a system directly impact an individual, the benefits and consequences are also likely to impact the organization.

Revisions

Since the introduction of the ISSM, several researchers have supported and extended the model through empirical studies. As more research was conducted and published in the IS community, DeLone and McLean (2003) revised the model to include the new research available. Four major revisions were made to the ISSM ten years after the introduction of the model.

First, the model was extended by adding the antecedent of service quality. System quality and information quality remain as antecedents, making a total of three antecedents in the updated model. Service quality was added to represent the component of support for the IS. Service quality considers the traditional "help desk" technical call support, and the support of the system in terms of training or documentation. Before the revision, service quality concepts were considered part of the systems quality construct. Further empirical findings pointed to the need for a separate construct (Pitt, Watson, & Kavan, 1995). Pitt and colleagues (1995) argued the original ISSM, which did not include service quality, focused on the product definition of an IS and ignored the service aspect of the system. They contend the IS can be viewed as a service provided for the use of members, and, therefore, considering the quality of
the service is important for understanding individual and organizational outcomes. In the 2003 revision, DeLone and McLean agreed the service quality construct is appropriate for some studies. However, they contend each quality dimension will have different impacts depending on the particular study. They provide the example, “For measuring the overall success of the IS department, as opposed to individual systems, ‘service quality’ may become the most important variable. Once again, context should dictate the appropriate specification and application of the D&M IS Success Model.” (DeLone & McLean, 2003; pg. 18). In the present research, the system is an individual system, not all IS offered by the organization. Therefore, service quality is unlikely to be a focal construct in this research.

The second change to the model involves including "user intention" as an alternative to system use in the updated ISSM (DeLone & McLean, 2003). DeLone and McLean (2003) allow for the substitution of intention in some contexts by describing the opportunity to observe the effect of user satisfaction on use. DeLone and McLean (2003) pointed out that “Use must precede ‘user satisfaction’ in a process sense, but positive experience with ‘use’ will lead to greater ‘user satisfaction’ in a causal sense. Similarly, increased "user satisfaction" will lead to increased ‘intention to use,’ and thus ‘use.’” (p. 23). However, DeLone and McLean acknowledge the context of the study will dictate whether use or intention to use is appropriate (DeLone & McLean, 2003). The present research considers the behavioral aspect of use, and how this behavior explains net benefits. Therefore, intention to use is not an appropriate measure of use for this study.

The third model change was a combination of individual impact and organizational impact into one construct labeled net benefits. As mentioned in Chapter 1, net benefits are
defined as the user defined and task-specific benefits of the system at both the individual and organizational levels (DeLone & McLean, 2003). While this is meant to consider the holistic and recursive nature of the original constructs, the authors contend the original constructs might be more appropriate given the circumstances and specifics of the research.

Finally, the fourth change to the ISSM is the inclusion of recursive feedback loops from net benefits to use/intention to use and user satisfaction (DeLone & McLean, 2003). These loops are a necessary update, as DeLone and McLean contend positive benefits will encourage the use of the system and increase user satisfaction, just as negative benefits will lead to lower user satisfaction and a resistance to using the system. Again, the context, as well as the defined users of the system, will dictate whether these relationships should be tested in a particular study (DeLone & McLean, 2003). Figure 2-6 shows the updated model.

**Figure 2-6. The Updated ISSM (DeLone & McLean, 2003)**
Both the original ISSM and the revised model gained significant traction in the IS research field. The model was validated through multiple methodologies and environments including online database systems (Rai et al., 2002), e-commerce (DeLone & McLean, 2004; Wang, 2008), e-learning (Wang et al., 2007, Wang & Chiu, 2011, Hassanzadeh, Kanaani, & Elahi, 2012), and healthcare IS (Petter & Fruhling, 2011). Furthermore, a meta-analysis of the most prominent ISSM validation studies found that the majority of the ISSM relationships between constructs were supported, and those with weaker support were the more recently added constructs, such as service quality (Petter & McLean, 2009).

The meta-analysis provided by Petter and McLean (2009) indicated the model has not been tested in its entirety by all researchers using the model. For example, Gorla and colleagues (2010) observed the direct and indirect effects of the quality measures (system, service, and information) on organizational impact, but did not measure system use or user satisfaction. Gorla and colleagues (2010) argue their study is not concerned with the actual use of the system, nor the level of satisfaction felt by the users, but rather the impact of that use on the organization’s goals.

It also appears the model commonly is used as a framework for researchers to map other variables onto in the study of IS success (Jennex & Olfman, 1998; Molla & Licker, 2001; Wang & Chiu, 2011; Hassanzadeh et al., 2012; Karahanna, Williams, & Polites, 2013; Setia, Venkatesh, & Joglekar, 2013). For example, Wang and Chiu (2011) use the ISSM as a framework to investigate the influence of communication quality in e-learning IS research. Wang and Chiu
(2011) use the core constructs of information quality, service quality, system quality, user satisfaction and net benefits, which they measure as loyalty intention. Then, they integrate communication quality as a mediator in the model between several of the core constructs. Other researchers have used this technique of integrating other variables into the ISSM when investigating the effects of organizational memory (Jennex & Olfman, 1998), trust and support and service in e-commerce (Molla & Licker, 2001), loyalty to the system (Hassanzadeh et al., 2012), uncertainty and national culture (Karahanna et al., 2013), and customer service capabilities (Setia et al., 2013).

Limitations

In general, the ISSM provides a succinct yet inclusive model for understanding technology use and outcomes. It may be used to identify key areas of further research and understanding. However, some of the relevant underlying psychological constructs, such as attitude and social norm (Ajzen & Fishbein, 1977; Ajzen, 1991) are absent from this model. Previous adoption models, for example, the Technology Acceptance Model (TAM) (Davis, 1989) included perceived ease of use and perceived usefulness. The ISSM focuses more on measures of success than these perceptions and may lack important insights captured by other adoption models (Davis, 1989; Venkatesh et al., 2003). Petter, DeLone, and McLean (2013) discuss the vast independent variables that may be antecedents of the model, but also may act as interaction variables inside the model. One of these constructs is the users’ attitude toward the technology, management support, or management processes. An argument may be made that without understanding the constructs that lead to the quality measures, researchers and practitioners cannot fully explain or understand IS success.
Another limitation of the ISSM is the exclusion of social or organizational factors in the model. In this way, the ISSM is similar to the first version of TAM (Davis, 1989). The original TAM model included only individual level antecedents. However, as the model was revised (TAM2 - Venkatesh & Davis, 2000) and extended (UTAUT – Venkatesh et al., 2003) several years later, social constructs were added, such as social influence and subjective norm. Other researchers, specifically in the knowledge management research stream, have found organizational and social factors to be significant variables when considering IS success (Zahra & George, 2002; Todorova & Durisin, 2007; Gregory, Harris, Armenakis, & Shook, 2009). As the ISSM is one of the few adoption models which does not consider use as the final outcome (Davis, 1989; Venkatesh et al., 2003), the model allows for the investigation of these social elements toward the benefits of IS. Therefore, it would be advantageous to use the ISSM as a general theory to model the context of organizational culture.

**Guideline 2: Contextualizing and Refining a General Theory**

I use the ISSM as the general theoretical underpinning to investigate the factors affecting the benefits of an IS. Theoretical models may be refined to focus on the factors specific to the context being investigated (Hong et al., 2014). DeLone and McLean (2003) contend it is likely not all constructs in the ISSM need to be included, and instead researchers should focus on the constructs related to the study context. Empirically, several researchers have used this approach and included only specific constructs of the ISSM when investigating decision making (Teng & Calhoun, 1996), work environment (Teo & Wong, 1998), web-customer satisfaction (McKinney, Yoon, & Zahedi, 2002), leadership (Prybutok, Zhang, & Ryan, 2008), and virtual communities (Zheng, Yang, & McLean, 2013). The causal chain theorized...
(DeLone & McLean, 2003) between the core constructs of Perceived Information Quality (PIQ), Use and Net Benefits form the backbone of my research model (Figure 2-7). This framework provides a prominent and well-supported model for the foundation of the research, and it provides the opportunity for the observation of organizational culture effects before system use, as well as after use (figure 2-7).

**Figure 2-7. Extracted ISSM Constructs and Relationships**

I focus on the PIQ as an antecedent to system Use. This construct will consider the relevance, timeliness and accuracy of the information provided by the IS (Seddon, 1997). I do not include system quality in this research, as previous research has indicated system quality can be reflected in information quality (Gorla et al., 2010). For example, system quality may be measured through level of integration with other systems, response times, and processing times. If the system is perceived to be of low system quality, then these features will affect the accuracy and timeliness of information. Accuracy and timeliness are measures of information quality. I do not include service quality as its role in the model has not been well supported in the literature (Petter & McLean, 2009). Furthermore, DeLone and McLean (2003) explain that certain quality measures may be salient in specific contexts, saying, “To measure the success of a single system, ‘information quality’ or ‘system quality’ may be the most important quality component” (DeLone & McLean, 2003; p. 18). For the setting of this research, where a single system is studied, at the individual unit of analysis, PIQ is an important measure.
System Use is the mediator in my extracted variance model. System Use includes the use of the system over a given period by an intended user (Burton-Jones & Straub, 2006). One of the major explanations for the productivity paradox is mismeasurement (Brynjolfsson, 1993). Previous literature has shown both a disparity between reported intention to use a system and actual use (Devaraj & Kohli, 2003; Johnson et al., 2014) and alignment between the two constructs (Taylor & Todd, 1995). Thus, Use will be measured both as actual use and self-reported use.

In the foundational model of the present study, PIQ is the predictor, Use the mediator, and Net Benefits the outcome variable.

Guideline 3: Thorough Evaluation of the Context to Identify Context Specific Factors

The motivation for the present research is to understand the productivity paradox by considering mismanagement issues of IS. A possible source for mismanagement issues may be a function of an underlying organizational culture. Recalling the definition of organizational culture, as the collection of shared dominant values that guide behavior in an organization (Leidner & Kayworth, 2006), I contend that the unique values of an organization are characteristics that likely influence the management of IS. Therefore, exploring the context of organizational culture in the present research model is important in an investigation of the factors leading to benefits of IS, and in understanding the productivity paradox.

Organizational Culture

The term "organizational culture" (also referred to as "corporate culture") entered the research field in 1965 in textbooks by both Bass and Schein independently (Schein, 1996). While
the early measurement of organizational culture had been focused primarily on individual characteristics and how they matched or conflicted with the social norms of the organization, the research evolved to include more intergroup phenomena and leadership implications (Schein, 1996). The concept of organizational culture was advanced significantly by Geert Hofstede in the early 1980s through the extensive study of culture, at both the national, organizational and individual levels. Hofstede defines culture as "the collective programming of the human mind that distinguishes the members of one human group from those of another. Culture, in this sense, is a system of collectively held values." (Hofstede, 1980; p. 24). A value is "a broad tendency to prefer certain states of affairs over others" (Hofstede, 1980; p. 19). This view of a value-based organizational culture definition is supported in prominent IS research as well. Straub and colleagues (2002) postulated shared values were the central and distinguishing characteristic of culture.

In 2006, the organizational culture construct was reviewed under the IS lens through a meta-analysis conducted by Leidner and Kayworth (2006). This seminal work describes organizational culture as enabling “the differentiation of organizations along the lines of dominant values guiding organizational behaviors” (Leidner & Kayworth, 2006; p. 360). This description supports the concept that organization culture is not simply a list of values the group may hold, but a ranking of those values. Certain organizational culture values may be hidden, even from the group itself, until there is a conflict in which the group participants must choose between two mutually exclusive values. In IS research, this conflict can arise between stakeholders and technology (Leidner & Kayworth, 2006; Kappos & Rivard, 2008). For example, an organization may value both security and cooperation as part of the organizational culture.
However, if a technology, such as an intranet, which is designed to encourage collaboration and information sharing amongst departments, is presented, the technology may be contrary to the value of security. Therefore, the values of security and cooperation are pinned against each other, meaning the organization must rank one of these values as higher than the other in the face of this new technology.

*Observing Organizational Culture*

The value hierarchy that forms organizational culture often is difficult to observe directly. Hofstede (1998) specifies that values represent the invisible parts of culture. For this reason, the operationalization of the organizational culture in research endeavors varies. Some researchers look to organizational structure to lend insight into the culture of an organization (Ruppel & Harrington, 2001; Claver-Cortes, Pertusa-Ortega, & Molina-Azorin, 2012). Other researchers have taken a top-down view of culture and focused on management style (Olson, 1982; Rivard, Lapointe, & Kappos, 2011). Attitudes also have been used to observe the underlying values of the organizational culture (De Long & Fahey, 2000; Gregory et al., 2009). Additionally, many researchers rely on the perceptions of the values held by organizational members to gain insight into the values represented in organizational culture (Kanungo, Sadavarti, & Srinivas, 2001; Jarvenpaa & Staples, 2001; Scott, Mannion, & Davies, 2003). Straub and colleagues (2002) have identified the difficulty in measuring organizational culture as it is unconscious and embedded in values.

Embedded values often are reflected in attitudes and perceptions. Attitudes involve evaluation of the target, and perceptions involve assigned meaning.
**Attitudes.** An attitude is “an individual’s propensity to evaluate a particular entity with some degree of favorability or unfavorability” (Eagly & Chaiken, 2007; p.583). Evaluation involves a determination of the personal value one holds for a target item. The evaluation is unseen until the consistent behavior is observed. As Ajzen and Fishbein (1975, p. 8) stated, “attitudes cannot be observed directly but have to be inferred from observed consistency in behavior.” I find this consistent with Hofstede’s (1998) specification that culture contains two components, actions, which are the visible parts of cultures, and values, which are the invisible parts of culture.

Constant, Kiesler, and Sproull (1994) investigated information sharing through individuals’ attitudes. Constant and colleagues (1994) assumed “organizational culture and policies as well as personal factors can influence people’s attitudes about information sharing” (Constant et al., 1994; p. 401). These authors observed information sharing attitudes through the stimulus-response consistency method (as suggested by Fishbein and Ajzen, 1975). This method presents the specific object (e.g., information sharing) and requires each subject express some degree of favorableness or unfavorableness toward the object in question. Empirically, Gregory et al. (2009) found a direct effect of culture on employee attitudes. Straub and colleagues (2002) cited Hampden-Turner and Trompenaar’s 1993 book, The Seven Cultures of Capitalism, in stating, “members of a culture are likely to share common attitudes because they share a common history” (p. 13). Recall the definition of organizational culture is a collection of values, and attitudes are evaluations of specific objects. By also considering the empirical support (Constant et al., 1994; Gregory et al., 2009), as well as the conceptual support
(Straub et al., 2002; Hampden-Turner & Trompenaar, 1993), I conclude attitudes will provide a valid and appropriate measure of organizational culture.

**Perceptions.** Following the seminal research by Taylor and Fiske (1978), perceptions are the way individuals assign meaning to their environment. Individuals “take information about the social environment and put it together to make inferences about what causes things to happen as they do and what causes people to behave as they do” (Taylor & Fiske, 1978; p. 250). In this respect, perceptions provide valuable insight as to how the individual distinguishes the values of the organization.

Perceptions frequently are studied in IS research adoption models (e.g. perceived ease of use and perceived usefulness are key constructs in the Technology Acceptance Model by Davis in 1989), as well as in the observation of organizational culture. Scott and colleagues (2003) specifically reviewed the measurement of organizational culture in the field of health care and found all of the instruments that measure organizational culture examine perceptions provided by organizational members. The concept of a link between perceptions of values and organizational culture was proposed by Kaarst-Brown and Robey (1999). These researchers looked at the perceptions of the use and management of IS in different organizations and referred to it as the organizational culture. For example, members of one of the organizations perceived IS to be highly powerful and valuable while the members of the other organization perceived IS to be risky and dangerous. From this analysis, the values associated with IS are elicited. As organizational culture is a collection of values, perceptions provide an appropriate observation of the culture of each organization. Given this review of previous literature, I conclude perceptions will provide insight into the culture of an organization.
Multidimensional View. While attitudes and perceptions are fundamentally different, both measures are meaningful and insightful in the study of organizational culture by enabling a multidimensional view of organizational culture. As previously discussed, values are the invisible part of a culture (Hofstede, 1998), and, therefore, may be difficult to observe. Hofstede (1998) found attitudes and perceptions are specific to a situation, and through the observation of attitudes and perceptions toward an object, values pertaining to the object may be interpreted. Both techniques are valid and meaningful (Kanungo et al. 2001), as they each provide different insights into the understanding of organizational culture.

Measuring attitudes and perceptions to study organizational culture has been used outside mainstream management research. Specifically, Singh, Anderson, Mclean-Plunkett, Raheja, and Singh (2013) investigated the relationship between organizational culture and medication errors in ambulatory medicine. Singh and colleagues (2013) measure attitudes toward safety practices and perceptions of management through a single safety questionnaire, the Safety Attitudes Questionnaire (SAQ; Sexton, Helmreich, Neilands, Rowan, Vella, Boyden, Roberts, & Thomas, 2006). This questionnaire was adapted from the Flight Management Attitudes Questionnaire (FMAQ; Helmreich, Merritt, Sherman, Gregorich, & Wiener, 1993), which was created after researchers found that most airline accidents were due to an organizational culture where interpersonal interactions were dysfunctional (Sexton et al., 2006). Sexton and colleagues (2006) found attitudes and perceptions are both important in understanding the organizational culture.
Recalling the meta-analysis of Leidner and Kayworth (2006), organizational culture enables “the differentiation of organizations along the lines of dominant values guiding organizational behaviors” (p. 360) and is therefore a ranking of organizational values. IS researchers have identified key values influence IS outcomes, such as use and net benefits. For example, Alavi, Kayworth, and Leidner (2006) investigated the value an organizational culture places on expertise, formalization, innovativeness, collaboration and autonomy on the use of knowledge management tools and systems. Alavi and colleagues (2006) found that the rank of each of these values influenced how the IS was used in organization, as well as the outcomes experienced in the organization. Jarvenpaa and Staples (2000) empirically studied information sharing values and found a significant relationship between information sharing attitudes and the use of an information system. Gregory and colleagues (2009) found that specific cultural values, such as cohesiveness and creativity, impact specific organizational outcomes, such as patient satisfaction. Finally, Lawrence (2013) found organizations with a culture that values innovation and support for IS projects consider these values to enhance the resolution of project conflict.

Investigations of organizational culture are value-based, both in general and with respect to specific values. Straub and colleagues (2002), have called for a consistent measure of organizational culture in IS research. Measurements of attitudes and perceptions can inform meaningful conclusions about the effects of organizational culture on work-related behaviors (e.g., Constant et al., 1994; Hofstede, 1998; Kaarst-Brown & Robey, 1999; Kanungo et al., 2001; Straub et al., 2002; Sexton et al., 2006; Gregory et al., 2009; Singh et al., 2013). As guideline
four for contextual theorizing calls for the decomposition of a particular context into context-specific factors, the current research identifies two organizational culture facets, Information Sharing Attitudes and Perceptions of IS Strategy, which will be discussed further in the next sections.

Information Sharing Attitudes

Information sharing is defined as “the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures” (Wang & Noe, 2010; p. 117). Recall the definition of an attitude is “an individual’s propensity to evaluate a particular entity with some degree of favorability or unfavorability” (Eagly & Chaiken, 2007; p.583). Therefore, I combine these definitions to derive the definition of Information Sharing Attitudes as an individual’s propensity to evaluate with some degree of favorability or unfavorability the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures.

The construct of information sharing gained popularity in 1994 as Constant and colleagues (1994) presented a seminal theory regarding attitudes of information sharing in organizations. Constant and colleagues (1994) presented a measurement of information sharing attitudes and the link between these attitudes and information ownership beliefs as well as behaviors regarding information sharing. Since this research, several other researchers have studied the concept of information sharing in organizations through both qualitative and quantitative methods (Jarvenpaa & Leidner, 1998; Jarvenpaa & Staples, 2000; Ruppel &
Harrington, 2001; Alavi et al., 2006; Li & Lin, 2006; Wang & Noe, 2010). It is important to note that the words "knowledge" and "information" are used interchangeably when investigating information sharing. Therefore, some studies refer to information sharing as knowledge sharing. Wang and Noe (2010) explicitly acknowledged this by saying, “Many researchers use the terms knowledge and information interchangeably, emphasizing there is not much practical utility in distinguishing knowledge from information in knowledge sharing research” (p. 117).

Information is considered one of the most valuable assets of an organization (Barney, 1991; Grant, 1996; Alavi et al., 2006). In the seminal work of Robert Grant (1996), one of the essential characteristics of information is the transferability of this information within the firm. Some information is transferred primarily through communication, while other information may be considered tacit knowledge, and must be codified and observed to be applied and acquired through practice (Grant, 1996). Firms that can disseminate information between individuals and departments may develop a competitive advantage over those that cannot (Barney, 1991). With this in mind, information sharing is an important topic in the business management field, particularly in the knowledge management research stream.

A key question, when researching information sharing attitudes, is what are the factors influencing information sharing attitudes? Researchers have looked into the organizational culture, management support, and rewards offered to encourage information sharing (Wang & Noe, 2010). For example, Bock, Zmud, Kim, and Lee (2005) identified subjective norms, conducive to information sharing, directly influenced intentions to share information and influenced attitudes toward information sharing. In this way, information sharing attitudes are a reflection of the subjective norms, suggesting information sharing attitudes may illuminate
underlying values of information sharing by the collective. Other motivation factors, such as perceived benefits and costs as well as beliefs of knowledge ownership have been found to impact information sharing attitudes. Jarvenpaa and Staples (2001) have found individuals who believe the information and expertise they have gained from the organization belongs to them (as opposed to the organization) are likely to report they would engage in information sharing. This suggests information sharing attitudes are shaped by the value placed on information sharing behaviors at the organization, perceived by the members in the form of rewards or information ownership.

However, limitations exist in the information sharing research stream. First, many of the studies record users' intentions to share (Constant et al., 1994; Jarvenpaa & Staples, 2000; 2001) or self-reported information sharing behavior (Bock et al., 2005), without measuring actual behavior. Measuring intentions leads to a possible issue with response acquiescence or social desirability bias (Schwab, 2005) as subjects may be responding as they believe they should respond, as opposed to responding with their actual intentions or behaviors. Second, variables measured in the information sharing literature are captured by a single source at a single period (Wang & Noe, 2010). A research design that measures variables in a single measure at a single period suggests causal inferences are limited, as temporal precedence cannot be established. Wang and Noe (2010) suggested collecting the values for information sharing separately from the outcome variables to limit common method bias.

**Information Sharing Attitudes in IS Research.** Information sharing has been researched in both the organizational behavior field as well as the IS field. IS experts began researching information sharing attitudes as they specifically relate to how some IS and knowledge
management systems are used. Both fields have furthered the understanding of information sharing. For example, organizational behavior research conceptualized the construct by measuring information sharing in terms of individual attitudes and considered the reasons why an individual may choose to share information or hoard information (Constant et al., 1994). IS researchers have looked more to the outcomes of information sharing, such as the use and benefits of knowledge management systems (DeLong & Fahey, 2000; Ruppel & Harrington, 2001). From these two research streams, informative findings have been presented in terms of how sharing information differs from sharing other organizational resources, why individuals have positive information sharing attitudes, why individuals have negative information sharing attitudes, and how the values of the organization affect information sharing attitudes.

In regard to how sharing information differs from sharing other organizational resources, an important finding is that an individuals' attitude toward information as an organizational resource is different from his or her attitude toward other resources in the organization. For example, an individual may recognize a tangible resource of the organization, such as a stapler, as clearly belonging to the organization. Whereas an intangible resource of the firm, for example, specific training completed at a company sponsored event, as not necessarily owned by the organization. The fact that the information cannot be separated from the individual, unlike a stapler, changes the ownership belief for the individual (Constant et al., 1994). Consider what happens when the individual leaves the organization. If the individual takes the stapler, then that behavior is clearly stealing, as the stapler belongs to the organization. However, the same cannot be said with taking information gained from training. The individual has no choice but to take this information and training, and it is considered
gaining experience, as opposed to stealing. Because individuals have different ownership beliefs regarding information compared to tangible resources of the organization, information sharing attitudes differ from other resource sharing attitudes (Constant et al., 1994; DeLong & Fahey, 2000). Jarvenpaa and Staples (2001) empirically showed that, if individuals recognize information as an organizationally owned resource, then their propensity to share information changes from “unlikely to share” to “likely to share” information.

Regarding why an individual would possess a positive attitude toward sharing information, the perception of management support has been shown to influence information sharing attitudes. Connelly and Kelloway (2003) investigated the effect of perceptions of management’s support for information sharing on the dependent variable of actual information sharing. Connelly and Kelloway (2003) found that while information sharing is voluntary in most cases, it is not necessarily spontaneous. If individuals had reason to believe top management supported knowledge sharing, for example, by investing in information sharing technology and infrastructures, then the individuals were observed as being interested in acting in agreement with management direction. By this logic, the information sharing attitude of an individual is influenced by the perceived support of management.

In regard to why an individual might possess a negative attitude toward information sharing, fear and costs related to sharing information have been identified as factors. One of the reasons individuals may not have positive attitudes toward information sharing is fear of being betrayed, deceived, or replaced. Renzl (2008) studied the effect of fear about information sharing and described this fear as “fear of being betrayed, being deceived, or of being easily replaceable, i.e. the fear of losing one’s unique value” (Renzl, 2008; p.210). Renzl showed that if
an individual is fearful of losing his or her power, or worth in the group, the individual will be less likely to share information.

Individuals also may have poor information sharing attitudes due to the individual benefits the information provides. This argument is phrased nicely by Renzl when she asked, “why should individuals contribute knowledge if they are not rewarded and do not gain anything?” (Renzl, 2008; p. 216). In other words, an evaluation must be made by the individual as to whether the benefits of sharing the information counter the risks involved with losing his or her unique value or power. This evaluation process is also examined by Bock and colleagues when they postulated personal belief structures, as well as institutional structures, affect an individual’s attitude toward information sharing. For example, in a pay-for-performance or commission-based compensation schedule, individuals may feel they are in competition with each other, and sharing certain information may limit their ability to distinguish themselves from other employees. In these cases, the evaluative process may lead to negative information sharing attitudes, as an individual may value his or her benefit of hoarding over the benefit from sharing (Bock et al., 2005).

Finally, information sharing attitudes have been shown to be influenced by the values expressed by the organization itself. Ruppel and Harrington (2001) presented organizational values as a reason individuals share information in an organization. Ruppel and Harrington (2001) empirically supported the concept that an innovative and trusting culture promotes positive attitudes toward information sharing among members, thereby influencing the use and adoption of certain intranet technology. However, values of the organization may instead deter information sharing between individuals. For example, Koch, Leidner, and Gonzalez (2013)
presented two dynamics contributing to an organization's culture that ended up impeding information sharing. First, the organization's history with hiring freezes, acquisitions, and cutbacks, led to increased fear in the organization of losing one’s job, and lead to the promotion of guarding knowledge for power and status. Second, the organization was a US government contractor working on security, intelligence and advanced weaponry, therefore requiring a high level of security in the organization. This value of security, while appropriate for the organization to promote, was inconsistent with the value of information sharing. Therefore, when a technology was introduced to encourage sharing amongst individuals, the values of the organization negatively influenced the use and benefits of the system through the individuals shared negative attitudes toward information sharing (Koch et al., 2013).

**Information Sharing Attitudes Relation to Organizational Culture.** Finally, it is essential to form the connection between information sharing attitudes and organizational culture. Recalling the definition of attitude, “a learned disposition to respond in a consistently favorable or unfavorable manner with respect to a given object” (Fishbein & Ajzen, 1975; p. 6), a fundamental feature of an attitude is the individual's preference. The definition of organizational culture is a system of collectively held values (Hofstede, 1998), and a value is defined as "a broad tendency to prefer certain states of affairs over others" (Hofstede, 1980; p. 19). Following this logic, a collection of either preferences or values, would give insight into the culture of an organization. Per previous literature, several values impact the individual's attitude toward information sharing, for example, the value of fear, trust, power, and security. As Kayworth and Leidner (2006) pointed out, organizational culture also allows the differentiation of organizations according to the dominant values of the organization.
Therefore, the rank of the information sharing value in the value hierarchy of the organization indicates different organizational cultures. An organization that values information sharing above other values should have members who exhibit more favorable attitudes toward information sharing than those organizations who value information sharing below other values. As indicative of the organizational culture, the degree of value placed on information sharing, will be observable in the interval measurement of Information Sharing Attitude.

**Perceptions of IS Strategy**

The values foundational to organizational culture can be difficult to observe, so researchers often rely on perceptions of the values held by organizational members to gain insight into the organizational culture (Kanungo, Sadavarti, & Srinivas, 2001; Jarvenpaa & Staples, 2001; Scott, Mannion, & Davies, 2003). One key perception related to organizational culture and potentially impacting IS Use and Net Benefits is Perception of IS Strategy.

**Strategy Defined.** A strategy has been defined by multiple researchers in several different contexts. In the field of business management, a prominent strategy researcher, Henry Mintzberg (1987), defined strategy as a plan, a ploy, a pattern, a position and a perspective. The notion of strategy as perspective fits with my focus on organizational culture. In Mintzberg’s perspective definition, strategy is how the organization perceives the world and the organization's role in the world. He likened the strategy of an organization to the personality of an individual. In this way, the strategy of an organization is “built right into it”. The character of an organization leads the organization to act and respond in a certain way to stimuli. Mintzberg noted that other fields have used other concepts to capture this notion. In
particular, sociologists refer to the “ideology” of a society, military theorists refer to the “grand strategy” of armies, and anthropologists refer to the “culture” of a society.

This organizational personality embodies the organizational culture and values of the collective (Mintzberg, 1987). For example, if a company values innovation and the first-mover advantage, then the company may be an aggressive risk taker and devote resources and attention to research and design. Another example is if a company values safety, then the company may accentuate safe working environments and infrastructure.

Chen, Mocker, Preston, and Teubner (2010) adopted the perspective definition when defining IS strategy as, “a shared organizational perspective on setting and meeting organizational goals” (Chen et al., 2010, p. 236). Following these researchers, I define strategy as the shared organizational perspective on setting and meeting organizational goals based on the organization’s culture and values.

I measure the Perception of IS Strategy by members to gain insight into the culture of an organization. Perceptions of strategy are valid reflections of organizational culture because as Mintzberg (1987) noted, strategy 1) is reflective of values, 2) is shared by the collective, and 3) distinguishes one organization from another. Following Husted and Allen (2007), I use classic literature (Child, 1972; Hambrick & Mason, 1984; Prahalad & Bettis, 1986; Andrews, 1987) and the more contemporary theory, the resource-based view (RBV) of the firm (Barney, 1991) to form the connection between strategy and organizational culture.

**Reflective of Values.** Corporate values historically have been listed as a fundamental pillar of corporate strategy (Andrews, 1987), but these values were later de-emphasized by
other researchers (Porter, 1979). The RBV presented by Barney (1991) brought values back into the spotlight by linking strategy and values through the concept of organizational culture. Barney specifies the strategy of a firm is formed by the external perception of the business environment and the internal resources of the organization. One of the key resources of the organization, in the fact that it is valuable and difficult to imitate, is organizational culture, which is rooted in the dominant values and beliefs of the organization (Barney, 1991).

Strategic choices are made through an evaluative process (Guth & Tagiuri, 1965; Child, 1972; Hedberg & Johsson, 1977, Prahalad & Bettis, 1986, Geletkanycz, 1997). The decision maker considers his or her cognitive base (perceptions about the future, alternatives, or consequences) and his or her values (Hambrick & Mason, 1984). As Hambrick and Mason (1984) point out, values are an important element in organizational strategy; “a decision maker can arrive at a set of perceptions that suggests a certain choice, but discard that choice on the basis of values” (Hambrick & Mason, 1984; p. 195). Therefore, a strategy is derived partially from the consideration and ranking of values. This value ranking is reflective of the value ranking within the organizational culture.

The connection between values and strategy has been empirically supported as well (Geletkanycz, 1997; Kotey & Meredith, 1997; Husted & Allen, 2007). Geletkanycz (1997) tested the effects of managerial values on the strategic choices for an organization. He found the national cultural values of individualism and short-term orientation covary with certain strategic decisions and policies. Kotey and Meredith (1997) tested a similar relationship between values and strategy when they focused on the link between managerial values and organizational strategies. Kotey and Meredith (1997) measured the personal values of small
business owners, in terms of entrepreneurial and conservative values, and found specific strategies, in terms of proactive or reactive strategies, are associated with these values. Husted and Allen (2007) found similar results by looking at the corporate responsibility values of a firm and the strategy of the firm. Husted and Allen (2007) use the RBV to hypothesize the relationship between strategy and values, and found the organizations with a high value for social responsibility were much more likely than other firms to engage in a socially responsible strategy.

Guth and Tagiuri (1965) summarize the relationship between values and strategy best by stating, "It is quite clear, on the basis of both observation and of systematic studies of top management in business organizations, that personal values are important determinants in the choice of corporate strategy" (p. 123). This concept is consistent with the values-based definition of organizational culture. Strategy, including IS strategy, is indicative of organizational values, so perceptions of strategy are an appropriate operationalization of organizational culture.

**Shared by the Collective.** According to the shared perspective view of strategy, a key component of strategy is the collective feature of strategy. Following this definition, the strategy cannot only be dictated to the organization from the board room, but, in fact, is shared by the members of the organization. Mintzberg (1987) describes this well when discussing the concept, "Strategy is a perspective shared by the members of an organization, through their intentions and/or by their actions. In effect, when we are talking about strategy in this context, we are entering the realm of the collective mind – individuals united by common thinking and/or behavior" (p. 17). Mintzberg is not alone in specifying strategy as collectively shared;
Guth and Tagiuri (1965) define strategy as shared when they say strategy is, “an explicit and shared set of goals and policies defining what the company is to achieve and become in the future and how it must operate in order to reach its goals” (p. 127).

The cultural model of strategy formation, offered by Bougeois and Brodwin (1984) further supports the shared perspective view strategy. Bougeois and Brodwin (1984) provided the metaphor of upper management playing a coaching role in the organization. The coach may give general direction but then the strategy is taken up by the members of the organization to fulfill the goal. The shared by the collective component of strategy is supported later by Hart (1992) in the discussion of strategic vision and shared values. While top management motivates and inspires the strategy, the strategy centers on the shared perspective and values of organizational members.

By defining strategy as a group-level phenomenon, researchers must consider the perceptions of strategy by organizational members to assess the strategy, and therefore the values of an organization. Perceptions are how individuals assign meaning to their environment (Taylor & Fiske, 1978), so organizational members’ perceptions of strategy indicate the way members assign meaning to the strategy of the organization.

**Distinguish an Organization.** As noted, organizational culture is shared values, and it also is what distinguishes one group from another (Hofstede, 1980; Leidner & Kayworth, 2006). Shared values are ranked according to priority, creating a unique value hierarchy that distinguishes one organization from other organizations with different value hierarchies. As Hedberg and Johsson (1977) discussed, one of the purposes of a strategy is to be an ordering
system that maps information into perspectives or worldviews. Roth, Schweiger, and Morrison (1991) posited these worldviews are the dominant general management logic, based on the schemas of the top managers. The schemas are unique to each manager but are reflective of the values, theories, and propositions of the managers.

Empirical research supports the concept that the strategy of an organization differs from another organization in terms of values. For example, in the empirical work of Kotey and Meredith (1997), two distinct strategies were measured, proactive strategies and reactive strategies. Proactive strategies involve initiative-taking and value more integration and risk. Reactive strategies tend to follow the market leaders and do not value innovation greatly. The researchers admit the activities involved with each strategy may intermingle, but a “proactive-reactive continuum” (Kotey & Meredith, 1997; p. 39) exists, which is used to distinguish organizations.

The idea of strategy distinguishing an organization is revisited by Mahoney and Pandian (1992) in their discussion of the RBV and strategic management. As the RBV explains, the strategy of the firm is the distinctive competencies of the organization. These competencies are defined by the rules and routines of the organization and may be based on the values of the organization. The idea of strategy distinguishing the organization is particularly true when considering the information technology (IT) capability of an organization. Bharadwaj (2000) discusses IT capabilities under the RBV lens and finds organizations differentiate themselves on the basis of their IT capabilities. An organization that values IT capabilities, and the strategic value IT provides for the organization, employs a superior IT capability strategy. The superior IT capability strategy is consistent with the value placed on IT and is shared by the collective.
Bharadwaj found that organizations may be identified and differentiated based on strategy, such as a superior IT capability strategy. In summary, measuring organizational culture through the perceptions of strategy, as the strategy is based on values, shared by the collective and distinguishes one group from another, is insightful and appropriate.

**Support in IS Research.** In their seminal work regarding perceptions of IS strategy and organizational culture, Kaarst-Brown and Robey (1999) operationalized organizational culture as the organization’s perspective of the use and management of IS. This operationalization fits with the definition of IS strategy as the “organizational perspective on the investment in, deployment, use, and management of the information system” (Chen et al., 2010; p.236).

Kaarst-Brown and Robey (1999) investigated two organizations in the same industry and measured the IS strategy from the perspective of the members of the organization. Data collection was conducted through participant observations, historical-biographic interviews and artifact and document analysis. The researchers gathered an understanding of the IS strategy, through members’ perspectives, and used this to measure the organizational culture. They described organizational culture as myth and magic, explaining that several employees did not understand how the system technology specifically works and instead considered the system “magic”. The authors considered five IT culture types as representative of perceived IS strategic value. One of these perspectives is the technology being represented by a “dragon on a pile of gold”. In this culture, the members see the value of the technology and revere the power the technology may provide. This is representative of a culture where the IS is perceived as having a high strategic value. Kaarst-Brown and Robey (1999) also presented the “caged dragon” and “dead dragons” cultural types. In these cultures, the organization is fearful of the technology, or
resentful of the technology, respectively. This is because the technology might have wounded the organization or individuals in the past, either through providing inaccurate data or replacing human labor. In this culture the power of the IS department is limited and perceived as a necessary evil.

Perceptions of IS strategy also were investigated in the work of Kanungo, Sadavarti, and Srinivas (2001) when they studied the IS strategy and organizational culture in a large financial institution. Kanungo and colleagues (2001) found support for the different views and roles of IS representing organizational culture values through a research questionnaire. Similar to Kaarst-Brown and Robey’s (1999) “dragon on a pile of gold”, the centrally planned/leading edge view of IS was consistent with high levels of perceived IS strategic value. Conversely, the shared view of low perceived IS strategic value presented IS as nothing more than an expense. With this view, IS was considered a necessary evil, like plumbing, the organization must have it in order to conduct business, but it does not add value beyond a single function (Kanungo et al., 2001). These views of the potential and value of IS are components of the organizational culture, as the culture of an organization is a ranking of organizational values; a perception of an aggressive IS strategy (“dragon on a pile of gold”, centrally planned/leading edge) ranks the value of IS higher than a conservative strategy (“caged dragon”, necessary evil). With this in mind, I conclude that the Perceptions of IS Strategy by the members of the organization will yield meaningful insights into the culture of an organization.

**Perceptions of IS Strategy in IS Research.** IS strategy is the “organizational perspective on the investment in, deployment, use, and management of the information system” (Chen et al., 2010; p.236). Previous research considered IS strategy as financial in nature, such as IT
expenditures and research and design (R&D) investments and looked to financial ratios and reports to support evidence toward strategy success (Byrnjolsson & Hitt, 1996). However, as Brynjolfsson and Hitt (2000) showed, the measurement of these performance objectives was crude and subject to significant error. For example, certain tax advantages are offered for investments in R&D, so investing in R&D may not indicate a specific IS strategy as much as a particular tax strategy. Parsons (1983) deviated from this practice and presented generic IT strategy types observed in organizations ranging from viewing IS as a “necessary evil” in the organization, to a “centrally planned” and “leading edge” asset (Kanungo et al., 2001). The conceptualization of IS strategy as an organizational perspective on the investment in, deployment, use and management of IS, as opposed to the historical conceptualization as the resources devote, began a deeper discussion of the role of IS strategy.

In particular, researchers have discussed the role IS should hold in the organization. Parson (1983) presented six generic IT strategies in a teaching note. These strategies ranged from a centrally planned and leading-edge strategy to a necessary evil. In an organization where IS is considered centrally planned and leading edge, the IS is considered a tool toward a competitive advantage. Conversely, in organizations where IS is considered a necessary evil, investments in IS are made with caution. Ward (1987) furthered this discussion by showing the present and future importance of IS in an organization ranges from a support system for the organization to a strategic function of the organization. Benefits from the system are determined through this importance, whether the system is viewed as strategic or supportive. The systems that are considered strategic assets of the organization are regarded as "stars" of the organization, requiring significant resources and generating significant benefits. The view of
IS as a star, is that "existing computer systems are critical to existing operations" and "future systems are critical to success" (Ward, 1987; p. 24). Systems considered supporting assets to the organization are regarded as "dogs" and are viewed as systems that "exist to improve management and performance, but none are critical to business" (Ward, 1987; p. 24).

Ragu-Nathan et al. (2001) also investigated perceptions of IS strategy in organizations and focused on specific dimensions of the IS strategy. For example, Ragu-Nathan and colleagues (2001) considered the promotion of IS within the organization. If systems are promoted aggressively within the organization, organizations tend to promote IS services through “behaviors such as actively encouraging user involvement, promoting user awareness of available technologies, offering user support, and maintaining continuous interaction with users" (Ragu-Nathan et al., 2001; p. 271). On the other hand, the dimension of a conservative management of IS describes the management attitude toward IS as focusing on the risks associated with the systems. Ragu-Nathan and colleagues (2001) found those organizations that perceived the IS strategy to be aggressively promoted reported higher performing information systems, and a similar significant relationship was not supported by the conservative management of IS. While methodological issues may exist, such as common method bias and measurement issues, this research provides a basis for investigating the Perceptions of IS Strategy in an organization and the outcomes of IS deployment.

Chen et al. (2010) further studied IS strategy and divided IS strategy into two types, IS innovators and IS conservatives. The researchers proposed a measurement tool for examining IS strategy and propositions regarding the planning, alignment, and competitive advantage of IS. The researchers also admitted two significant limitations exist when studying IS strategy.
First, IS strategy generally has been viewed only from a top-down perspective, and so many measures of IS strategy have been of the perceptions from top management. In a conceptualization where IS strategy is considered as a perspective of the collective, then measuring the IS strategy through members' perceptions would be a more appropriate measure. Second, the view of IS strategy as a perspective of the collective is less mature in the IS literature and, therefore, still is not well understood. Fewer than nine articles regarding this definition were identified by the researchers, and the majority were theoretical and not empirically tested. These two limitations indicate a gap in the IS literature regarding perceptions of IS strategy and IS outcomes. The current research addresses this gap in two ways. First, I am using Perceptions of IS Strategy from the organizational members’ perspective as opposed to the top-down perspective. Second, I am defining IS strategy as the shared view of the role of IS in the organization; a conceptualization of IS strategy currently underutilized in extant IS research. By addressing these gaps, the current research progresses our understanding of IS strategy.

**HYPOTHESIS DEVELOPMENT**

**Guideline 4: Modeling Context-Specific Factors**

The fourth guideline for investigating the effects of context in IS research is to include the context-specific factors on the core constructs in the general model as direct effects on the outcome. While each construct was discussed at length in the literature review, table 2-1 includes a summary of these constructs along with their sources.
Table 2-1. Construct Definitions and Sources

<table>
<thead>
<tr>
<th>Construct</th>
<th>Source(s)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Information Quality</td>
<td>DeLone &amp; McLean, 1992; Seddon, 1997</td>
<td>The relevance, timeliness and accuracy of the output of the information system.</td>
</tr>
<tr>
<td>Use</td>
<td>Burton-Jones &amp; Gallivan, 2007; p. 659</td>
<td>A user’s employment of a system to perform a task.</td>
</tr>
<tr>
<td>Individual Net Benefits</td>
<td>DeLone &amp; McLean, 2003</td>
<td>The user defined and task specific benefits of the system at the individual level.</td>
</tr>
<tr>
<td>Information Sharing Attitude</td>
<td>Eagly &amp; Chaiken, 2007; Wang &amp; Noe, 2010; p. 117</td>
<td>An individual’s propensity to evaluate the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures with some degree of favorability or unfavorability.</td>
</tr>
<tr>
<td>Perceptions of IS Strategy</td>
<td>Chen et al., 2010</td>
<td>The organizational perspective on the investment in, deployment, use, and management of the information system.</td>
</tr>
</tbody>
</table>

Before I present the hypotheses of the present research, I must point out the IS literature still is working to identify the role of organizational culture in the use and benefits of IS. While evidence will be presented in the next section to support the hypothesized relationships, more conceptual and empirical work is needed to qualify each relationship as strongly supported. Furthermore, while some relationships hypothesized may be more meaningful than others, current IS literature has not identified these relationships, and instead the effects of organizational culture may be expected on several factors leading to IS benefits (Kappos & Rivard, 2008). The present research seeks to address this issue by testing many of the relationships simultaneously. In this way, the degree of the hypothesized relationships may be assessed and IS research may progress toward a more focused understanding of the impact of organizational culture.
The Relationships from the ISSM.

I begin by confirming the relationships presented by the general theory. I use the core constructs of PIQ, Use and individual Net Benefits from the ISSM (DeLone & McLean, 2003) as the basis for the general theory. The model proposes mediation (if viewed as a variance model) of the relationship between PIQ and individual Net Benefits through system Use (see figure 1-3).

The first relationship to be tested is the effect of PIQ on Use. It is logical for a user who perceives the information generated by the system to be relevant, timely, and accurate to use the system more. This logic has been empirically supported by Saeed and Abdinnour-Helm (2008) in a study looking at PIQ and actual usage of a student information system. When this study’s participants perceived the information provided by the IS to be accurate, well-formatted, and timely, they were more likely to use the system. In other words, the relationship between PIQ and systems use was found to be positive and significant.

Other researchers have found similar results (Venkatesh & Davis, 2000; Rai et al., 2002; Hassanzadeh et al., 2012). For example, Venkatesh and Davis (2000) published a seminal study measuring the output quality of an IS and its effects on the intention and use of an information system. Output quality was measured as a form of perceived relevance of the output of the system to the individual’s needs. When a person found the information output to be relevant and high quality, then their intention to use increased. A significant and positive relationship between use intention and usage behavior also was supported in the study, suggesting the influence of output quality on the use of an IS. Thereby, I propose H1:
**H1:** There exists a positive relationship between the Perceived Information Quality of an IS and the Use of the system by a user.

The second relationship to be tested from the ISSM model is the relationship between Use and Net Benefits. This is one of the focal relationships in the research model, as the productivity paradox questions the relationship between use (as inferred by IS investment) and benefits derived from the system. However, previous researchers have cited specific explanations for why a relationship between use and net benefits may not be supported, such as lags (Bierly et al., 2000; Desmarais et al., 1997; Andreu & Ciborra, 1996; Tippins & Sohi, 2003; Gregor et al., 2006), mismanagement (Damanpour, 1992; Guimaras & Igbaria, 1997; Li & Ye, 1999; Fichman, 2004; Petter et al., 2013), and measurement issues (Venkatesh & Morris, 2000; Devaraj & Kohli, 2003; Johnson et al., 2014). Specifically, Devaraj and Kohli (2003) contend that when use is measured through usage logs and an objective benefits variable is measured, the effect of use on the benefits of a system is positive and significant.

The relationship between use and net benefits of an information system has been theoretically proposed in the first (DeLone & McLean, 1992) and second (DeLone & McLean, 2003) versions of the ISSM. The relationship is also conceptually supported by DeLone and McLean (2004) in an illustrative case study of two online retailers. Furthermore, a meta-analysis of the ISSM found the relationship between use and net benefits to be moderately supported (Petter & McLean, 2009). The relationship is supported empirically by Zhu and Kraemer (2005) in a large-scale questionnaire study of multinational organizations. These researchers found a direct and positive significant relationship between the use of a system by the employees as a whole and the benefits for the organization, such as increasing sales, improving customer
services, reducing inventory and procurement costs, and making internal processes more efficient. In another setting, Venkatesh and Sykes (2013) found similar results by showing the positive influence of social media use on individual economic benefits. Therefore, I propose H2:

**H2:** There exists a positive relationship between the Use of the system by a user and the user's individual Net Benefits.

*Additional Relationships Between Factors in the General Theory*

DeLone and McLean propose that information quality affects use, and that use is a direct antecedent of individual impact. DeLone and McLean argue the output of an IS cannot be beneficial for an individual organization unless it is *consumed*, in other words, used. Empirically, this logic is supported by Hodges and Hernandez (1999). These researchers study four local mental health authorities of a single hospital. Each authority has the same client outcome information data. However, certain authorities benefit more from this information than the other authorities. Hodges and Hernandez indicated this is due to the use of the system, proposing the information quality, in and of itself, is not enough to generate benefits for the organization. Instead, systems use carries the effect of the information quality to create benefits.

While this implies that system use is a mediator between perceived information quality and net benefits, the explicit distinction is not made. Recall the model perspective discussion of the ISSM. The ISSM is presented as a hybrid model, containing elements of both a variance and process model. If the model is considered purely as a variance model, then system use is a mediator. However, in a process model, use may be considered a step toward realizing net
benefits. The present research model will test the ISSM relationships as a variance model, inferring system use as a mediator. To determine the degree of mediation, the direct effect of perceived information quality on net benefits will be tested. Several researchers have presented the direct effects from PIQ to use, and from use to net benefits, without reporting the direct effect between PIQ and net benefits (DeLone & McLean, 2003; Petter & McLean, 2009; Petter & Fruhling, 2011, Hassanzadeh et al., 2012). This does not mean necessarily a direct effect does not exist, but a reported coefficient for the relationship between information quality and net benefits has not been presented, so the assumption of a fully mediated relationship would be inappropriate.

Some researchers have reported a direct effect from PIQ to net benefits (e.g., Etezadi-Amoli and Farhoomand, 1996). Consistent with the process approach, DeLone and McLean (1992, 2003) argue that use must occur for benefits to be realized from the system. However, consistent with the variance approach, some researchers have reported a significant direct effect between PIQ and net benefits. For example, Etezadi-Amoli and Farhoomand (1996) found a significant relationship between PIQ and net benefits but only in the presence of a minimum level of participant use. This is consistent with other studies reporting the direct relationship between PIQ and net benefits (e.g., Bharati & Chaudhury, 2004; Etezadi-Amoli, & Farhoomand, 1996; Gorla et al., 2010; Prybutok et al., 2008; Teo & Wong, 1998; Wixom & Watson, 2001; Zheng et al., 2013). In these studies, system use is assumed or required, and not statistically reported. This does not mean the relationship is not mediated by use. If the model does not include use, then it may be an unstudied variable that effects how PIQ translates to benefits in
the real world. However, a thorough investigation, where a direct effect and a mediated effect are both considered is necessary. Therefore, I will test the direct effect in H3:

\[ H3: \text{There exists a positive relationship between the Perceived Information Quality of an IS and the user’s individual Net Benefits.} \]

**Contextual Direct Effects**

**Effect of Organizational Culture on Perceived Information Quality.** Recalling guideline four, modeling the context-specific factors as direct effects on the focal constructs, I consider the direct effects of Information Sharing Attitudes and Perceived IS Strategy on the constructs of PIQ (H4), system Use (H5), and individual Net Benefits (H6).

Evoking the definition of organizational culture, as “a system of collectively held values” (Hofstede, 1980; p. 24), the culture of an organization indicates the value placed on certain processes and artifacts within the organization. For example, an organization that values customer loyalty and satisfaction, may accept lower profit margins to build customer relationships than other organizations. In other words, the values of an organization help determine the priorities of said organization. If an organizational culture prioritizes information, and the IS provides this information, then it is possible the information is perceived more relevant to the users than if the organizational culture did not value the information. Recall, one of the components of PIQ is relevance (DeLone & McLean, 1992; Seddon, 1997). As the perception of relevance of information is affected by the priorities of the organization, it is logical to expect organizational culture to have an effect on PIQ.
Furthermore, previous research has indicated a positive relationship between number of individuals involved with sharing information and perceptions of the accuracy and completeness of information (Davenport & Prusak, 1998; Alavi & Leidner, 1999; Alavi & Leidner, 2006). One of the reasons for this phenomenon is collaborative filtering (Poston & Speier, 2005). Collaborative filtering is “the process of filtering or evaluating items using the opinions of others” (Schafer et al., 2007; p. 291). When information sharing attitudes are positive, the likelihood of more user activity in an IS is increased. As a group, users can share opinions and further details regarding this information, adding credibility to the information. By this logic, favorable Information Sharing Attitudes are linked positively to PIQ. Thus, I propose H4a:

\[ H4a: \text{There exists a positive relationship between the Information Sharing Attitudes of IS users and Perceived Information Quality of an IS.} \]

Moreover, research has indicated perceptions of IS strategy may affect the perceived information quality of a system. Specifically, the operations management literature (particularly the supply chain management research stream) illuminates the role of top manager support as an important factor in providing quality information (Feldmann & Muller, 2003; Li & Lin, 2003). A manager who supports a strategic role for IS (a high perception of IS strategy) understands the strategic value of information. When the strategic value of information is perceived, then the quality of the information, in terms of accuracy and timeliness, is perceived high as well. Li and Lin (2003) empirically found companies with managers who understood the importance of information also possessed timely and accurate information. In this respect, a logical argument may be made that a higher importance Perception of IS Strategy (where the role of IS is
considered as a strategic asset as opposed to a necessary evil) will be linked to a high level of Perceived Information Quality, and H4a:

\[ H4b: \text{There exists a positive relationship between the Perceptions of IS Strategy and the Perceived Information Quality of an IS.} \]

**Effects of Organizational Culture on System Use.** Prominent researchers have demonstrated the explanatory power of attitudes on the behavior of individuals. For example, the Theory of Planned Behavior (TPB) is a seminal theory positing the effects of attitudes on behavior, mediated by intention (Ajzen, 1991). As system use is a behavior of an individual, the effect of an information sharing attitude on the behavior of system use logically follows, as behavior intentions carry the effect of the attitude to the behavior. Empirically, this logic is supported by Pavlou and Fygenson (2006) in e-commerce research. Pavlou and Fygenson (2006) used a group of internet consumers and measured the individuals’ attitudes toward getting information or purchasing an online product. The dependent variable in the study is the behavioral intention to get information or purchase the product. The relationship between attitudes and behavioral intention was found to be significant, as well as the relationship between the behavioral intention and behavior.

The focal attitude in the present research is the Information Sharing Attitude. As discussed, favorable information sharing attitudes promote free and open sharing of information (Wang & Noe, 2010). The use of electronic information systems enables this free and open information sharing. Information systems provide a viable platform for sharing information, such as internal documents and data among customers and employees (Lai &
Mahapatra, 1998). Conceptually, Scott (1998) described several ways intranets have been used to share knowledge, such as providing video conferencing to facilitate the transfer of tacit knowledge, or an intranet that offers a place for users to share original experiences. Therefore, if the likelihood to share information is increased due to positive Information Sharing Attitudes, and sharing is facilitated through the Use of an IS, then Use will also increase. I propose H5a:

H5a: There exists a positive relationship between the Information Sharing Attitudes of IS users and Use of the information system.

Similar to attitudes, subjective norms also have been presented as antecedents of behavior, mediated by intention, in the TPB (Ajzen, 1991). A subjective norm refers to “the perceived social pressure to perform or not perform a behavior” (Ajzen, 1991; p. 188). Recall the definition of IS strategy, the organizational perspective on the investment in, deployment, use and management of the information system based on the organization’s culture and values (Chen et al., 2010). If the perceived IS strategy is the organizational perspective of the role of an IS, then the subjective norm would reflect this perspective. For example, if a member of an organization perceives the use of the information system is valued highly, specifically by people important to the member, then the member would feel as though their behavior to use the system is also important. This is supported theoretically in seminal technology adoption models.

For example, a revision of the TAM model by Venkatesh and Davis (2000) includes subjective norm as an antecedent to use, mediated by intention to use. The Unified Theory of Acceptance and Use of Technology (UTAUT) presented by Venkatesh et al. (2003) includes
social influence as a factor of influence on use behavior, mediated by behavioral intention.

Finally, Social Cognitive Theory (Bandura, 1977) presents social norm as an environmental factor that, along with cognitive and behavioral factors, determines human behavior. As Venkatesh and colleagues state, “While they have different labels, each of these constructs [social influence, subjective norm, social factors, image, social norms] contains the explicit or implicit notion that the individual’s behavior is influenced by the way in which they believe others will view them as a result of having used the technology” (Venkatesh et al., 2003; p. 451). Given the extensive theoretical evidence, along with the empirical evidence, it would be logical for a higher importance Perception of IS Strategy to be consistent with high levels of system Use. Therefore, I propose H5b:

\[ H5b: \text{There exists a positive relationship between the Perceptions of IS Strategy and Use of the information system.} \]

Effect of Organizational Culture on Net Benefits. Another stream of research infers the benefits of IS are derived in some organizations more than others due to organizational factors. (Cohen & Levinthal, 1990; Zahra & George, 2002; Newell et al 2003; Tordova & Durisin, 2007; Camison & Fores, 2010; Kostopoulos et al., 2011). Zahra and George (2002) describe four steps to leverage information: acquisition, assimilation, transformation, and exploitation. The acquisition dimension refers to a “firm’s ability to identify and acquire externally generated knowledge that is critical to its operations” (Zahra & George, 2002; p. 2002). Assimilation refers to the firm’s routines and processes that allow it to understand this acquired information. Transformation is the process whereby the information is internalized and converted into actionable knowledge. Finally, exploitation occurs when the knowledge is used and applied
toward business operations. (Zahra & George, 2002). According to these authors, the organization must have routines and processes in place to share information, as well as the underlying assumption in the organization that information is important. A specific organizational culture characteristic, one that can transform information into a benefit for the organization, is required (Zahra & George, 2002).

Recall the definition of information sharing, “the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures” (Wang & Noe, 2010; p. 117). Information sharing through IS is considered an organizational process because individuals must identify important information and disseminate it efficiently, so it may be leveraged (Barney, 1991; Grant, 1996; Alavi et al., 2006). A culture that promotes the free sharing of information, by exhibiting favorable information sharing attitudes, is likely to increase the benefits derived from this information. This concept is supported empirically by Harrington and Guimaraes (2005) when they found a positive relationship between available information sharing channels and IS benefits. Benefits were measured as improving response times, providing a competitive advantage and reducing costs. These authors concluded that “encouraging greater degrees of information sharing, including knowledge of technology use, business strategies, and operations, across business units may enhance the ability of the management team to implement information technologies” (Harrington & Guimaraes, 2005; p. 57). These findings suggest attitudes toward sharing of information within an organization have a direct and positive effect on net benefits.
**H6a: There exists a positive relationship between Information Sharing Attitudes and the individual Net Benefits of the IS.**

Along this same reasoning, Perceptions of IS Strategy also may affect the benefits derived from an IS directly. Recall the definition of IS strategy, “The organizational perspective on the investment in, deployment, use, and management of the information system” (Chen et al., 2010). As discussed earlier, the perception of the IS strategy demonstrates how the organizational members view the strategic role of IS. Olsen (1982) points out that just because the technology allows for the collection of certain information, this does not mean the organization will apply this information. The management of the IS will influence the processes and routines used to understand this information in an organization. This concept is consistent with information assimilation, which refers to the firm’s routines and processes that allow it to understand acquired information (Zahra & George, 2002).

Perceived IS strategy includes the organizational perspective on the investment in the information system. In an organization where individuals perceive management to invest freely in the use and management of IS, the members are likely to recognize the value of the information provided by the system. By recognizing the value of the information, the members are likely to work to understand fully organizational information and work to reap the benefits from IS. This view is consistent with the transformation step toward leveraging information, the process whereby the information is internalized and converted into actionable knowledge (Zahra & George, 2002). As earlier discussed, Zahra and George (2002) have identified ways in which information is leveraged so benefits may be derived, specifically through acquisition, assimilation, transformation, and exploitation. Following the arguments above, perceptions of
IS strategy may improve the benefits derived in the assimilation and transformation steps. Therefore, it is reasonable to expect Perceived IS Strategy to impact IS Net Benefits positively:

\[ H6b: \text{There exists a positive relationship between the Perceptions of IS Strategy and the individual Net Benefits of the IS.} \]

**Guideline 5: Examination of Interplay Between Constructs**

Consistent with guideline 5 for investigating contextual factors in IS research, examination of contingent and interaction effects is necessary. The discussion above points to the organizational culture facets of Information Sharing Attitudes and Perceptions of IS Strategy being direct antecedents of the outcome variables of Perceived Information Quality, Use and Net Benefits. However, evidence exists indicating the influence of organizational culture may be contingent and complementary, and, therefore, an interacting effect (Hofstede, 1998; Jarvenpaa & Leidner, 1998; Hodges & Hernandez, 1999; Wade & Hulland, 2004; Leidner & Kayworth, 2006; Kappos & Rivard, 2008). Previous literature has indicated a direct relationship between organizational culture and performance may not exist. For example, Hofstede (1998) states “Although nobody has found - or is likely to find - a simple one-to-one relationship of any aspect of organizational culture with organizational performance, there is little doubt that organizational culture affects performance; in the long run, it may be the one decisive influence for the survival or fall of the organization” (p. 491). This statement indicates the effect may be an interaction effect, amplifying or dampening the previously established relationships to Use and Net Benefits. To create a complete model of organizational culture, I also consider the
possibility the organizational culture variables may moderate other relationships in the research model.

Contextual Moderating Effects

**Relationship between Perceived Information Quality and Use.** The first relationship where moderation may occur is between Perceived Information Quality and system Use. The relationship between PIQ and Use has previously been supported by a large effect size, as shown in the meta-analysis of the ISSM by Petter and McLean (2009). When considering organizational culture, researchers Leidner and Kayworth (2006) describe how organizational culture is hidden, even from the group itself, until there is conflict between shared values (Leidner & Kayworth, 2006; Kappos & Rivard, 2008). Organizational culture may have an effect on how PIQ affects system use if the cultural values embedded in the technology conflict with the values of the organization. For example, when an intranet IS is presented, and designed to encourage information sharing amongst departments, the system might be perceived to be of high or low information quality. According to the relationship between perceived information quality and use, the higher the information quality, the greater the use. If a high level of information quality is perceived, and the organizational culture does not value information sharing, then the effect of perceived information quality on use may be dampened. In this sense, the influence of PIQ on Use is contingent upon the culture of the organization.

The interaction effect also is propositioned in a literature synthesis by Kappos and Rivard (2008), who consider organizational culture as a moderator between IS characteristics and use. The researchers found that when the characteristics of IS are consistent with user's
values, beliefs, and assumptions, systems use is increased. As the PIQ reflects the characteristics of the system, and organizational culture is a collection of values, this is consistent with the idea that PIQ interacts with organizational culture to predict system use. With this in mind, it is important to consider a moderating role of organizational culture on the relationship between PIQ and Use.

In summary, the cultural values of the organization likely will interact with the PIQ to impact Use. Information Sharing Attitudes and Perceptions of IS Strategy are expected to have an amplification effect on the relationship between PIQ and system Use. Therefore, I propose H7a and b:

\[ H7a: \text{The impact of Perceived Information Quality on system Use is enhanced as Information Sharing Attitudes increase.} \]

\[ H7b: \text{The impact of Perceived Information Quality on system Use is enhanced as Perceptions of IS Strategy Increase.} \]

Relationship between Use and Net Benefits. The other relationship that may be influenced by organizational culture is the relationship between Use and Net Benefits. Again, the relationship between these two variables is supported empirically in the meta-analysis by Petter and McLean (2009). While the organizational culture may have a direct effect on the benefits realized from the system, it is also likely the combination of use and organizational culture will have an effect on net benefits. Davis (1989) describes in his seminal work, “performance gains are often obstructed by users’ unwillingness to accept and use available systems” (p. 319). Davis does not test the relationship between use and net benefits, but the
assumption that performance gains are linked to use is presented and shared by other researchers (Bailey & Pearson, 1983; Davis, 1989; Wixom & Watson, 2001; Venkatesh et al., 2003).

Consider the study by Hodges and Hernandez (1999) investigating the use of information in organizations. The researchers find that the use of an IS, in and of itself, is not enough to derive benefits. They study four separate branches of one organization. Each branch has access to the same information. However, benefits derived from the IS, specifically decision-making accuracy, are different between the two organizations based on the perceptions of organizational values. The organizations differ in recognizing the value of the information, which is reflective of the perceived IS strategy, and the effect of the system use on decision making is also different. This suggests the benefits derived from the use of an IS are affected by the perceived role of IS in the organization.

This effect is supported empirically by Jarvenpaa and Leinder (1998) as they investigate the value of IS on organizational performance. These researchers found that even when the system is used, the benefits of the IS cannot be fully realized unless it is managed to leverage other firm resources. This finding is consistent with the idea that even though the system is used, management of the system will impact the relationship between use and net benefits. Wade and Hulland (2004) discuss the interdependent role IS resources play with other resources of the firm. They contend IS must be used to leverage other resources to provide benefits for an organization. These findings indicate that system use alone may impact benefits, but a distinct organizational culture with an integrated IS strategy that leverages other resources, may enhance this impact. This realization suggests use and organization culture
interact to impact net benefits from the system. With this in mind, it will be appropriate to consider the fact that organizational culture may play a moderating role on the relationship between Use and Net Benefits.

I expect the relationship between Use and Net Benefits to be moderated by Information Sharing Attitudes and by Perceived IS Strategy.

H8a: Information Sharing Attitudes enhance the positive relationship between system Use and individual Net Benefits.

H8b: Perceptions of IS strategy enhance the positive relationship between system Use and individual Net Benefits.

The full model, with testable hypotheses is presented in figure 2-8.

Figure 2-8. Research Model with Hypotheses
Guideline 6: Examination of Alternative Models

The above discussion outlines the theoretical and empirical support for each relationship proposed in the research model (figure 2-7). However, part of thoughtful theory development requires the examination of alternative context-specific models (Hong et al., 2014). While each of the independent variables may have an effect on the Use and Net Benefits of an IS, these effects may exist in an intervening form, i.e. mediation, mediated moderation, or moderated mediation. For example, it may be realistic for organizational culture to exhibit a positive and significant relationship on system use (supporting H5), but not with the other variables in the model (unsupported H4, H6, H7, and H8). Recalling the TPB, research has shown attitudes and social norms have influence behavior through intentions (Ajzen, 1991). If organizational culture influences system use behavior similar to the way attitudes and social norms influence behavior, then this relationship may exist as the primary influence of organizational culture. This means the organizational culture does influence the individual benefits of IS, but only through the use of the system, so that actual system Use is a mediator to Net Benefits.

Alternatively, it may be apparent the interaction between PIQ and organizational culture has a significant and positive relationship to system Use, but the other relationships with organizational culture are smaller, either in terms of value or significance. This would indicate a model of mediated moderation (e.g., Muller et al., 2005), wherein the effect of PIQ on Net Benefits via system Use differs depending on the level of the organizational culture variable.
However, the effect of organizational culture may occur after use. The data may suggest the relationship posited in hypothesis 8 is stronger than the other relationships with organizational culture. If the relationship between PIQ and Net Benefits is mediated by system use, then a model of moderated mediation occurs (Muller et al., 2005). In this case, the effect of system use on net benefits is amplified by the organizational culture.

As Hong et al. (2014) explain, “Taken together, the consideration of these different alternative models can help to understand the potential indirect effects of context-specific factors on a phenomenon.” (p. 120). Therefore, the data analysis technique used in this study must accommodate for the comparison of each relationship in the model. This requirement is satisfied by the utilization of structured equation modelling (SEM) as the data analysis technique (explained in chapter 3 – method of analysis).
CHAPTER 3

INTRODUCTION

The primary purpose of this study is to investigate the factors affecting the use and net benefits of information systems (IS) through the context of organizational culture. In summary of chapter 1 and 2, the productivity paradox has illuminated the inconsistent findings regarding the realization of net benefits from IS (Brynjolfsson & Hitt, 1996; Carr, 2003). One of the explanations for the paradox is mismanagement of IS resources, either by way of process alignment (Dos Santos & Sussman, 2000; Holahan, Aronson, Jurkat, & Schoorman, 2004) or organizational characteristics (Karahanna, Straub, & Chervany, 1999; Agarwal & Karahanna, 2000; DeLong & Fahey, 2000; Polites & Karahanna, 2012). Consequently, considering the context of culture likely will provide valuable insights into the factors affecting IS benefits (Jarvenpaa & Staples, 2000; Straub, Loch, Evaristo, Karahanna, & Strite, 2002; Alavi, Kayworth, & Leidner 2006; Leidner & Kayworth, 2006; Gregory, Harris, Armenakis, & Shook, 2009; Lawrence, 2013). For this reason, a model integrating the context specific factors of information sharing attitudes and perceptions of IS strategy is presented.

The research model hypothesized in chapter 2 (also available in figure 3-1) was tested as a pure variance model. This means the definition and operationalization of each variable remained constant, but the values differed by subject. The variance extracted for each predictor variable was used to explain the variance in the criterion variable (Seddon, 1997; Burton-Jones, McLean, & Monod, 2014). I used a survey methodology to investigate the relationships proposed in the hypothesized model (figure 3-1). The survey was deployed online...
using a college student sampling frame, with the Blackboard e-learning system as the IS of interest. This design accommodated a large sample size and measured the model variables with pre-validated items. I obtained observational data for the outcome variables of the model. This decreased the likelihood of contamination due to common method bias (CMB). The full research design and rationale for these choices are detailed in the research design section.

**Figure 3-1. Research Model with Hypotheses**

**METHODOLOGY**

The present research used two methods of collecting data, survey items and observational data, to investigate the relationships proposed in the research model above (figure 3-1). PIQ, Information Sharing Attitudes and Perceptions of IS Strategy were measured through a self-reported research survey. System Use and individual Net Benefits were measured through observational data by observing system use logs and individual course grades respectively. By using different data types (such as survey data and observational data), the credibility of the findings is improved as some of the CMB is mitigated by through the use of multiple methods. CMB is defined as “the variance that is attributable to the measurement
method rather than to the constructs the measures represent” (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; p. 879). Using multiple methods reduces effects that occur when only one, common method is used. CMB is discussed in greater detail in a later section.

Survey methodology has been used commonly in IS research (Lederer & Mendelow, 1988; Vitale, 1999; Agarwal & Karahanna, 2000; Harrington & Guimaraes, 2005; Karahanna, Williams, & Polites, 2013; Venkatesh & Sykes, 2013). This design accommodated a large sample size, and self-report items were assessed through items from pre-validated instruments. The survey was administered electronically. Electronic surveys can gather data from large numbers of people in a very short amount of time.

**RESEARCH DESIGN**

**Population and Sample**

The target population for this research includes any user of an IS in an organization. A sample from a public institution or private company both would be considered a subset of the target population as long as the organization offers an IS. The sampling frame for the current research included undergraduate students enrolled in a single core business management course required for all business administration majors or minors of study. This sample population used the IS (Blackboard) in the course. Student populations have invariably been used in previous research regarding IS use (Agarwal & Karahanna, 2000; Chen, Gillenson, & Sherrell, 2002; Polites & Karahanna, 2012; Guiso, Sapienza, & Zingalas, 2013), information sharing attitudes (Constant, Kiesler, & Sproull, 1994), and perceptions of the organizational
environment (Wolfe & Loraas, 2008). Despite the fact that much of IS research relies on student samples, such reliance may limit generalizability of results (Schwab, 2005).

Generalizability can be enhanced through attention to research design and setting. As Polites and Karahanna (2012) pointed out, the use of student samples can be appropriate in research settings that are realistic or not contrived. In their study, Polites and Karahanna (2012) asked university students to answer questions about their actual use of email to carry out a real and natural task. Similarly, many employees in organizations outside of academia use email to perform work functions. Therefore, the research setting is comparable to a setting of the target population. This is also true for the present research wherein students respond to questions about a specific IS, Blackboard, they used to submit actual course assignments, collaborate with other students and the professor, retrieve information and resources, and manage their performance. Therefore, the insights gained from this student sample likely are applicable for the target population.

Sample Size

The study is designed for a sample of greater than 250 participants. The determination of an acceptable sample size is partially dependent on the chosen method of data analysis. For this study, the analysis method is covariance-based structural equation modelling (SEM). Other analysis alternatives and the rationale for this choice are discussed in detail in the Method of Analysis section of this chapter. Using a sample size of at least 200 cases is generally considered and acceptable size for SEM (Hair, Black, Babin, & Anderson, 2010; Kline, 2011). By using a large sample size, as in at least 200 cases, the quality of SEM estimates is improved (Hair et al., 2010).
Unit of Analysis

The unit of analysis for this research study is the individual. While it might seem intuitive to study organizational culture at an organizational level, previous literature has indicated measuring at the individual level is appropriate (Straub et al., 2002; Iivari & Iivari, 2011; Hu, Dinev, Hart, & Cooke, 2012). As Straub and colleagues (2002) discussed, “culture must be measured at an individual level even though it is assumed that it is a group-level phenomenon” (Straub et al., 2002, p. 19). As Straub and colleagues (2002) point out, while culture is assumed to be a group-level phenomenon, it only can manifest itself through the individual. “Once the individual level data is aggregated, it will also be possible to assert that certain cultural characteristics do or do not belong to certain cultures”, (Straub et al., 2002; p. 19).

Data Collection

Participating students received extra credit for their participation through completion of the survey but were offered an alternative assignment for the same credit if they chose not to participate. A mild incentive, such as extra credit has been shown to increase participation (Dillman, Smith & Christian, 2014). Subjects were free to abandon the survey at any time but were not awarded credit for incomplete surveys. The survey was expected to take thirty minutes to complete. The participant was promised confidentiality, but his or her name was required to earn extra credit and link the responses with the observational data collected later. Therefore, the survey was confidential, but not anonymous.

There are three possible advantages for using a research survey to investigate the role of organizational culture on IS success. First, using a research survey allows for the employment
of previously validated measurement instruments. DeLone and McLean (2003) advocated for the use of existing validated scales wherever possible rather than the development of new measures. Second, using a survey allows for a larger sample size to be collected than other more time intensive alternatives, such as interviews and laboratory experiments. Increasing the sample size helps to improve the generalizability of the research findings (Schwab, 2005). Third, using a survey allows for each latent variable to be measured through several survey items. This technique should improve the reliability of the measurement of the variable (Schwab, 2005).

**Variable Measurement**

*Perceived Information Quality*

To capture the PIQ variable, I used a validated, self-report scale from previous literature. Self-report items are necessary, in this case, to observe the internal mental state of the individual (Schwab, 2005). I adopt the Doll and Torkzadeh’s (1988) seven-item scale used to assess perceived information quality. This scale used a seven-point response scale ranging from “to a very large extent” to “Never”. It was used by Seddon and Kiew (1996) when investigating the system quality characteristics and user satisfaction with an accounting information system. Other researchers have used the scale in empirical research, including Seddon and Yip (1992); Rai, Lang, and Welker, (2002), Bharati and Chaudhury (2004), and Gorla, Somers, and Wang (2010). The items in the scale do not specifically mention Blackboard but instead refer to "the system". To limit confusion for the respondent, I changed "the system" to "Blackboard" so the student would be reminded of the exact system referenced. The items are provided below in Table 3-1.
Table 3-1. Perceived Information Quality Measures (Doll & Torkzadeh, 1988)

<table>
<thead>
<tr>
<th></th>
<th>To a very large extent</th>
<th>Most of the time</th>
<th>More than half the time</th>
<th>Around half the time</th>
<th>Not Often</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think the information in Blackboard is presented in a useful format?</td>
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<td>Is the information clear?</td>
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<td>Does Blackboard provide sufficient information?</td>
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<td>Does Blackboard provide up-to-date information?</td>
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<tr>
<td>Do you get the information you need in time?</td>
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<tr>
<td>Does Blackboard provide information that seems to be just exactly what you need?</td>
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<tr>
<td>Does the information content on Blackboard meet your needs?</td>
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</tbody>
</table>

**Use**

System Use is measured in two ways. First, I captured user-reported system use levels from the pre-published, five-item scale by Burton-Jones and Straub (2006). Burton-Jones and Straub (2006) used the scale to study the use of the software program Excel by undergraduate students. The scale has been adapted and used in other empirical studies investigating trust (McKnight, Carter, Thatcher, & Clay, 2011) and social media use (Lallmahomed, Nor, Ibrahim, & Rahman, 2013). The Burton-Jones and Straub survey utilizes a 5-point response scale, but to reduce cognitive effort for the participant, the response scale for this instrument was converted to a seven-point scale in keeping with the other instruments in the survey. Also, the body of the items is amended to fit the Blackboard and online learning context of the study in two ways.
First, “MS Excel” is replaced with “Blackboard”, and second, the functionality of the system is changed to fit Blackboard’s functionality. For example, whereas Burton-Jones and Straub (2006) ask, “When I was using MS Excel, I used features that helped me perform calculations on my data” (p. 237), the present study asks, “When I was using Blackboard, I used the features that helped me submit assignments or take tests”. The items are listed in Table 3-2.

Table 3-2. Use Measures (Burton-Jones & Straub, 2006)

<table>
<thead>
<tr>
<th>Item</th>
<th>To a very large extent</th>
<th>Most of the time</th>
<th>More than half the time</th>
<th>Around half the time</th>
<th>Not Often</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>When I was using Blackboard, I did not use features that would help me learn.</td>
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<td>When I was using Blackboard, I used the features that helped me communicate with other students, such as the email or discussion board tool.</td>
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<tr>
<td>When I was using Blackboard, I used the features that helped me retrieve class resources, such as class presentation or study guides.</td>
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<tr>
<td>When I was using Blackboard, I used the features that helped me to submit assignments or take tests.</td>
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<tr>
<td>When I was using Blackboard, I used the features that helped me monitor my grades in the course.</td>
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</tr>
</tbody>
</table>

To limit CMB (Podsakoff et al., 2003) and improve accuracy (Venkatesh & Davis, 2000; Johnson, Zheng, Padman, 2014), I obtain the individual users' Blackboard system use log for the duration of the course. These logs provide the number of visits to specific content areas, as well as the average number of days logged in, the average number of times logged in per day, and the total time spent in the system.

Observational data, such as use logs, are exceedingly important in IS research. Straub, Limayem, and Karahanna-Evaristo (1995) investigated the link between self-reported use and
computer recorded system use in a study of the Technology Acceptance Model (Davis, 1989). Straub and colleagues (1995) found the two measures of use were not correlated strongly, contrary to the expectations arising from prior IS research. Johnson et al. (2014) also supported this finding when researching the impacts of electronic health IS systems. Furthermore, Devaraj and Kohli (2003) pointed to the self-reported measurement of actual use as a reason for the weak empirical support of the relationship between use and individual and organizational performance. The authors investigated the actual use of a health IS and the financial and quality performance measures of the hospital and found significant support for the increase in actual use leading to better performance measures. As the model in the current research is investigating Net Benefits of the system as an outcome, it will be important and prudent to measure computer-recorded observed system use.

Net Benefits

To measure individual Net Benefits for the subjects, I use two methods of data collection, observational data and self-reported survey data. Observational data involves the respondent’s final grade in the course. In the sense that a student’s grade is of importance for the student, and a considerable net benefit of using the system, one outcome variable in the present research is the final course grade for the student in the class. Furthermore, the mission of the university is “to transform lives and communities through power of discovery, learning and creative expression in an inclusive environment“ (https://www.kent.edu/kent/mission). In the sense that the student grade is also representative of student learning, improved learning is a benefit for the university as well. Thus, a self-report record of Net Benefits in the present study is a self-reported scale that requested the approximation of the user’s grade, as well as
his or her perceived knowledge level in the course. Because grades occur on a five-point scale (A, B, C, D, F), the self-report response scale range also exists as a five-point scale. The full scale is provided in Table 3-3.

<table>
<thead>
<tr>
<th>Table 3-3. Self-Reported Grade and Knowledge Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>What grade do you expect to earn in this class?</td>
</tr>
<tr>
<td>What is your average quiz score?</td>
</tr>
<tr>
<td>What is your average homework score?</td>
</tr>
<tr>
<td>I have a firm understanding of the course material</td>
</tr>
<tr>
<td>I have learned a lot in this course</td>
</tr>
<tr>
<td>I would consider myself knowledgeable in the course material.</td>
</tr>
</tbody>
</table>

The intent for using observed data is to alleviate two common biases in research survey design. First, by employing a different method for collecting the outcome variable, the likelihood of CMB is reduced (Podsakoff et al., 2003). CMB is fully discussed in a separate section. Second, careless response bias is also mitigated for the variables of Use and Net Benefits. By collecting observational data, I do not rely upon the accuracy of the student to predict or estimate his or her course score, collecting actual scores instead. By limiting CMB and response bias when possible, the reliability of the scores collected is improved (Schwab, 2005).
Information Sharing Attitudes

As presented in Chapter 2, Information Sharing Attitudes and Perceptions of IS Strategy are the focal factors of organizational culture in this investigation. To capture information sharing attitudes, I used the validated scale developed by Bock, Zmud, Kim and Lee (2005) and subsequently used by Chow and Chan (2008). Bock and colleagues (2005) used the term “knowledge sharing” instead of information sharing in their study. They defined knowledge as “the individual’s know-how or something which is helpful in solving problems in the organization” and knowledge sharing as “providing or transferring one’s knowledge to others”. Recall the definition of information sharing used in my research, “the provision of task information and know-how to help others and collaborate with others to solve problems, develop new ideas, or implement policies or procedures” (Wang & Noe, 2010; p. 117). I find this is a case where information and knowledge have been used interchangeably, as suggested by Wang and Noe (2010). Therefore, I have changed “knowledge” to “information” when using the questions.

Bock and colleagues (2005) also present respondents with the definition of knowledge sharing before asking the questions. Following this procedure, I provided the following information before the information sharing items: Here, information sharing means providing task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures. Information sharing is possible through various methods such as formal and/or informal meetings and information settings. While Bock and colleagues (2005) used a five-point Likert scale, ranging from “very frequently” to
“extremely unlikely”, I use a seven-point scale ranging from “to a very large extent” to “Never” to stay consistent with other survey items. The items are presented in Table 3-4.

Table 3-4. Information Sharing Items (Bock et al., 2005)

<table>
<thead>
<tr>
<th>Information Sharing Items (Bock et al., 2005)</th>
<th>To a very large extent</th>
<th>Most of the time</th>
<th>More than half the time</th>
<th>Around half the time</th>
<th>Not Often</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>My information sharing with other students is good.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My information sharing with other students is harmful.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My information sharing with other students is an enjoyable experience.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>My information sharing with other students is valuable to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My information sharing with other students is a wise move.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Perceptions of IS Strategy

Perceptions of IS strategy have been measured historically through qualitative methods (Ward, 1987; Kaarst-Brown & Robey, 1999), with the exception of Kanungo, Sadavarti, and Srinivas (2001) who used a survey instrument. I adopt the measures from the previously validated measures by Kanungo and colleagues (2001) and tailor the items for the current research. The original survey references “IS,” “IT,” “top management,” and improvements to “internal efficiency.” I reference “Blackboard”, “the “University” and an improved “learning environment.” Table 3-5 provides the items used to measure this variable.
Table 3-5. Perceptions of IS Strategy (Kanungo et al., 2001)

<table>
<thead>
<tr>
<th></th>
<th>To a very large extent</th>
<th>Most of the time</th>
<th>More than half the time</th>
<th>Around half the time</th>
<th>Not Often</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>State-of-the-art technology is maintained in Blackboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blackboard function and control is centralized at the University level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Updates to Blackboard are made only when absolutely necessary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blackboard investments are made to improve the learning environment</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Controls*

The purpose of control variables is to avoid contamination and alternative explanations for results (Schwab, 2005). Because experience with a specific system has previously been shown to predict future use of the system (Venkatesh & Davis, 2000), I measure experience with Blackboard. A six-item scale developed by Schmacher and Morahan-Martin, 2001 captures such experience. These items are available in Figure 3-5.
Further, self-efficacy of a specific technology has been shown to be linked to the respondent’s use of the specific technology (Compeau, Higgins, & Huff, 1999), so I measure this with a scale presented by Compeau and Higgin’s (1995). This scale was adopted from Bandura (1977) and is highly cited and validated by other researchers. For example, the scale was used by Venkatesh, Morris, and Davis (2003) in the development of the Unified Theory of Acceptance and Use of Technology (UTAUT), a seminal theory in IS literature, as well as other prominently cited empirical research studies (Venkatesh, 2000; Venkatesh & Morris, 2000; Agarwal & Karahanna, 2000). Figure 3-6 lists items for the self-efficacy control.
Also, Barrick and Mount (1991) have found conscientiousness to be linked to job performance. Since I am using course performance (individual grades) as a dependent variable, I account for these effects but controlling for conscientiousness. I deploy an eleven-item personality scale to measure the respondent’s level of conscientiousness (Goldberg, 1990), shown in Figure 3-7.
Furthermore, I collect measures for all of the ISSM variables to control against misspecification. Although I am most concerned with the effects of PIQ, Use and Net Benefits from the ISSM, I do not want to fit the model without a significant predictor. Therefore, I collected the following measures for systems quality, service quality, and user satisfaction from the sources noted in Tables 3-6, 3-7, and 3-8 respectively.
<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Somewhat Agree</th>
<th>Neither Agree or Disagree</th>
<th>Somewhat Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackboard is easy to use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blackboard us user friendly</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Compared to other computer software, Blackboard is easy to learn</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>I find it easy to do what I need to do in the Blackboard website.</td>
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<td></td>
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<tr>
<td>It is easy for me to become skillful at using Blackboard</td>
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<td></td>
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<tr>
<td>I believe that Blackboard is cumbersome to use</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Using Blackboard takes a lot of mental effort</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using Blackboard is often frustrating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-7. Service Quality Measures (Wang, 2008)

<table>
<thead>
<tr>
<th>Description</th>
<th>To a very large extent</th>
<th>Most of the time</th>
<th>More than half the time</th>
<th>Around half the time</th>
<th>Not Often</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>When you have a problem, you can reach the Blackboard help desk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Blackboard help desk is always willing to help you</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Blackboard help desk has the knowledge to answer your questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Blackboard help desk gives you individual attention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Blackboard help desk understands your specific needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3-8. User Satisfaction Measures (Seddon & Yip, 1992; Wang, 2008; Wang et al., 2003)

<table>
<thead>
<tr>
<th>Question</th>
<th>Adequate</th>
<th>Above Expectations</th>
<th>Inadequate</th>
<th>Below Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>How adequately do you feel Blackboard meets the information needs of your class?</td>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>How has the Blackboard system met your expectations?</td>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>What is your perceived utility of the Blackboard system?</td>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>Overall, are you satisfied with the Blackboard system?</td>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

Finally, I collect information regarding respondent demographics following Constant and colleagues (1994). All of these items are available in Figure 3-8 below.
Addressing Validity

Content Validity

Even though I use pre-validated scales, it is necessary to perform content validation techniques (Schwab, 2005). Three pre-tests assess the content validity of the measures. The first two pre-tests focus on expert validation of the scales. Expert validation means researchers in the business management field considered the constructs, scales, and items for their appropriateness and accuracy of the variables in the study (Gehlbach & Brinkworth, 2011). To satisfy this, I met and communicated extensively with experienced organizational behavior researchers to develop the necessary scales for the current research. I also formally presented
the instrument to a panel of Ph.D. students and faculty members to investigate possible measurement issues with the variable measurement. Finally, I conducted a pilot test of 50-100 participants before the full study was deployed to see if any functional or technical issues arose due to the research survey design.

*Common Method Bias*

CMB is the variance of a study that may be attributable to the measurement method rather than the constructs or variables themselves (Podsakoff et al., 2003). CMB is especially a concern when all measurements in a study are obtained from a single method, such as a single research survey. Therefore, it is important to assess the CMB and treat it if necessary. In the present study, I mitigate the effects of CMB through data collection techniques and statistical methods.

Podsakoff and colleagues (2003) provide an important reference work for the assessment and treatment of CMB. Podsakoff and colleagues suggest that measuring the variables through multiple data sources, for example, collecting observed data, may reduce the likelihood of CMB in research as the observational data would not be affected by the same biases as the items on the research survey (Podsakoff et al., 2003). Therefore, I collect both self-report and observed indicators of Use and Net Benefits.

Statistical methods also allow for the examination of CMB in the data set. One of the most common of these is the Harmon one-factor test (Podsakoff et al., 2003). In IS research, this test has been used frequently and has been well accepted in the top journals of the IS discipline (Bhatt & Grover, 2005; Hu et al., 2012; Polites & Karahanna, 2012). In this test, all
items are loaded onto one factor. Then the total amount of variance explained by one factor is examined. If the total variance explained by one factor is over 50%, then it indicates CMB may be present. Criticisms of this test exist in that it becomes less conservative as the number of variables increases, and the test does not control statistically for CMB (Podsakoff et al., 2003). It is also prudent to test for CMB through a method factor (common latent factor) in the confirmatory factor analysis (CFA). This test allows for all items to load on a separate factor, and the variance to be extracted. If the single method factor explains a significant amount of variance, the factor is included in testing the research model to control for CMB (Podsakoff et al., 2003).

*Careless Response Bias*

The research survey is long (136 items total) and therefore, at risk for careless response bias. To protect against this bias, I follow Meade and Craig (2012) by employing three methods of identifying careless responses. First, I embed several bogus questions in the survey, instructing the respondent to select a specific response for the item (e.g. “Select Not Often for this question”). Second, I calculate the total time used to complete the survey. Considering the length of the survey, and the distribution of completion times for the survey, I examine the response time as an indicator of careless responding. Following Meade and Craig (2012) I calculate the completion time for 95% to 98% of the respondents. The minimum time for each of these percentages is recorded as a breakpoint. This is the minimum response time for careful responding. Responses below this point are reexamined to determine whether careless responses are evident in this group.
Another cause for concern is the response rate and nonresponse bias. Nonresponse bias occurs when a group of cases does not complete the survey and, therefore, the scores are not representative of the sample population (Schwab, 2005). Baruch & Holtom (2008) reported the average response rate for organizational research to be 50%.

Reliability

Reliability is defined as the "proportion of observed score variance that is systematic" (Schwab, 2006; p. 242). I report the composite reliability as the internal consistency measure of each variable. I look for factor loadings above 0.7 to indicate reliable estimates (Hair et al., 2010 citing Nunally, 1978; Chin, 1998). While composite reliability has been shown to produce a more consistent estimate of true reliability (Peterson & Kim, 2013) and Cronbach’s Alpha has been shown to over- or underestimate reliability (Raykov, 2001), I report the Cronbach’s Alpha for each variable as well, as it is customary in IS research.

Convergent Validity

I consider the convergent validity of the scores through confirmatory factor analysis (CFA). I report the factor loadings and cross-loadings of the specified model and report extracted variance and eigenvalues for each latent variable. I obtain and report the chi-squared score for the model and the degrees of freedom. A very high chi-square may indicate a bad fit of the model; however, the sample size of the study must be considered (Hair et al., 2010). I also report the normed chi-square by dividing the chi-square of the model by the degrees of freedom. If this estimate is above 5.0, then a poor fit of the model may be indicated (Bollen, 1989). Next, I measure the average extracted variance (AVE) of the model and look for an AVE
lower than Cronbach’s alpha, but greater than 0.50 (Hair et al., 2010). This value indicates a high correspondence in two or more items for the same construct (Schwab, 2005). Based on these results, I reconsider any items that are not loading on the intended construct measure.

*Discriminant Validity*

I assess the discriminant validity of the scores through a CFA as well. I calculate the maximum shared variance (MSV) as well as the average shared variance (ASV). If the average variance extracted is greater than the MSV and the ASV, then this indicates the measures are appropriate for the specific variable. I also consider the square root of the AVE, as this should be greater than inter-construct correlations (Hair et al., 2010). This estimate indicates the scores from items measuring different constructs do not converge, or load onto multiple factors (Schwab, 2005). While these techniques do not completely ensure construct validity, they are helpful in identifying a validity violation (Schwab, 2005).

I assess overall fit of the model using the fit indices provided by Hair and colleagues (2010), Kline (2011) and Hu and Bentler (1999).

<table>
<thead>
<tr>
<th>Fit Statistic</th>
<th>Threshold</th>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Chi-Square</td>
<td>Significant p-values</td>
<td>Hair et al., 2010</td>
<td>Shows how well the model fits the data</td>
</tr>
<tr>
<td>Normed Chi-Square</td>
<td>Less than 5.0</td>
<td>Bollen, 1989</td>
<td>Divides the Model Chi-Square by the degrees of freedom to adjust for sample size</td>
</tr>
<tr>
<td>Joreskog-Sorbom Goodness of Fit (GFI)</td>
<td>Greater than 0.90</td>
<td>Hair et al., 2010</td>
<td>Estimates the proportion of covariances in the sample data matrix explained by the model</td>
</tr>
<tr>
<td>Adjusted Goodness of Fit (AGFI)</td>
<td>Greater than 0.80</td>
<td>Hair et al., 2010</td>
<td>Adjusts the GFI for model complexity</td>
</tr>
<tr>
<td>Metric</td>
<td>Reference</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-----------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Normed Fit Index (NFI)</td>
<td>Greater than 0.90</td>
<td>Hair et al., 2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The ratio of the difference between the chi-squared for the fitted model and the null model to the chi-squared of the null model</td>
<td></td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>Less than 0.07*</td>
<td>Hair et al., 2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Represents how well a model fits a population, not just a sample used.</td>
<td></td>
</tr>
<tr>
<td>Standardized Root Mean Square Residual (SRMR)</td>
<td>Less than 0.08*</td>
<td>Hair et al., 2010; Hu &amp; Bentler, 1999</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Useful for comparing fit across models</td>
<td></td>
</tr>
</tbody>
</table>

*Recommended threshold for N > 250 and more than 30 observed variables (p. 654)

**Method of Analysis**

**Method Alternatives**

Three forms of data analysis were considered before choosing SEM as the data analysis technique. The hypothesis testing could be completed through a series of linear regressions.

First, I would assess the direct linear relationship from PIQ → Use, PIQ → Net Benefits, and system Use → Net Benefits. An insignificant relationship between PIQ and Net Benefits, when accounting for use, would indicate a fully mediated relationship by Use. Then, I would assess the direct relationship between each organizational culture variable and PIQ, system Use, and Net Benefits. After which, I would evaluate the interaction effects of organizational culture on the relationships between PIQ and Use, as well as Use and Net Benefits. If moderation is supported, then I would follow the framework provided by Muller, Judd, and Yzerbyt (2005) to consider the placement of the moderation in testing for mediated moderation (where organizational culture influences net benefits before use), moderated mediation (where organizational culture influences net benefits after use). A major limitation of this approach is, for a complex model where direct effects and moderating effects are tested, the individual
linear regressions do not allow for a holistic analysis of the full model without a series of regressions. Also, this approach would require a separate factor analysis for the regression model.

Another alternative considered would be to check for significant differences between two levels of the organizational culture variables. First, I could separate the survey responses into groups based on a high/low level of Information Sharing Attitudes crossed by a high/low level of Perception of IS Strategy. Then, using a 2x2 MANOVA (Multiple Analysis of Variance) I would look for differences between these groups on the dependent variables of Use and Net Benefits. A limitation of this approach is the method sacrifices some of the precision in the measurement of the organizational culture variables. This technique would involve converting a continuous variable into a dichotomous variable, which is generally not preferred (Schwab, 2005). Another drawback is I would not be able to gauge the degree of the relationship, only that significant differences exist.

The third, and chosen, data analysis alternative is SEM. Through this approach, I can combine factor analysis and multiple regression analysis in one model. Furthermore, I can test the degree of the relationships through the sign, size, and significance of the path coefficients. SEM also allows for the comparison of several models without the need for equation-by-equation analysis (Schwab, 2005). Recall the sixth guideline for completing context specific theorizing in IS research is to examine alternative context-specific models (Hong, Chan, Thong, Chasalow, & Dhillon, 2014). SEM allows for assessment of both direct and indirect effects (Mertler & Vannatta, 2013), and I must assess whether PIQ, use, Information Sharing Attitudes, and Perceived IS Strategy have direct, mediating, or moderating effects on Net Benefits.
**Structural Equation Modeling**

SEM is an extension of multiple regression that integrates the measurement model with the statistical models representing causal models (Schwab, 2005). There are two forms of SEM available, covariance SEM, sometimes modeled through SPSS Amos, and principal components SEM modeled through PLS software, such as PLS-Graph or Smart PLS. Each tool has advantages and disadvantages. PLS is preferred for “situations in which theory about measurement is not strong, but the goal is to estimate predictive relations among latent variables” (Kline, 2011, p.287). PLS is not the best choice for the present research. The current research model is based on several seminal theories, and the measures are pre-validated by other researchers. Also, PLS estimates “are statistically inferior relative to those generated under full estimation (e.g. [maximum likelihood] in [covariance] SEM) in terms of bias and consistency” (Kline, 2011, p.287). Covariance SEM enables assessment of complex models, such as the one proposed in the present research. With this in mind, I plan to use covariance SEM.

SEM has been used in previous empirical investigations of the ISSM (Hassanzadeh, Kanaani, & Elahi, 2012), technology adoption (Lee, Choi, Kim, & Hong, 2007), organizational learning (Alegre & Chiva, 2008), organizational culture (Richard, McMillan-Capehart, Bhuian, & Taylor, 2009), and scale development and validation (Wang, Wang, & Shee, 2007). I used the SPSS Amos statistical software for the data analysis. SPSS Amos has been used in several respected studies and has been shown to be valid and robust (e.g., Renzl, 2008; Van Den Hooff & Huysman, 2009; Larson & Adams, 2010).
Assumptions and Diagnoses

SEM is a form of path analysis and “essentially an extension and specific application of multiple regression” (Mertler & Vannatta, 2013; p. 200). Therefore, the assumptions for multiple regression must be met. Kutner, Nachtsheim, Neter, & Li (2005) provide guidelines for assumptions, procedures for assessing these assumptions, and possible treatments.

1. **Linearity.** Regression assumes the relationship between dependent and independent variables is a straight-line function. I assess the linearity of the data through examining a scatterplot of the residuals versus predicted values. Furthermore, the dependent variable must be a continuous variable, as is satisfied in my two outcome variables of Use and Net Benefits. When linearity cannot be established, outliers are investigated through a Bonferroni test and nonlinear transformation may be applied.

2. **Independence.** Regression assumes no correlation exists between consecutive errors. This correlation sometimes is referred to as serial correlation or autocorrelation. To assess this assumption, I examine the table of residual autocorrelations and look for values close to zero and within the 95% confidence bands. I also obtain the Durbin-Watson statistic. If the Durbin-Watson statistic is close to two, then serial correlation is not an issue. If the independence assumption is violated, then transformed variables are used to remove the autocorrelation parameter, either through the Cochrane-Orcutt method or the Hildreth-Lu procedure.
3. **Homoscedasticity.** Regression assumes the constant variance of errors versus time, the predictions, and any independent variable. To diagnose these issues, the Brown-Forsythe test statistic and the Lave test statistic are calculated. Insignificant values indicate a homoscedasticity violation. Violations of this assumption could be treated through a log transformation applied to the dependent variable.

4. **Normality.** Regression assumes the error distribution is normal. To diagnose multivariate normality, I consider the skewness and kurtosis estimates of the model looking for absolute values greater that 1 to be cause for concern (Hair et al., 2010). To treat for violations of normality, the potential for outliers is examined by obtaining the Mahalanobis distance values, and nonlinear transformation of the variables is considered.

5. **Multicollinearity.** Regression assumes independent variables are independent of each other, and, therefore, no multicollinearity exists between items. To assess multicollinearity, I obtain the inter-item correlations and variance inflation factors for each independent variable. If multicollinearity is not an issue, then the inter-item correlations would be less than 0.7 and the variance inflation factor (VIF) would be lower than 10 (Kline, 2011). If multicollinearity is an issue, then the model can be respecified to remove the covarying variables or combine them into one measure if appropriate.

Some of these assumptions cannot be tested in the Amos computer program, so I also employ other tools in SPSS, to complete these assessments.
Power Calculations

Power is the "probability of rejecting the null hypothesis when there is a real effect in the population" (Kline, 2011; p. 34). Six factors influence the power of an analysis (Kline, 2011). First, the level of statistical significance must be appropriately set. The significance level of the present research is 0.05 resulting in a 95% confidence interval. Second, a one-tailed, or directional, hypothesis leads to greater power. This is included in this research. Third, with-in subject research designs also lead to greater power. This guideline is satisfied in the present research design. Fourth, parametric test statistics, as opposed to nonparametric methods, are more powerful. SEM is a parametric test statistic. Fifth, high score reliability contributes to high statistical power. This is evaluated through statistical analysis and reported by the composite reliability estimates of the measures. Finally, sample size is an important determinant of power, as larger samples generally provide more statistical power than smaller samples (below 200 cases) (Kline, 2011).

Based on these factors, there is no reason to believe power is an issue for this research. However, to determine an appropriate sample size, Cohen’s statistical power test, provided through an apriori sample size calculator for multiple regression (Soper, 2015) confirms the sample size appropriate for the desired power. For the present research, power is determined through an assessment of each outcome variable (Use and Net Benefits). For Use, there are three predictor variables. With alpha set to 0.05, and a low effect size (0.10) specified, and a desired power of 0.80, a sample size of 112 is required. For Net Benefits, there are four predictor variables. With the same parameters as are specified for Use, a sample size of 124 is
required. Thus, a sample size of more than 250 cases is sufficient to mitigate statistical power risks.
CHAPTER 4

INTRODUCTION

The purpose of this study is to understand the role of organizational culture in the Use and Net Benefits of IS. The key research questions consider the roles of IS Use and PIQ on the realization of IS benefits, as well as the context of selected organizational culture facets on the focal constructs of the ISSM. The data in this study were collected with the explicit goal of answering these questions through a thorough and systematic analysis of the model hypotheses presented in figure 4-1.

**Figure 4-1. Research Model with Hypotheses**

Participants were recruited from a large public university in the Midwestern region of the United States. In this study, a case is defined as the behavior of a single student in a single undergraduate business course. This means if a student was recruited for participation in one course (for example Marketing Principles), then he or she may also have been recruited to participate from another course (such as Principles of Management). Each student-course
combination is considered one case. This is consistent with the definition of a case by Schwab (2005) as an entity investigated in research. Schwab explains that a case may be a single transaction or a single record. In this study the student’s behavior in each course is a separate transaction or record, and therefore a unique entity. The total number of cases obtained was 1,627, from 8 separate courses. Of this sample, 1,150 subjects agreed to participate, resulting in a 71% participation rate.

DATA COLLECTION

Five variables were measured in this study. The variable name, definition, and initial measurement (specific items will be presented later) are summarized in table 4-1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Information Quality</td>
<td>The perceived relevance, timeliness and accuracy of the output of the information system. (DeLone &amp; McLean, 1992; Seddon, 1997)</td>
<td>Survey items (Doll &amp; Torkzadeh, 1988)</td>
</tr>
<tr>
<td>Use</td>
<td>A user’s employment of a system to perform a task (Burton-Jones &amp; Gallivan, 2007; p. 659)</td>
<td>Survey items (Burton-Jones &amp; Straub, 2006)</td>
</tr>
<tr>
<td>Individual Net Benefits</td>
<td>The user-defined and task-specific benefits of the system at the individual level (DeLone &amp; McLean, 2003)</td>
<td>Survey items</td>
</tr>
<tr>
<td>Information Sharing Attitude</td>
<td>An individual’s propensity to evaluate the provision of task information and know-how to help others and to collaborate with others to solve problems, develop new ideas, or implement policies or procedures with some degree of favorability or unfavorability (Eagly &amp; Chaiken, 2007; Wang &amp; Noe, 2010; p. 117)</td>
<td>Survey items (Bock et al., 2005)</td>
</tr>
<tr>
<td>Perceptions of IS Strategy</td>
<td>The organizational perspective on the investment in, deployment, use, and management of the information system (Chen et al., 2010)</td>
<td>Survey items (Kanungo et al., 2001)</td>
</tr>
</tbody>
</table>
The data collection procedure included several steps. First, each subject was sent a recruitment email explaining the study specifics. The email was sent around the end time of the specific class. For example, if a class was scheduled for Monday evenings from 6 – 7:15 pm, then the email was sent at 7:15 on Monday. Right before the email was delivered, the instructor of the class introduced the study to the students and informed them they would receive an email with more information.

A copy of the recruitment email is in figure 4-2. The email included a link to the survey. By clicking the link, the subject entered the survey and was able to sign electronically the informed consent form to participate. By agreeing to participate, the subject completed the survey and allowed the researchers to collect the subject’s computer-recorded use logs and final course grade. Following Dillman and colleagues (2009), two reminder emails were sent a few days apart to subjects who had not yet participated.

**Figure 4-2. Recruitment Email**

<table>
<thead>
<tr>
<th>SUBJECT: MIS 34060 – Research Extra Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dear [Subject first name]</td>
</tr>
<tr>
<td>You are being invited to participate in the “Organizational Culture Values and Information Systems” research to earn [extra credit] in your [course name] course with [Professor name]. This email describes the study. If you are not registered for [course name], please disregard this message.</td>
</tr>
<tr>
<td>Please read the following information carefully.</td>
</tr>
<tr>
<td>To Participate in the Study:</td>
</tr>
<tr>
<td>Should you choose to participate in this extra credit opportunity, you will be invited to take a survey on Qualtrics. It will take 15-25 minutes. On the first page of the Qualtrics survey, you will be asked to sign the informed consent form. Please read this page carefully before selecting your answer.</td>
</tr>
</tbody>
</table>

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If you would like to participate, please click the link below (or copy and paste the link into your web browser) and answer the survey. Extra credit will not be awarded for incomplete surveys and you may only participate in this survey once.

**Follow this link to the Survey:**
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
(Survey Link)

**DEADLINE: The deadline to complete the survey is [Deadline].**

Participation in this study is completely voluntary; whether or not you participate in this study is completely up to you. If you choose not to participate, there will be no penalty of any kind.

**Alternative:**

If you want to earn the extra credit, but do not wish to participate in the study, you can choose to write a two-page, 12 pt. font, single-spaced research paper instead. You will need to find a current article (published within the past year) about a topic related to [course name]. Acceptable sources for these press articles include USA Today, the Wall Street Journal or Bloomberg Businessweek.

You must complete the following:

- Summarize the article.
- In addition to summarizing the article, you need to describe how the information presented within the article fits within the [course name] course content.
- Submit your paper and a copy of the article as an email attachment to Candice Vander Weerdt at cvander8@kent.edu or in her mailbox on the 4th floor, room A417, BSA.

The deadline for completing the study or writing research paper is [Deadline]. You may only complete the survey or write the paper; you may not do both for double points.

If you have any problems, or questions, or want to know more about this study, please contact Candice Vander Weerdt at 330-672-1153 or at cvander8@kent.edu.

Thank you in advance for your participation!

Sincerely,

Candice Vander Weerdt
Ph.D. Student, Management & Information Systems
The survey responses were collected in the final four weeks of class to measure Perceived Information Quality (PIQ), system Use (USE), individual Net Benefits (BEN), Information Sharing Attitudes (ISA) and Perceptions of IS Strategy (PS). After the course ended, computer-recorded use logs were obtained to measure system Use. The focal system in this investigation is the Blackboard course delivery system. Five measures of Use were collected:

1. Total Course Hits – includes number of daily hits within the system by each user. It is obtained from the Overall Summary of User Activity report, which displays user activity for all areas of the course, as well as activity dates, times, and days of the week.

2. Discussion Board Hits – includes the number of hits per user in each course discussion board forum. It is obtained from the User Activity in Forums report, which displays a summary of user activity in Discussion Board Forums for the course.

3. Daily Course Hit Standard Deviation – includes the standard deviation of all of the activity the user had in the course per day. It is obtained from the Overall Summary of User Activity report, which displays user activity for all areas of the course, as well as activity dates, times, and days of the week.

4. Weekly Course Hit Standard Deviation – includes the activity the user had in the course. The hits are aggregated by week and the standard deviation is recorded. Information for this is obtained from the Overall Summary of User Activity report, which displays user activity for all areas of the course, as well as activity dates, times, and days of the week.

5. Total Course Hours – includes the total amount of activity the user had in the course. Obtained from the Course Activity Overview report, which displays overall activity within a single course, sorted by student and date.
The second measure of use, discussion board hits, was not retained in the data sample because only 2 of the 8 course sections used the discussion board in the class. When the discussion board hits were recorded, it appeared only 90 subjects had accessed the discussion board at least 1 time. For this reason, the results of any analysis on this small subset may not reflect results of the entire sample.

At the end of the semester the participant’s final course grade also was captured. This score was recorded as a percentage (therefore a number between 0 and 1) that indicated the performance of the student in the specific course. Each of these measures - survey items, computer-recorded logs, and course grade – was recorded for each consenting student-course case.

**Response Rate and Careless Responses**

As mentioned earlier, 1,150 subjects participated from the 1,627 invited to participate, returning a participation rate of 71%. From this sample, 280 cases were eliminated for careless responding, failure to consent, or missing scores. Specifically, 24 cases did not agree to participate in the study and were eliminated immediately. Fifty-seven cases did not answer more than 10% of the items and were removed for missing scores. One hundred ninety-two cases did not answer correctly on the bogus questions (inserted as attention traps). Seven cases completed the survey in less than 6 minutes, and thus were removed as careless responses. Removing the 280 cases resulted in 870 usable cases and a response rate of 53%. This response rate is consistent with the reported average response rate for organizational research of 50% (Baruch & Holtom, 2008). The sample characteristics are displayed in table 4.2.
Since a large portion of the cases (280 cases, 24% of total cases) was eliminated for careless responding, failure to consent, or missing scores, the sample characteristics of the eliminated group were compared to the retained cases. When adding the eliminated cases to the retained sample, the demographic proportions are largely unchanged. Table 4-3 shows the
descriptive characteristics of the retained sample, the eliminated sample and the full sample (sum of retained and eliminated cases). The change in proportions for each descriptive characteristic was below 15%. The change was less than 5% in most of the descriptive characteristics (83%). The largest changes are emphasized in the table. There is a slight indication the eliminated scores were disproportionately male, closer to graduation, with more years of college, less likely to be currently working, with a lower GPA (between 2.0-3.0). I also compared the observed variable scores across groups and found no significant difference between groups in terms of recorded grade and Blackboard use. The analysis indicates a specific group or characteristic was not under-represented significantly.

Table 4-3. Characteristics of Eliminated Cases Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Retained</th>
<th>Eliminated</th>
<th>Full</th>
<th>Change Between Retained and Full</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>397 46%</td>
<td>115 41%</td>
<td>512 45%</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>472 54%</td>
<td>85 30%</td>
<td>557 48%</td>
<td>6%</td>
</tr>
<tr>
<td>Age</td>
<td>&lt; 20 years</td>
<td>196 23%</td>
<td>32 11%</td>
<td>228 20%</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>20-24 years</td>
<td>617 71%</td>
<td>152 54%</td>
<td>769 67%</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>25-29 years</td>
<td>39 4%</td>
<td>16 6%</td>
<td>55 5%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>30+ years</td>
<td>18 2%</td>
<td>1 0%</td>
<td>19 2%</td>
<td>0%</td>
</tr>
<tr>
<td>Expected Graduation</td>
<td>&lt; 1 year</td>
<td>0 0%</td>
<td>9 3%</td>
<td>9 1%</td>
<td>-1%</td>
</tr>
<tr>
<td></td>
<td>2 years</td>
<td>19 2%</td>
<td>59 21%</td>
<td>78 7%</td>
<td>-5%</td>
</tr>
<tr>
<td></td>
<td>3 years</td>
<td>215 25%</td>
<td>76 27%</td>
<td>291 25%</td>
<td>-1%</td>
</tr>
<tr>
<td></td>
<td>4+ years</td>
<td>624 72%</td>
<td>51 18%</td>
<td>675 59%</td>
<td>13%</td>
</tr>
<tr>
<td>Years of College Completed</td>
<td>&lt; 1 year</td>
<td>6 1%</td>
<td>3 1%</td>
<td>9 1%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>1-2 years</td>
<td>516 59%</td>
<td>100 36%</td>
<td>616 54%</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>3 years</td>
<td>224 26%</td>
<td>63 23%</td>
<td>287 25%</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>4+ years</td>
<td>22 3%</td>
<td>34 12%</td>
<td>56 5%</td>
<td>-2%</td>
</tr>
<tr>
<td>Major</td>
<td>Accounting</td>
<td>104 12%</td>
<td>13 5%</td>
<td>117 10%</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>Business Management</td>
<td>169 19%</td>
<td>17 6%</td>
<td>186 16%</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>28 3%</td>
<td>2 1%</td>
<td>30 3%</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Entrepreneurship</td>
<td>21 2%</td>
<td>4 1%</td>
<td>25 2%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Finance</td>
<td>84 10%</td>
<td>18 6%</td>
<td>102 9%</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Information Systems</td>
<td>48 6%</td>
<td>0 0%</td>
<td>48 4%</td>
<td>1%</td>
</tr>
<tr>
<td></td>
<td>Marketing</td>
<td>139 16%</td>
<td>18 6%</td>
<td>157 14%</td>
<td>2%</td>
</tr>
<tr>
<td>Employment Status</td>
<td>Other</td>
<td>274</td>
<td>31%</td>
<td>4</td>
<td>1%</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------</td>
<td>-----</td>
<td>-----</td>
<td>---</td>
<td>----</td>
</tr>
<tr>
<td>None</td>
<td>237</td>
<td>27%</td>
<td>97</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>97</td>
<td>11%</td>
<td>17</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>541</td>
<td>62%</td>
<td>86</td>
<td>31%</td>
<td></td>
</tr>
<tr>
<td>GPA</td>
<td>3.0 – 4.0</td>
<td>622</td>
<td>71%</td>
<td>126</td>
<td>45%</td>
</tr>
<tr>
<td>2.0 – 2.9</td>
<td>238</td>
<td>27%</td>
<td>70</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>1.0 – 1.9</td>
<td>2</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>&lt;1.0</td>
<td>1</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Recorded Grade</td>
<td>A</td>
<td>308</td>
<td>35%</td>
<td>110</td>
<td>39%</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>271</td>
<td>31%</td>
<td>70</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>196</td>
<td>23%</td>
<td>61</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>70</td>
<td>8%</td>
<td>20</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>25</td>
<td>3%</td>
<td>19</td>
<td>7%</td>
</tr>
<tr>
<td>Hours</td>
<td>Percentiles 76-100</td>
<td>216</td>
<td>25%</td>
<td>60</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>Percentiles 51-75</td>
<td>206</td>
<td>24%</td>
<td>70</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Percentiles 26-50</td>
<td>218</td>
<td>25%</td>
<td>57</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Percentiles 0-25</td>
<td>208</td>
<td>24%</td>
<td>81</td>
<td>29%</td>
</tr>
<tr>
<td>Hits</td>
<td>Percentiles 76-100</td>
<td>223</td>
<td>26%</td>
<td>53</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td>Percentiles 51-75</td>
<td>217</td>
<td>25%</td>
<td>60</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>Percentiles 26-50</td>
<td>209</td>
<td>24%</td>
<td>68</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>Percentiles 0-25</td>
<td>200</td>
<td>23%</td>
<td>89</td>
<td>32%</td>
</tr>
</tbody>
</table>

Missing data were considered for each survey item. Very few responses were missing from the variable measurement items; no item was missing more than 2% of the total sample, and no single case was missing more than 10% of the scores. Kline (2011) suggests less than 5% missing data in a large sample is ignorable. A single-imputation method was used for the missing data and the median of the responses was input (Kline, 2011). A few demographic items suffered from missing data. Specifically, 89% did not disclose an SAT score, and 30% did not disclose an ACT score. This may be explained by the nature of the questions, as some students may not remember past SAT or ACT scores.
Outliers

Most variables in the model were measured through Likert-type scale items with a range of 1 to 7. Since the range is limited, univariate outliers were not a concern for these variables. However, 2 variables were measured on a continuous scale. Individual Net Benefits was measured with the subject’s final course grade. The grade percentage (ranging from 0% - 100%) was recorded. A box plot graph was constructed (displayed in figure 4-3) and 9 outliers were identified as very low failing grades. None of the outliers was an extreme case (3 standard deviations from the mean; Kline, 2011), so all were retained in the data set.
System Use was the second variable measured with a discrete or continuous scale. The 4 remaining use measures were total course hits (HITS), daily hits standard deviation (DSD), weekly course hits standard deviation (WSD), and total course hours (HOURS). A box plot was created in SPSS for each variable and is displayed in figure 4-4. A single case was an extreme outlier for all 3 measures and was removed from analysis.
Normality

To assess normality, the skewness and kurtosis were obtained for the continuous scale measurements, displayed in table 4-4.
Table 4-4. Descriptive and Normality Statistics for Continuous Scale Measures

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
<td>Statistic</td>
</tr>
<tr>
<td>HITS</td>
<td>869</td>
<td>42</td>
<td>2187</td>
<td>551.69</td>
<td>302.255</td>
<td>1.000</td>
<td>1.992</td>
</tr>
<tr>
<td>DSD</td>
<td>869</td>
<td>1.231</td>
<td>63.947</td>
<td>11.256</td>
<td>6.569</td>
<td>1.935</td>
<td>8.380</td>
</tr>
<tr>
<td>WSD</td>
<td>869</td>
<td>3.324</td>
<td>166.495</td>
<td>28.639</td>
<td>20.214</td>
<td>2.522</td>
<td>10.259</td>
</tr>
<tr>
<td>HOURS</td>
<td>869</td>
<td>0.000</td>
<td>128.533</td>
<td>29.613</td>
<td>20.192</td>
<td>1.313</td>
<td>2.418</td>
</tr>
<tr>
<td>GRADE</td>
<td>869</td>
<td>0.374</td>
<td>1.109</td>
<td>0.844</td>
<td>0.117</td>
<td>-.568</td>
<td>.223</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>869</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The skewness and kurtosis are within the normal ranges (less than |3.0|; Kline, 2011) for the final grade scores. However, the Use measures appear somewhat abnormal. The total-hits and total-hours measures are not extremely non-normal, but the standard deviation measures of daily and weekly hits are very kurtosed, 8.380 and 10.259 respectively. To treat for this issue, a two-step transformation was completed for all use measures (Templeton, 2011). The original distribution graphs and resultant distributions are displayed in figure 4-5. The adjusted descriptive statistics are presented below, in Table 4-5.
Figure 4-5. Original and Transformed Distributions for System Use Measures
Table 4-5. Descriptive and Normality Statistics for Transformed System Use

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum Statistic</th>
<th>Maximum Statistic</th>
<th>Mean Statistic</th>
<th>Std. Deviation Statistic</th>
<th>Skewness Statistic</th>
<th>Kurtosis Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>NormHits</td>
<td>868</td>
<td>-369.67</td>
<td>1473.05</td>
<td>551.692</td>
<td>300.377</td>
<td>.000</td>
<td>-.101</td>
</tr>
<tr>
<td>NormDSD</td>
<td>868</td>
<td>-8.77</td>
<td>31.280</td>
<td>11.256</td>
<td>6.528</td>
<td>.000</td>
<td>-.101</td>
</tr>
<tr>
<td>NormWSD</td>
<td>868</td>
<td>-32.98</td>
<td>90.258</td>
<td>28.639</td>
<td>20.089</td>
<td>.000</td>
<td>-.101</td>
</tr>
<tr>
<td>NormHours</td>
<td>868</td>
<td>-18.47</td>
<td>91.163</td>
<td>29.635</td>
<td>20.002</td>
<td>.025</td>
<td>-.171</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>866</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FACTOR ANALYSIS

Before a CFA could be performed, an exploratory factor analysis (EFA) was conducted in SPSS with all items measuring the focal model variables of PIQ, USE, BEN, ISA and PS. An EFA was conducted to allow all items to freely load on factors. Although the present research model was previously identified, and therefore calls for a CFA, the EFA allows another assessment of the measurement model (Kline, 2011). Maximum likelihood (ML) estimation was used along
with the Promax rotation. ML is the most widely used estimation for SEM analysis and provides simultaneous estimation (Kline, 2011). This means ML estimation is a full-information method and “when all statistical requirements are met, and the model is correctly specified, ML estimates in large samples are asymptotically unbiased, efficient, and consistent” (Kline, 2011, p. 155). Promax (an oblique rotation method) was selected because the goal of the analysis was to obtain several meaningful factors as opposed to a small number of constructs (Hair et al., 2010).

Eight items from various scales were eliminated from the analysis for low loadings. These items may be found in table 4-6. One variable differed in terms of measurement method, USE. The computer recorded system use measures, and the self-reported use measures did not load on 1 factor but instead formed 2 distinct variables, self-reported use and computer recorded use. Both variables were retained for future analyses.
Table 4-6. Eliminated Items from the EFA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRUSE</td>
<td>When I was using Blackboard, I did not use features that would help me learn.</td>
<td>Reverse coded item</td>
</tr>
<tr>
<td>SRUSE</td>
<td>When I was using Blackboard, I used the features that helped me communicate with other students, such as the email or discussion board tool.</td>
<td>Several classes did not use the Discussion Board Blackboard tool</td>
</tr>
<tr>
<td>BEN (self-reported)</td>
<td>I have a firm understanding of the course material.</td>
<td>Scale was subject to case perception</td>
</tr>
<tr>
<td>BEN (self-reported)</td>
<td>I have learned a lot in this course</td>
<td>Scale was subject to case perception</td>
</tr>
<tr>
<td>BEN (self-reported)</td>
<td>I would consider myself knowledgeable in the course material</td>
<td>Scale was subject to case perception</td>
</tr>
<tr>
<td>ISA</td>
<td>My information sharing with other students is harmful</td>
<td>Reverse coded item</td>
</tr>
<tr>
<td>PS</td>
<td>State-of-the-art technology is maintained in Blackboard.</td>
<td>Scale refinement</td>
</tr>
<tr>
<td>PS</td>
<td>Blackboard investments are made to improve the learning environment.</td>
<td>Scale refinement</td>
</tr>
</tbody>
</table>

The final measurement model consisted of 7 items measuring PIQ (Doll & Torkzadeh, 1988), 4 items measuring computer-recorded system use (CRUSE) (listed in table 4-4), 3 items measuring self-reported system use (SRUSE) (Burton-Jones & Straub, 2006), 4 items measuring BEN (three self-reported items and one observed measure), 4 items measuring ISA (Bock et al., 2005), and 3 items measuring PS (Kanungo et al., 2001). The control variables of conscientiousness (CON), voluntariness (VOL), experience (EX), and computer self-efficacy (SE) were added to the model and items from 3 of the control scales were eliminated for poor loadings. The final control variables included 3 items measuring CON, 3 items measuring VOL, 3 items measuring EX, and 6 items measuring SE.
The model Kaiser-Meyer-Olkin Measure of Sample Adequacy (KMO) reached 0.845 and was significant at the 99.9% level. A significant KMO between 0.5 and 1 indicates that sufficient correlations exist among the variables in the model, and the factor analysis may be performed (Hair et al., 2010). All item communalities scored at least 0.30 except the computer-recorded use hours (0.280) and one of the items measuring conscientiousness (0.266). Despite these low communalities, both items were retained through the CFA as they both loaded on the appropriate factor without significant cross-loading and are important components of Use and conscientiousness. As Hair and colleagues (2010) discuss, “an optimal structure exists when all variables have high loadings only on a single factor” (p. 122). While the communalities are slightly lower than other items, the absence of cross-loading indicates the item may be retained. With the 10 factors, 60.867% of the variance was explained and only 12 (1.0%) of the nonredundant residuals had absolute values greater than 0.05.

The pattern matrix for the EFA is displayed in table 4-7. The bold numbers show the rotated item loadings, while the regular text displays the cross-loadings.

**Table 4-7. EFA Pattern Matrix**

<table>
<thead>
<tr>
<th></th>
<th>Factor (Composite Reliability)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0.909</td>
</tr>
<tr>
<td>PIQ1</td>
<td>0.735</td>
</tr>
<tr>
<td>PIQ2</td>
<td>0.730</td>
</tr>
<tr>
<td>PIQ3</td>
<td>0.750</td>
</tr>
<tr>
<td>PIQ4</td>
<td>0.783</td>
</tr>
<tr>
<td>PIQ5</td>
<td>0.802</td>
</tr>
<tr>
<td>PIQ6</td>
<td>0.772</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>---</td>
</tr>
<tr>
<td>PIQ7</td>
<td>.792</td>
</tr>
<tr>
<td>SE1</td>
<td>.038</td>
</tr>
<tr>
<td>SE2</td>
<td>.000</td>
</tr>
<tr>
<td>SE3</td>
<td>-.027</td>
</tr>
<tr>
<td>SE4</td>
<td>-.051</td>
</tr>
<tr>
<td>SE5</td>
<td>.061</td>
</tr>
<tr>
<td>SE6</td>
<td>-.011</td>
</tr>
<tr>
<td>NormDSD</td>
<td>-.033</td>
</tr>
<tr>
<td>NormHits</td>
<td>-.001</td>
</tr>
<tr>
<td>NormHours</td>
<td>.018</td>
</tr>
<tr>
<td>NormWSD</td>
<td>.012</td>
</tr>
<tr>
<td>ISA1</td>
<td>-.009</td>
</tr>
<tr>
<td>ISA3</td>
<td>.007</td>
</tr>
<tr>
<td>ISA4</td>
<td>.012</td>
</tr>
<tr>
<td>ISA5</td>
<td>-.014</td>
</tr>
<tr>
<td>BEN1</td>
<td>-.015</td>
</tr>
<tr>
<td>BEN2</td>
<td>-.049</td>
</tr>
<tr>
<td>BEN3</td>
<td>.069</td>
</tr>
<tr>
<td>GRADE</td>
<td>.006</td>
</tr>
<tr>
<td>V2</td>
<td>.020</td>
</tr>
<tr>
<td>V3</td>
<td>.012</td>
</tr>
<tr>
<td>V4</td>
<td>-.019</td>
</tr>
<tr>
<td>SRUSE3</td>
<td>.025</td>
</tr>
<tr>
<td>SRUSE4</td>
<td>-.055</td>
</tr>
<tr>
<td>SRUSE5</td>
<td>.060</td>
</tr>
<tr>
<td>EX2</td>
<td>.029</td>
</tr>
<tr>
<td>EX3</td>
<td>.049</td>
</tr>
<tr>
<td>EX6</td>
<td>-.097</td>
</tr>
<tr>
<td>CON1</td>
<td>-.063</td>
</tr>
<tr>
<td>CON3</td>
<td>.061</td>
</tr>
<tr>
<td>CON10</td>
<td>.034</td>
</tr>
<tr>
<td>PS2</td>
<td>.066</td>
</tr>
<tr>
<td>PS3</td>
<td>-.023</td>
</tr>
<tr>
<td>PS5</td>
<td>-.027</td>
</tr>
</tbody>
</table>

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalization.

- Rotation converged in 6 iterations.
A factor loading is the correlation between the variable and the factor, in other words, how much variance of the factor is explained by the variable. Hair and colleagues (2010) postulate factor loadings in the range of 0.3 to 0.4 meet the minimal level for interpretation and factors of 0.5 or greater are considered practically significant (Hair et al., 2010). Except for 1 item measuring conscientiousness (0.454), all loadings were above 0.5 indicating sufficient convergent validity (Hair et al., 2010). No strong cross loadings were present, indicating sufficient discriminant validity. The factor correlation matrix (table 4-8) was obtained, and discriminant validity was again supported, as no factor was correlated greater than 0.7 with another factor. In other words, no factors shared the majority of their variance with other factors.

Table 4-8. EFA Factor Correlation Matrix

<table>
<thead>
<tr>
<th>Factor</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>1</td>
<td>1.000</td>
<td>.211</td>
<td>-.061</td>
<td>.189</td>
<td>-.117</td>
<td>-.090</td>
<td>.381</td>
<td>-.238</td>
<td>.353</td>
<td>.298</td>
</tr>
<tr>
<td>2</td>
<td>.211</td>
<td>1.000</td>
<td>.028</td>
<td>.110</td>
<td>-.064</td>
<td>-.174</td>
<td>.195</td>
<td>-.141</td>
<td>.136</td>
<td>.093</td>
</tr>
<tr>
<td>3</td>
<td>-.061</td>
<td>.028</td>
<td>1.000</td>
<td>-.039</td>
<td>.295</td>
<td>.079</td>
<td>-.048</td>
<td>-.019</td>
<td>.013</td>
<td>-.024</td>
</tr>
<tr>
<td>4</td>
<td>.189</td>
<td>.110</td>
<td>-.039</td>
<td>1.000</td>
<td>-.107</td>
<td>.065</td>
<td>.200</td>
<td>-.114</td>
<td>.172</td>
<td>.249</td>
</tr>
<tr>
<td>5</td>
<td>-.117</td>
<td>-.064</td>
<td>.295</td>
<td>-.107</td>
<td>1.000</td>
<td>-.006</td>
<td>.055</td>
<td>.077</td>
<td>-.288</td>
<td>-.095</td>
</tr>
<tr>
<td>6</td>
<td>-.090</td>
<td>-.174</td>
<td>.079</td>
<td>.065</td>
<td>-.006</td>
<td>1.000</td>
<td>-.257</td>
<td>.168</td>
<td>-.109</td>
<td>.102</td>
</tr>
<tr>
<td>7</td>
<td>.381</td>
<td>.195</td>
<td>-.048</td>
<td>.200</td>
<td>-.055</td>
<td>-.257</td>
<td>1.000</td>
<td>-.353</td>
<td>.157</td>
<td>.071</td>
</tr>
<tr>
<td>8</td>
<td>-.238</td>
<td>-.141</td>
<td>-.019</td>
<td>-.114</td>
<td>.077</td>
<td>.168</td>
<td>-.353</td>
<td>1.000</td>
<td>-.170</td>
<td>-.171</td>
</tr>
<tr>
<td>9</td>
<td>.353</td>
<td>.136</td>
<td>.013</td>
<td>.172</td>
<td>-.288</td>
<td>-.109</td>
<td>.157</td>
<td>-.170</td>
<td>1.000</td>
<td>.186</td>
</tr>
<tr>
<td>10</td>
<td>.298</td>
<td>.093</td>
<td>-.024</td>
<td>.249</td>
<td>-.095</td>
<td>.102</td>
<td>.071</td>
<td>-.171</td>
<td>.186</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Extraction Method: Maximum Likelihood.
Rotation Method: Promax with Kaiser Normalization.

Finally, reliability was assessed through an analysis of the Composite Reliability (CR). The CR is a measure of how the variables in a factor measure the same construct. The CR of
unrefined, early research factors is likely to be lower than prior used scales (Nunnally, 1978).

The CR is listed in the column headings of the pattern matrix in table 4-7. Most of the factors in the present research had a CR score of 0.7 or above, which is the commonly accepted threshold for the measure (Nunnally, 1978). However, Hair and colleagues (2010) argue, “Reliability between 0.6 and 0.7 may be acceptable, provided that other indicators of a model’s construct validity are good” (p. 687). While, the PS variable had a lower CR at 0.654, this may be expected, as the scale was developed through the combination of previously used items and items derived from qualitative research. The CON variable also suffered from a low CR, 0.683, in the EFA, and a low loading in the pattern matrix. However, in the CFA, when the factor structure was predefined, all CR estimates were above 0.70, supporting sufficient reliability.

Following the preliminary EFA, CFA was conducted. Model fit was assessed by obtaining the fit indices presented in table 4-9.
Table 4-9. Fit Indices and Thresholds for CFA Model

<table>
<thead>
<tr>
<th>Fit Statistic</th>
<th>Threshold</th>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Chi-Square</td>
<td>Significant p-</td>
<td>Hair et al., 2010</td>
<td>Shows how well the model fits the data</td>
</tr>
<tr>
<td></td>
<td>values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normed Chi-Square</td>
<td>Less than 5.0</td>
<td>Bollen, 1989</td>
<td>Divides the Model Chi-Square by the degrees of freedom to adjust for sample size</td>
</tr>
<tr>
<td>Normed Fit Index (NFI)</td>
<td>Greater than 0.9</td>
<td>Hair et al., 2010</td>
<td>The ratio of the difference between the chi-squared for the fitted model and the null model to the chi-squared of the null model</td>
</tr>
<tr>
<td>Confirmatory Fit Index (CFI)</td>
<td>Greater than 0.95</td>
<td>Hu &amp; Bentler 1999</td>
<td>An improvement on the NFI that takes sample size into consideration</td>
</tr>
<tr>
<td>Joreskog-Sorbom Goodness of Fit (GFI)</td>
<td>Greater than 0.9</td>
<td>Hair et al., 2010</td>
<td>Estimates the proportion of covariances in the sample data matrix explained by the model</td>
</tr>
<tr>
<td>Adjusted Goodness of Fit (AGFI)</td>
<td>Greater than 0.80</td>
<td>Hair et al., 2010</td>
<td>Adjusts the GFI for model complexity</td>
</tr>
<tr>
<td>Standardized Root Mean Square Residual (SRMR)</td>
<td>Less than 0.08*</td>
<td>Hair et al., 2010; Hu &amp; Bentler, 1999</td>
<td>Useful for comparing fit across models</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA)</td>
<td>Less than 0.07*</td>
<td>Hair et al., 2010</td>
<td>Represents how well a model fits a population, not just a sample used.</td>
</tr>
</tbody>
</table>

*Recommended threshold for N > 250 and more than 30 observed variables (p. 654)

The initial model fit is displayed in table 4-10. The CFI and NFI of the model were slightly lower than the recommended threshold, and a few of the factor loadings were weak.

Specifically, the average variance extracted was less than the recommended threshold of 0.50 (Hair et al., 2010) for the EX, CON and PS constructs. Brown (2015) suggests obtaining the modification indices to identify the areas of the measurement model where respecification may be viable. Covarying errors must be reasonable and theoretically supported. This means only error terms from items of the same construct may be covaried, and only in the case where the modification indices indicate redundant measurement. Furthermore, covariance in the
indicators might be due to another exogenous cause, such as similarly worded items, reverse-worded items, and questions differentially prone to social desirability (Brown, 2015).

Therefore, covariance of error terms was considered only when error terms: 1) resulted from items of the same construct; 2) resulted from items similarly worded and located nearby in the survey; and 3) indicated a viable amount of redundancy was likely (high modification index score). Two pairs of error terms in the SE factor, 2 pairs of error terms in the CON factor, 1 pair of error terms in the EX factor, and 2 pairs of error terms in the PS factor were covaried. Each of the covaried pairs satisfied the three conditions above. They loaded on the same factor, were similarly worded and located near each other on the survey and exhibited high modification scores. Additionally, the errors for computer recorded hits and computer recorded hours were covaried. It is reasonable to covary these errors as the variance may be a byproduct of how the data were collected, on a continuous scale as opposed to a Likert-type scale survey item. This resulted in the following model fit parameters (thresholds provided by Hu and Bentler (1999).

**Table 4-10. CFA Model Fit Parameters**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Threshold</th>
<th>Initial</th>
<th>Covaried Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square/df (CMIN/df)</td>
<td>&lt; 3</td>
<td>2.687</td>
<td>2.154</td>
</tr>
<tr>
<td>p-value</td>
<td>&gt; 0.05</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>NFI</td>
<td>&gt; 0.90</td>
<td>0.908</td>
<td>0.927</td>
</tr>
<tr>
<td>CFI</td>
<td>&gt; 0.95</td>
<td>0.940</td>
<td>0.959</td>
</tr>
<tr>
<td>GFI</td>
<td>&gt; 0.95</td>
<td>0.904</td>
<td>0.921</td>
</tr>
<tr>
<td>AGFI</td>
<td>&gt; 0.80</td>
<td>0.886</td>
<td>0.906</td>
</tr>
<tr>
<td>SRMR</td>
<td>&lt; 0.09</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>RMSEA</td>
<td>&lt; 0.05</td>
<td>0.044</td>
<td>0.036</td>
</tr>
</tbody>
</table>
Validity and reliability were assessed next. All 10 factors reached the commonly accepted composite reliability threshold of 0.7 (Nunnally, 1978), with scores ranging from 0.753 to 0.913. Convergent validity was assessed by 1) factor loadings, and 2) the average variance extracted (AVE) for each construct. Hair and colleagues (2010) recommend all factor loadings reach 0.5, and ideally 0.7. With the exception of the computer-recorded use hours, all factor loadings exceeded 0.5 and most (77%) exceeded 0.7. The average of the loading values for each construct exceeded 0.70. The AVE for all 10 factors reached the recommended threshold of 0.50, ranging from 0.507 to 0.738.

Discriminant validity was assessed by 1) comparing the AVE to the maximum shared variance (MSV) and 2) comparing the square root of the AVE to the inter-construct correlations. Table 4-11 shows the CR, AVE, MSV and correlation matrix for the CFA. As seen from this table, AVE is greater than the MSV for all constructs, demonstrating discriminant validity. In the correlation matrix, the bolded diagonal values display the square root of the AVE. All bold values exceed the inter-construct correlations, again supporting discriminant validity. Although Cronbach’s alpha is not considered as accurate as composite reliability (CR) by some researchers, I have obtained the Cronbach’s alpha for each construct. It is found in appendix A. The Cronbach’s alpha for each construct was very close to the CR, though slightly lower, with the exception of CRUSE. A large difference in this construct can be explained by the violation of the tau-equivalence assumption in Cronbach’s alpha. For this reason, Cronbach’s alpha is not appropriate for constructs with different scales, as is the case with CRUSE (Trizano-Hermosilla & Alvarado, 2016).
Table 4-11. CR, AVE, MSV, and Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>EX</th>
<th>PIQ</th>
<th>SE</th>
<th>CRUSE</th>
<th>ISA</th>
<th>CON</th>
<th>VOL</th>
<th>BEN</th>
<th>SRUSE</th>
<th>PS</th>
<th>CR</th>
<th>AVE</th>
<th>MSV</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX</td>
<td>0.728</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.771</td>
<td>0.530</td>
<td>0.126</td>
</tr>
<tr>
<td>PIQ</td>
<td>-0.233</td>
<td>0.767</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.909</td>
<td>0.588</td>
<td>0.149</td>
</tr>
<tr>
<td>SE</td>
<td>-0.143</td>
<td>0.187</td>
<td>0.798</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.912</td>
<td>0.638</td>
<td>0.037</td>
</tr>
<tr>
<td>CRUSE</td>
<td>-0.023</td>
<td>-0.061</td>
<td>0.022</td>
<td>0.859</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.913</td>
<td>0.738</td>
<td>0.071</td>
</tr>
<tr>
<td>ISA</td>
<td>-0.114</td>
<td>0.189</td>
<td>0.098</td>
<td>-0.042</td>
<td>0.838</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.904</td>
<td>0.703</td>
<td>0.045</td>
</tr>
<tr>
<td>CON</td>
<td>-0.146</td>
<td>0.315</td>
<td>0.093</td>
<td>-0.002</td>
<td>0.173</td>
<td>0.712</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.753</td>
<td>0.507</td>
<td>0.122</td>
</tr>
<tr>
<td>VOL</td>
<td>0.163</td>
<td>-0.085</td>
<td>-0.185</td>
<td>0.075</td>
<td>0.058</td>
<td>-0.083</td>
<td>0.798</td>
<td></td>
<td></td>
<td></td>
<td>0.840</td>
<td>0.637</td>
<td>0.063</td>
</tr>
<tr>
<td>BEN</td>
<td>0.098</td>
<td>-0.137</td>
<td>-0.072</td>
<td>0.266</td>
<td>-0.113</td>
<td>-0.349</td>
<td>-0.002</td>
<td>0.772</td>
<td></td>
<td></td>
<td>0.854</td>
<td>0.597</td>
<td>0.122</td>
</tr>
<tr>
<td>SRUSE</td>
<td>-0.355</td>
<td>0.386</td>
<td>0.193</td>
<td>-0.036</td>
<td>0.211</td>
<td>0.130</td>
<td>-0.251</td>
<td>-0.066</td>
<td>0.766</td>
<td></td>
<td>0.809</td>
<td>0.587</td>
<td>0.149</td>
</tr>
<tr>
<td>PS</td>
<td>-0.174</td>
<td>0.284</td>
<td>0.085</td>
<td>-0.027</td>
<td>0.191</td>
<td>0.156</td>
<td>0.026</td>
<td>-0.079</td>
<td>0.115</td>
<td>0.746</td>
<td>0.784</td>
<td>0.557</td>
<td>0.081</td>
</tr>
</tbody>
</table>

CMB is a serious concern for research designs where both the independent variables and dependent variables are collected through the same instrument (Podsakoff et al., 2003). The research design limited the likelihood of CMB by collecting the focal independent variables (system Use and Benefits) through non-survey data collection techniques (computer-recorded use logs and final grades). However, 9 constructs (3 model variables, 4 controls, and 2 dependent variables) were collected through a self-reported survey at a single point in time. Therefore, I ran a CFA of only the survey item data and a common latent factor to isolate any significant common method bias. The common latent factor method allows all variables measured through the same survey instrument to load on one additional factor (Podsakoff et al., 2003). It is interpreted by examining the percentage of the total variance that may be accounted for from this latent factor. The variance extracted from unstandardized estimates of the latent factor is squared, providing the percentage of variance attributed to CMB. If the percentage of variance extracted is over 50%, then CMB may be a serious concern (Eichhorn,
In the present model the common variance extracted accounted for less than 1% (0.64%, 0.08^2), indicating CMB is not a significant threat to construct validity.

I also tested for CMB with a Harmon’s single factor test. In this test all items from the constructs in the study are loaded onto a single factor. The extracted variance from this single factor model shows how much variance may be accounted for by one general factor. While there is no specific guideline for an appropriate amount of variance to be attributed to one factor (Podsakoff et al., 2003), the common threshold for tolerable CMB is that the majority of variance cannot be attributed to one factor. The amount of variance extracted for a single factor in the present research was 16.315% (below 50%), which indicates CMB is not a serious concern.

Before the SEM was constructed, multivariate assumptions in terms of multivariate outliers, linearity, homoscedascity, and multicollinearity were assessed. Multivariate outliers were identified by obtaining the Cook’s distance of each independent variable on the dependent variable (Cook & Weisberg, 1982). All distances were well below the 1.0 threshold (Cook & Weisberg, 1982), indicating the multivariate outlier assumption is not violated.

A curve estimation was used to evaluate linearity between the dependent and independent variables. The results of the linear model estimation may be found in table 4.12. A linear model was significant at the 90% level for all variables except one. The effect of PIQ on
SRUSE was not significantly linear. However, another model (logarithmic, inverse, quadratic, etc.) was not a considerably better fit than linear.

Table 4-12. Linear Model Estimation Significance

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>CRUSE</th>
<th>SRUSE</th>
<th>BEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIQ</td>
<td>0.004</td>
<td>0.189*</td>
<td>0.023</td>
</tr>
<tr>
<td>PS</td>
<td>0.001</td>
<td>0.016</td>
<td>0.007</td>
</tr>
<tr>
<td>ISA</td>
<td>0.002</td>
<td>0.057</td>
<td>0.016</td>
</tr>
<tr>
<td>CRUSE</td>
<td>-</td>
<td>-</td>
<td>0.082</td>
</tr>
<tr>
<td>SRUSE</td>
<td>-</td>
<td>-</td>
<td>0.006</td>
</tr>
</tbody>
</table>

*While this value was above 0.10, it was still one of the lowest regression estimates. The only smaller model estimates were Logarithmic (0.188) and Inverse (0.167), neither of which were significant.

Independence was assessed by obtaining the residual autocorrelations and evaluating the shape of the distribution. A scatter plot of the residual values by the predicted values was constructed. Hair and colleagues (2010) postulate autocorrelation is not a concern for a dataset when this scatter plot exhibits a random pattern (similar to a null plot of residuals). The plots for the current research may be found in appendix A, and there is no observable pattern in the generated scatterplot graph, indicating the independence assumption is not violated. Also, the Durbin-Watson score was obtained for each dependent variable (CRUSE, SRUSE, and BEN). These are listed in appendix A. Each score is above 1.0 and lower than 3.0, the approximation provided by Field (2009), thereby supporting the assumption of independence.

Homoscedasticity was assessed by plotting the regression standardized residuals of the dependent variables. The scatterplots are displayed in figure 4-6 and demonstrate sufficient
consistent pattern. There were no defined groups in the analysis, so Brown-Forsythe and Laverne statistics were not necessary.

**Figure 4-6. Scatterplots of Regression Standardized Residuals for Dependent Variables**

![Scatterplot](image)
The tolerance and variance inflation factors (VIF) were obtained to assess multicollinearity. These measures indicate how much variance is shared by the independent and dependent variables. Shared variance may decrease the ability to ascertain the effect of the independent variables on the dependent variables. A VIF below 3 and a tolerance greater than 0.1 indicate sufficient multicollinearity (Hair et al., 2010). For each dependent variable, the VIFs were well below 3 and the tolerance greater than 0.1. In relation to the threshold provided by Hair and colleagues (2010) my results indicate low multicollinearity.

HYPOTHESIS TESTING

An interesting finding emerged from the factor analysis. The observed data and survey data did not match for the measurement of system Use. The computer recorded use measures (CRUSE) did not correlate with the self-reported use measures (SRUSE). Important results may be interpreted from each of these measures. Therefore, 2 models are discussed in the following hypothesis review. The first model tested is the CRUSE model; this model considers the computer-recorded use measurement of system Uese. Next, the SRUSE model will be tested, which analyses the self-reported measurement of Use.

CRUSE Model

A model considering the direct effects of organizational culture on the ISSM was constructed first. This model used CRUSE and exhibited good model fit (CMIN=2.098, p-value=0.014, CFI=0.988, NFI=0.978, GFI=0.995, AGFI=0.969, SRMR=0.000, RMSEA=0.036). Seven controls were collected for this research. As mentioned in chapter 3, experience, computer self-efficacy, and voluntariness have been shown to influence computer use. Conscientiousness has
been shown to have an effect on student grades, so a measure of conscientiousness was obtained also. Finally, GPA, class absences and the specific course where the cases were collected may influence system Use and Benefits (grades). To remove the variance attributed to the exogenous variables (EX, SE, VOL, CON, GPA), class absences (ABS), and course (COUR) the controls were regressed on all dependent variables (PIQ, CRUSE, and BEN). Following Hair and colleagues (2010), non-significant control relationships were removed, leaving 10 control relationships (shown in figure 4.8). By retaining significant regression relationships of the exogenous variables in the model, the variance explained by the exogenous variables on the dependent variables was removed, or controlled, allowing remaining regression estimates to measure the effect of the independent variables on the dependent variables. The direct effects of the organizational culture variables on the focal constructs of the model are found in figure 4-7:

**Figure 4-7. Direct Effects of Organizational Culture Constructs in CRUSE Model**

* $p < 0.05$, ** $p < 0.01$
Next, mediation effects were tested. Following the procedure described by Hayes (2009), bootstrapping was used to test mediation in the PIQ \(\rightarrow\) CRUSE \(\rightarrow\) BEN path. Mediation was found to be insignificant at the 0.05 level \((p = 0.162)\). A Sobel test was conducted following equation 1 from MacKinnon and Dwyer (1993). Insignificance was supported, as the z value obtained was 0.187, which was not significant at the 0.05 level.

\[
z \text{ value} = \frac{a \cdot b}{\sqrt{b^2 \times s_a + a^2 \times s_b}}
\] (1)

Next, indirect effects were added to the model. This means 4 variables were created: ISA/PIQ, PS/PIQ, ISA/CRUSE, PS/CRUSE. With these additions, the model fit deteriorated quite a bit \((\text{CMIN}=5.343, \text{p-value}=0.000, \text{CFI}=0.935, \text{NFI}=0.927, \text{GFI}=0.985, \text{AGFI}=0.900, \text{SRMR}=0.000, \text{RMSEA}=0.071)\). All of the interactions were small \((<0.025)\) and insignificant. Following the empirical model trimming procedure of Kline (2011), regression lines were systematically removed systematically one at a time until model fit deteriorated. This means, at each deletion model, fit was assessed. The model fit improved as paths were eliminated. However, at the deletion of the path between ISA and BEN, the model fit worsened, indicating a parsimonious and optimal model preceded. The model fit estimates at each deletion are presented in table 4-13, with emphasis on the optimal model.
### Table 4-13. Model Trimming of CRUSE Model

<table>
<thead>
<tr>
<th>Measure</th>
<th>Threshold</th>
<th>Just-Identified Model</th>
<th>Delete PS/CRUSE</th>
<th>Delete PS/PIQ</th>
<th>Delete ISA/PIQ</th>
<th>Delete ISA/CRUSE</th>
<th>Delete PS→CRUSE</th>
<th>Delete PIQ→BEN</th>
<th>Delete ISA→CRUSE</th>
<th>Delete ISA→BEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMIN/df</td>
<td>&lt; 3</td>
<td>5.343</td>
<td>5.827</td>
<td>5.393</td>
<td>3.567</td>
<td>2.098</td>
<td>1.969</td>
<td>1.862</td>
<td>1.807</td>
<td>1.846</td>
</tr>
<tr>
<td>p-value</td>
<td>&gt; 0.05</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.014</td>
<td>0.019</td>
<td>0.025</td>
<td>0.028</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>NFI</td>
<td>&gt; 0.90</td>
<td>0.927</td>
<td>0.927</td>
<td>0.931</td>
<td>0.959</td>
<td>0.978</td>
<td>0.978</td>
<td>0.978</td>
<td>0.977</td>
<td>0.975</td>
</tr>
<tr>
<td>CFI</td>
<td>&gt; 0.95</td>
<td>0.935</td>
<td>0.935</td>
<td>0.940</td>
<td>0.968</td>
<td>0.988</td>
<td>0.989</td>
<td>0.989</td>
<td>0.989</td>
<td>0.988</td>
</tr>
<tr>
<td>GFI</td>
<td>&gt; 0.95</td>
<td>0.985</td>
<td>0.985</td>
<td>0.986</td>
<td>0.991</td>
<td>0.995</td>
<td>0.995</td>
<td>0.995</td>
<td>0.995</td>
<td>0.994</td>
</tr>
<tr>
<td>AGFI</td>
<td>&gt; 0.80</td>
<td>0.900</td>
<td>0.897</td>
<td>0.910</td>
<td>0.944</td>
<td>0.969</td>
<td>0.971</td>
<td>0.972</td>
<td>0.973</td>
<td>0.973</td>
</tr>
<tr>
<td>SRMR</td>
<td>&lt; 0.09</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>RMSEA</td>
<td>&lt; 0.05</td>
<td>0.071</td>
<td>0.075</td>
<td>0.071</td>
<td>0.054</td>
<td>0.036</td>
<td>0.033</td>
<td>0.032</td>
<td>0.030</td>
<td>0.031</td>
</tr>
</tbody>
</table>

The optimal CRUSE model is presented in figure 4-8:

**Figure 4-8. Regression Estimates for CRUSE Model**

* *p < 0.05, **p < 0.01*
Next, the SRUSE model was assessed. With the identical controls, the model fit was very bad (CMIN=9.047, p-value=0.000, NFI=0.924, CFI=0.929, GFI=0.980, AGFI=0.873, SRMR=0.000, RMSEA=0.096). However, most of this poor fit was due to improper controls. Again, following Hair and colleagues (2010), insignificant controls were removed, specifically, GPA was no longer a significant predictor of system use, but EX and VOL were. When GPA was eliminated as a SRUSE control and EX and VOL were added, the model fit improved (CMIN=1.715, p-value=0.063, NFI=0.987, CFI=0.994, GFI=0.996, AGFI=0.975, SRMR=0.000, RMSEA=0.029), reaching the model fit thresholds of Hu and Bentler (1999; Table 4-8). The regression estimates of the direct relationships may be found in figure 4-9.

**Figure 4-9. Direct Effect Regression Estimates for the SRUSE Model**

![Diagram showing regression estimates for the SRUSE Model with labels: PIQ, SRUSE, BEN, ISA, PS, and Organizational Culture. Coefficients are indicated with asterisks: *p < 0.05, **p < 0.01.](image-url)
Again, bootstrapping was used to evaluate mediation. The mediator of SRUSE on the path from PIQ to SRBEN was not supported ($p=0.862$). A Sobel test following equation 1, supported these results, with a $z$ value of 0.654, which is not significant at the 0.05 level.

Organizational culture moderators were added to the direct effects model, retaining the PS/PIQ and ISA/PIQ variables and adding ISA/SRUSE and PS/SRUSE. As with the CRUSE model, the model fit deteriorated significantly ($CMIN=14.466$, $p$-value$=0.000$, $NFI=0.885$, $CFI=0.887$, $GFI=0.965$, $AGFI=0.751$, $SRMR=0.000$, $RMSEA=0.125$). All of the regression estimates of the interactions were small ($<|0.05|$), but some were significant. However, the model fit was too poor to draw significant support for the moderation.

Again, the empirical model trimming procedure of Kline (2011) was applied and regression lines were systematically removed one at a time until model fit deteriorated. The model fit estimates at each deletion are presented in table 4-14, with emphasis on the optimal model. The regression results from the optimal model may be found in figure 4-10.

**Table 4-14. Model Trimming of SRUSE Model**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Threshold</th>
<th>Just-Identified Model</th>
<th>Delete ISA/ SRUSE</th>
<th>Delete ISA/ PIQ</th>
<th>Delete PS/PIQ</th>
<th>Delete ABS SRUSE</th>
<th>Delete SRUSE BEN</th>
<th>Delete PS/ SRUSE</th>
<th>Delete PS BEN</th>
<th>Delete SRUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>p-value</td>
<td>$&gt; 0.05$</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>NFI</td>
<td>$&gt; 0.90$</td>
<td>0.885</td>
<td>0.943</td>
<td>0.946</td>
<td>0.968</td>
<td>0.968</td>
<td>0.968</td>
<td>0.986</td>
<td>0.985</td>
<td>0.983</td>
</tr>
<tr>
<td>CFI</td>
<td>$&gt; 0.95$</td>
<td>0.887</td>
<td>0.949</td>
<td>0.952</td>
<td>0.976</td>
<td>0.976</td>
<td>0.977</td>
<td>0.995</td>
<td>0.995</td>
<td>0.994</td>
</tr>
<tr>
<td>GFI</td>
<td>$&gt; 0.95$</td>
<td>0.965</td>
<td>0.984</td>
<td>0.985</td>
<td>0.992</td>
<td>0.992</td>
<td>0.992</td>
<td>0.996</td>
<td>0.996</td>
<td>0.995</td>
</tr>
<tr>
<td>AGFI</td>
<td>$&gt; 0.80$</td>
<td>0.751</td>
<td>0.885</td>
<td>0.895</td>
<td>0.944</td>
<td>0.947</td>
<td>0.950</td>
<td>0.977</td>
<td>0.977</td>
<td>0.977</td>
</tr>
<tr>
<td>SRMR</td>
<td>$&lt; 0.09$</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>RMSEA</td>
<td>$&lt; 0.05$</td>
<td>0.125</td>
<td>0.080</td>
<td>0.078</td>
<td>0.055</td>
<td>0.052</td>
<td>0.050</td>
<td>0.025</td>
<td>0.025</td>
<td>0.026</td>
</tr>
</tbody>
</table>
Figure 4-10. Regression Estimates for the SRUSE Model

Statistical Power

Observed statistical power was obtained and is provided in table 4-15 for each dependent variable in both models. The threshold of 0.80, recommended by Kline (2011), was met for each dependent variable.

Table 4-15. Observed Statistical Power of Dependent Variables

<table>
<thead>
<tr>
<th>Model (n=869)</th>
<th>Dependent Variable</th>
<th>Number of Predictors</th>
<th>Observed R-squared</th>
<th>Observed Statistical Power (p=0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRUSE</td>
<td>PIQ</td>
<td>5</td>
<td>0.23</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>CRUSE</td>
<td>4</td>
<td>0.03</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>BEN</td>
<td>6</td>
<td>0.40</td>
<td>1.0</td>
</tr>
<tr>
<td>SRUSE</td>
<td>PIQ</td>
<td>5</td>
<td>0.23</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>SRUSE</td>
<td>6</td>
<td>0.35</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>BEN</td>
<td>5</td>
<td>0.34</td>
<td>1.0</td>
</tr>
</tbody>
</table>
HYPOTHESIS RESULTS

The results of hypothesis testing are found in table 4-16 along with the research model below. Figure 4.11 shows the original research model with all hypotheses, and figure 4.12 shows the model supported by the data analysis, with only the significant relationships visible.
### Table 4-16. Hypothesis Support Across all Models

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Path</th>
<th>CRUSE</th>
<th>SRUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>PIQ → USE</td>
<td>Not Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>H2</td>
<td>USE → BEN</td>
<td>Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H3</td>
<td>PIQ → BEN</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H4a</td>
<td>ISA → PIQ</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>H4b</td>
<td>PS → PIQ</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>H5a</td>
<td>ISA → USE</td>
<td>Not Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>H5b</td>
<td>PS → USE</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H6a</td>
<td>ISA → BEN</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H6b</td>
<td>PS → BEN</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H7a</td>
<td>ISA/PIQ → USE</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H7b</td>
<td>PS/PIQ → USE</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H8a</td>
<td>ISA/USE → BEN</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>H8b</td>
<td>PS/USE → BEN</td>
<td>Not Supported</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>
Figure 4-11. Initial Research Model with Hypotheses Results

Figure 4-12. Final Research Model with Hypotheses Results

*Either self-reported use or computer-recorded use

A full discussion of these results and implications will begin in chapter 5.
CHAPTER 5

CONCLUSION

Introduction

This research investigated the role of organizational culture on focal constructs of the ISSM. The research model was presented in chapter 2 and can be found in figure 5-1. This model postulates the relationship between PIQ and Net Benefits is mediated by system Use. Furthermore, the model proposes the focal constructs of organizational culture, operationalized as Information Sharing Attitudes (ISA) and Perceptions of IS Strategy (PS), influence each construct of the model, as well as moderate the direct relationships between constructs.

Figure 5-1. Research Model with Hypotheses (Identical to Figure 2-7)

The relationships supported by the present study may be found in Figure 5-2. I found relationships existed between PIQ $\rightarrow$ Use and Use $\rightarrow$ Benefits, but, as I will discuss in the section below, the relationships are contingent upon the measurement of Use. I found SRUSE
to be related to certain antecedents in the model, but not to the outcome of Net Benefits, while I found CRUSE is linked to the outcome of Net Benefits but not to antecedents in the model. In the next sections, I use my initial research questions as a framework for discussing each of these general findings in greater detail, and I provide possible explanations.

**Figure 5-2. Research Model Supported by Data Analysis**

*Either self-reported use or computer-recorded use.

**Research Questions**

The research questions (RQs) for this dissertation directly focus on the predictors of IS Use and Benefits, as well as the role of organizational culture in the ISSM.

**RQ1: What are the roles of System Use in the realization of IS Benefits**

As discussed in chapter 1, the relationship between IS use and the benefits of IS, referred to as the productivity paradox, has not been supported by prominent IS researchers (Brynjofsson & Hitt, 1996, Carr, 2003) and still is being investigated (Bharadwaj, 2000; Chan, 2000; Devaraj & Kohli, 2003; Fichman, 2004; Setia & Patel, 2013). The present research focused
primarily on the management of IS in terms of predicting Benefits through system Use.

Specifically, I considered how organizational culture constructs influenced Use and the Benefits of IS through Use. Results indicate the effect of Use on Net Benefits was contingent upon the method of measurement of system Use.

Measurement of Use

As noted previously, there was a division in my model with respect to relationships among constructs, and this division occurred through different measurements of Use. Thus, a preliminary answer to this research question is that the role of Use in the realization of Net Benefits differs according to whether Use is measured as a self-report or a computer-report variable. I found no meaningful role of self-reported Use in the realization of Net Benefits, but I did find a meaningful role for computer-reported Use.

To understand why self-reported Use is not linked to Net Benefits, we can consider the limitations inherent in self-report data. Accuracy is a concern for many researchers when behavior data are self-reported (Hald et al., 2003; Schwab, 2005; Otten et al., 2009; Celis-Morales et al., 2012). Self-reported responses may not measure accurately actual behavior because of effects of social desirability (Schwab, 2005), CMB (Podsakoff et al., 2003), careless responding (Meade & Craig, 2012), or hypothesis guessing (Straub et al., 1995). In the field of IS, researchers debate the accuracy of the measurement of technology use through self-reported items versus objective computer-recorded data.

In the 1980s, researchers began discussing the limitations of self-reported items (Davis, 1989) and the opportunities provided through measuring system Use with computer recorded
logs (Rice & Borgman, 1983). Some researchers found results were not changed by the operationalization and measurement of use (self-report versus computer-report). For example, Taylor and Todd (1995) replicated the seminal technology acceptance model (TAM) study of Davis (1989) but used objectively recorded use data instead of self-reported system use items. Taylor and Todd found the effects of perceived ease of use and perceived usefulness on system use were consistent with the relationships of these variables in the TAM research of Davis (1989).

However, other researchers have found significant differences between self-reported and computer-recorded use data. For example, Straub, Limayem, and Karahanna-Evaristo (1995) investigated the same relationships of TAM that Davis (1989) and Taylor and Todd (1995) assessed, but Straub et al. measured use twice – with self-reported items and computer-recorded data. Straub and colleagues (1995) found the measures of use loaded on separate factors based on the measurement type, self-reported system usage and computer-recorded system usage. The antecedents of the model, perceived usefulness and perceived ease of use, explained 48.7% of the variance of self-reported system usage, while the same antecedents explained only 6.9% of variance of computer-recorded system usage.

Still, many IS researchers do not specify the operationalization and measurement of system use as a component of the theory they are testing (Hartwick, 1994; Petter & Fruhling, 2011; Bajaj & Nidumolu, 1998; Lallmahomen, Nor, Ibrahim, & Rahman, 2013; Karahanna & Straub, 1999; Gefan & Straub, 1997). Some researchers briefly acknowledge a limitation of measuring use through self-reported items. For example, in an investigation of the TAM and software quality measures, Wallace and Sheetz (2014) collected self-reported use data and
found use was predicted significantly by perceived ease of use. These researchers defended the limitation of using self-reported items to measure system use with only two sentences, “Also, we only used perceptual self-reported measures of use instead of actual use. So these results must be interpreted with that limitation in mind.” (Wallace & Sheetz, 2014, p. 256).

As the debate continues regarding the sensitivity of the measurement of the construct of use, prominent researchers advise using multiple methods to measure system use to gain a comprehensive view of the construct. In the seminal revision of the ISSM, DeLone and McLean discuss the aforementioned findings of Straub, Limayem and Karahanna-Evaristo (1995) and postulate “Their findings suggest that self-reported system usage and computer-recorded usage should both be measured in empirical studies because the two do not necessarily correlate with one another” (emphasis added) (DeLone & McLean, 2003, p. 20). Pursuant to this recommendation, the present research collected both measures of System Use.

In the present research, I found the two measures of Use were not significantly correlated. In fact, the measures were somewhat negatively correlated (-.041), although still not significantly. This is consistent with the findings of Straub and colleagues (1995), which showed the self-reported items loaded on a separate factor from the computer-recorded data. Consequently, to follow the effects of each factor in subsequent analyses, I divided the construct of Use into two variables. The SRUSE variable is a measure of the case’s self-reported Use from the survey, whereas the CRUSE variable is a measure of the case’s computer-recorded Use.
With two separate constructs, I found the following significant relationships presented in figure 5-3. Figure 5-3 illustrates the disconnect between the subjective experiences of organizational culture and system perceptions and the objective experiences of how the system is actually used and the Benefits that Use brings. My findings suggest SRUSE is related to organizational culture and PIQ, while CRUSE is related to Benefits. Yet, because a relationship cannot be established between SRUSE and CRUSE, there is a break in the model, and I cannot predict Use or Benefits from users’ attitudes and perceptions of the system.

**Figure 5-3. Research Model with Two Use Variables**

Explanations for Results

The sensitivity of the Use measurement may be explained by cognitive biases or the role of Use in the ISSM. I will begin by describing the cognitive biases, specifically, CMB, social desirability, and cognitive burden. Each of these factors impacts how subjects respond to survey questions but does not influence objective, computer-recorded data. As Craig and Meade (2012) explain, when responses are not accurate, spurious relationships and lower reliability may occur compared to objective data (Meade & Craig, 2012). Then, I will describe
how the role of Use in the ISSM may explain how support for the relationships in the present research model was contingent upon the measurement of Use.

*Cognitive explanations related to self-report measurements.*

Possible explanations for differences between results obtained through self-report versus computer-report data may be due to the nature of self-report data, which is susceptible to cognitive bias and cognitive burden.

*Common Method Bias.* CMB is defined as the variance of a study that may be attributable to the measurement method rather than the constructs or variables themselves (Podsakoff et al., 2003). CMB may occur when variables are measured at a single point in time through a single method, so the method itself accounts for the relationship between variables. This means variables measured through the same survey may share variance because the items measuring both variables are presented in the same format and at the same time, creating systemic error variance attributed to the common method. As Podsakoff and colleagues (2003) summarize, “systematic error variance can have a serious confounding influence on empirical results, yielding potentially misleading conclusions” (p. 879). Several variables in the present research model were collected solely through a single measurement method (the survey). These variables included ISA, PS, PIQ, and SRUSE. All of these variables were related to one another. Two variables included measures from objective data sources, CRUSE and Benefits. These two variables also were related to each other, but not to the previously mentioned variables. From this information, it is logical to consider CMB as an explanation for the difference in Use scores. The SRUSE scores are related to self-reported data and the CRUSE
scores are related to objective data. However, potential CMB for the self-report items was assessed statistically through a common latent factor analysis of all survey-recorded data, and I found less than 1% of variance extracted could be attributed to a method factor. Therefore, it is unlikely for CMB to explain the difference between scores of SRUSE and CRUSE.

**Social Desirability.** Social desirability is defined as the “tendency to present oneself in a publicly favorable light” (Schwab, 2005, p. 45). In other words, if a respondent feels that the focal behavior is favorable in an organization or group, then the respondent is likely to report participating in the behavior. Social desirability cannot influence CRUSE, as the scores are objectively reported, but it may affect SRUSE scores, as respondents may exaggerate use if the respondent perceives IS use as socially desirable. Previous literature has discussed the possibility of social desirability bias in technology use, and empirical findings have found evidence of the bias in certain settings.

Straub and colleagues (1995) argue IS use is not susceptible to social desirability bias because computer use is a neutral activity. A main requirement for social desirability bias is that the focal behavior is viewed as socially favorable by the respondent. System use is a neutral activity that is neither socially desirable nor socially undesirable. Straub and colleagues explain, “Our view is that since computer use is neither a social stigma nor a violation of law, it clearly represents a neutral activity” (Straub et al., 1995; p. 1332).

However, social desirability has been cited as an explanation of the difference between self-reported use and computer-recorded use in some settings, for example, mobile phone technology research. Kobayashi and Boase (2012) argue that one of the reasons why mobile
phone use commonly is over reported in self-reported data, as opposed to computer-recorded data, is because using a mobile phone is considered a general indicator of sociability. Respondents who want to appear popular and socially active, may over report mobile phone use to appear more sociable and popular. This is supported empirically by Kobayashi and Boase (2012) when they investigate the non-random nature of self-report error in mobile phone communication. These researchers found that respondents who reported being more socially active were more likely to over-report their mobile phone use. It important to note though that the mobile phone use setting may be unique and not applicable to the present study. Mobile phone use is a particular type of technology behavior that has been considered by some researchers to be uniquely addictive and therefore more susceptible to social desirability bias (Bianchi & Phillips, 2005; Takao, Takahashi, and Kitamura). For example, Takao, Takahashi, and Kitamura (2009) explained that mobile phone use is banned or illegal in certain circumstances and has been identified as tool used for bullying, loafing, and harassment. It is likely the social stigma associated with mobile phone use may not impact IS Use in the same degree.

While mobile phone use may be influenced uniquely by social desirability bias, other researchers have argued it also may affect professional IS use. For example, Devaraj and Kohli (2003) explain that in some organizations users may feel their supervisors expect them to use an IS. Therefore, an exaggeration of use could be reported to fit these expectations. In the present research, If the user of an IS believes using the system is a desirable behavior and expected by the instructor, as may be the case when asking students how long and how often they work with an academic course delivery system, then social desirability may explain why SRUSE and CRUSE are not correlated significantly.
In the present research, social desirability was mitigated by collecting the Use and Net Benefits variables with secondary data as well as with self-reported data. I did not expect social desirability bias to be a significant concern for Use, as the construct is considered a neutral activity by prominent IS researchers (Straub et al., 1995). However, my results, which did not find a relationship between the SRUSE and CRUSE scores, indicate use behavior may not be a neutral activity, and the findings from mobile phone research settings may be applicable to other settings. It may be prudent for future researchers to consider the possibility of social desirability bias in IS use behavior and design further ways to mitigate the effects.

**Cognitive Burden and Absorption.** Another explanation for measurement sensitivity of Use is cognitive burden. Cognitive burden occurs when “respondents attempt to recall behaviors that they do not typically think about or record on a regular basis” (Boase & Ling, 2013, p. 510). In this regard, reporting the duration or features used of an IS would be inconsistent with the way the system is used. Junco (2013) explains this concept best with the example of driving a car. When a person drives a car, it is natural for him or her to look at the speedometer. Therefore, asking this person to report a typical speed driven would be appropriate. However, when a person is using an IS, it is not intuitive to be looking at a clock, or counting the features used. Therefore, requesting a report of IS use in terms of duration or feature diversity would require a cognitive burden.

Along with cognitive burden, the respondent may also be influenced by the effects of cognitive absorption. Cognitive absorption is a component, and sometimes a measure, of system use (Burton-Jones, 2005). Cognitive absorption is defined as “a state of deep involvement with software’ that is exhibited through five dimensions: temporal disassociation,
focused immersion, heightened enjoyment, control, and curiosity” (Agarwal & Karahanna, 2000; p. 673). The focal dimension, in terms of explaining self-reported use errors, is temporal disassociation, “or the inability to register the passage of time while engaged in interaction” (Agarwal & Karahanna, 2000; p. 673). If a person experiences temporal disassociation when using an IS, then he or she will experience a significant cognitive burden to recall the duration of his or her use. Therefore, a cognitive burden, resulting from cognitive absorption, may account for the difference between SRUSE and CRUSE scores.

In review, the scores of SRUSE and CRUSE were not correlated significantly. The difference between scores may be explained by social desirability or cognitive burden. However, further research is needed to understand the sensitivity to measurement of the Use construct. This is especially necessary as the antecedents and outcomes of Use are different contingent on the measurement of Use. In the next sections, I will describe the unique roles of SRUSE and CRUSE in the ISSM.

*Role of Use in the ISSM*

As discussed above, the support for the relationships in the ISSM is contingent on the measurement of Use. In addition to the potential impact of cognitive biases, the role of Use in the ISSM, as one part of a multi-part process versus a mediator between two factors, may explain the results of the present research. As discussed in chapter 2, the ISSM is presented as a hybrid model, with elements of a process and variance model. Recall, DeLone and McLean describe the ISSM as a three-process model. The three processes are creating the system, using the system, and the consequences of system use. The process model does not consider the
variance, or degree, of the variables, only the presence of the variables. However, DeLone and McLean also admit the ISSM requires a variance perspective, as each of the processes is a necessary but not sufficient condition for the resultant outcome. They explain, “without system use, there can be no consequences or benefits. However, with system use, even extensive use, which is inappropriate or ill-informed, there may also be no benefits. Thus, to understand fully the dimensions of IS success, a variance model is also needed” (p. 16). The results of the present research may be explained by the hybrid model interpretation of the ISSM, where CRUSE serves as a process component of the model and SRUSE represents a variance component.

Role of Computer-Recorded Use (CRUSE) – A Process Component. As depicted in figure 5-3, neither the focal organizational culture facets, nor PIQ, was found to be related significantly to CRUSE, but a significant and positive relationship between CRUSE and Benefits was established. These results indicate the impact of attitudes and perceptions of IS are not related to Benefits through the Use of the system. This means Use, when measured through computer-recorded data, is not a mediator in the ISSM model, but may be a necessary step toward the realization of Benefits. Therefore, the process-model interpretation of the ISSM may explain the role of CRUSE in the ISSM, in that System Use is a necessary condition for Benefits.

DeLone and McLean (1992, 2003) postulate the information and services of an IS must be consumed through system use. If the system is not used, then benefits cannot be realized. Other researchers have supported empirically this notion. For example, Devaraj and Kohli (2003) collected objective, computer-recorded use data as well as objective benefits data of a
healthcare IS. These researchers found a significant and positive relationship between the use of the system and the benefits for the hospital. Devaraj and Kohli argue the productivity paradox (which discussed the phenomenon of stagnant productivity following large IS and IT investments) may be explained by the lack of attention on actual, objectively measured use. The present research supports these claims by showing the significant effect of objectively measured Use on objectively measured Benefits.

The role of CRUSE as a process component in the ISSM also may explain the lack of relationship between the attitudes and perceptions of a system and system use. Recall that DeLone and McLean introduced the process-model ISSM with three stages: “the creation of the system, the Use of the system, and the consequences of this System Use” (DeLone & McLean, 2003; p. 16). Note the description of the first two processes of the model: the creation of the system and the use of the system. These words are objective verbs; the model does not specify perceptions of the system and perceived use of the system. Therefore, if a research study measures perceptions of the system and perception of use, then the process model interpretation may not be applicable, as the perceptions of an individual may not represent the actual process. This may explain why the objective measure of Use, CRUSE, is related significantly to Benefits, but not related to the subjective measure of Use, SRUSE, and other perceptions and attitudes of the user. When the Use process is completed, Benefits are affected. However, an individual’s perceptions and attitudes of the system are not part of the process of system creation or System Use.

Role of Self-Reported Use – A Variance Component. In the present research, SRUSE was related significantly and positively to PIQ but was not related to Net Benefits. This means the
greater the perceived quality of the system, the greater the reported Use of the system. The effect of PIQ on SRUSE is supported theoretically in the ISSM by DeLone and McLean (1992, 2003) and supported empirically by multiple researchers (Venkatesh & Davis, 2000; Rai et al., 2002; Saeed & Abdinnor-Helm, 2008; Hassanzadeh et al., 2012). For example, Saeed and Abdinnor-Helm (2008) performed a large-scale survey study, which investigated the effects of information quality, system integration, and IS usefulness on use of an IS. Over 1,000 responses were collected, and the researchers supported a positive and significant relationship between the respondents’ perception of information quality of the system and the respondents’ reports of use. The current research compliments the above research stream in that individuals in the present study who reported favorable attitudes and perceptions of an IS also reported using the system more.

The antecedent relationships of SRUSE support the variance-model interpretation of the ISSM. The variance of SRUSE is explained by the variance in attitudes and perceptions of the users. These results may be explained by the user component of the ISSM. In the Theory of Self-Consistency, psychologists suggest the scores of self-reported behaviors for an individual generally will be correlated for positive and negative actions. As Thorne describes of Lecky’s work, “A constant pattern or organization of ideas and attitudes will be reflected in positive correlations of all categories with each other, and that a high consistency of responses within each category would be caused by organized systems of values in these limited areas” (Lecky & Thorne, 1961, p. 45). This means if an individual reports a positive Information Sharing Attitude, a positive Perceived IS Strategy, and a positive PIQ of the IS, then it would be likely he or she
would report a high (positive) Use score. In this way, the Theory of Self-Consistency may explain the relationships between attitudes and perceptions of SRUSE but not CRUSE.

In a variance-model interpretation of the ISSM, the impact of antecedents (attitudes and perceptions) on Benefits is transferred through SRUSE. In other words, an individual’s positive attitudes and perceptions of IS would be correlated with Benefits, because the individual would be likely to use the system more than someone with negative attitudes and perceptions of IS. However, even though the link between reported Use and both attitudes and perceptions was positive, there was no connection between SRUSE and Benefits. Therefore, System Use does not transfer the impact of PIQ to Benefits and does not serve as a mediator between attitudes and perceptions and IS Benefits.

**Limitations of the Process-model Interpretation.** My results indicate the process model interpretation of the ISSM is important but limited. While the process model perspective of the ISSM explains the connection between actual Use and Benefits, the model leaves out the essence of the user, the person. Without understanding why, the user engages with the system and benefits from its use, the ISSM is limited to description as opposed to explanation. As described by prominent psychologists, human behavior may be observed in two ways: through an “objective” or “external” frame of reference, or through a “perceptual” frame of reference (Combs & Snygg, 1949). The perceptual frame enables the researcher to understand and anticipate behavior, as “People do not behave according to the facts as others see them. They behave according to the facts as they see them” (Combs & Snygg, 1949, p. 17). A richer understanding of the stimuli of IS Use may be achieved by connecting user perceptions and attitudes with actual behavior.
RQ2: What are the roles of perceived information quality in the realization of IS Benefits?

This research question focused on how the effect of PIQ was related to the Benefits derived from a system, either as a direct effect or through the mediation of System Use. The ISSM suggests PIQ should impact Benefits through the impact of PIQ on Use. This implies potential direct and indirect effects of PIQ on Benefits. The present research addressed this question by assessing direct and indirect effects. I did not find support for a direct or an indirect relationship between PIQ and Individual Net Benefits.

Explanation of Results

As discussed in the previous section, the role of Use in the ISSM may explain my inability to find a relationship between PIQ and Benefits. Explanations for lack of observation of direct and indirect effects may be found in material related to the previous discussions of measurement invariance for Use as well as process and variance model interpretations. The direct effect does not exist. I have no clear explanation for this, but it is possible that without actual Use behavior, PIQ cannot impact Benefits. In other words, Benefits derived from the system are consequences of behavior, and are not impacted by the user’s perceptions. The indirect effect does not exist due to my finding that SRUSE and CRUSE are separate variable causing a causal break in the model. SRUSE cannot transfer the effect of PIQ to Benefits because SRUSE is not related to Benefits. Similarly, CRUSE cannot transfer the effect of PIQ to Benefits because CRUSE is not related to PIQ.
RQ3: Do the selected facets of Organizational Culture (information sharing attitudes and perceptions of IS strategy) affect the selected focal constructs (perceived information quality, use, and net benefits) of the ISSM and/or the relationships between them?

This research question focused on the effects of Organizational Culture facets on selected constructs of the ISSM. As explained in chapter 1, one reason for the failure to support a relationship between IS Use and Benefits is that the contextual factors within an organization might affect the extent to which the IS was used (Damanpour, 1992; Guimaras & Igbaria, 1997; Li & Ye, 1999; Fichman, 2004; Petter et al., 2013). The present research addressed this question by considering the effects of two facets of Organizational Culture, Information Sharing Attitude and Perceived IS Strategy, as direct effects on the selected focal ISSM constructs of PIQ, System Use, and Individual Net Benefits, or moderating effects on the relationships between these constructs. As the measures of Use were related to different facets, I will describe the effects of each organizational culture variable below with SRUSE, and then again with CRUSE.

Organizational Culture and SRUSE

The effect of organizational culture on SRUSE was both direct and indirect. As Combs and Syngg (1949) point out, behavior from a perceptual view is based on how the individual sees the facts. If an individual has a positive attitude toward sharing information, and the IS is considered a meaningful channel for sharing information, then the individual is more likely to report using the IS. This may explain why organizational culture impacted the perceived behavior of the individual.
Direct Effects of Organizational Culture on SRUSE

I found organizational culture had a direct effect on self-reported behavior. Specifically, Information Sharing Attitude, a facet of organizational culture, was related significantly and directly to SRUSE. The relationship between Information Sharing Attitude and SRUSE is consistent with previous conceptual research (Constant et al., 1994; Jarvenpaa & Staples, 2001; Hooff & Huysman, 2009) and empirical findings (Jarvenpaa & Staples, 2000). For example, Jarvenpaa and Staples (2000) investigated the role of information sharing attitudes and organizational ownership of information on information sharing behavior using collaborative media. All variables were collected through a questionnaire, and the researchers found information culture, and the attitudes toward sharing, were related positively and significantly to the use of collaborative media. Consistent with Jarvenpaa and Staples (2000), the present research found Information Sharing Attitude was related significantly to SRUSE. Individuals reporting favorable Information Sharing Attitude also reported high levels of Use.

Furthermore, a significant and positive relationship was established between Perceived IS Strategy and PIQ. This finding is consistent with previous research (Feldmann & Muller, 2003, Li & Lin, 2003). As Li and Lin (2003) found, in organizations where managers understood the importance and value of information, and projected a strategic value of information, the perceived timeliness and accuracy of the information (information quality) was also high. My findings support this concept, but instead of measuring perceived IS strategy from the perception of the manager, as did Li and Lin (2003) did, this study measured it from the perception of the user.
An important implication may be elicited from these results. I found support for the idea that system characteristics, such as PIQ, are not necessarily descriptors of the specific system, but instead reflect the culture and perceptions of the members of the organization. As earlier discussed, PIQ is defined as the perceived relevance, timeliness and accuracy of the output of the IS (DeLone & McLean, 1992; Seddon, 1997). The present study indicates the perceptions of information relevance, timeliness and accuracy is influenced by the attitudes and perceptions of IS users within the organization. For IS professionals, this means that the quality of systems is not based solely on the construction or design of the system, but also the perceptions of support and importance of the system within the organization.

**Indirect Effects of Organizational Culture on SRUSE**

The effect of organizational culture was related indirectly to SRUSE through mediation by PIQ. This means the relationship between organizational culture and SRUSE is explained by the perceptions of information quality. Recall the definition of organizational culture as the collection of shared dominant values that guide behavior in an organization (Leidner & Kayworth, 2006). The present research suggests culture impacts perceived Use because culture impacts PIQ. A perception is how an individual may assign meaning to their environment (Taylor & Fiske, 1978). As the shared values of an organization are perceived by an individual, these values may influence how other objects are perceived, such as the quality of IS or an individual’s thoughts about her or his own behavior.
**Moderating Effects of Organizational Culture on SRUSE**

I did not find the relationship between PIQ and SRUSE to be moderated by culture. Prominent researchers have argued the influence of organizational culture may not be directly observable but instead an interaction effect between perceptions, behavior, and benefits (Hofstede, 1998; Jarvenpaa & Leidner, 1998; Hodges & Hernandez, 1999; Wade & Hulland, 2004; Leidner & Kayworth, 2006; Kappos & Rivard, 2008). The present research did not find a significant interaction effect. This means Organization Culture had an effect on the perceptions of IS quality and SRUSE but did not change the nature of the relationship between PIQ and SRUSE.

**Effects of Organizational Culture with CRUSE**

Although Organizational culture was related significantly to SRUSE, it was not related to CRUSE or Net Benefits, nor did culture moderate the relationship between CRUSE and Net Benefits. I will discuss the direct and indirect effects below as well as the moderating role of organization culture on the relationship between CRUSE and Benefits.

**Direct Effects of Organizational Culture on CRUSE.** A direct relationship between Organizational Culture and CRUSE was not supported. Although the present study did not measure behavioral intentions, this finding is inconsistent with the theory of planned behavior (TPB; Ajzen, 1991), which predicts a relationship between attitudes and behavior, explained through intentions. Organizational culture is measured through the attitudes of individuals as the definition of organizational culture is a ranking of organizational values and an essential feature of an attitude is to evaluate, or assign value, to an object (Eagly & Chaiken, 2007). Some
researchers have identified difficulty in connecting attitudes and perceptions with observed behavior (Straub et al., 1995; DeLone & McLean, 2003). For example, Straub, Limayem, and Karahanna-Evaristo (1995) collected observed use data and self-reported use data regarding voicemail use, as well as survey data from users regarding the perceived usefulness and perceived ease of use of the voicemail system. When observed use was considered, the perceptions of the system were not related significantly to system use and only 6.9% of the variance of use could be explained, despite the significant and positive relationship between perceptions of the system and self-reported use. Additionally, few studies collecting attitudes and perceptions also collect use with an objective measure (Constant et al., 1994, Jarvenpaa & Staples, 2000; Bock et al., 2005; Poston & Speier, 2005; Wang & Chiu, 2011).

However, some researchers have established a connection between system perceptions and computer-recorded use. One explanation for this connection is behavioral intentions. For example, Venkatesh and Morris (2000) found perceived ease of use and perceived usefulness were not related significantly to computer-recorded use. Although, perceived ease of use and perceived usefulness were related significantly to behavioral intention to use the system, and this behavioral intention was related significantly to computer-recorded use. This may suggest behavioral intention fully mediates the relationship between perceptions of an IS and computer-recorded Use.

However, the ISSM does not include intentions in the first presentation of the model (1992) and presents intentions as a substitute for use in the revised model (2003). Recall the updated ISSM depiction in chapter 2 (Figure 2-6 in chapter 2 and presented below as figure 5-4). Intentions are not related to Use but instead may be used as an alternative measure of Use.
DeLone and McLean (2003) discussed the fact that the context of the study will determine which operationalization of system use is appropriate. DeLone and McLean also explained that replacing Use with intentions would be replacing behavior with attitudes and “attitudes, and their links with behavior, are notoriously difficult to measure” (2003, p. 23). The present research was in fact attempting to understand the relationship between attitudes and behavior. Therefore, Use as a behavior was more appropriate to investigate than intention to use. As the present research was based on the framework of the ISSM, and the ISSM does not include a role for Intentions beyond being a proxy for use, I measured Use directly through self-reported and observed behavior without including a measure of intention to use. One important contribution of my work is the suggestion that intention may not be a proxy for Use but actually may be another, important, variable in ISSM model.

**Figure 5-4. The Updated ISSM (DeLone & McLean, 2003)**

Not unlike other psychological constructs, intentions are complex constructs. In the study of the formation of behavioral intentions and the effects of intentions on behavior,
Fishbein and Ajzen (1975) discuss how four elements form an intention: behavior, target, situation, and time. Fishbein and Ajzen explain how each of these elements may change the nature of the intention, and the relationship between the intention and behavior. The specificity of the constructs in the present research model may explain why a significant relationship between attitude and behavior was not established. The measure of Information System Attitude elicited the respondent’s value of sharing information in a non-specific, general setting, whereas the behavior that was measured was specific to Blackboard Use. Assessing respondents’ intentions toward using (behavior) Blackboard (the target object) for a specific class (situation) in the current semester (time) may provide a better understanding of why or the attitudes and perceptions of the system were not related to CRUSE.

**Direct Effects of Organizational Culture on Net Benefits.** A direct effect of organizational culture on Net Benefits was not supported. This means that the attitudes and perceptions of the system were not related to Benefits derived from the system. As discussed earlier, this may be explained by the process-model interpretation. The individual’s attitudes and perceptions are not part of the ISSM process and are not related to Use and the consequences of Use.

**Indirect Effects of Organizational Culture on Net Benefits.** The effect of organizational culture was not related to Net Benefits directly, nor indirectly through the mediation of CRUSE. As discussed above, it was hypothesized that organizational culture would influence Net Benefits either independently, or through additional Use. The present research did not find support for these hypotheses, as the only variable related to Benefits was CRUSE, and organizational culture, for reasons described in a previous section, was not related to CRUSE.
Moderating Effects of Organizational Culture on CRUSE and Net Benefits

Finally, organizational culture did not moderate the relationship between Use and Benefits. This is inconsistent with the theory of Absorptive Capacity (Cohen & Levinthal, 2001) that suggests organizational culture may improve the use of an IS and therefore increase the benefits derived from the Use. The process-model interpretation of the ISSM may explain this lack of interaction effect. If the ISSM is strictly a process-model and does not take into account the individual or the variance of the components in the processes stages, then the relationship is fixed, and will not be influenced by attitudes and perceptions as aspects of culture.

Limitations

A significant limitation of the present study is generalizability. Concerns of generalizability revolve around the question: “Can we generalize the results of a study to other participants, other groups, and other conditions?” (Kerlinger & Lee, 2000). Generalizability was limited because of three factors: 1) a robust measurement of system Use was not obtained, 2) the sample frame may not be representative of other organizations, and 3) the computer-recorded measures of system Use may not be representative of actual use.

Robust Measurement

I found the relationships in the ISSM, were sensitive to the specific measurement of the Use variable. This suggests the generalizability of my results is reduced because the findings are not consistent across the different ways my research questions were addressed. In other words, the relationship between system Use and Benefits is contingent on whether Use was
self-report or computer-report. It is meaningful for future research to consider these differences at both conceptual and empirical levels.

At a conceptual level, the ISSM is presented without specific measurements of variables. Recall the definition of system use is “a user’s employment of a system to perform a task” (Burton-Jones & Gallivan, 2007; p. 659). The definition of the construct does not assume a specific measurement of the variable. This lack of precision allows the ISSM to be applied in a variety of contexts. Other prominent IS models provide more precise construct definitions (Davis, 1989). For example, in the Technology Acceptance Model (TAM; Davis, 1989) a key construct is “perceived ease of use” and is defined as “the degree to which a person believes that using a particular system would be free of effort” (p. 320). This definition of perceived ease of use specifies that the model is observing perceptions of the user. In the TAM the actual ease of use of a system is irrelevant – it is what the user thinks that is important. It is important to note however, that TAM does not predict Benefits. Rather, in TAM the dependent variable is behavior. My findings suggest the path to Benefits requires more precise constructs than the ISSM provides.

My findings are also meaningful for future empirical studies of IS use. Some academic disciplines, such as Finance, dedicate significant attention to the robustness of results against specific measurement choices (Nam et al., 2006; Campbell et al., 2011; Beber & Fabbri, 2012; Guiso et al., 2013). It is common for articles published in Finance journals to include a titled section listing robustness checks. In these sections, the data analysis is performed several times with different measures of the same variable. For example, in an investigation of equity-based managerial compensation and firm value, Nam, Tang, Thornton, and Wynne (2006) consider
three alternative measures to assess the dependent variable of firm value to confirm the initial research findings. When different measures were considered, these researchers found their results were largely consistent, giving a clear and reliable view of the relationship between managerial compensation and firm value. Conversely, my results are not consistent when different measures of use are considered, indicating the relationships in the present study are not understood reliably. Robustness checks are not discussed as widely in IS journals relative to Finance journals but are important for reliability and generalizability. Perhaps the prolific inclusion of robustness checks in IS research would lend to consistent and reliable ISSM relationships.

**Sampling Frame**

The present research sampled university students using a single course delivery IS. In a research note discussing the validity of using student subjects in IS research, Compeau et al (2012) explained that the research setting, when using student samples, may affect generalizability of results to business organizations. In a university setting, the students of the university may be considered “customers” of the university, instead of “employees”, as many organizational members consider themselves. The relationships formed in a university setting may be more temporary than relationships formed in a corporate environment. Finally, the culture in a university setting is generally more egalitarian and open than in business organizations (Compeau et al., 2012). The present research attempts to mitigate these differences by collecting objective data along with survey data.
Computer-Recorded Data

The measurement of Use was limited to the data collected by the Blackboard system. The system Use variable was measured by recording the user’s course hits (how many times they clicked through system screens), course hours, and course hit frequency (daily and weekly standard deviations). These measures may not give the full picture of system Use. The system may record more course hits for student A versus student B, but student A may be having more difficulty navigating the system than student B. While both students are using the system to the same extent, student B may be a more efficient or experienced navigator and thus, result in a lower “Use” score. The research design mitigated this limitation by measuring a user’s experience with the system. However, a user’s experience and navigation efficiency may vary depending on the specific course IS.

The course hour’s value may be inflated as some users may neglect to close the system when they are finished. A subject may walk away while Blackboard is still open or leave it running in the background while they complete other tasks, unrelated to the system. Some researchers have collected more granular data, such as minutes the application is displayed in the foreground (De Reuver & Bouwman, 2015), recording systems where users where logged off after periods of inactivity (Venkatesh et al., 2003), and the number of features used in a system (Burton-Jones & Straub, 2006).

Future Research

A key contribution of this research is the discrepancy between subjective, self-reported Use and objective, computer-recorded Use. As discussed earlier, the lack of integration
between SRUSE and CRUSE may be attributed to cognitive measurement differences or the role of Use in the ISSM. Three explanations were made for the measurement discrepancy: CMB, social desirability, and cognitive burden. Future research may include mitigating these biases by collecting data in two methods, self-reported and observed, as did the present research. If two methods are not available, then certain cognitive biases, such as social desirability, may be accounted for by including social desirability scales when measuring computer use. To limit the cognitive burden associated with recalling IS use, researchers may consider rephrasing self-reported system Use items to reflect common schemas about technology use. For example, instead of focusing on hours spent using the IS, researchers may ask subjects to describe the features used in the IS.

Future researchers may work to clarify the role of system Use in the ISSM. As illustrated in figure 5-2, I was unable to connect the perceptions and attitudes of a user with actual system Use and Benefits. This disconnect involves differential operationalization of system Use, specifically the separation between self-perception and behavior. A key motivation for the present research was to gain insight into what factors account for the benefits derived from IS, in other words, to provide an explanation for the productivity paradox. Without understanding how SRUSE and CRUSE are related, the connection between the user (perceptions and attitudes) and consequences (Benefits) remains elusive. Researchers are encouraged to seek alternative forms of measurement, such as computer-recorded logs and specific IS use scales, to bridge the gap between perceptions of use and actual use.

Beyond measurement, other constructs may explain the discrepancy between perceived use and actual use. Recall the research of Venkatesh and Morris (2000), in which the
researchers did not find a direct link between perceptions of the system and actual use but found an indirect relationship between these two constructs through the mediation of behavioral intentions. As mentioned earlier, intentions may provide the specificity needed to understand the attitude-behavior relationship. Fishbein and Ajzen (1975) explain other factors affect the likelihood of behavior, such as the person’s volitional control over the behavior, the stability of the intention, and the person’s attitude toward the specific situation. These factors sometimes are observed in the user’s intention to perform a specific behavior. Future researchers are encouraged to consider intentions of system use as a separate and unique construct that may shed light on the person’s conscious subjective probability to use the IS and its possible role in the person’s objective, actual use of the system. The idea that behavioral intention is an attitude or a proxy for behavior may be limiting the efficacy of theory development in IS research.

While the present research investigated the influence of organizational culture on the perceptions system Use, more research is needed to understand the effects of organizational culture on actual behavior and Benefits. The present research only looked at two facets of organizational culture – Information Sharing Attitude and Perceived IS Strategy. Future research may look to other facets of organizational culture. For example, ownership of information may be meaningful to the behavior of an individual to share information. Jarvenpaa and Staples (2000) argue that information sharing attitudes are related directly to ownership beliefs. If an employee believes the information belongs to the company, then she or he is likely to share the information with other employees in the company. Another factor to consider may be the stability of the organizational culture. Hu and colleagues (2012) investigated the effect of top
management support on the employee compliance behavior with IS policies. These researchers found the effect of top management support on compliance behavior was mediated fully by organizational culture. This indicates the strength of the culture may also be important.

Finally, future research should focus also on generalizing to other settings. As Compeau and colleagues (2012) pointed out, the organizational setting of a University may not be indicative of a business environment. For example, students are not compared to each other for recognition or assessment, but certain business decisions, such as choosing employees for promotion, require managers to compare individuals with other members of the organization. The factors and relationships between the focal constructs of the present research may change in a setting with more internal competition than a University classroom.

CONCLUSION

The original motivation for this study was to understand how benefits are derived from IS and the role of organizational culture in this process. While I am able to link Benefits from IS with user behavior, I was unable to link the psychology of the user, specifically in terms of perceptions and attitudes, with Use behavior and Benefits. Without this connection, it is difficult for IS researchers to recognize the antecedents of Use behavior and understand how Use behavior is influenced. This is especially important since system Use is directly linked with Benefits, as supported by my findings. The present research finds clear evidence that the construct of system Use requires further clarification and specification in the ISSM if we are to understand how Benefits are derived from IS.
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APPENDIX A

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<th>Cronbach’s Alpha</th>
<th>Durbin-Watson</th>
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<tr>
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<tr>
<td>PS</td>
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Scatterplot

Dependent Variable: CRUSE

Regression Standardized Residual vs. Regression Standardized Predicted Value