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Middle Managers Intention To Use Information In A Data-driven Decision Support System: A Case Study In The Aircraft Industry

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ABSTRACT

As aircraft organizations, like many organizations, seek out ways to increase efficiencies in order to remain competitive within the market, higher utilization of information and personnel become essential. This increase in efficiency will require additional insight into the behavioral intention predictability of middle managers that are responsible for making the decisions that drive efficiencies. Theoretical models such as the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB), and the Technology Acceptance Model (TAM) have linked behavioral intention to predictable behavior. This research study seeks to provide a deeper understanding into the phenomenon of the behavioral intention predictability of middle managers in the aircraft industry to who use information from a data-driven decision support system. The research intends to use a case study methodology utilizing interviews and observations to collect data about attitude, subjective norms, and perceived behavioral controls. All of these play a role in the prediction of behavioral intention. The expectation of the study is to provide organizations, within the aerospace industry, with advanced understanding about behavioral intention predictability to maximize information utilization and performance from a data-driven decision support system. This research study focuses on the measurement of behavioral intention to use, not use itself.

MIDDLE MANAGERS INTENTION TO USE INFORMATION IN A DATA-DRIVEN DECISION SUPPORT SYSTEM: A CASE STUDY IN THE AIRCRAFT INDUSTRY

by

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1. Chapter 1. Introduction

As organizations compete in the world market, each company contains specific attributes that define the level of success obtained from their ability to utilize information and technology for increased effectiveness (Reeves, Walsh et al. 2012). Even though every organization has unique attributes, they also possess common challenges that potentially limit their ability to be successful. One of the many challenges faced by middle management's team decision-making abilities is the interaction of information. These decisions are the cornerstone to the success of the organization. They guide the activities to strategically align with the overall goals of the company (Kaluzny 1989).

Like many industries that compete on a global economic level, the aircraft industry is re-evaluating and restructuring itself by utilizing core technologies and systems to enhance decision-making capability. The aircraft industry is known as an important industry significant to the national economy (Chu, Zhang et al. 2010). As an important industry on a global scale, utilization of information for optimal effectiveness is essential to the organization. Regardless of the type of organization, the topic of organizational information can be a very sensitive subject. This topic typically stirs a wide array of

thoughts, beliefs, attitudes, and emotions. These play a pivotal role in understanding the behavioral intention predictability of middle managers to use the information produced by a data-driven Decision Support System (DSS), and its impact on an organization (Hoch and Schkade 1996).

A DSS is a computer-based information system that provides the essential information to businesses and organizations in order to support the effectiveness of decision-making events (Barr and Sharda 1997). An effective DSS system will provide the necessary support for management, operations, and other divisions of the organization to effectively make important decisions quickly and dynamically, which would typically require significant amounts of time and energy if performed manually (Kim, Sharman et al. 2007). These systems have the ability to operate and function effectively at all levels of the organization and they can operate in a fully-automated mode, completely manual mode, or a combination of both (Kim, Sharman et al. 2007). A DSS is a particular kind of information system, which is an interactive system that supports the decision-making process of a manager in an organization. These tend to be more prevalent in semi-structural and completely unstructured situations. The system utilizes information, models, and data manipulation tools to help make decisions (Phillips-Wren, Hahn et al. 2004).

This research study stems from the personal observations experienced in the professional environment regarding manager training. It has been observed through previous experiences that managers receive little to no training on how to become truly effective managers. Even when they do get the opportunity to attend training classes, the training is often condensed due to time constraints. The vision of this author is to create a DSS that would provide manager training that is directly attributable to their specific

environment and measured on their specific metrics. For example, if a manger has a goal to produce 100 widgets each and every day and falls short of that goal, the DSS could utilize an expert system to identify the root cause followed by specific corrective action (management training) to address their immediate and precise issue. This method would help them understand the proper way to address the problem, based on the direction of the organization or company culture. This eliminates generic and often fruitless training that fails to truly help the managers become better managers. However, the question still remains about whether or not they will engage with the system and the behavioral intentions to use the system.

Past research in the field of information technology acceptance has possessed a variety of perspectives and approaches to understanding the phenomenon of user intentions (Davis 1989). The primary objective of research in the field of information technology is to identify the significance of technology for the end-user and to understand the influences of that implication, so organizations can obtain a smoother integration of technology with their users (Swanson 1982).

Establishing an understanding of the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system (DSS) would provide companies with the ability to evaluate the performance of their organization, which is essential to the success of any enterprise. Ajzen confirms this evaluation as he addresses the essential role that behavioral intention plays within organizations (Ajzen 2001). This information often comes from various sources and while each person can perceive the integrity and validity of the data differently, the reasons

behind the perception or the level of acceptance of the information can be vastly diverse (Sprague Jr and Carlson 1982).

By understanding how these effect people's perceptions about the DSS and the DSS information, organizations can begin to develop new and unique ways to communicate. They can provide information that directly complements the existing tribal knowledge found within the organizational culture (Fishbein and Ajzen 1975). However, the true challenge that exists remains in the behavioral intention to use the information that is provided to them through the DSS (Kim, Sharman et al. 2007). The decision-making process that managers experience contains a fundamental satisfaction of the activity. This process provides the essential elements necessary for the successful completion of the project (Völkner and Werners 2000). Most managers take great pride in making their own decisions based on the information they want to select. The mere thought of taking actions based on a DSS for many managers is purely inconceivable and most show minimal interest or need for the use of a formal DSS tool to make management decisions (Yan 2011).

One of the primary challenges that still remain within the DSS framework is to accurately reproduce the decisions made by human managers faced with the same situations and data. This challenge is increasingly becoming more important. It provides the managers with the understanding that the system is trying to adapt to their methodology and their style of management. It is not just providing them with an alternate management style or another problem-solving technique (Yan 2011). From a human computer interaction perspective, the manner in which the DSS engages the manager is critical to the outcome's success (Brown, Massey et al. 2002).

Even though many managers take great pride in their ability and the effectiveness of their decision-making, the freedom to apply selective measures in the systems and technologies in which they will engage may not be a decision they can make indiscriminately on their own. With many organizations today, organizational information adoption is not considered to be a voluntary act but more of an essential requirement mandated for all or most employees. Brown (Brown, Massey et al. 2002) identified the differentiation between acceptance of mandated technology and voluntary technology. The research found that significant differences in underlying relationships of technology acceptance were present under the mandated environment. This explanatory study found that behavior in a mandated setting is significantly more complicated as it contains various attitude-behavioral variables. The individual's attitudes toward using technology as well as the behavioral intention to use that technology have an impact on the actual system use. This research specifically focuses on the behavioral intention predictability aspect.

The key focus in the understanding of this phenomenon resides less on the technology and the tools within the DSS, but more about the way the technology is utilized, underutilized, or is completely nonexistent within the organization (Fisher and Howell 2004). It has been observed that there is a significant level of information that is not accepted by middle management, but the reasons are not clearly identified. Based upon researcher observation experience with the managers, several of them simply refused to use the data and dispensed with the problems in another fashion.

Based on past literature, minimal research has been conducted in understanding the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system within an aircraft-manufacturing

environment. With aircraft manufacturing competing on a global scale, the need to increase productivity and understand why users accept information is critical to success. The ability for researchers to conduct robust probing early in the developmental process will inevitably have a significant impact on the manufacturer's ability to provide information that is conducive to users as well as the environment. This research study focuses on the measurement of behavioral intention to use rather than use itself. The true challenge resides in the development of decision support systems that provide information that fits the decision styles of managers and satisfies their decision information needs to make more informed and better decisions for the organization (Yan and Davison 2011).

The phenomenon of interest in this research focuses on the behavioral intention predictability of manager to use information from a DSS. This chapter provides an overview of this research in addition to the foundational information to advance the understanding of the phenomenon and its relevance to the field. The study will explain the importance of the problem and provide relevant research questions that guide the research through the investigation. The theoretical framework to which the research is aligned follows this. Then, the methodology research findings, and conclusions are discussed. Finally, the summary of the contributions into the phenomenon is explained to conclude the research.

1.1 Delineation of the Research Problem

The goal is to understand the *behavioral intention predictability* of managers in the aircraft industry to use information produced from a decision support system. This research applies concentrated focus on the behavioral intention predictability aspect, not

the actual use. Specifically, the people involved in the research consist of middle managers that range from: 1st level managers, 2nd level managers, to directors in the aircraft industry. The term "information" can mean a wide variety of things, but specifically for this research the goal is to understand the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system on a daily basis such as:

- Financial or incurred costs data
- Inventory information
- Schedule or delivery information
- Performance related information

Through understanding of the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system, organizations will be able to take full advantage of the distinctive competencies of the key decision-makers, while using technology to compensate for their fundamental weaknesses. This premise builds on the concept that the improvement of performance by the key decision makers within the organization will capitalize on their inherent strengths, thus providing the organization with a distinct advantage. Optimally, this will mitigate the number of situations that key decision-makers weaknesses can undermine their ability to utilize their strengths effectively.

This research study focuses on the measurement of behavioral intention to use. It addresses an important issue that could make a big impact. How do organizations

view the level of importance regarding the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system? By examining the underlying reasons why managers and other decision-makers gravitate toward certain tools within the DSS, executives will better understand the key attributes of the DSS that are more favorable to the organization.

1.2 Research Questions

Q1: *How does attitude impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*

> ***Q1.1:*** *How does cognition impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*
>
> ***Q1.2:*** *How does affect impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*
>
> ***Q1.3:*** *How does the behavioral dimension impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*

Q2: *How do subjective norms impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*

Q3: *How do perceived behavioral controls impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*

1.3 Theories

User intention to use information from a decision support system and information technology adoption are the cornerstones to understanding the behavioral intention predictability of managers in the aircraft industry. Therefore, it only stands to reason that these two areas are significant components in the literature. Understanding user behavioral intention predictability with the information from a DSS, and information technology adoption, using theoretical applications, are the key dependent variables in the information technology literature. These theoretical interests provide researchers with a variety of proven perspectives in understanding user intention to use information and information technology adoption. These theoretical intention models are derived from the field of psychology as well as the field of information technology. An important facet of the research applies behavioral intentions to predict actual use and establishes the key areas that identify the significant contributions to intention but not to use itself. This research

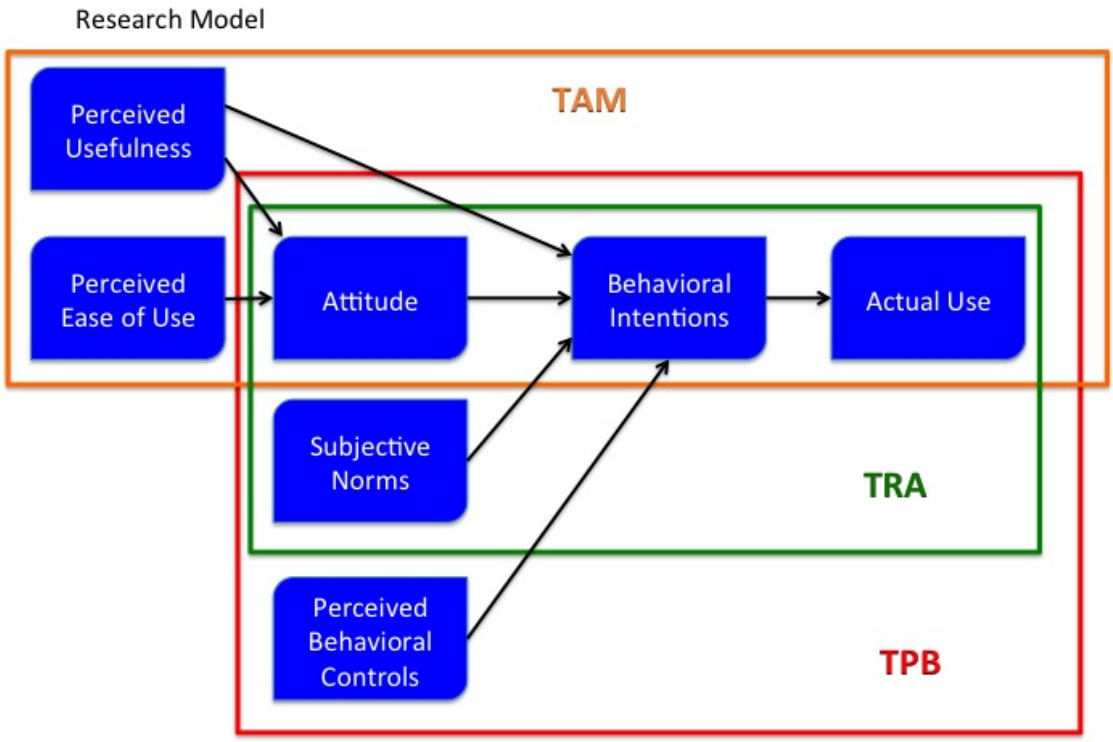
will identify three theories that significantly contribute to the research literature but will select the theory best suited for the research study.

These theories are:

- The Theory of Reasoned Action (TRA)
- The Theory of Planned Behavior (TPB)
- The Technology Acceptance Model (TAM)

Both the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) are proven models that have been used significantly in prior research and are successful in predicting and explaining behavior across a vast variety of environments and applications. As a derivative of this social psychology research, the Technology Acceptance Model (TAM) was an evolution from the Theory of Reasoned Action (TRA) and has become a very powerful and effective method to identify and represent the predecessors of technology use and perceived usefulness.

Figure 1. Theoretical Research Model



(Source: Research model is adopted from Davis (1989) and Fishbein and Ajzen (1975): Technology Acceptance Model (TAM) was developed by Davis and it was an extended model of the existing Theory of Reasoned Action (TRA) developed by Fishbein and Ajzen (1975).)

Each of these models has provided significant contributions to the field of research by assisting the prediction of technology acceptance behavior.

1.3.1 Overview of the Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (Fishbein and Ajzen 1975) is a highly proven and well-established social psychological model that focuses on the elements of consciously

intended human behaviors. This theory is predicated on the assumption that all individuals are deemed as behaving in a typical rational manner. It is assumed they will consider the implications of their actions prior to deciding if the given behavior is acceptable in nature. The Theory of Reasoned Action is considered to be very intuitive and insightful in the practical application of explaining human behavior (Ajzen and Fishbein 1980).

The Theory of Reasoned Action suggests that the vast majority of behavior regarding social relevance is under volitional control and is therefore considered to be predictable from intention. This particular theory also suggests that the stability of intention is influenced by several extraneous factors. TRA also insinuates that the relationship between intention and behavior depends on the measure of intention that corresponds to the behavioral criteria and that intention does not change prior to the behavior that is observed (Ajzen and Fishbein 1980).

The Theory of Reasoned Action identifies how behavioral intention is a function of two determinants known as attitude towards behavior and the individual's perception of social pressures identified in the model as subjective norms. The term "attitude" references an individual's own performance of the behavior rather than their performance as a general term. Additionally, the term "subjective norm" is a meaning that refers to a set of beliefs identified as normative beliefs. These normative beliefs correspond to the possibility that important relevant individuals or groups would approve or disprove of the individual's behavior. The Theory of Reasoned Action also suggests that in order to obtain an estimate of the subjective norm, each normative belief of the individual is initially

multiplied by the motivation to comply with the referent and the cross product is summed for all other salient referents (Ajzen and Madden 1986).

While considered to be an affective model, the Theory of Reasoned Action is a general model that does not provide specific beliefs that are operative for a particular behavior. Additionally, the theory addresses the prediction rather than the outcome of the behaviors. This limits the predictability of the model in situations where intentions and behavior are related as behavior, which is determined by behavioral intentions. Unfortunately, the Theory of Reasoned Action is not properly equipped and designed to predict situations in which individuals have low levels of volitional control (Ajzen 1991).

1.3.2 Overview of the Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) is an extension of the theory of reasoned action as it enhances the original model's limitations by addressing the behaviors in which people have inadequate volitional controls (Ajzen and Madden 1986). The TPB proposes that in addition to attitudinal and normative influences, another component known as perceived behavioral control (PBC) also influences behavioral intentions and actual behavior. The primary difference between the two theories resides in the identification of a conditional component in which individuals do not have full control over the environment or the situation. According to the theory of planned behavior, the action of humans is predicated on three types of considerations.

These considerations are identified as:

- The behavioral beliefs about the possible outcomes of the behavior and the evaluation of those outcomes.
- The normative beliefs about normative expectations of others and their motivation to comply with these expectations.
- The control beliefs about the available resources and opportunities that are controlled by the individual and the anticipated obstacles and impediments toward performing the desired behavior.

According to the theory, behavioral beliefs are an antecedent to a favorable or unfavorable attitude towards the behavior. Additionally, normative beliefs are an antecedent to proceed to social pressures and subjective norms while control beliefs are an antecedent to the perceived behavioral controls. Attitude has become a key identifier as a contributor of intention according to as Azjen and Fishbein (Fishbein and Ajzen 1975); attitude can be departmentalized into two distinct constructs, attitude toward the objects and attitude toward the behavior. Subjective norms are identified as a person's perception of the people who are important and influential in the individual's life, relative to what they perceive as being a desired behavior to be performed from the perspective of those influential individuals. Social norms, otherwise known as normative pressures, have a direct impact on behavioral intention and have been validated in previous studies based on the Theory of Reasoned Action in the Theory of Planned Behavior models. In the Theory of Planned Behavior, Perceived Behavioral Control is relative to an individual's performance

of a particular behavior that is determined by the individual's intent to perform a specific behavior.

As attitudes are contoured by beliefs, norms are contoured by normative beliefs and motivation to comply. Perceived behavioral controls are contoured by beliefs about the individual's opportunities and resources required to adapt the behavior.

1.3.3 Overview of the Technology Acceptance Model (TAM)

Developed by Davis originally, the Technology Acceptance Model (TAM) is a derivative from the Theory of Reasoned Action (Davis 1989). It hypothesizes that an individual's acceptance of technology is solely determined by the individual's complete voluntary intention to use the technology. As intention is predicated by attitude, the attitude of the individual is determined by the perception that the technology is deemed as being useful to the individual. The attitude of the individual is developed by the belief he possesses regarding the use of such technology. Davis suggests there are two forms of belief that influence the attitude of the individual. These beliefs are: perceived usefulness (PU) and perceived ease-of-use (PEOU). Perceived usefulness is identified as the probability that the individual engaging in the technology application or system will experience an increase in job performance or job satisfaction due to that technology or system use. The other belief, known as perceived ease-of-use, is identified as the level of expectation by the individual that the technology application or system will be free of effort or easy to use.

As identified in the model by Davis, perceived usefulness is influenced by perceived ease of use but perceived ease-of-use is not influenced by perceived usefulness. Each one

of the models (TRA/TPB/TAM) possesses the belief-attitude-intention-behavior relationship that provides substantial strength in predicting behavior dependent on the degree of measurement specificity attained (Ajzen and Fishbein 1980). The challenge that resides with this notion regarding the TAM is with the ability to measure beliefs about the actual use of the technology. For example, an individual might deem the technology to be both useful and easy-to-use while still regarding the behavior to actually use the technology as being unfavorable. Even as versatile and parsimonious as the TAM has proven to be, it still remains as an IT specific design that provides a potentially thorough tool of explanation and prediction of user acceptance of the vast array of technologies.

The TAM possesses a robust theoretical foundation and is a well-researched model that also contains a validated inventory of psychometric measurement scales. This enables researchers to use the model with an accumulation of strong empirical support that contains substantial explanatory power.

1.3.4 Overview of the Tripartite Model of Attitude

According to Breckler (Breckler 1984), attitude is defined as a response to an antecedent stimulus or attitude object. The three components that make up attitude are affect (otherwise known as emotions), behavior, and cognition. This is identified in the Tripartite Model of Attitude. The trichotomy of cognition, behavior, and affect is a human experience that dates back to Greek philosophers but was not formally identified as the Tripartite Model of Attitude until the late 1940's.

As this research study pursues a deeper understanding into the phenomenon understanding of behavioral intention predictability of managers to use information from a

data-driven decision support system, the theoretical framework of the TPB will be utilized. Therefore, this research study posits a qualitative methodological approach for the research.

1.4 Case Study Methodology

The case study methodology is considered to be an optimal research strategy for this study as it focuses on the events of the research with an objective of understanding the phenomenon within the context that is commonly imbedded within the phenomenon (Yin 2009). The case study methodology seeks to understand the behavioral intention of managers to use information. Each case is conducted within the aircraft industry at a manufacturing facility that utilizes a DSS within their enterprise resource planning (ERP) system. Each case involves a member of management that is considered to be "middle management" within the same organization but throughout various departments within the organization. Further details regarding the methodology of the research will be explained in Chapter 3 to include; data preparation, data collection, and data analysis.

The design of research is an important aspect of case study research methodology. The research design process requires the researcher to envision not only the beginning and the end of the research but each step of the process between. This design is typically viewed as a logical pathway that incorporates the research questions, data collection, data analysis (to include patterns and themes among the dataset), and specific description of how the analysis will lead to interpretation of the research findings (Yin 2009). As this research study seeks the "how" of behavioral intention predictability, the case study methodology is considered to be an optimal strategy (Yin 2003). The focus of case studies

include the development of understanding about a phenomenon through the collection of cases through deeper probing and analysis into the finite specifics of each case as well as the collection of cases (Cohen , Cohen, Manion et al. 1989). It is through these activities that themes emerge to illustrate the events surrounding the phenomenon. These cases are typically defined within a specific time boundary which can consist of a single case or even multiple cases (Creswell 1998).

The research presented is a culmination of the work from a pre-pilot study/ pilot study (as discussed later in Chapter 3 and Chapter 4), and the eventual final research study. The data that were collected for this research study was obtained in various forms to include observations, interviews, and notes. This triangulation of data collection provides a holistic perspective into the understanding of the phenomenon, which was analyzed through both deductive and inductive content analysis methods.

1.5 Chapter Summary

In summary of the chapter, the goal is to understand the *behavioral intention predictability* of managers in the aircraft industry to use information produced from a decision support system. Like many industries that compete on a global economic level, the aircraft industry is re-evaluating and restructuring itself by utilizing core technologies and systems to enhance decision-making capability and the industry is known for as an important industry significant to the national economy (Chu, Zhang et al. 2010). System information use can stir a wide array of thoughts, beliefs, attitudes, and emotions. These thoughts, beliefs, attitudes, and emotions play a pivotal role in understanding the

behavioral intention predictability of middle managers to use the information produced by a data-driven DSS, and its impact on an organization (Hoch and Schkade 1996).

While there remains a community of user behavioral intention theories regarding information and systems, this research study will examine the primary theories and perform a selection of a single theory that is best suited to address the key factors: attitude (consisting of cognition, affect, and behavior), subjective norms, and perceived behavioral controls. The research questions postured for these research studies are guided by the TPB theoretical framework. The Tripartite Model of Attitude plays a support role with regard to attitude in the TPB. According to Breckler, (Breckler 1984) attitude is defined as a response to an antecedent stimulus or attitude object and the trichotomy of cognition, behavior, and affect that is the human experience.

The qualitative case study methodology was selected for this research study as it is the ideal approach to given the fact that it focuses on the events of the research with an objective of understanding the phenomenon within the context that is commonly imbedded within the phenomenon (Yin 2009). The aforementioned case study methodology seeks to delve into the phenomenon of understanding the behavioral intention of managers to use information. This will be achieved through the collection and analysis of data via interviews, observations, and notes.

2. Chapter 2. The Literature Review

2.1 Introduction

In the quest to compete on a global level, the international strategy literature suggests that the utilization and effectiveness of key decision-making tools will be particularly essential to future success (Hedlund and Rolander 1990). As fierce competition emerged, the aircraft industry experienced low profit margins and high failure rates for new acquisitions. The aircraft industries, like many other industries, compete on a global level, which requires an unheralded development in aircraft control systems specifically designed for the aviation environment (Burrows, Brown et al. 2001). The aircraft control systems are essential to the internal operations managers who are the decision-makers of the organization. Due to the geographical distances and the cultural variations between divisions within the organization, the business units will inevitably possess variations in the decision-making process (Roth 1992). It is these variations that encourage organizations to utilize a DSS to assist managers with the decision-making functions. Since the act of decision-making is identified as an intrinsic aspect of business activities, managers who possess fraudulent information, on which, they base decisions, can have significant, negative consequences. Obtaining the essential knowledge is the raw material (and the necessary deliverable in any decision making process (Holsapple 2001).

Previous research explains how American managers and professionals reported using information systems, such as DSS, to aid the managers in planning, decision-making, budgeting, forecasting, trending identification, and problem solving (Igbaria, Pavri et al. 1989). Additional research noted a more specialized use of information technology. This

found businesses and government executives accepting of the quality and decision-making by electronic brainstorming to be equal to or better than those results acquired from live boardroom meetings (Nunamaker, Applegate et al. 1988).

It is estimated that organizations today invests billions of dollars in newer and more advanced information technology in order to improve efficiencies, effectiveness, and system capabilities. As a result of these significant investments, organizations understand the importance of effective decisions and how they are made. This understanding is applied to what we already know and comprehend about the decision-making process within the organization. Information technology decisions are identified as a foundational component that shapes the organization, yet there is much to understand about the behavioral intentions aspect of the process (Venkatraman 1994, Sauer, Yetton et al. 1997, Galliers and Baets 1998, Murray and Trefts 2000, Keil, Eloranta et al. 2001, Yates and Van Maanen 2001). With advancements in understanding of the behavioral intention phenomenon, management can make decisions to control the factors that are likely to lead to behavioral intention to use the information from a decision support system. By understanding the factors that play a role in the behavioral intention, managers can increase the prospective users intentions to use a new system (Jackson, Chow et al. 1997).

As DSS have become an integrated tool that began in the 1960s, the primary role of a DSS is to improve the decision-making capabilities of an individual. This can be achieved by: enhanced access to information management, problem structure, statistical and analytical tools, problem recognition, and the application of knowledge. Many of the tools found that within a DSS are analytic hierarchy process driven, data-driven based analytics, and fuzzy logic (Li, Ambani et al. 2009). Regardless of the tools within the DSS, anecdotal

evidence suggests that information systems technology provide significant advantages in managing organizations and information systems. The value of information can be defined as "the difference between a decision-makers payoff in the absence of information relative to what can be obtained in its presence" (Banker and Kauffman 2004).

The objective of this research is to provide understanding into the phenomenon, and to aid in spanning the gap between human behavior and information/ information systems. The need exists for more insight and more understanding into the essential decisions that assist practitioners with information system related problems that reside within the organization thereby helping to improve the quality of information systems decisions (Butler 1991, Cray, Mallory et al. 1991).

2.2 Aircraft Industry

Like many beginnings, the aircraft industry has a rich and colorful history that started with two bicycle makers in the United States. The first powered aircraft took flight on December 17, 1903 at Kitty Hawk North Carolina by Orville and Wilbur Wright. However, the world failed to put much faith in the new invention and it sparked little interest among the public. It wasn't until 1908 that the Wright brothers developed a modified version of the original aircraft design that was capable of carrying not one individual but two people. As a result, the United States Army purchased the first airplane for military use and the Wright brothers demonstrated the Wright Flyer in France from August 1908 to May 1909 (Blake 1974). From that moment on, the airplane and the aircraft industry became a globally recognized economic foundation for many countries.

As the aircraft industry began in the early 1900s it became clearly evident that the industry would serve as an important, significant symbol of great power. The development of the aircraft industry is of strategic significance to both the national economy and the national security of many countries (Chu, Zhang et al. 2010). Prior to the outbreak of World War II, the aircraft industry had become one of the world's largest manufacturing components and has remained one of the largest high-technology industries in many countries (ZHANG 2003). As a primary industry in manufacturing, the use of technology and information systems play an important role in manufacturing efficiencies and productivity (Sarkis 1997).

The utilization of technologies and information systems to advance aircraft manufacturing techniques is identified as a critical task faced by manufacturing management. This requires significant capital investment and scrutiny due to the high degree of uncertainty involved in these types of investments. The tangible and intangible benefits expected from these investments reside in the cost reduction as well as significant improvement in information flow, increased production flexibility, better coordination with users, and increased adaptability to changing market conditions that are difficult to predict and measure (Irani, Ezingeard et al. 1997). Considering the existence of a large number of decision attributes and the existence of both tangible, financial, non-tangible factors, as well as interaction between these various factors, the element of complexity becomes a serious concern. Many manufacturing organizations have attempted to use economic justification methodologies for short-term projects. These are often found to be inappropriate for evaluating (simply because advancement in manufacturing technologies has the inability to quantify and establish the specific relationships involving qualitative

aspects of performance). The establishment in the foundation of a decision-making framework, such as a decision support system, could provide specific critical decision attributes to assist and direct managers that deal with the complexity of the evaluation task (Kaplan 1984, Rosenthal 1984, De, Nof et al. 1985, Michael and Millen 1985, Meredith and Hill 1990, Irani 2002).

The use of information technology in the aircraft-manufacturing environment is an essential supportive tool as well as a competitive weapon. In the early 1980s, Peter Drucker, a leader in the development of management education, invented the concept known as management by objective. He predicted, "The factory of tomorrow will be organized around information rather than automation". His vision and insight have become a true reality in today's society. These establishments depend on the utilization and effectiveness of technology to expand and increase the employee's knowledge. Awareness is essential to survive and adapt in a dynamic business environment (Drucker 2012). While computer systems at all levels of the organization have the capability to enhance the user's ability to solve complex problems by providing a constant supply of quality information, the phenomenon regarding behavior intention of the user still remains (Chen 2002).

The business history of the aircraft industry contributes to contemporary decision-making and business practices for corporate managers and new venture entrepreneurs. Twenty –first century scholars, who studied organizational management and leadership, identified daunting concerns and challenges in the economic outlook that resulted in widespread concerns about the future (D'Intino, Boyles et al. 2008). As the advancement in the field of information technology has created extraordinary developments, it is the

advancement of user-friendly programs and systems that have become available to manufacturing managers. In making these effective tools and efficient systems readily available to managers they are also faced with the dilemma of making the right choice between the systems and the technologies. It is the very centrifuge of systems and tools that are intertwined with each other that provide a complex interrelationship between the system and the user (Burbidge 1984).

In today's business environment, it would be very difficult to find a manager that is not affected by technological change and by the persistent challenge of technology based decision making with the choice to engage with the technology (Kleindorfer and Partovi 1990). The hallmark of leadership is the ability to make effective decisions (Mumford, Friedrich et al. 2007). As with many industries, leaders in the aircraft industry make countless decisions in areas of the organization that can have significant impact on the users and the company. Since these decisions affect the users in profound ways (Frohman 2006), by obtaining a deeper understanding of the behavior intention behind the decision making process, leaders and organizations can become more effective. Unfortunately, there has been little research that delves into leadership decision-making and the relationship to intention of behavior in the aircraft industry (Westaby 2005).

2.3 Decision Making by Middle Managers

Middle managers have roles and responsibilities in different areas, such as personnel, financial, technological, and many others to help promote and establish the strategic vision of the organization. It is the proper selection and successful execution of such resource deployment that deem a manager as being effective. This selection process

otherwise known as “decision-making” defines the ability of the manager to successfully provide solutions to problems. Managers have underlying assumptions that shape their attitudes and influence their ability to make decisions. It is these assumptions that act as predictors of the decisions made by the manager. Used as a foundational component to the decisions that are made, assumptions (otherwise known as information) provide the data on which the decision is based. Unfortunately, since their decisions are based on the assumptions, they are no better than the assumptions upon which they are founded.

While the responsibility of a manager is to make decisions, they also have the perception that they are required to implement the decision. This linear thought process by the manager is to seek the best decision possible and then deal with the aftermath of the resistance to the change that becomes an inevitable challenge of the implementation. Regardless of the level of experience or tenure of a manager, the decision-making process is an experience that people embrace, as they do not challenge the ideas that are their own. Since managers have the responsibility, the obligation, and the title to make such decisions they deem are a part of what they are getting paid to perform, they are open to undertaking the challenge regardless of those affected by the decision. But how does behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system correlate with the decision making process that results from the usage of the information?

The decision-making process, otherwise known as a behavioral tendency, can be considered to be “impulsive behavior” as defined by psychologists (Lejoyeux, Ades et al. 1996). A decision that is defined as impulsive behavior would be performed spontaneously, immediately, and kinetically while omitting the delivery process of applying

careful consideration to the ramifications of the actual decision (Rook and Fisher 1995). When a manager makes a decision that is impulsive in nature, it is an indication that the impulsive choice that was selected was actually a deviated decision from a prior decision that was planned to be selected previous to the impulsive selection (Dholakia 2000).

For example, a manager receives information from a DSS that provides clear indications that overtime hours are not needed to meet scheduled deliveries. But, he impulsively decides to work overtime hours fearful of not making schedule deliveries, even after the announcement of no overtime. This would be considered a deviation from the previous selection. However, if the manager receives the exact information as above from a DSS, makes the same decision as above, with the only difference being, the decision was made BEFORE the announcement of no overtime, then this is an indication of an impulsive option. This arises from the fact that decision-makers are constantly exposed to make impulsive decisions within a short window of time or a behavioral need to select other than what was suggested. In the latter example, the impulsive choice selection process occurred as a decision implementation. It was actually chosen at the same time that the decision was enacted rather than before the decision-making process (Bagozzi, Dholakia et al. 2003).

In Naylor's theory of behavior in organizations, the resource allocation process limits the conceptualization of a manager's decision-making process where the individual provides minimal contribution to the act of choosing or performing effortful engagements. The author suggests that individuals use the element of time in the motivation process of allocating resources to various components within the timeframe to assist in the decision-making process (Naylor, Pritchard et al. 1980). Carver and Scheier's feedback loop model of self-regulation is viewed as controlled behavior of discrepancy by reducing feedback

processes that have an impact on a specific behavior by the decision-maker to a referenced value and subsequent behavior (Carver and Scheier 2001). As an example, if a manager makes a decision using an impulsive choice selection process with ill-fated results, the decision-maker's actions will reduce future desires to make impulsive decisions without having additional input, such as the omen of time or even a reference from another individual.

Regardless of the manager's decision-making process, it is clear that the element of behavioral influence is a contributor to the methods and success of the manager's ability to make effective decisions.

2.4 Theories of Behavioral Intentions

Research about the adoption of new technologies is an area that has been researched extensively across many disciplines, from information systems management to communication psychology. This past research includes social factors, control factors, and attitudinal factors that provide insight into the explanation of IT usage within various contexts. The need to develop the phenomenon of understanding user intentions to use and adopt information technology using theoretical applications is essential (Swanson 1982). These understandings into user intention to use the information technology adoption are the foundational elements to a deeper comprehension of why managers use information produced from a decision support system. These two areas serve as a significant component in the literature (Hu, Chau et al. 1999). Prior research applies the behavioral intentions to predict actual use and establishes the specific areas that illuminate the substantial contribution to intention as an important part of the research (Fishbein and

Ajzen 1975). It is the theoretical perspectives of past researchers that provide future research with a variety of proven perspectives that have been used to provide significant understanding of user intention to use in the adoption of information technology (Davis 1989). These behavioral intention models are derived from past research performed in the field of psychology as well as the field of information technology (Christie 1981). By closely examining some of the more prominent theories of behavior, the research study can benefit from the theory best suited to use as a framework. Each theory is examined individually followed by a comparison of each thus identifying the strengths and weaknesses of each. Finally, a selected theory to serve as the framework will emerge for the research study.

2.4.1 The Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) was derived from the social psychology setting and introduced by Martin Fishbein and Icek Ajzen to provide a deeper understanding of predictions of behavioral intention, predictions of attitude, and predictions of behavior (Fishbein and Ajzen 1975). The Theory of Reasoned Action is a widely used grounded theory. It serves as the foundation for many other theories that address attitudes such as, learning theories, expectancy-value theories, consistency theories, and attribution theory. According to the authors of the Theory of Reasoned Action, if suggested behavior is evaluated as a positive attitude and if individuals think there are significant others wanting them to perform the behavior, the results are a higher retention and higher motivation to perform such behavior.

By separating behavioral intention from behavior, this allows the explanation of limiting factors on attitudinal influence (Ajzen and Fishbein 1980). The Theory of

Reasoned Action was derived primarily from extensive frustration with traditional attitude-behavior research. Prior attitude-behavior research exhibited weak correlations between attitude measures and performance of volitional behaviors (Hale, Householder et al. 2003)

In its simplest form, the TRA can be expressed as the following equation:

Figure 2. Theory of Reasoned Action

$$BI = (AB)W_1 + (SN)W_2$$

Where:

- *BI* = behavioral intention
- (*AB*) = one's attitude toward performing the behavior
- *W* = empirically derived weights
- *(SN)* = one's subjective norm related to performing the behavior

(Hale, 2003)

TRA is a highly studied model that is intended to address the key determinants of consciously intended behaviors. As a part of the Theory of Reasoned Action, the behavioral intention of performing a specific behavior is determined by a personal factor and a social factor (Fishbein and Ajzen 1975). The attitude towards the behavior is represented by the individual factor and the social factor is represented by the subjective norm.

Figure 3. The Theory of Reasoned Action Formula: Attitude

Attitude is represented as: $A = \sum b_i e_i$

Figure 4. The Theory of Reasoned Action Formula: Subjective Norms

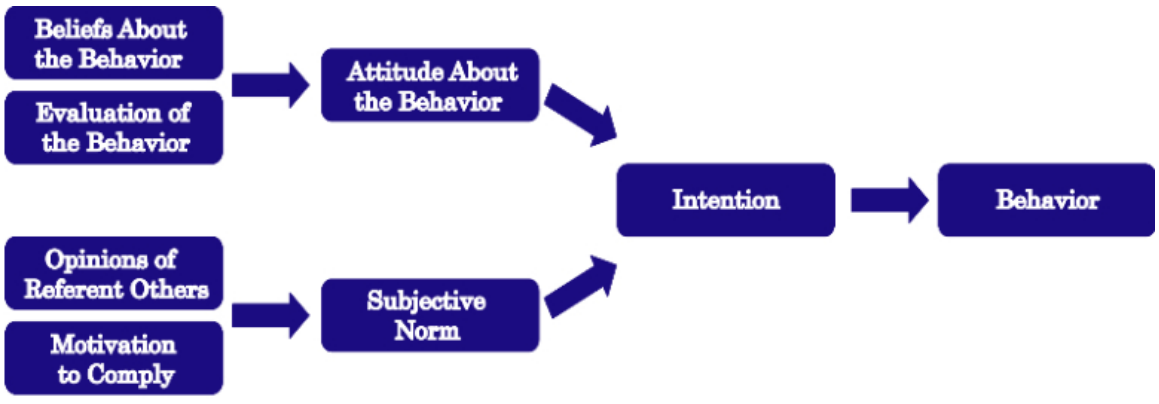
Subjective Norms are represented as: $SN = \sum nb_j mc_j$

According to TRA, an individual's attitude toward a specific behavior is solely determined by their beliefs about the forthcoming consequences regarding the act of the behavior, multiplied by the evaluation of the consequences. This particular model has been used and tested extensively and is considered to be a highly proven and established social psychological model that applies specific emphasis on the elements of consciously intended human behaviors. The theory hypothesizes that an individual's intention to carry out a specific behavior is considered a determinant of the behavior itself. Intentions are considered to be indications of the efforts that individuals are willing to exert and a measurement of how much effort they are planning to put forth in order to perform the desired behavior (Ajzen 1991). On the other hand, attitude toward the behavior is indicative to the degree in which an individual has a favorable or unfavorable perception of the desired behavior.

Within the Theory of Reasoned Action, Fishbein and Ajzen suggest that the immediate antecedents to behavior are considered to be behavioral intentions. These

intentions are a function of prominent information or beliefs about the probability that the acts of this particular behavior will provide a specific desired outcome as a result of the behavior (Ajzen and Fishbein 1980). Fishbein and Ajzen segregate the antecedent beliefs for behavioral intentions into two distinct individual groups. These two groups are known as behavioral and normative beliefs. While the behavioral beliefs are considered to be the fundamental influence on the attitude of an individual to perform the behavior, the normative beliefs are considered to be an influence on the individual subjective norms about performing that particular behavior. Therefore, the individual's perceptions about the information or beliefs impact the intention and subsequent behavior through the channels of attitude and through the channels of subjective norms (Fishbein and Ajzen 1975).

Figure 5. Theory of Reasoned Action Model



Fishbein-Aizen Theory of Reasoned Action

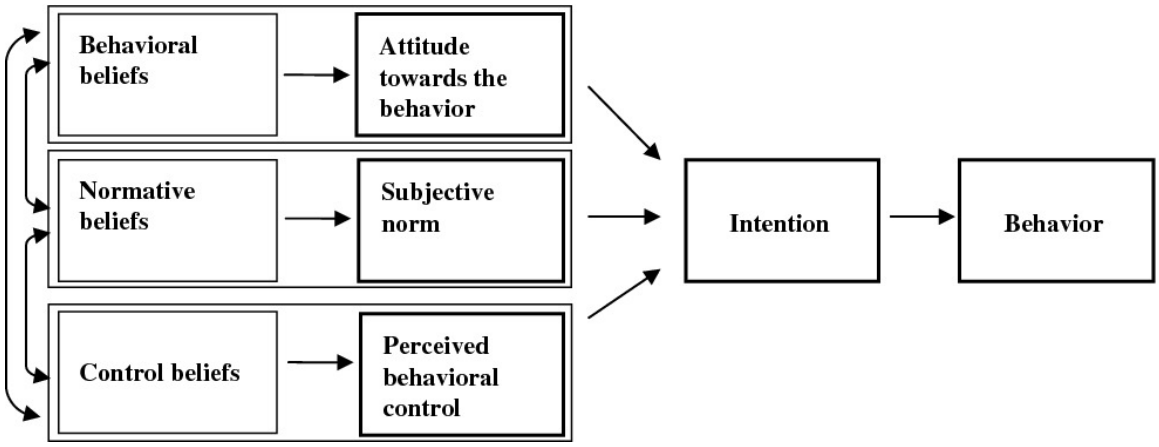
Even though the Theory of Reasoned Action model only contains an individual and a social component for the explanation for behavioral intentions and behavior itself, (the authors later account for external variables to model that were identified to influence intentions). But, only to the extent that they affect either attitudes or subject of norms not external or environmental influences (Fishbein and Ajzen 1975). Fishbein and Ajzen identified three boundary conditions that have the possibility of impacting the magnitude of the relation between behaviors. The first of the three conditions is the degree to which the measure of intention and the behavioral criterion correspond with respect to their individual levels of specificity. The second of the three conditions is the stability of intentions between the time of measurement and the performance of the behavior. The third condition is the degree to which carrying out the intention is considered to be under volitional control of the individual. This theory is predicated on the assumption that all individuals are deemed as behaving in a typical rationale and it is assumed that they will consider the implications of their actions prior to deciding whether or not the given behavior is acceptable in nature (Ajzen and Fishbein 1980).

In summary, to put the Theory of Reasoned Action definition into simple terms: an individual's volitional or involuntary behavior is predicted by their attitude toward that behavior and how they think other people will view them if they perform the desired behavior. The attitude of the individual combined with subjective norms will form the behavioral intention of the individual. The Theory of Reasoned Action is considered a channel model and does not identify perceived behavioral controls as being cooperative for a particular behavior (Davis 1989).

2.4.2 The Theory of Planned Behavior (TPB)

The Theory of Planned Behavior originated by Icek Ajzen in 1985 from his article "From intentions to actions: A Theory of Planned Behavior." The Theory of Planned Behavior was an extension of the Theory of Reasoned Action (Ajzen 1985). Martin Fishbein and Icek Ajzen proposed both theories. Consequently, as the Theory of Planned Behavior is an extension of the Theory of Reasoned Action, it too posits that if the evaluation of the suggested behavior is deemed as being positive (attitude) by individuals and the individual possesses a firm belief that other people around the individual want them to perform the perceived desired behavior (subjective norms), disbelief results in a higher behavioral intention and motivation to actually perform the desired behavior (Fishbein and Ajzen 1975). This results in a high correlation of attitudes and subjective norms directly linked to behavioral intention and consequently, to behavior. According to the theory of planned behavior, attitudes towards behavior and subjective norms guide and direct the users actions and intentions to perform the behavior (Ajzen 1991). Subjective norms are identified as the individual's perceptions of approval or disapproval from the acknowledgment of others that have performed or wish to perform the behavior. The Theory of Planned Behavior also expands the limitation or conditions of pure volitional control specified by the Theory of Reasoned Action. This is performed by including beliefs regarding the possession of prerequisite resources and providing opportunity for a specific behavior to be executed (Ajzen 2006).

Figure 6. The Theory of Planned Behavior Model



Theory of Planned Behavior (1985)

An additional determinant of intention is identified as perceived behavioral control. The addition of the element known as perceived behavioral control is the differentiating component to the Theory of Reasoned Action. According to Martin Fishbein and Icek Ajzen, perceived behavioral control is identified as an individual's appraisal of the perceived ease or difficulty to perform the behavior, which is considered to be determined by the total set of accessible control beliefs (Ajzen 1991). The element of perceived behavioral control was added to TRA in an attempt to address the specific situations in which individuals may lack the complete volitional control over the behavior that is desired. In addition to the formulas in TRA, TPB added perceived behavioral controls, which are represented below (Mathieson 1991):

Figure 7. The Theory of Planned Behavior Formula: Perceived Behavioral Controls

Perceived Behavioral Controls are represented as: $PBC = \sum cb_k pf_k$

For example, a manager's intention is to increase the annual budget for the sole purpose of increasing productivity and efficiency in the manufacturing process. It is evident that the approval of the proposed budget is not completely under the manager's control, but also resides with executive level management and finance. Even though the manager may firmly believe this is the best choice in the interest of the company and may even provide substantial documentation to support such a proposition, it is possible that the company simply does not have the available funds to support the increase in budget. Even though the manager may do everything in his power to make improvements, he does not solely possess control of the decision and the ability to execute the desired belief. In this situation the lack of control rests on the decision-making capabilities of the members of the executive management team, the finance department and the manager submitting the proposal.

Even with the lack of control exhibited in the perceived behavioral control construct, the behaviors that lead up to the attainment of the desired objective must be examined individually to identify potential problems of execution. Using the previous example, it is possible that the manager could experience difficulty in obtaining a substantial amount of information to support a proposition to increase the budget. Such a situation could be considered to be under greater volitional control then submitting the

proposal to the executive management team and the finance department. Since this middle of the proposal could be thwarted by a variety of extraneous factors, the manager must identify the significant challenge of obtaining the necessary supporting documentation and data to support the budget increase. Each of these situations contributes to the mundane behaviors experienced on a daily basis that can be subject to unforeseen obstacles and volitional control over the behavior.

The whole idea of including the perceived behavioral control concept into the theory of planned behavior was to accommodate the non-volitional elements inherent in all behaviors. This is especially true when the perceived behavioral control is likely to affect behavioral intentions. As a result, perceived behavioral control can dramatically impact behavior indirectly as well as directly by its impact on intention (Ajzen 2002). The construct of perceived behavioral control provides useful information about the actual control an individual can possess in the situation and is deemed as being effective as well as an additional direct predictor of behavior. In essence the more resources and opportunities individuals perceive they are in possession of, the greater the existence of the perceived behavioral control over the behavior (Ajzen 2006).

The construct of perceived behavioral control is not considered to be a new concept specifically developed for the theory of planned behavior. A comparatively similar model appeared in 1966 by Rosenstock (Rosenstock 1966) for the health belief model where it identified barriers in the model of interpersonal behavior (Triandis 1977). In this model, the form of facilitating conditions surface, but the construct of perceived behavioral control is truly solidified by Bandura's work on the theory of self-efficacy (Bandura 1977, Bandura 1989, Bandura 1997).

The additional component of perceived behavioral control, added to the Theory of Planned Behavior from the Theory of Reasoned Action, is a derivative of the Self-Efficacy Theory (SET). Self-efficacy theory originated from social cognitive theory and was introduced in 1977 by Bandura (Bandura, Adams et al. 1977). Such expectations as motivation, performance, and feelings of frustration associated with recurring failures determine behavioral reactions, according to Bandura. The author also identified the division of expectations into two specific areas known as: self-efficacy and outcome expectancy. The definition of self-efficacy is identified by Bandura as the conviction that an individual can successfully execute a specific behavior required to produce the desired outcome. According to Bandura, the component of self-efficacy is the most significant and important precondition for behavioral change as it determines the initiation of coping behavior (Bandura 1994)

The definition of perceived self-efficacy differs greatly from perceived behavior control as it applies specific focus on an individual's ability to execute a specific behavior. With that said, efficacy expectations are also defined as the conviction that an individual can successfully execute the desired behavior required to achieve a specific outcome. While containing consistency with the definition, perceived self-efficacy refers to the "beliefs in one's capabilities to organize and execute the courses of action required to produce given levels of attainments" (Bandura 1998). With these definitions, the focus is applied to the control over the behavior itself rather than the control over the outcome or events of the behavior. In order to deal with the coping behavior in the context of behavior modification, the self-efficacy theory was introduced to fill a void in behavioral understanding (Bandura, Adams et al. 1977).

While the perceived behavioral control construct and the self-efficacy construct are quite similar, they are both equally concerned with the perceived ability to perform a specific behavior or series of behaviors. The perceived behavioral control construct acknowledges a degree of control over performance of the behavior itself. The distinction between efficacy expectation and the perceived ability to perform a specific behavior will produce a specified outcome (Bandura, Adams et al. 1977). This concept is also linked to control beliefs, which referred to the presence of factors that may assist or impede performance of the specific behavior. Typically, this is measured with statements in a self-report instrument within a questionnaire that attempts to measure the confidence toward the probability, feasibility and likelihood of the behavior actually being executed.

In its simplest form, the theory of planned behavior can be expressed as the following mathematical function:

Figure 8. The Theory of Planned Behavior Formula

$$BI = (W_1)AB[(b) + (e)] + (W_2)SN\,[(n) + (m)] + (W_3)PBC[(c) + (p)]$$

BI: Behavioral intention

AB: Attitude toward behavior

(*b*): the strength of each belief

(*e*): the evaluation of the outcome or attribute

SN: Subjective norms

(*n*): the strength of each normative belief

(*m*): the motivation to comply with the referent

PBC: Perceived Behavioral Control

(*c*): the strength of each control belief

(*p*): the perceived power of the control factor

W' : empirically derived weight/coefficient

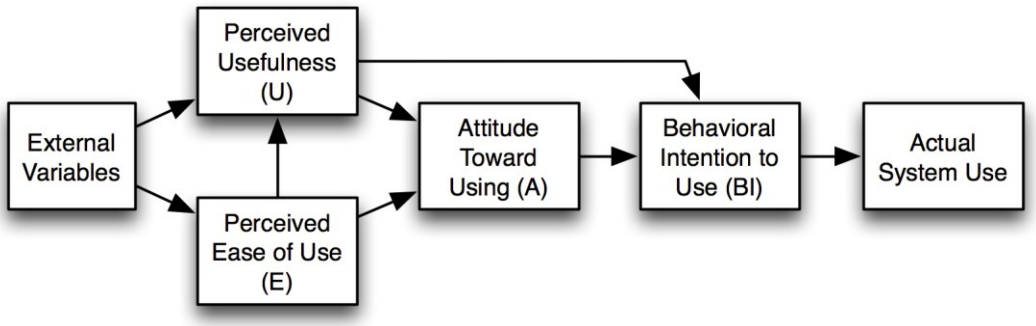
To the extent that it is an accurate reflection of actual behavioral control, perceived behavioral control can, together with intention, is used to predict behavior.

2.4.3 The Technology Acceptance Model (TAM)

Technology acceptance research has been founded upon models that incorporate perceived usefulness, perceived ease of use, attitude, and behavioral intentions. Fred Davis (Davis 1989) developed a model that applied measurement for predicting user acceptance of information technology known as the Technology Acceptance Model (TAM) in 1986. The TAM is a popular tool in predicting a user's acceptance of emerging information technology. TAM was developed under contractual agreements with IBM in the mid-1980s.

It was developed to be used as a market potential evaluation tool for a variety of emerging PC-based applications in the field of multimedia, image processing, and pen-based computing in hopes of guiding future investments in new product development areas.

Figure 9. The Technology Acceptance Model



Technology Acceptance Model (1989)

The original TAM theory was developed to provide an explanation of why users accept technology. It contained two primary components, perceived usefulness and perceived ease-of-use. TAM was derived from the Theory of Reasoned Action (TRA)(Ajzen and Fishbein 1980) and is considered to be one of the most influential extensions of TRA. TRA was developed by Fishbein and Azjen in order to expound on the wider range of behaviors based on situation specific combinations of personal beliefs and attitudes as well as the influence of others within the indivual's environment. The author of TAM saw an opportunistic adaptation of the tools used in TRA with a focus on the information

technology environment. However, TAM is considered to be less general than TRA. It was specifically designed to address computer usage behavior as it incorporates findings accumulated from over a decade of research. Both models attempt to understand the causal link of external variables to its user's acceptance and actual use in the workplace. External variables could be considered to be training, computer self-efficacy, objective system design characteristics, and user involvement in the design implementation process. These external variables are considered to be influential behavioral intention factors of use and usage indirectly on the guidance of users' perceived usefulness and perceived ease-of-use. Similar to the other behavioral models, the intention to use is determined by the individual's attitude towards use and is considered the single most important predictor of actual system usage.

TAM establishes the correlation between the perceptions of usefulness and the ease-of-use that influence people's intention to use information technology. It also identifies how this will ultimately play a pivotal role in influencing the individual's actual usage behavior. The TAM model also identifies an inner-relational component as perceived usefulness, affected by perceived ease-of-use simply because the easier the system is to use, the more useful it will become to the user (Davis, Bagozzi et al. 1989). Contrary to TRA, the original concept of TAM indicated the impact of perceived usefulness on intention is only partially arbitrated by attitude towards the usage of technology. Davis defines this as being attributable to the fact that within the work environment individuals will engage technology, even if they do not have a positive attitude toward the engagement of that technology, simply because they believe it may be able to provide productive enhancements to their job and employment responsibilities. Therefore, the theoretical

conceptualization of the original TAM included an attitude construct to address this specific issue. Unfortunately, based on previous empirical evidence, the latest TAM excluded the attitude construct. This was because attitude does not fully arbitrate the impact of perceived usefulness on intention (Davis, Bagozzi et al. 1989).

Davis posits that other factors, which are not included in the model, are inevitably going to impact the intention and usage through perceived usefulness and through ease-of-use. These external factors could include system design characteristics, training, and decision-maker characteristics that could potentially influence usage. The primary claim of TAM revolves around the concept that the easier technology is to use and the individual's perception of its usefulness, the more likely the user will possess a positive attitude. Therefore, their intention towards using the technology will become greatly increased. Two of the primary reasons this model possesses so much appeal in the research field are the facts that it is both simple and very specific. The model presents a finite number of factors, which jointly account for usage. These factors are specific, easy-to-understand, and they can easily be deployed through system design and implementation processes. Another relative advantage is the fact they can be applied to any generalizable setting.

The TAM can be represented formally as such:

Figure 10. The Technology Acceptance Model Formula

- $B = BI = w_1A + w_2U$
- $A = w_3U + w_4E$

- $U = w_5 E$

In the Technology Acceptance Model, usage behavior *(B)* is modeled as a direct function of behavior intention *(BI)*. BI is in turn a weighted function of: attitude toward usage *(A)* which reflects emotions of favorableness or unfavorableness toward using the technology, and perceived usefulness *(U),* which then reflects the belief that using the technology will improve performance. Attitude is determined by perceived usefulness and perceived ease of use *(E).* Lastly, ease of use is modeled as a direct determinant of perceived usefulness (Davis 1989).

2.5 Limitations

2.5.1 Theory of Reasoned Action Limitations

Sheppard (Sheppard, Hartwick et al. 1988) disagreed with the TRA but made certain exceptions for certain situations. For example, when they say "a behavioral intention measure will predict the performance of any voluntary act, unless intent changes prior to performance or unless the intention measure does not correspond to the behavioral criterion in terms of action, target, context, time-frame and/or specificity" (Sheppard, Hartwick et al. 1988). The point that Shepherd is trying to convey is there are always circumstances or unique situations that can have an impact on behavioral intention. A manager is routinely preparing for a formal presentation to the executive management team. Moments before the meeting, he realizes that circumstances have changed.

Therefore, the information that was about to be provided is different. The situation could affect the behavioral intention of the manager.

Sheppard (Sheppard, Hartwick et al. 1988) claims there are three limiting conditions on 1) the use of attitudes and subjective norms to predict intentions and 2) the use of intentions to predict the performance of behavior. They are:

1. **Goals Versus Behaviors**: there is a distinction between a goal intention and a behavioral intention
2. **The Choice Among Alternatives**: the presence of choice may dramatically change the nature of the intention formation process and the role of intentions in the performance of behavior
3. **Intentions Versus Estimates**: there are specific situations when the intention of the individual differs from the intended expectation from the perspective of the individual

Sheppard (Sheppard, Hartwick et al. 1988) suggest "that more than half of the research to date that has utilized the model has investigated activities for which the model was not originally intended". It was suggested that the model was used in conditions and circumstances that did not warrant the strengths of the model. Therefore, it would not perform well in specific situations. It was also discovered, that when the model was applied, as an explicit choice among alternatives, the performance of the model was very high and the prediction of goals and the prediction of activities was found to be accurate. Thus, Sheppard (Sheppard, Hartwick et al. 1988) concluded that the model "has strong predictive utility, even when utilized to investigate situations and activities that do not fall

within the boundary conditions originally specified for the model. That is not to say, however, that further modifications and refinements are unnecessary, especially when the model is extended to goal and choice domains" (Sheppard, Hartwick et al. 1988).

Hale (Hale, Householder et al. 2002) also account for certain exceptions to the theory when the claim was made: "The aim of the TRA is to explain volitional behaviors. Its explanatory scope excludes a wide range of behaviors such as those that are spontaneous, impulsive, habitual, the result of cravings, or simply scripted or mindless" (Bentler and Speckart 1979). Such behaviors are excluded because their performance might not be voluntary or because engaging in the behaviors might not involve a conscious decision on the part of the actor (Hale, Householder et al. 2002).

2.5.2 Theory of Planned Behavior Limitations

The Theory of Planned Behavior is based on cognitive processing and level of behavior change. But, compared to affective processing models, the theory of planned behavior overlooks emotional variables such as threat, fear, mood and negative or positive feeling and assessed them in a limited fashion.

It has also been argued that the theory of planned behavior contains a significant drawback for predicting behaviors and situations that involve significant personal emotion. Specifically, it has been identified to contain challenges in dealing with health related behavioral situations (Dutta-Bergman 2005). In past research regarding the health industry, the Theory of Planned Behavior possessed poor predictability, which can be

attributed to the exclusion of this variable. The vast majority of the research in the health field involving this theory is correlational and evidence-based on experimental studies, which have been found to be less persuasive.

Other arguments contend that because of the high relationship between behavioral intention and circumstantial limitations, behavioral intentions do not always lead to actual behavior. It was the advent of past research that concluded behavioral intention could not be the exclusive determinant of behavior when individuals controlled the behavior. It was the identification of such past research that provided the encouragement of the author to add a new component known as "perceived behavioral control." With the addition of this component the theory was extended from the Theory of Reasoned Action to include non-volitional behaviors for predicting behavioral intentions and actual behavior.

2.5.3 TAM Limitations

Even though The Technology Acceptance Model has proven to be extremely effective and frequently used, it has been widely criticized. The criticisms then lead the original authors to attempt to redefine it numerous times. The primary criticisms of TAM include questionable explanatory and predictive power, lack of practical value, and questionable heuristic value (Chuttur 2009). TAM has also been criticized for the numerous independent attempts by various researchers to expand TAM in order to adapt it to the constant dynamic IT environment. This has led some of the research into theoretical chaos and confusion (Benbasat and Barki 2007).

The overall consensus of critics regarding TAM agree that the theory focuses on the individual user of the computer while promoting the perceived usefulness contract with extension to bring forth additional factors to help explain how users perceive the usefulness of the technology while it ignores the essential less critical social processes of information systems development and implementation. Without any doubt, the advancement of understanding user intention to use technology is necessary, as well as the understanding of the social consequences of information systems use (Bagozzi 2007).

Past TAM research has provided the understanding that effect of perceived usefulness on intention is only partially mediated by attitude towards usage. This is further supported and explained by Davis (Davis 1989) as subsequent research primarily occurs in a work setting environment. Individuals engage in a technology or a system even though they do not possess a positive attitude toward the technology. This is because the system contains the potential to improve productivity and enhance the efficiency of the system. Since the original theoretical conceptualization of TAM didn't include the attitude construct, the author did not identify attitude as a completely mediated fact of perceived usefulness on behavioral intention.

In the TAM model, intention is primarily determined by attitude toward usage. Direct/indirect effects of perceived ease of use and perceived usefulness also determine it. One of the challenges with the TAM model is that it has not been tested with actual measures of usage behavior. Alternatively, the model has been tested and founded on the measures of usage intention and self-reported measures of usage, which are typically collected with the measurement of beliefs, attitudes, and intention. Coincidentally, the entire model has yet to be tested simultaneously. Various sections of the model have been

examined individually, using a regression-based approach. In order to perform a complete assessment of the model, researchers must incorporate the actual measures of usage. This is necessary to fully illustrate to what extent the model can assist us in gaining a deeper understanding of usage behavior.

2.6 Comparisons

2.6.1 Generality of the Model

Within each model resides a degree of generality that provides the differentiation between one model and the next. For example, the TAM posits that PU and PEU are the main determinants of individual usage decisions, while the TRA and the TPB apply situational specific beliefs. The identification of salient beliefs specific to each area is considered the standard methodology for the TPB and TRA, but it is not essential for the TAM. In terms of application ability, TRA and TPB are significantly more difficult to apply across various contexts. This is because they require pilot studies to identify different relevant outcomes, reference groups, and control variables.

The debate of deriving skills from elicited beliefs has been ongoing by researchers as they defend their positions on the relative advantages and disadvantages for each model. The deriving skills from list of beliefs are inherent to TRA and the TPB but in the TAM, the uses of general beliefs are present. Some researchers argue in favor of generic belief as they recommend the approach must be consistent and cumulative in order to save time, therefore a generic set of beliefs is the ideal situation (Davis 1989). Contrary to the generic set of beliefs principle is the elicitation of specific beliefs. It provides a greater guarantee

that the beliefs will apply to the population and that the intervention strategies will be effectively selected for the specific issues (Ajzen and Fishbein 1980). Researchers continue to debate which methodology remains superior. The answer primarily hinges on the researcher's primary focus regarding prediction or explanation needs. Mathieson concluded that while TAM contained a slightly better predictor of intention, because of the incorporation of specific beliefs rather than generic beliefs, the TPB provided better explanatory support.

2.6.2 Social variables

The element of social variables illustrates yet another difference among the three models. Fred Davis did not include social norms in the TAM model because he concluded they were not independent explanations to the outcome. In contrast, social variables have deemed to be an important element if they capture variance that is not defined by other variables in the model (Mathieson 1991). Advocates of the TRA and TPB suggest the social factors that are not directly linked to job-related or usefulness related outcomes could be considered a primary motivation necessary to identify this component. The roles of subjective norm as a determinant of IT are not specific or clear enough in the present literature. Neither Davis (Davis 1989) nor Mathieson (Mathieson 1991) identify a significant relationship between subjective norms and intentions, studies in organizational settings have determined that subjective norms are a significant determinant of intention or self-reported use of information technology (Hartwick and Barki 1994).

2.6.3 Behavioral controls

Behavioral control is a differentiating component across the three models as it measures the skills, opportunities, and resources needed to engage and understand a specific behavior. Ajzen illustrated the differentiation between internal control, factors that are correct for six of the individual, and the external control factors that are specific to an individualized situation such as time, opportunity, and cooperation of others (Ajzen and Fishbein 1980). The primary component of the TAM utilizes the element of perceived ease-of-use to describe internal control factors, but fails to explicitly consider the present external factors. Therefore, the TAM contains a much higher negative probability in identifying the distinctive barriers, given the fact that it is designated to operate across many situations. Since TPB identifies the important control variables for each specific situation first and foremost, it is more probable that it will capture the situation specific factors that help define behavioral controls.

2.6.4 Prediction and Explanation

Each of the three models were specifically designed and developed to explain and predict human behavior. As each of the models identifies the determinants of intention behavior, while detailing the pattern and direction of the causal influence among the variables, there are distinct differences among the models. These are important considerations for future research. Part of the challenge with each of the models is the differentiation of terms and the specific intention of those terms. Explanation and prediction mean different things; prediction can occur independently of explanation

however, explanation cannot occur independently of prediction. Unfortunately, the explanatory power of each model can only be identified once accurate prediction has been established. Past research regarding the TAM applies specific focus on the determinants of intention to use an information system. These past studies fail to validate their models with respect to the prediction of actual behavior and consequently fail to show the explanation is valid for the behavior of interest.

Through series of comparisons across each model, (Davis 1989) found in his comparison of the TRA and the TAM that the TAM predicted the use of a word processing package significantly better than the TRA. In a similar fashion, (Mathieson 1991) determined that the TAM predicted intentions more accurately than the TPB, but as advancements and better understandings are identified more revelations began to surface (Taylor and Todd 1995). It was determined through their comparison research of the TAM and the TPB that the TPB predicted intention better than the TAM. Arguably, if the primary goal of the studies is to predict use, then it can be concluded that TPB is preferable (Taylor and Todd 1995). TPB also contains a slightly higher explanatory power because it includes constructs such as, subjective norms and perceived behavior controls.

2.6.5 Parsimony

While each of the models is considered to be relatively parsimonious, the 5-variable TAM is more parsimonious than the 6-variable TRA, as well as the 8-variable TPB. It was concluded that the TPB with 6 determinants of intention is considered to be twice as complex as the TAM. For practical purposes, the application of the models must contain parsimony, but could be more or less needed in pursuit of fuller understanding of the

cognitive determinants of technology acceptance. With this level rationale, the degree of parsimony can be considered as being relatively insignificant (Taylor and Todd 1995). In summation, the TAM contends to be easier to apply and possess a more specific focus, while containing a less predictive ability to understand behavior intention.

Many of the past studies involving behavioral intention research use TRA, TPB, decomposed TPB, and/or TAM. As identified in Table 1, past research in the field of behavioral intention spans over the course of decades and has been conducted worldwide. These models have served a variety of industries and fields and are well respected. The adoption of new technologies has been extensively researched across the various disciplines. The various models include attitude, social factors, and control factors. These have been identified, as being contributors, enabling IT usage to be explained and better understood. Each theory has made an individual contribution to the field of research, but they all have one common denominator; they are each seeking to explore and explain how individuals perceive, adopt, and use information technology. While each model identifies specific, unique key components to their individual model, they both have similar goals, as well as similar components that lead to the same desired outcome.

With so many behavioral theories available to a researcher, it can be very challenging to determine which behavioral theory would best suit the research project. As the quest began by reviewing many of the various theories regarding behavioral intentions and behavior, it was evident that the behavioral theory must focus on the link between beliefs and behavior while providing a predictive element to behavioral intention. Other behavioral theories that were considered but not selected included the Self-Efficacy Theory (SET) and Behaviorism Theory (Bandura, 1977). The SET was derived as a social cognitive

theory with expectations to include motivation, performance, and other feelings associated with repeated failures determine affect and behavior reactions (Bandura, 1994). This particular theory is commonly defined as the conviction in which one person can successfully execute the behavior required to produce the desired outcome or outcomes. The SET was not selected as the behavioral theory of choice as the TPB construct of perceived behavioral control originated from the SET theory but does not specifically address subjective norms and other influential factors in determining behavioral intention predictability. The other behavioral intention theory that was considered was known as behaviorism which is also used in the field of psychology. This particular theory studies stimulus-response relationships. This particular theory also utilizes operant conditioning which is known as "learning in which voluntary behavior is strengthened or weakened by consequences or antecedents" (Wolford, 2001). The behavioral theory of behaviorism was not selected as it focuses on the consequences that are associated between a stimulus and a particular behavior. Additionally, this theory focuses on how individuals learn and respond to stimuli's. Ergo, the TRA, TPB, and TAM were selected as the primary behavioral theories that address behavioral intention and behavior.

Table 1. Theory Comparisons

Theory Comparison						
Author(s)	Research Setting	Study Sample	Behavioral Model	Analysis	Methodology	Key Findings
Chan and Lu (2004)	Hong Kong	Individual bank customers	TPB	Strucural Equation Modeling	Quantitative - Survey Design	Findings show that attitude, subjective norms, and perceived behavioral control have a direct positive relationship towards behavioral intention.
Shih and Fang (2004)	Taiwan	Individual bank customers	TPB / Decomposed TPB / TRA	Strucural Equation Modeling	Quantitative - Survey Design	TRA and TPB both provided a comparable fit. Attitude and perceived behavioral control was significant predictor of intention to adopt. Relative advantage and complexity were significant predictors of attitude while self efficacy was a significant predictor of perceived behavioral control.
Athiyaman (2002)	Australia	Individual customers	TPB	Path Analysis	Quantitative - Survey Design	Attitude, social factors, and perceived behavioral controls were all significantly correlated with intention to purchase ticket online
Gentry and Calatone (2002)	Major Public University	Undergraduate Students	TRA / TPB / TAM	Strucural Equation Modeling	Quantitative - Survey Design	Findings show that perceived usefulness and perceived ease of use are strong determinants of behavior
Chau and Hu (2001)	Public Tertiary Hospitals	Physicians in Hong Kong	TRA / TPB / TAM	Confirmatory Factor Analysis	Quantitative - Survey Design	Findings suggested previous instruments tested repeatedly in business settings may not be valid in professional settings.Limitations with TAM and TPB found to predict IT acceptance.
Riemenschneider and Hardgrave (2001)	Public Organization	Software Developers	TAM	Confirmatory Factor Analysis	Quantitative - Survey Design	Confirms the relationship of training to ease of use to usefulness to usage.
Sutton, McVey, and Glanz (1999)	General public London, England	Individuals age 16-24	TRA / TPB	Multistage Stratified Design	Quantitative - Survey Design	Measures of past behavior provided best predictors of intentionsand attentuated the effects of attitude and subjective norms.
Taylor and Todd (1995)	Major Public University	Business School Participants	TRA / TPB / TAM	Expectancy Value Approach	Quantitative - Survey Design	While TAM was useful in predicting IT usage behavior, TPB provided a complete understanding of behavior and behavioral intention relative to normative and control beliefs.
Mathieson (1991)	Major Public Western University	Juniors and Seniors in a management program	TPB / TAM	Expectancy Value Approach	Quantitative - Survey Design	TAM is easier to use but TPB provided more information about the factors users consider when making choices.
Davis, Bagozzi, Warshaw (1989)	University of Michigan	Full-time MBA students	TRA / TAM	Confirmatory Factor Analysis	Quantitative - Survey Design	Perceived usefulness strongly influenced peoples intentions to use technology.

As identified previously, each of the three models exhibit specific attributes. They provide compelling arguments to use their theories for the sole purpose of understanding the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system. For this particular research, the goal is to provide the maximum amount of explanatory power to the specific focus on behavioral intention. Applying that understanding, the model that has the fewest predictors, provides adequate levels of prediction to behavioral intention, and includes an in-depth understanding of behavioral intention will provide the research with the necessary date to establish adequate findings.

Past research and researchers have argued that parsimony, in and of itself, provides the necessary desirability, as it provides facilitation of the understanding (Browne, Cudeck et al. 1993). However, parsimony is not the most important factor when selecting a model that identifies behavioral intention. TRA has been used and tested repeatedly for many years and is deemed as being an effective behavioral intention model that provides understanding represented by attitude towards behavior. The authors of TRA posit that suggested behavior results have a higher retention and motivation rate when the individual possesses a positive attitude about the behavior. The individual believes that others around him, of significant importance, want him to perform the behavior. The primary difference between TRA and TPB is the addition of a construct known as perceived behavioral control in the TPB. The significant importance of this construct is the ability for the perceived behavioral control to perform as a determining intention, along with the attitude toward behavior and subjective norms (Ajzen and Madden 1986).

One of the important factors regarding the perceived behavior controls is the relationship between actual control and the perceived control over the behavior in question. Critics of TPB contend that behavior is not always under full volitional control, therefore intentions will be considered less than adequate predictors of behavior. This is primarily due to the intention-behavior relationship dependency of the individual possessing the ability to turn his intentions into behaviors if and when he chooses to do so. If, for whatever reason, actual control is considered to be low, the ability to turn intention into behavior is substantially decreased.

Therefore, behavior will be determined by intentions and partially determined by the level of control that the individual possesses over the behavior. Individuals who possess a significant amount of actual control will serve as a proxy for the actual control and co-determine behavior together with intention to support the perceived behavioral control relationship with behavior (Ajzen 1985). Another important factor regarding perceived behavioral control is the motivational impact. This factor contends that individuals with a significant level of perceived behavioral control will be more likely to perform the intended behavior when they encounter unforeseen obstacles to that behavior. (Ajzen 1991).

The Theory of Planned Behavior contains an advantage over TRA with the additional component of perceived behavioral control, but how does TPB compare to the TAM for the purpose of identifying behavior intention in a manufacturing environment? In order to perform a true comparison of the two models, a better understanding of behavior, behavioral intentions, and a comparison of the previous research must be evaluated. Both models, TPB and TAM, identify behavioral intentions as the primary determinant of

behavior and they both suggest there are indirect effects on behavior. Both models also identify the indirect effects of derivative of attitude, but only TPB identify subjective norms and perceived behavioral controls as antecedent beliefs. As behavioral intentions have become recognized as an essential mediator in the relationship between behavior and attitude, subjective norms, and perceived behavioral controls, the course from behavioral intentions to behavior was identified as substantially important in both models (Ajzen and Fishbein 1980, Ajzen and Madden 1986). Even as behavioral intentions have a substantial and important role in the determination of behavior, it is equally important to recognize the pragmatic component in predicting behavior. Nevertheless, past researchers have also identified behavioral intentions as being more predictive of behavior when the individuals have obtained prior experience with the behavior (Taylor and Todd 1995).

In both models, prior research identified the indirect effects of other factors that can meaningfully impact behavior. For the TAM model, the significant indirect effects are perceived usefulness and ease of use. Attitude, on the other hand, does not play a role on the indirect effect of behavior according to Davis (Davis 1989). Since he claims attitude does not have an impact indirectly on behavior, it is likely that the effect of usefulness on intention and subsequent behavior is significant. Davis concludes that attitude is potentially a non-factor in the determinant of attention of usage in a workplace environment, when factors such as usefulness are independently taken into consideration. This conclusion is also based on the assumption that within work related environments, intentions will be formed based on performance considerations rather than on the likes and dislikes of the individuals performing that particular behavior (Davis 1989).

As for the TPB model, the factors of attitude, subjective norms, and perceived behavior controls all contained significant indirect effects on behavior identified by Taylor and Todd (Taylor and Todd 1995). It is critical to acknowledge the fact that behavior is primarily driven by behavioral intention when attempting to interpret the contribution of each model to the understanding of behavior. Additionally, the variance decreases the behavioral intention whenever it is removed from the model. The additional explanatory components within the model play a significant role as well, even though they are substantially smaller roles. They contain an indirect effect on behavior, which contributes substantive indicators to the factors that influence behavioral intention. This is an important determinant of behaviors in itself. It is the antecedents of intention within the model that provide a deeper understanding of IT usage (Taylor and Todd 1995).

It's vital to examine and understand the direct and indirect influences of various factors regarding behavioral intention. It is clearly the most essential determinant of IT usage behavior in each model. As indicated by Taylor and Todd (Taylor and Todd 1995), TAM explains 52% of the variance in behavioral intention, while TPB explains 57% of the variance in the behavioral intention. This provides a validation that the addition of subjective norms and perceived behavioral controls offer insight into behavioral intention. These results are also consistent with the TRA meta-analysis reported by Shepherd (Sheppard, Hartwick et al. 1988). This analysis indicated that attitude and subjective norm together explained 44% of the variance in behavioral intention. These findings are similar in magnitude to the results founded by Davis, Mathieson, and Hardwick and Barki (Davis 1989, Mathieson 1991, Hartwick and Barki 1994). The TPB model presents an increase in the ability to explain intention compared to TAM. Previous research indicates that

subjective norms and perceived behavioral controls do contribute to the explanation of behavioral intention. Additionally, superior and peer influences, self-efficacy and resource constraints, all have significant indirect influences on behavioral intention. The TPB model provides a more all-inclusive understanding of intention in comparison to TAM.

It's essential to identify contrasting previous studies such as Davis (Davis 1989) and Mathieson (Mathieson 1991). In their studies, TPB models did not perform as well as TAM in predicting behavioral intention. In both research studies, TAM outperformed TPB in predicting behavioral intention. However, later research indicates that TPB provided a moderately better explanation of behavioral intention and provided more explanatory power. Each of the studies identified were measured using the same constructs in order to establish the validity and reliability of those measurements. Neither Davis nor Mathieson identified a significant influence of subjective norms on behavioral intention. Yet more current research identified such an influence, which contributed to the explanation of behavioral intention.

The results could potentially be due to variances in the nature of the target behavior between studies and timeframe. It is believed that the perception of real consequence associated with behavior cause subjective norms to have a significant influence on behavioral intention. Even Davis,(Davis 1993) suggested that subjective norms may be influential in a more realistic organizational setting, as subjective norms have been identified to be more important in the early stages of system development (Hartwick and Barki 1994). Comparing the relationship between subjective norms and behavioral intention, to those with and without prior experience regarding information technology, subjective norms were identified as a significant determinant and even more of an

important predictor of intention for the individuals without prior experience (Taylor and Todd 1995).

Since the goal of this research is to understand the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system, it is critically important that the selected model provides more complete understanding of the determinants of intention. As each model identifies specific attributes that present clearer strengths over the other models, it's important to identify and match the strength needed to the situation encompassed in the research. If the goal of the research were prediction of usage, then TAM would be a preferred theory to apply to the research. However, the TPB model provides a more comprehensive understanding of usage behavior and behavioral intention. This will be a more effective guide to managers and researchers interested in the study of behavioral intention to use information from a decision support system.

2.7 Comparison of Tripartite Model of Attitude and the Technology Acceptance Model

2.7.1 Attitude dimension

As each component within the models is illustrated, you will see similarities and differences in both TAM and TPB as explained in the previous paragraph. Because attitude is a common denominator within each model, it comes as no surprise that attitude plays a similar role in determining exceptions influence by users.

Q1: *How does attitude impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*

With that said, the term attitude carries a similar meaning within the various models (Mathieson 1991). For example, within the TAM, the attitude component is used more in the context of the use of technology. It was specifically designed to predict individual use of information systems and information technology. The attitude to behavioral intention relationship, which is within the TAM model, insinuates that, all else being equal, people form intentions to exhibit behaviors that will have a positive impact. This particular attitude-behavioral intention relationship is also fundamental to the Theory of Reasoned Action from which TAM was derived. Additionally, according to the TAM model, attitude is correspondingly determined by usefulness as well as ease-of-use while both usefulness and ease of use is considered to have a significant effect on attitude. Two essential mechanisms, where ease-of-use influences attitudes and behavior are self-efficacy and instrumentality. The TAM model also suggests that the determinants of attitude are distinctly related to one's relevant beliefs as well as behaviors (Davis, Bagozzi et al. 1989).

The TPB model, as well as the decomposed TPB model, was designed for specific behavior predictions across different environments. In the Theory of Planned Behavior model, behavior is determined by intention to perform the behavior. Additionally, intention is predicated on three individual factors: attitude toward the behavior, subjective norms, and perceived behavioral control. Across all three factors reside beliefs that are antecedent to each factor. While attitude is a distinct function of the products of behavior beliefs and outcome evaluations, it plays a vital role to the overall outcome of behavior. A

behavioral belief is the subjective probability that a behavior will lead to a specific consequence. The specific outcomes are subjective in nature by the perspective of the user and the behavioral belief.

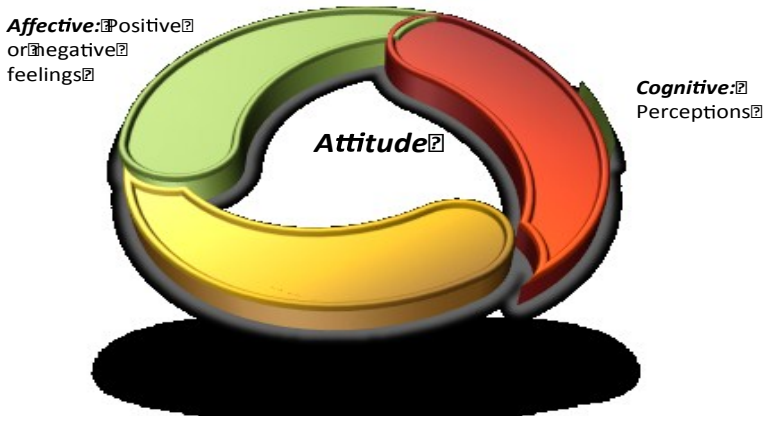
For example, if a user determined a different kind of information would save time, compared to other sources of information that are currently utilized, the evaluation of the new information and the desirability of the outcome is increased. Suppose a manager is receiving information that is derived from a decision support system that will assist in increased productivity by saving time. The manager must first view the information as having the potential for his desired outcome of increased productivity. The relevant behavioral belief is the extent to which the manager believes the information will indeed improve productivity.

Therefore, the associated outcome evaluation would be the conclusive importance of the need to improve productivity from the perspective of the manager. Since the behavioral beliefs and the outcome evaluations are multiplied, they would possess the most significant impact on attitude. The manager must believe the information derived from the DSS would in fact improve productivity. The manager must also regard the need and desire to improve productivity as an important component to his success. It is not only important for the manager to believe the information will provide increased productivity but the end result will be important to him (Mathieson 1991).

Attitude is defined as a response to an antecedent stimulus or attitude object (Breckler 1984). By utilizing the tripartite model of attitude, Hong, Thong, Chasalow, and Dhillon suggest that the model of attitude provides a comprehensive structure for studying user acceptance of information technology (Hong, Thong et al. 2011). Hong, Thong,

Chasalow, and Dhillon stated " rooted in the trichotomy of knowing, feeling, and acting as the three main facets of human experience, attitude has been betrayed as a tripartite model which contain three major dimensions, cognitive, affective, and behavioral" (Hong, Thong et al. 2011). The research identifies the cognitive dimension relative to an individual's beliefs, thoughts, and perceptual responses about the attitude object. The affective component refers to an individual's feelings, emotions, or gut reactions engendered by an attitude object. While the behavioral dimension is indicative of an individual's evaluation of an attitude object based on past behaviors (Piderit 2000).

Figure 11. The Tripartite Model of Attitude: Cognition-Affective-Behavior



Tripartite Model of Attitude

This research suggests three primary components that play a significant role in the attitudinal influence of middle managers' intention to use information produced by a data-driven DSS. With the advent of the Tripartite Model of Attitude, three more subsidiary research questions exist to further support the attitude component of the TPB.

2.7.2 Cognitive dimension

Q1.1: *How does cognition impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*

Cognitive dimension of attitude has been the primary focus of early research regarding attitude. According to the expectancy-value model, the most popular conceptualization of attitude relative to cognition, individuals create their own perceptions and beliefs about an object based on personal evaluations of its attributes. The beliefs of each individual connects the object with certain attributes and the individual's overall attitude toward an object is determine by the subjective values of the objects attributes in addition to the potency of the affiliations (Fishbein and Ajzen 1975). The overall postulation of the expectancy-value model of attitude is that estimated judgments are the result of individual cognitive processes (Ajzen 2001)

Davis theorized that the acceptance of information technology hinged on two important beliefs that influenced the usage of information systems by users; perceived usefulness (PU) and perceived ease-of-use (PEOU), which primarily focused on the affective aspect of attitude (Davis 1989). Further research would identify that the influence of attitude on information technology use would only moderately provide the ability to forecast users acceptance of information technology. However, he also came to the realization that the influence of attitude on information technology usage became transparent upon perceived usefulness consideration. It was this realization that guided Davis to the conclusion that attitude offers substantially less value in predicting information technology use. This in turn, provided the deductive reasoning that fully supported his beliefs that perceived usefulness and perceived ease-of-use were the primary predictors to user usage (Mathieson 1991). Even with his findings, the social psychology literature providing a counter to the research has suggested that attitude has both an affective and a cognitive effect on usage.

As cognition is directly related to the individuals' specific beliefs related to an object, it was initially believed that the underlying theory could not contain a cognitive component of attitude. However, according to the dyadic perspective of attitude, both the cognitive and the affective components of attitude operate through different psychological apparatuses (Jackson, Chow et al. 1997). With that said, it has been determined that Davis did not find a significant influence of attitude in his study simply because the potentially significant influence of cognition was counterweighed by the inconsequential influence of affect (Yang and Yoo 2004).

2.7.3 Affective dimension

> ***Q1.2:*** *How does the affective dimension impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*

A large portion of psychology literature suggests that human behavior can be better comprehended if affective processes are taken into consideration in addition to outstanding beliefs (Edwards 1990). As environments change, affect may even exert a stronger impact on behavior as associated to cognition. As evolution has concluded about the ability for humans to adapt to changing environments, the need and desire to adapt is critical to the rate of survival. Affect contains significant contributions with this adaptive process by providing meaningful stimuli, while contributing more readily in comparison to cognition factors (Verplanken, Hofstee et al. 1998). For example, people can often express

how they feel about a person or an object even when they cannot effectively articulate why and how they feel the way they do. With this in mind, it is determined that the emotional process of individuals contain a reliance on affect and emotion as a faster, more obtainable, and more efficient way to deal with the complex and changing environments in comparison to a cognitive, analytical reasoning rationale (Sloman 1996). But how does this factor into the information systems environment?

The majority of the research conducted regarding technology adoption tends to focus on the cognitive components, while leaving the affective components of information acceptance and adoption unexplored. However, recent research has uncovered the importance of emotions and it is anticipated to be an essential element to fully understanding the phenomenon. As important as the discovery of emotions are to the understanding of information technology acceptance, the researchers also discovered a balanced thinking-feeling model that proposes a cognitive and emotional parallel in the research (Kim, Chan et al. 2007). As important as it is in understanding how the user's thought process impacts information technology acceptance, emotional components such as mood also play a role. But how does that role impact the user's acceptance and is it truly considered to be a significant influence?

Recent research examined the effects of positive mood and the effects on individuals' cognition and behavior regarding acceptance of a DSS. This involved engagement of tasks that were believed to be unfamiliar (Djamasbi, Strong et al. 2010). The research provided the confirmation that mood related usefulness of the decision-support system to their intention to use it produced different results under moderate uncertainty levels rather than an environment that contained a higher level of uncertainty.

This level indicated usefulness as a much less significant predictor of intention to use. This understanding will play a pivotal role in the phenomenon as the research confirms that DSS adoption is a rational choice and rational decisions cannot be made without the influence of emotions. As it has been confirmed that affect possesses a significant role in the influence of users regarding information technology acceptance, what affect related concepts exist in the research literature that provide additional insight into the phenomenon?

Dr. Zhang's research in affective related concepts propose the affective response model (ARM) as a vehicle to address three significant questions regarding the affective dimension (Zhang 2013):

1. What are the pertinent affective concepts in the ICT context?
2. In what ways are these affective concepts similar to or different from each other?
3. How do these affective concepts relate to each other?

This research provided the essential framework for future research to apply the taxonomy to obtain a comprehensible understanding into the phenomenon related to the affective dimension in the information technology environment.

2.7.4 Behavioral Dimension

1.3: *How does the behavioral dimension impact the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system?*

Beyond the effects of cognition and affect, individuals' attitudes can evaluate objects based on past behaviors as well. It is a common occurrence to find people using their own behaviors as a reference for their attitude toward an object or an action that is performing a function that leads to their approval as stated by the self-perception theory (Bem 1973). When this type of perceived behavior is repeated or with a habitual behavior, it can inform people about the attitude they possess about an object. For example, the fact that an individual frequently washes his or her hands prior to eating will provide the information about his or her perception in regards to hygienic principles and the desire to have hands that are cleaned prior to meals. This activity could also project a level of respect for those around the individual that would come in contact with the food. This inference is maintained as long as the individual's behavior is judged as being a voluntary act, not a mandated function (Petty, Wheeler et al. 2000).

The tripartite model of attitude plays a significant role in this research. It has been used to examine employees' attitudes toward organizational changes from a management perspective. With great success, the model was successfully applied to understand employee's attitudes toward organizational and technological changes in the professional environment (Elizur and Guttman 1976). Piderit (Piderit 2000) applied the tripartite model of attitude to identify employees' ambivalence about attitudes toward organizational changes. Her findings concluded that significant resistance to organizational changes could be understood from a multidimensional view of attitude. Conceptualizing individual dimensions provided the research with the possibility of different reactions along the various dimensions. Her findings concluded that individual's cognitive responses to

propose organizational changes could be in conflict with his or her affective or emotional response. In other words, individuals may agree with the applied logic and the benefits obtained by organizational change, even though they are apprehensive about change itself, as well as how it will impact their daily lives. The importance of the ability to apply the tripartite model of attitude to the organizational environment allows researchers to obtain a comprehensive view of individuals' attitudes towards imminent changes within the organization.

The tripartite model of attitude has effectively demonstrated its usefulness in providing the platform to examine the level of user acceptance in regard to information technology within the organization (Hong, Thong et al. 2002). Ironically, the majority of research performed in regard to user acceptance of information technology adoption has put substantial emphasis on the cognitive dimension. Basic assumptions are made that identify users as rational individuals who make adoption decisions based on their evaluations of system characteristics and environmental characteristics rather than affective, emotional, or behavioral (Elizur and Guttman 1976, Thong 1999).

The dimension of affect in respect to attitude has been examined in the context as an antecedent of the cognitive dimension. As this implies that perceived enjoyment is a predictor of usage intention, it further validates that the users decisions to accept and engage technology far surpasses the cognitive element. Emotional variables such as computer anxiety and effective usage intentions through perceived ease-of-use, also play a contributing role in the adoption and acceptance of information technology (Venkatesh 2000). Researchers have found that this component will play a more substantial role in user acceptance and promote user engagement at an early age, which will continually

change and evolve how people interact and accept information technology (Van der Heijden 2004). Past usage behavior of an individual can also play a significant role in their attitude toward information technology engagement. The self-perception theory contends that users are given the opportunity to develop habitual usage behavior, which increases the possibility of engaging with information technology and sustaining the usage (Breckler and Wiggins 1989).

2.8 Decision Support Systems (DSS)

As computers and technology began to emerge in the 1960's through systems such as the mainframe and minicomputer, the evolution of the Decision Support System (DSS) began to unfold. The computer was identified as the perfect tool to conduct automated, quantitative modeling functions that required a fraction of the time compared to humans. One of the first systems developed was the DSS. Originally identified as a model-based management decision system, the first DSS related dissertation was submitted in 1967 by Michael Scott-Morton, a Harvard PhD student. The term "Decision Support System" was later coined in 1971 in a *Sloan Management Review* article authored by A. Gorry and Michael Scott-Morton (Power 2007).

As the title of the system suggests, DSS characterizes systems that intend to assist and support managerial decision-making in semi-structured decision situations. These systems were designed to accompany the decision-makers, enabling enhancement of their capabilities, yet not designed to replace the inherent judgmental skills of the manager. The purpose of these systems was designed to enhance judgmental capabilities that require decisions, but could not be completely supported by algorithms (Doukidis 1988). They

incorporate a variety of decision models and thus are capable of performing "what if" analysis for managers. DSS tends to be used in planning, analyzing alternatives, and trial and error search for solutions.

Little defines DSS as a "model-based set of procedures for processing data and judgments to assist a manager in his decision-making" (Little 2004). Little posits that DSS systems must possess a simple, robust, easy to control, adaptive, and effective communication in order to be successful. Moore and Chang (Moore and Chang 1980) defined DSS as extension systems designed to support ad hoc data analysis and decision modeling toward future planning and utilized at intervals that are random and arbitrary. Bonczek (Bonczek, Holsapple et al. 1980) contends that a DSS is a computer-based system consisting of three interactive components: a language system to provide communication between the user and other components of the DSS, a knowledge system that contains a repository of domain knowledge contained within the DSS in the form of data, processes or procedures, and a problem-processing system that joins the other two components that contain one or more problem manipulation capabilities required to make effective decisions. His concept for this definition provides important understanding regarding the relationship between DSS and knowledge.

As each author provides their own perspective regarding the definitions of DSS, they can be compared and contrasted by simply examining the various concepts used to define the DSS itself. Also, the perspective of how the DSS can accomplish the appropriate usage patterns and necessary development processes essential to the success of the DSS. Even though DSS perspectives contain numerous contrasts, they are the product of a developmental process that allows the user, the builder, and the system itself to be capable

of influencing one another, resulting in system evolution and development of patterns for users (Power 2000).

Such systems are generally operated through terminal based interactive dialogues with users. DSS differs from other traditional information systems because most information systems don't provide the custom made information that is tailor made for each and every manager. Although DSS systems can be created and used by managers only, they are nevertheless a part of the organization's MIS. As DSS is tailored to a specific managerial task or special problem, its use is limited to that task or problem (Goodwin, Fildes et al. 2011). DSS tend to serve management control level and strategic planning level managers. The elements of DSS include a database, model base and software providing an interactive dialogue facility for the manager. The data in the database typically is a combination of internal master files and data from external sources.

As DSS systems were intended to increase the speed and accuracy of data analysis, postulate costs reduction solutions, provide effective and efficient analysis of substantial amounts of quantitative data, and deliver the essential insight into the functional aspects of the business, there still exists a hesitation for users to accept the information they receive from the DSS. With the inevitable need to address the uncertain international business environment conditions of economic globalization, the criticality of establishing more effective and more efficient ways to conduct data analysis is needed in order to remain competitive (Phillips-Wren, Mora et al. 2009).

As with the definition of DSS, there lacks a common acknowledgment of expected taxonomy for DSS. However, Daniel Power has identified and differentiated between the

various DSS and using the mode of assistance as the criterion for the categories, has identified five distinct types of DSS (Power 2002).

2.8.1 Types of DSS

1. **Communication-driven system:** the number of decisions in the operational management and at the middle management is such that they are based on one or two aspects of a decision-making situation. It does not perform any elaborate computations, analysis, or decision-making. If the status is known, the decision is automatic. The status and solution have a unique relation. In this type of system, communication and network technologies drive decision based collaboration activities. These technologies are a major architectural component found in groupware, computer bulletin board systems, and video conferencing.

2. **Knowledge-driven system:** these decision systems are based on cooperative analysis and use of a formula or algorithm, but these processes are not structured and can vary. Cash flow analysis, inventory analysis, and the personal inventory systems are examples of analysis systems. This system utilizes simple data processing tools and simple-to-complex business rules that are required to develop this system.

3. **Data-driven system:** in this system, the data is analyzed and information reports are generated which might contain numerous exemptions as a feature. The decision makers use these reports for assessment of the situation for decision-making. Sales analysis, account receivable system, market research analysis, and MRP systems are examples of

this system. These systems are primarily dedicated to resolving problem solving issues and providing domain knowledge to the user.

4. **Document-driven systems:** these systems are not necessarily for decision-making but they are essential in keeping track of the major components of the business as a functioning unit. The contents of these systems are more data processing leading to formal reporting, with exemptions, if necessary. These systems account items such as cash, inventory, and personnel then relate it to a norm or norms developed by the management team, for control and decision-making. These systems manage, retrieve, and manipulate unstructured information in various formats. The retrieval of the data is accomplished by computer storage and processing engines that perform the queries.

5. **Model-driven systems:** these systems are simulation models or optimization models for decision-making. These decisions are generally one-time and infrequent, but provide general guidelines for operation or management. Often, these systems will be used for access and modification of financials, optimization processes, and simulation models.

2.8.2 DSS Capabilities

(Power 2002)

- Decision-making support by amalgamating human judgments and computerized information. This capability goes beyond conventional computerized systems that use standard quantitative tools or analytics.
- DSS provides decision-making support at all levels of management, ranging from entry-level managers to top executives.
- Support can be provided to several different organizations, various organizational levels, different departments, and to individuals as well as groups.
- Provide support to numerous interdependent or sequential decision-making processes. This decision can be replicated numerous times or it can be a one-time decision.
- Most DSS have the capabilities to support several decision-making processes as well as a variety of styles.
- A significant advantage of DSS is their ability to become extremely adaptive and progressive. Even though decision-makers tend to be reactive, an effective DSS is able to respond to the changing conditions quickly and adapt to the needs of the organization and the manager.
- Effective DSS provide the user with a level of comfort as to their flexibility, user-friendliness, enhanced graphical capability, and ability to make changes quickly and efficiently.
- The focus is to improve the effectiveness of decision-making, which improves accuracy and quality, rather than improving the cost of the decision-making.
- A unique characteristic of a DSS is how the decision-maker maintains complete control over each and every step of the decision-making process. A common

misnomer about DSS is the system is designed to replace the core decision-maker. In actuality, DSS specifically focuses on the support to the manager in the decision-making process.

- A core capability of the DSS is to utilize existing models for analyzing decision-making situations. This capability provides the system with the ability to experiment with different strategies under different configurations with various scenarios in the environment.

As described above, a DSS is an analytical system that possesses significant capabilities to provide data analysis essential to assisting managers to better understand the competitive environments. With that said, simply because the system possesses great potential, it doesn't necessarily mean that members of the middle management team are going to accept the information and engage in using the system. This study is in search of increased knowledge and understanding how behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system.

A DSS is intended to deliver solution-oriented recommendations that assist the end user with selecting the best solution to problems (Venkatesh, Brown et al. 2008). These systems can be identified as expert systems or simply aids for assessing situations from a different perspective. In some cases, they are associated as being intelligent decision support systems. The unique quality of these systems is the fact they use existing information and system knowledge to provide information to the end-user. Specifically, these systems contain the necessary information to provide problem solving capabilities

and are integrated with or contain data mining functionality. This requires the system to sort through mass amounts of data to provide data relational models from the knowledge base. One of the key capabilities of this type of system is to provide management with input for decision-making. Another function of these systems is the ability to function across vast organizations while offering individual level information specific to the needs of the end-user (Venkatesh, Brown et al. 2008).

As there are several types of DSS that encompass thousands of different applications, this research seeks to understand the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system and how it will impact organizations within the aircraft industry. This particular type of decision support system emphasizes the access and manipulation of internal company data as well as external data. Typically, this type of DSS contains file systems accessed by a query or retrieval tool that provides the users with information ranging from basic decision-making support to advance in complex analysis functionality. Many data-driven DSS use real-time data to aid in performance enhancement and analysis of large collections of data (Alter 1980).

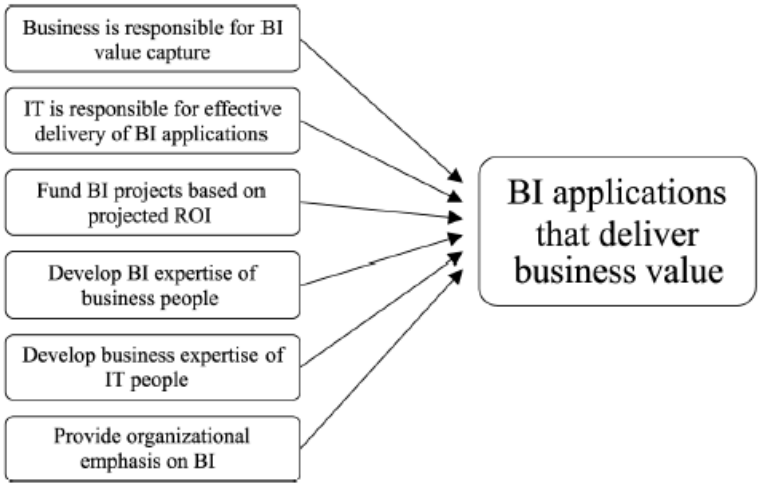
2.8.3 Data-driven DSS concepts

The term "Business Intelligence" is often identified as BI. This term is a popular and common umbrella term introduced by Howard Dresner of the Gartner Group in 1989. It describes a set of concepts and methods to improve business decision-making by utilizing computerized support systems (Nylund 1999). Business intelligence systems are data driven DSS that are responsible for supporting the querying function of a database and

production of periodic summary reports. Data driven DSS systems have been commonly identified by various names over the years which include; data-oriented DSS (Alter 1980), retrieval-only DSS by (Bonczek, Holsapple et al. 1981), executive information systems, Online Analytical Processing (OLAP) systems, and other identified business intelligence systems. The confusion often is inherent in the use of the term business intelligence system, since it refers to the truest definition of a data driven DSS or data driven decision support system.

A knowledge-based economy contains comparative organizations that mandate the assistance of business intelligence (BI) tools. By collecting, analyzing, and disseminating information across their enterprises, the organizations remain competitive. Thus enabling their users to engage in technology that allow them to make better, more informed decisions. As global economies operate with increasing speed, their ability to provide the manager's access to "actionable data" becomes a vital need to identify performance metrics, understand customer and user behavior, as well as understand market indicators to help guide organizations. Business applications as DSS provide managers with the essential data and analysis required to support the criticality of the decisions that they make.

Figure 12. Business Intelligence Application Model

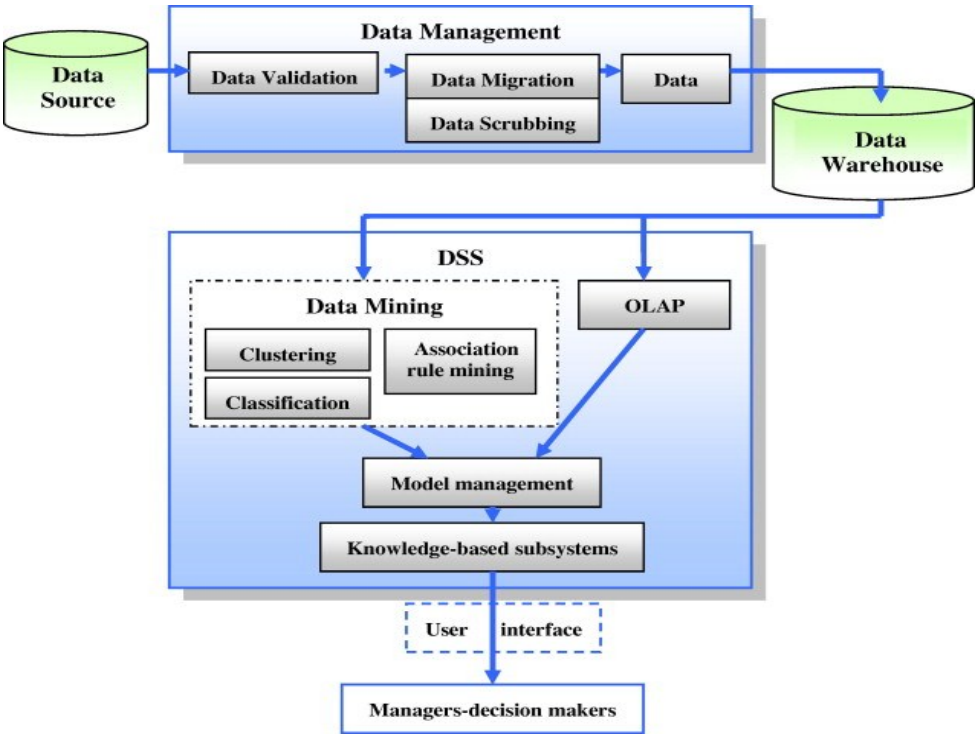


Data-driven decision support systems have been used for a wide array of purposes over the last 50 years. The U.S. Semi- Automatic Ground Environment (SAGE) air-defense command and control system became fully functional in 1963 and has provided decision support for more than 20 years. This system provided operators with access through the means of cathode ray tube displays and a light to select " tracks" of incoming aircraft that could potentially be identified as hostile (Power 2007).

In the business environment, data driven DSS was designed utilizing an APL-based software package called AAIMS, An Analytical Information Management System. Data-driven decision support systems have evolved into a more complex technology capable of

handling complex problems. According to Watson, Wixom, Hoffer, Anderson-Lehman, and Reynolds (Watson, Wixom et al. 2006), "Data management for decision support has moved through three generations, with the latest being real-time data warehousing". Data-driven decision support systems provide essential information to managers by including operational and strategic business intelligence queries, dynamic and real-time performance monitoring, and customer service relationship management tools.

Figure 13. Data Management Process Flow for Decision Making



Data-driven DSS support the activity of decision-making functions for managers. It provides an avenue for them to retrieve both current and historical data to support their

decision-making activity. With additional frequency, a DSS possesses the potential to increase access into the database in order to assist managers. It also provides helpful insights into the processes of the organization, employee performance, customer activities, behavior trends, and organization-wide performance metrics. Data-driven DSS identification indicates a specific type of Decision Support System that applies specific emphasis to the manipulation and access of a time-series of internal company data and some external data. These systems are known to contain a simple file system. Retrieval instruments that provide the user with data functionality enabling the support to make decisions accessible to them. This information is retrieved out of a data warehouse system that allows the manipulation of the data by the retrieval instruments to provide users with the additional functionality of the data. The Online Analytical Processing (OLAP) provides the data driven DSS with the functionality that is connected to a large collection of historical data for effective and efficient analysis (Power 2002).

Decision automation is another functionality that results from data mining and can be utilized if the data is changing quickly. Data mining tools can be incorporated into the data driven DSS to fully utilize automation. However, the most common data driven computerized decision support system is built utilizing a data warehouse product with a report that includes inherent querying abilities. DSS applications generate billions of dollars in revenue for organizations each year as businesses and managers seek to utilize the effectiveness of the system (Inmon 2005).

With today's complex organizational structures, embedded models within a DSS can be an essential tool for managers to make effective and informed decisions in the workplace. Most DSS utilize algebraic, simulation, financial, decision analytics, and

optimization models to perform complex calculations that provide managers with the decision-support necessary (Power and Sharda 2007). Even as organizations change the way they structure information, DSS continues to evolve. It also becomes more and more critical to the success of the organization to understand the variety of behavioral and technical problems that create system performance and to understand the behavioral intention predictability of managers in the aircraft industry who use information produced from a decision support system.

The essential component to possessing an effective data driven DSS is having easy and rapid access to large amounts of accurate, well-organized multi-dimensional data (Codd, Codd et al. 1993). The Online Analytical Processing (OLAP) software systems are characterized by:

1. Multidimensional conceptual view
2. Link to variety of data sources
3. Easy for users to access and understand
4. Multi-user support
5. Intuitive data manipulation
6. Flexible reporting
7. Analytical capabilities

Daniel Powers composed a detailed summary of major features contained within a data driven DSS illustrated from a user's perspective (Power 2007). They are:

- Ad Hoc Data Filtering and Retrieval
    - The system assists users to query computerized data, filtered by utilizing drop-down menus and is often predefined. Users have the ability to change aggregation levels ranging from detail to summary level.
- Alerts and Triggers
    - These systems help the users establish rules for e-mail notification as well as other predefined actions.
- Create Data Displays
    - Users possess the ability to interactively change displays of their choice such as, scattering diagrams and pie charts. They may also be able to animate historical data on charts and be able to playback historical data in a time sequence.
- Data Management
    - Users are restricted to a limited amount of working storage for data subset and apply group data or change data formats among users. Some systems even allow users to request changes to master data definitions as well as data models.
- Data Summarization
    - This allows users to view and create pivot tables while creating custom aggregations and calculate computer fields, totals, and subtotals. Pivot tables provide the user with the ability to summarize selected fields and rows of data in a table format in order to view data from different perspectives and include various fields in the table. This utilizes the user's ability to view a

slice of the data or provide an effective drill down tool to establish a more detailed data viewpoint value in a single table.

- Excel Integration
    - Several data driven DSS allow users to extract and download data to provide additional analysis while other systems allow users to upload data for analysis for the users own work storage.
- Metadata Creation and Retrieval
    - Data driven DSS understands the need for users to be able to add metadata for analysis and reports that are created, while providing descriptive information stored as metadata. Metadata provides the explanation of the data contained within a DSS dataset and provides the context for DSS to aid users to comprehend the data within the system.
- Report Design, Generation, and Storage
    - This allows the users to interactively extract, design and present information with reports in tables, pie charts, bar charts, as well as other diagrams. The user also has the ability to create templates and save specific formats that allow them to reuse the format with new data later. These reports can often be distributed via the web as well as PDF document conversions.
- Statistical Analysis
    - This function provides users with the ability to conduct calculations and descriptive statistics necessary to summarize or to describe data, create trend lines, or drill the data for unique relationships not previously identified.
- View Predefined Data Displays

  - Data driven DSS can provide custom displays created by the engineer for operational performance monitoring to include a custom dashboard display that provides specific information to the user relative to their task work performance related data. This term is a metaphorical reference to an automobile's dashboard as it provides the essential information quickly and concisely. The information display integrates information from multiple sources into gauges and dials that resembles the dashboard of an automobile that users are typically accustomed to interacting with. A scorecard on the other hand is a table displaying performance metrics that may include indicators such as arrows and stop light displays or may present data in a pie chart, scatterplot, or multidimensional map typically used in predefined data displays.

- View Production Reports
  - Data driven DSS designers can create predefined reports as part of a data driven system that allows users to easily access specific data driven subsets of information. This functionality is conditional upon the need of the user, the purpose of the system, the selected environment, and the necessary resources expended building the system. The high utilization of these systems to monitor performance emphasize predefined data displays and production reports, while remaining focused on the ad hoc queries for historical data analysis to emphasize data filtering and retrieval. The decisions made by users that hinge on the data driven DSS can be affected by other factors that are unrelated to the actual data, so the designer must

consider how the system data is framed and displayed. A data driven DSS that is effectively and efficiently designed can emphasize the data display and help ensure that the appropriate data is retrieved as well as displayed to the user in an effective manner.

Data driven DSS managers can easily access and manipulate different perspectives contained within the data to identify and perform their own analysis. This, in addition to having access to reliable, consistent, and high-quality information necessary to make informed decisions, doing so in a time sensitive manner (Power 2008).

As this research study seeks to understand behavioral intention predictability of managers to use information produced from a DSS, it must also recognize the implications that the inherent characteristics of a DSS may inflict on the findings of the study. Some of the observed inherent characteristics of the DSS that may pose inherent risk to the user environment, and therefore might impact the findings of this study are:

1. **Data capturing collection:** This researcher has observed that while there are a great number of different systems in the market, there are many that are not compatible with each other. Consequently, this can force decision-makers to retype data or forced into creating an isolated merging technique in order to use existing data. This effort of mixed-matching of systems creates unnecessary duplication of data and effort as it attempts to capture and collect data that can be utilized across your position. Such problems could arise from the non-compatibility issues of the systems with existing databases, computer networks, and even newer technologies.

This particular issue can also potentially drive significant frustration and ill will toward the system that perhaps was improperly engineered or applied. Thus potentially resulting in strong, negative feelings toward an otherwise effective system.

2. **Data integrity and security:** the potential duplication of data imposes a significant threat to the data integrity throughout the system by causing conflicts and version control issues during different cycles of updated data. This particular problem could inject distrust with the system or with the data, as a result rendering the system unappealing to users who have experienced the system in the past. Additionally, this issue has the potential to scatter sensitive data at various locations or areas, which could pose significant security threats throughout the company, which could lead to substantial harm to people, as well as the organization as a whole.

3. **Unstructured problems:** while many of the current DSS aid with the decision-making process, many systems are inherently designed to help users with structured problems. It could be much more difficult to find a quality DSS that is specifically designed to help users solve unstructured problems which are commonly faced by executive managers as well as middle managers who make vital decisions every day. This characteristic could contain the propensity to deter users from engaging with the system simply because they may view it as a non-value added system that does not aid in unstructured problems. This particular

characteristic could change the way the users perceive the system and the usefulness of the system.

4. **Standardization:** the necessity to standardize fundamental features of a DSS is needed so the system can be utilized by more than one decision-maker, but at the same time considering the individual differences in terms of their decision style. If the system is considered too structured, as many DSS are, this could be perceived by users as inflexible, therefore lacking appeal as a versatile tool for decision-making. If the system is considered to be lacking the flexibility to adapt to individual differences in decision-making styles, the system could be considered as a rigid tool designed for a single particular type of decision-making style.

3. Chapter 3: Proposed Research Design: A Case Study

3.1 Overview:

Research methods provide the architecture to describe and seek to understand the environment in which we occupy. Various perspectives in philosophical viewpoints require researchers to make methodological decisions to properly and effectively select the best method to articulate the area of research as well as the purpose for the research (Benbasat and Weber 1996). Within the information technology phenomenon resides an increasing interest in the application of qualitative research approaches and one of those qualitative methodological approaches is case study research (Lee and Liebenau 1997).

Case study research is recognized as obtaining increasing acceptance over the past decade in the field of information technology (Benbasat and Weber 1996).

The purpose of this chapter is to portray the proposed plan of the research project while providing the rationale for the selected methodological approach. This research proposes the methodological approach of a case study through examination of the plan, design, data preparation, collection, and analysis as illustrated by Yin (Yin 2009). This chapter will provide the guidance through the research project and examine each step of the process.

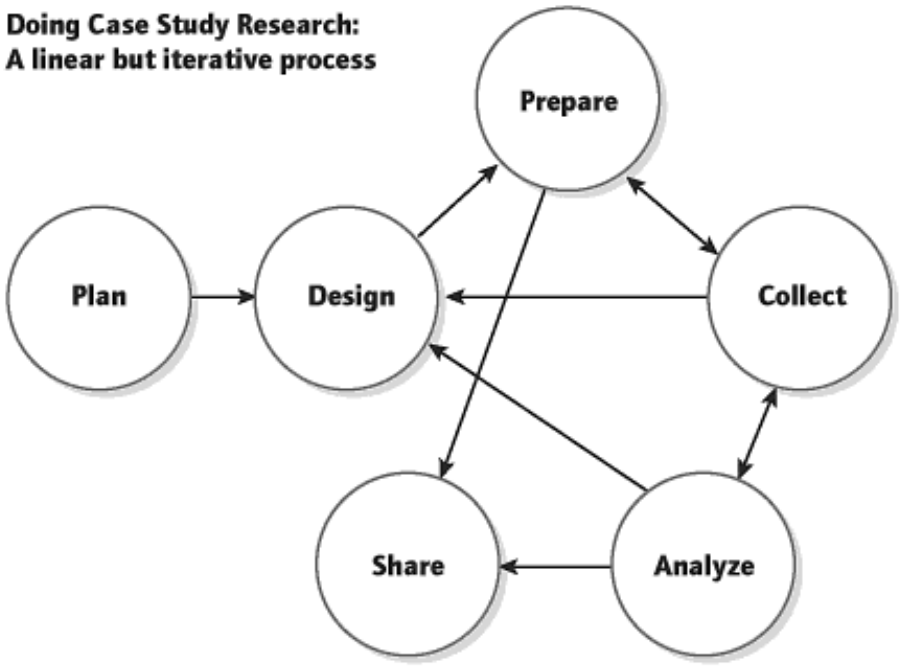


Figure 14. Case Study Map as illustrated by Yin (2009).

Case studies are empirical inquiries that study the depth of a particular event, program, or phenomenon over a defined period of time. Typically, a case study is used to investigate and understand a phenomenon within the natural environment in which the boundaries between the phenomenon and the context are not clearly identified (Leedy and Ormrod 2005). The case study methodology was selected as it was deemed as being useful for learning more about this poorly understood situation or environment, such as the aircraft industry.

David Arnott contributed to decision support systems theory by investigating and clearly specifying the nature of the evolutionary process of DSS (Arnott and Pervan 2005). By utilizing case study methodology, he was able to use insights from other disciplines and prior DSS research to develop a framework for understanding DSS evolution. The framework in the case study findings was used to define a research agenda that is important for DSS development.

His study utilized a single case design that applied a descriptive purpose to capture substantially more detail than the application of a survey. This is especially important in terms of identifying the important characteristics of the systems development process. He acknowledges the fact that case studies are especially useful for theory building and refining concepts for further studies and also stated that the selection of the case study was considered to be opportunistic for his research. The unit of analysis was the decision-support application that resulted from the system development process. He also noted that this particular case study was instrumental simply because the actual case was less important than the process being studied.

The selected data collection technique is face-to-face interviews and participant observation since the main benefit of participant observation is the direct interaction with the participants that would not have been possible in non-participant observation environments. Arnott notes that the main problems regarding bias of participant observation are: the need to take advocacy rather than observer roles, which inevitably result in the researcher becoming a supporter of the group and not having enough time for observations (Arnott and Pervan 2005). The biases of participant observation are diminished because of the nature of system evolution rather than the personal and organizational impact of the DSS being observed.

The vast majority of the interactions between the researcher and the participants were observations. Each observation was recorded in running diaries and even some sessions were recorded using audio devices in addition to the observation.

Table 2. Case Study Research References:

Case Study Research References			
Author(s)	Title	Publisher	Location
Creswell, J.W. (2003)	*Research design: Qualitative, quantitative and mixed methods approaches (2nd Edition)*	Sage Publications	Thousand Oaks, CA
Merriam, S.B. (1998)	*Qualitative research and case study applications*	Jossey-Bass Publishers	San Francisco, CA

	in education.		
Ragin, C.C. & Bescker, H.S. (Eds) (1992)	*What is a case? Exploring the foundations of social inquiry*	Cambridge University Presss	Cambridge, United Kingdom
Robson, C. (2002)	*Real world research (2nd Edition)*	Blackwell Publishing	Oxford, United Kingdom
Scholtz, R.W. & Tietje, O. (2002)	*Embedded case study methods: Integrating quantitative and qualitative knowledge*	Sage Publications	Thousand Oaks, CA
Yin, R.K. (2003)	*The case study anthology*	Sage Publications	Thousand Oaks, CA
Yin, R.K. (2004) (Ed)	*Case study research: Design and methods* (Applied Social Research Methods Series, 5, 3rd ed.)	Sage Publications	Thousand Oaks, CA

The authors of, "Web-Based Decision-Support Systems: A Case Study in Project Delivery", applied the case study research methodology which included the problem definition, proposed solutions, along with data validation (Molenaar and Songer 2001). The authors noted that the techniques were chosen in order to extend previous project selection model by employing a more quantifiable and repeatable methodology. In this example, the authors chose a retrospective case study questionnaire to employ the data collection method for this research. The purpose for selecting a questionnaire was to find

associations and correlations between project variables and project outcomes. The authors contend that the questionnaires, while generally do not determine causal connection between events, can indicate correlation. It was further noted that the respondents were not asked for their opinion about why specific projects were successful or unsuccessful, they were only asked about objective project variables that may correlate to success. This is where the qualitative case study approach using interviews and observations will provide the additional insight and depth into the phenomenon.

As the research straddles the field of Human Computer Interaction (HCI) and the field of Psychology, it is important to point out that even though there is a significant amount of interest in the technical side of system use, it is equally necessary to emphasize that it is not the primary focus of the research. This research interest is focused on the behavioral intention of managers who engage in system use. Additionally, the phenomenon of interest is behavioral intention is delineated by social, cognitive, affective, and behavioral influences.

3.2 Qualitative Case Study Planning

This research study applied a qualitative approach, which is the ideal method for research seeking to understand a phenomenon that revolves around behavioral intention predictability. As illustrated previously, Yin provides a 6-step process specifically designed for qualitative research using a case study methodology. The initial step within this model is identified as the "planning" process.

With a multitude of philosophical paradigms available to represent the research perspective, it became increasingly evident this was an important aspect of the research

that needed careful consideration. Proper selection of a philosophical worldview point is imperative as it applies a specific lens through which the research is viewed throughout each step of the process. It is also important that the epistemological foundation work collaboratively with the specific theory selected, as well as the qualitative case study methodology for the research study.

Qualitative case studies often adopt the interpretivist perspective. It focuses on life experiences that radically alter and shape the meanings that individuals give to themselves and the experiences they encounter. The interpretivist approach contains many positive attributes. For this research study, it enabled the researcher to identify different definitions of the problem and exposes the limitations of statistics and statistical evaluations (Denzin 2001). The interpretivist perspective embraces the ontological belief that people's reality is constructed primarily on a social basis. This research also focused on the experiences of the manager, while identifying how they interpret their world, how they perceive reality, and the understanding of meaning associated with their *reality*.

In this research study, the primary focus revolved around the behavioral intentions of middle managers, which contains a foundation within the field of psychology. Therefore, it is important to address the research utilizing a theory that is psychologically based and founded, even though it is directly related to IS and DSS. The TPB is specifically designed to aid in the understanding of behavioral intentions of the managers, which is psychologically based. Advancement in understanding can be achieved by exploring how they interpret their world and how they perceive reality by adopting the interpretivist perspective.

In the following sections, the research addressed philosophical assumptions about the compatibility of the psychologically based theory and the characteristics of

Interpretivism. As this research study sought out to obtain empirical data to provide a deeper understanding of the phenomenon that revolves around behavioral intention predictability of managers, an interpretivist epistemological approach was selected to understand the theoretical application of the Theory of Planned Behavior.

3.3 Philosophical Paradigm: Interpretivism

3.3.1 Epistemological Foundations and Alignment

During the conception of IS research, the adoption of a positivistic epistemological position was a common philosophical base within the information systems field (Avgerou 2000). It was a product of the computer science field that utilized systems to aid in the data-processing applications within organizations. However, this particular position was not adopted and received by all scholars within the information systems field.

Other researchers identified significant flaws that were inherent in the positive, oriented philosophical perspective. Kaplan and Duchon identified such flaws that inherently "remove enough features from the subject of study that only obvious results are possible" (Kaplan and Duchon 1988). The authors realized that in order for a positivist-oriented method to produce generalizable and reproducible results, many of the key components within the study were not recognized. These key components were known as the social interactions that occur within the natural environment of the study that could possibly play a significant role in the phenomenon being researched.

During the same year that the Theory of Planned Behavior was developed, Hirschheim acknowledged a clear distinction between the information systems field in the

computer science field (Hirschheim 1985). The author contended, "Information systems, because they are largely human or social in nature, share all of the difficulties associated with the social sciences". It was during this time frame that researchers realized the increase complexities around information systems and the sociological impact that significantly affected them. With this growing realization accompanied a paradigm shift from the focus of technology-oriented concerns to social and behavioral concerns (Avgerou 2000).

The field of information systems currently utilizes the disciplines of other areas such as psychology and sociology in order to employ the various methodological approaches in researching a specific phenomenon (Mingers 2001). Since information system researchers have embraced and accepted the interpretivist epistemology as well as the positivist epistemology, it is important to recognize and apply the epistemology that directly aligns with the research.

This epistemological approach identifies that reality consists of individual's subjective experiences in an external environment. This particular approach can embrace an inter-subjective epistemology as well as the ontological belief that people's reality is constructed primarily on a social basis. Andrade contends that the interpretive researcher acquires information through social constructions such as language, consciousness, and common interpretations (Andrade 2009).

Interpretive researchers begin under the common assumption that access to reality can only be constructed through social interactions such as language, experiences, and shared meanings (Boland Jr and Day 1989). Generally speaking, interpretive studies typically attempt understanding phenomenon through the meanings of people assigned to

them. Interpretive methods of research in IS is aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham 1995). Another important aspect of interpretive research is the absence of predefined dependent and independent variables. Instead, the research focuses on the full complexity of human sense making as the situation emerges and evolves (Kaplan and Maxwell 2005).

The interpretive paradigm is strengthened through observation and interpretation. This strengthening process is achieved by observing in order to collect information about specific events. Interpretation is achieved in order to make sense of the information by drawing inferences or by judging the relationship between the information and an abstract pattern (Aikenhead 1997). The interpretive paradigm is primarily focused on understanding the world as it is from subjective experiences of the individuals who have obtained the experience. This particular research will utilize the interpretive paradigm by using interview techniques, as well as observations, to develop interpretation of the collected information about the experiences of the participants in the study. The research utilized meaning oriented methodologies that rely on subjective relationships between the researcher and the participants in the research. This particular approach was also selected to help explain the subjective reasoning and meanings that reside behind the social action (Myers and Avison 1997).

Table 3. Characteristics of Interpretivism

Feature	**Description**
Purpose of	To understand the behavioral intention predictability of middle

research	managers to use information from a decision support system
Ontology	✓ There are multiple realities ✓ Reality can be explored and constructed through human interactions, and meaningful actions. ✓ Discover how people make sense of their social worlds in the natural setting by means of daily routines, conversations and writings while interacting with others around them. These writings could be text and visual pictures ✓ Many social realities exist due to varying human experience, including people's knowledge, views, interpretations, and experiences.
Epistemology	✓ Events are understood through the mental processes of interpretation that is influenced by interaction with social contexts. ✓ Those active in the research process socially construct knowledge by experiencing real life or natural settings. ✓ Inquirer and the inquired-into are interlocked in an interactive process of talking and listening, reading and writing. ✓ More personal, interactive mode of data collection
Methodology	✓ Process of data collection by text messages, interviews, and reflective sessions. ✓ Research is a product of the values of the researcher

The interest of interpretivists is not the generation of a new theory, but rather to enrich the understanding of an existing theory. In the interpretive approach, the researcher does not stand above or outside the environment but rather a participant observer of environment who engages in the activities and discerns the meanings of the actions as they are expressed within the specific social contexts. Walsham (Walsham 1995) presents three specific uses for theory in interpretive case studies:

1. Design and collection of the data which is guided by the theory
2. Data collection and analysis which uses the theory as a guiding iterative process
3. Utilization of the theory as an outcome of a case study

3.3.2 Philosophical Assumptions of the Theory of Planned Behavior

As previously explained, the research in this document espouses the Theory of Planned Behavior (TPB) to assist in the understanding of the phenomenon through the meanings of people about the system using the TPB to determine behavioral intention predictability. The central premise of TPB is that behavioral decisions are the result of a reasoned process of three kinds of considerations (Ajzen 2001). These considerations are:

1. Beliefs about the probable consequences or other attributes of the behavior known as behavioral beliefs.

2. Beliefs about the subjective norms, which are expectations of other people (normative beliefs).
3. Beliefs about the presence of factors that may positively or negatively impact the performance of the desired behavior (control beliefs).

According to Ajzen, " in their respective aggregates, behavioral beliefs produce a favorable or unfavorable *attitude toward behavior*; normative beliefs result in perceived social pressure or *subjective norm*; and control beliefs give rise to *perceived behavioral control*, the perceived ease or difficulty of performing the behavior (Ajzen 2002). In combination, attitude toward the behavior, subjective norm, and perception of behavioral control lead to the formation of a behavioral *intention*. Finally, given a sufficient degree of *actual* control over the behavior, people are expected to carry out their intentions when the opportunity arises. Intention is thus assumed to be the immediate antecedent of behavior." In figure 15, the model identifies influential background factors in addition to the standard model. Specifically, this research is focusing on experience and knowledge of information by the participants from their perspective.

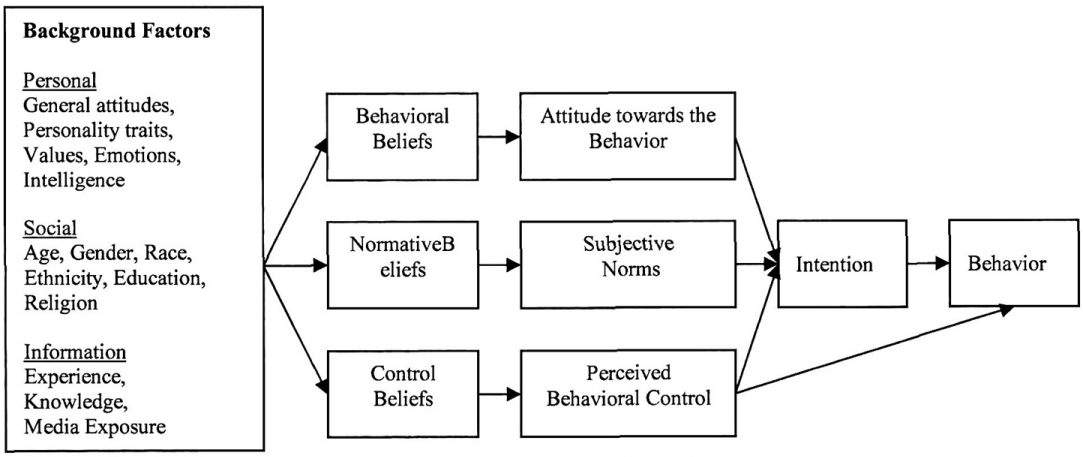


Figure 1: Theory of Planned Behaviour
Source: Ajzen (2005), p. 135

Figure 15. TPB Model

Teo and Tan applied TPB, a theory that is commonly used in commercial settings, within an educational context in order to explain teacher's acceptance of technology in terms of behavioral intention (Teo and Tan 2012). The authors maintain that attitudes toward computer use are significantly influenced by different variables. These variables include computer confidence, *knowledge* about computers, as well as computer *experience* (Teo 2008). It was determined that all factors are capable of interacting with one another to directly impact the attitudes toward computer use. For example, the authors examined the attitudes of the participants towards computer use and it was determined that the attitudes towards computer use was directly influenced by behavioral intention (Teo and Lee 2010).

TBD has emerged as a widely accepted model that contains a robust method for explaining intention to use technologies in different contexts. The theory is rooted within the social psychology field designed to help researchers understand "why". It is argued

that an individual's attitude is strongly influenced by attitude, subjective norms, and perceived behavioral controls, which are all considered to be a *social* derivative (Ajzen 1991).

Over 20 years ago, several strands of various philosophies began to emerge which "emphasized the inherent meaningfulness of the social world" (Markus and Lee 1999). Interpretivism emerged as the primary philosophy for social research. Ontologically speaking, social structures do not subsist independently from the activities in which they encounter. As the structure enables the activity to which they are reproduced or transformed. Epistemologically speaking, social systems are "inherently interactive and open" (Mingers and Willcocks 2004). Mingers contends "the main effect is that it is difficult to test theories since predicted effects may or may not occur depending on a multitude of factors. It focuses attention on a series explanatory rather than predictive power. Social science is itself a social practice and is, therefore, inherently self-referential. This means that both social science knowledge can self-effect the social world, and perhaps change it."

It is vitally important that the perspective seeks to understand how things are and what they are in order to understand why. Interwoven into the recursive nature of activity and society is the social activity through which the social structures are reproduced and modified. Therefore, the structures that permit the social activity are subsequently reinforced and meaning is established through those social activities. This research study intends to apply a socially derived theory (TPB) to understand a social phenomenon (behavioral intention) through a philosophically social lens (Interpretivism).

3.4 Rationalization for Case Study

Williams suggests the differences between interpretivist and positivist approaches can be clearly identified by examining the epistemological and ontological stances (Williams 2008). Interpretivism can be positioned as either " non-positivism' in which facts and values are intertwined and hard to disentangle, and both are involved in scientific knowledge; and 'normativism' which takes the view that scientific knowledge is ideological and inevitably conducive to particular sets of social ends." Another distinguishing difference resides in the independent construction of the ontology. He posits that 'internal realism', which views reality for us as an inter-subjective construction of the shared human cognitive apparatus, and 'subjective idealism' where each person is considered to construct his or her own reality."

Table 4. Alternative stances on knowledge and reality

Epistemology	***Ontology***
Positivism: Facts and values are distinct and scientific knowledge consists only of facts	External realism: Reality exists independently of our construction of it
Non-positivism: Facts and values are intertwined; both are involved in scientific knowledge	Internal realism: Reality-for-us is an inter-subjective construction of the shared human cognitive apparatus

Normativism: Scientific knowledge is ideology goal and inevitably conducive to particular sets of social ends	Subjective idealism: Each person constructs his or her own reality

He expresses that the typical ontological stance for most interpretive researchers will includes either the Non-positivism position or the Normativism position with specific regard to the human interpretations and meanings associated with computer systems.

Mingers posits that there is considerable value in meticulous examination of the philosophical basis in the related fields of 'systems' (Mingers 1984). He recognizes the existence of at least four distinctly different strands of interpretive approaches such as phenomenology, ethnography, philosophy of language, and hermeneutics. Each of the four interpretive approaches utilizes the case study methodology to capture the events within the social context.

All researchers contemplate the concerns of the role of the theory in their research, regardless of their philosophical stance. Eisenhardt addresses the issue of the role that theory will play in the context of organizational research (Eisenhardt 1989). She identifies three distinct uses of theory relative to interpretive case studies. A summary of the examples of the use of theory in IS case studies is provided in the table below. This research intends to use the theory as an initial guidance design and data collection.

Examples of the use of theory in IS case studies:

Use of theory	*Interpretive IS case study*
As an initial guide to design and data collection	Walsham (1993) drawing on Pettigrew
As part of an iterative process of data collection and analysis	Orlikowski (1993) using grounded theory
As a final product of the research	Orlikowski and Robey (1991)

Walsham states "the motivation for the use of theory in the earlier stages of interpretive case studies is to create an initial theoretical framework which takes account of previous knowledge, and which creates a sensible theoretical basis to inform the topics and approach of the early empirical work" (Walsham 1995). He later suggests that although theory can provide a valuable guide initially, there exist a threat in interpretive studies to preserve and protect the openness of the data collected in the field. Another concern resides with the willingness to modify initial assumptions and theories as a result of the findings from the research. It is not uncommon for researchers to expand, revise, or abandoned altogether the initial theories used during the research as a result of the iterative process of data collection and analysis. Conceptually, the use of the theory during the research can expose inherent weaknesses or gaps within the theory that must be open to consideration.

Deep within the heart of TPB are the assumptions that imply behavior is entirely dependent on the individual as long as there is behavior of will present. This type of behavior strongly influences the degree of intention behavior consistency, which confirms that intentions are superior predictors of individual actions (Sheeran 2002).

According to TPB, the primary antecedent of an individual behavior is their intention toward the behavior itself. This in turn has a direct impact of an individual's behavioral intention determined by attitude, subjective norms, and perceived behavioral controls. As attitude is constructed of cognition, affect, and behavior, it contains a social structure linked to attitude. Subjective norms also contain a social structure link as it contends with the notion of how behavioral intention is influenced by other people. Perceived behavioral controls also involve a social structure impact thus explaining the variance of behaviors where the individual does not have full volitional control of the situation (Ajzen 1991, Ajzen 2002).

3.4.1 Case Study Design

The design of research is an important aspect of case study research methodology. The research design process requires the researcher to envision not only the beginning and the end of the research but each step of the process in between. This design is typically viewed as a logical pathway that incorporates the research questions, data collection, data analysis (to include patterns and themes among the dataset), and specific description of how the analysis will lead to interpretation of the research findings (Yin 2009).

Case study research is considered to be an optimal research strategy when three conditions are determined to be applicable to the research. These conditions are as follows (Yin 2003):

1. When the research objective is interested in and answering "how," "what," and "why" questions.
2. When the research is interested in contemporary events and fails to have control or the ability to manipulate behavioral events.
3. When the research is used as an evaluation tool to explain, describe, illustrate, explore, or to be utilized as a matter evaluation instrument.

Case study research is considered to be an optimal research strategy for this study as it seeks to understand the behavioral intention of managers to use information. Interest in the topic was developed both personally and professionally. Given the fact that I have experience in the management field as well as reviewing literature and studies in the field, the research was a good fit. The research questions themselves really began to come to fruition following the pre-pilot study that was designed to better fit the scope of the research to the research questions. The pre-pilot consisted of managers within the aircraft industry who were in a "middle management" position. Originally, this was designed as a full pilot study but after the completion of the data collection and analysis, it was determined that a more in-depth pilot study was needed. Consequently, it was through the efforts of the pilot study that the research questions became clear and took substance. It was from the research plan that this qualitative research case study was prepared to

effectively ask the "how" questions that are best addressed through the use a case study. This research is also striving to be used as an evaluation tool to explain the behavioral intention implications of systems within a specific manufacturing industry.

In a case study, the researcher provides a depth of understanding by collecting substantial amounts of data on the individuals or events that are part of the phenomenon investigation. Case studies require multiple sources of data input in order to substantiate the findings of the research. The data that are collected in a case study often include observations, interviews, documents, historical records, and even audiotapes and videotapes. In a case study, in order for the researcher to perform an effective and comprehensive investigation, the researcher will spend a substantial amount of time understanding the actual environment and interacting with the people and the occurrences that will provide a specific piece to the phenomenon (Eisenhardt 1989). This type of continuous interaction will ensure that the researcher will be experiencing a thorough amount of exposure into the investigated phenomenon. One of the distinct advantages of a case study is the benefit from prior research in theoretical propositions to help guide the data collection and data analysis of the research through the phenomenon.

Additionally, the purpose for using a case study method can contain several different objectives (Yin 1981):

- *Exploratory* - this method is used when the researcher applies a case to investigate a phenomenon that does not contain an established protocol or to seek to understand

the phenomenon that does not contain a clear understanding from past research studies.

- *Explanatory* - this method is used when the researcher is applying a case study to demonstrate how particular events occur and can be clearly understood in its own context.
- *Descriptive* - this method is used when the researcher is trying to apply a visual representation of the phenomenon as a holistic element. In this type of method, the researcher seeks to apply specific and key relationships among the individuals and the participative elements to better describe the phenomenon and its internal operations.

This research study, as described by Yin, was considered to be an *explanatory* type of case study. Since the research focused on the behavioral intentions of managers to use information in their environment, the explanatory method was used to provide a deeper understanding of the phenomenon in its own context. This was achieved by viewing the social phenomenon through the interpretivist lens but from the perspective of the managers using their own terms of their firsthand experiences. The TPB guided the collection of data with the intention of provided a deeper explanation of the understanding of the phenomenon.

Comparatively speaking, explanatory studies are typically less structured in order to collect data with an open- ended objective from the conception of the study. This method is necessary to allow the research to evolve based on participants input to shape and guide the formation of the study (Arthur and Nazroo 2003). Additionally, the descriptive method

applied more focus on the relationships between the participants and the elements within the environment to better understand and describe the events that are occurring.

The overlying objective for qualitative research is defined as " the achievement of understanding how people make sense out of their lives, delineate the process (rather than the outcome or product) of meaning-making, and describe how people interpret what they experience" says Merriam (Merriam 2014). Viewing the situation from the perspective of the participant rather than viewing the situation from the researcher's perspective in order to understand the phenomenon determines the achievement of this process. The difference in perspective provides a first-hand account of the understanding.

3.5 Case Study Preparation

3.5.1 Selection of the Research Population

The aerospace organization has two distinct establishments that serve specific roles and functions for the company as a whole. These two areas are known as operations and support groups. The operations organization consists of individual programs that build assemblies and sub-assemblies for specific make and models of aircraft. The operations group programs also consist of a variety of aircraft from business jets to commercial aircraft. Each one of the programs contains a distinctive hierarchy of first level managers, senior managers, and directors.

The support group organizations contain key functions that provide essential information, equipment, parts, tools, and logistics support for the operations organization.

The support group organization consists of: Supply Chain Management, Quality, Engineering, Lean Manufacturing, Finance, and Human Resources. Similar to the operations group, the support group organization contains the same distinctive hierarchy of first level managers, senior managers, and directors.

This particular environment was selected for numerous reasons. First of all, the need for a greater understanding into the phenomenon of behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system exists throughout the organization, including both the operations group and the support group. The organization as a whole is undergoing significant changes and creates a challenging environment for managers. They are given considerable amounts of information throughout the day to provide them the basis for making rapid decisions. Secondly, there exists a need in the aircraft industry to provide additional insight into understanding the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system specifically pertaining to their environment.

Like many other aircraft manufacturing companies, the organization contained large systems that integrate all areas of the business across the enterprise through an ERP (Enterprise Resource Planning) system. The ERP system contained several subsystems such as a DSS. This provided information to managers, which enabled them to make logical decisions and adjustments to the organization for improved performance. In particular, the aerospace company DSS is made up of two subsystems: a data analysis system and an information analysis system. The data analysis system provided inventory analysis information and the information analysis system provides scheduling and production unit

analysis. Both systems provide a wide array of data for managers to use in making their decisions. This is where the potential for problems can occur. Many managers do not utilize information that is provided to them from the DSS to make decisions. The managers take it upon themselves to base decisions on other sources of data deemed as being more reliable. Sometimes these decisions are even based on emotions, behaviors, or other cognitive processes. As managers continued to apply different rationale, other than the information that is derived from a DSS to form the basis of their decisions, the results continued the establishment of erratic performance and poor rationale.

The primary reason for this research was to develop an understanding of the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system. While previous research focused on the areas of behavioral intentions in a general sense or different specific environments, no prior research has focused on the behavioral intentions for managers within the aircraft industry specifically. This research provided a significant contribution to the aircraft industry by providing a deeper understanding of why this phenomenon occurred. Accordingly, it assisted with the development of new ways to provide managers with information that is suitable and desirable to their specific needs. This research was also able to bridge the gap between the managers who are making decisions every day and the information received in order to establish enterprise-wide consistencies and improved performance measures.

The research was able to produce objective and replicable generalizations, which provide inferences from the text. The research was conducted within an aircraft industry organization that possesses an Enterprise Resource Planning (ERP) system. Data collection methods consisted of qualitative methods employing interviews and observation (Leedy

and Ormrod 2005). Based on the focus of this research and the research questions, interviews were selected as the instrument of choice to address the specific area of the research questions.

The interview was selected as a key component to data collection because of the ability to extract information in an open-type format and to provide extensive probing into the phenomenon. The interview protocol contained a scripted plan for the interview. It included a specific list of questions, on-site locations, and the creation of an environment that encouraged the participants to assume power and control over their own intentions and the outcome of those intentions. These methods provided an intensive analysis with both the individual and the environment, focusing on the developmental factors in relation to the context.

Each participant engaged in a one-on-one interview as well as direct observation during the interview. This engagement occurred on site, in the natural environment in which the participants gather information on a daily basis. All data collection from interviews and observations was coded, analyzed, and assigned to categories identifying any trends, themes, and descriptions. The optimal goal was to provide a detailed interpretation of the facts. Each pattern identified was supported with sufficient evidence by utilizing deductive and inductive content analysis tools. Through the use of traditional deductive content analysis, the research was able to produce objective and replicable generalizations, which provided inferences from the text. This type of analysis was typically used to investigate a particular phenomenon by measuring certain themes that were revealed in and by the text. The text was transformed into countable units through analysis by measurement of the revealed factors. In deductive content analysis, it is

developed using a framework of coded categories that are typically based on established theory or model. As the content analysis proceeds in a systematic format, one of the primary checks and controls built in the process is the measure of intercoder reliability. One of the many advantages of deductive content analysis is the ability to be unobtrusive. By using this type of study the researcher intends to overcome the typical bias that is commonly found in obtrusive techniques as well as the untrustworthiness of purely anecdotal and nonsystematic analysis. These usually rely entirely on the interpretation of the researcher alone.

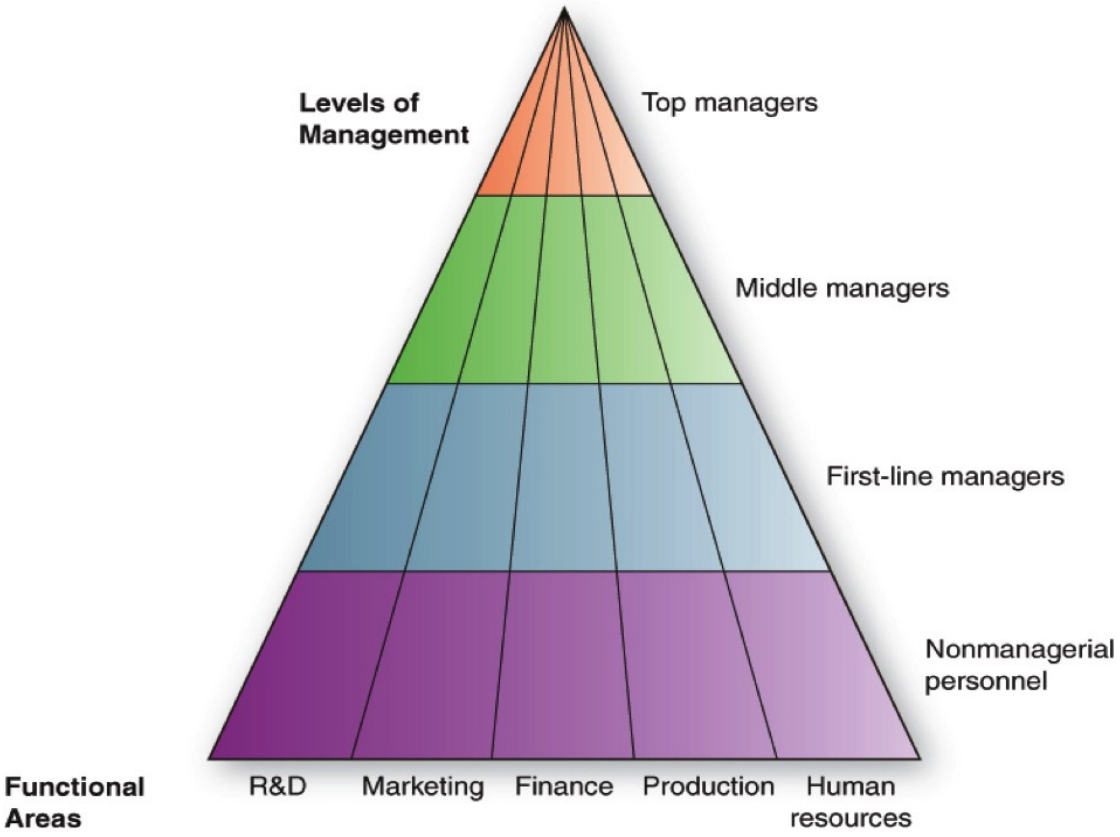
3.5.2 Decision-Making Level of the Population

Within the field of management reside three primary levels of management: Executive Management, Middle Management, and Entry-Level Management. A typical position within the executive management level would be the vice president. The roles of the vice president are primarily encompassed around the vision of the organization and the formulation of company policies and goals that are directly related to the growth of the company. A typical position within the middle-management level would contain a possible title of Director or Senior Manager and in some cases the title of First Level managers, which also falls into this category. The middle-management level primarily focuses on the relevancy in the productivity of the organization, which may include building teams to increase skill set capabilities as well as providing a productive and supportive work environment. An entry-level management title could be identified as a supervisor, lead, or foreman. The role of the entry-level management provided a direct link between with the

workers and the middle level management. Their time was primarily spent directing and controlling the precise activities of the work that is being performed by the employees.

This is an example of the various levels of management across the functional areas of an organization:

Figure 16. Management Levels by Functional Areas Example



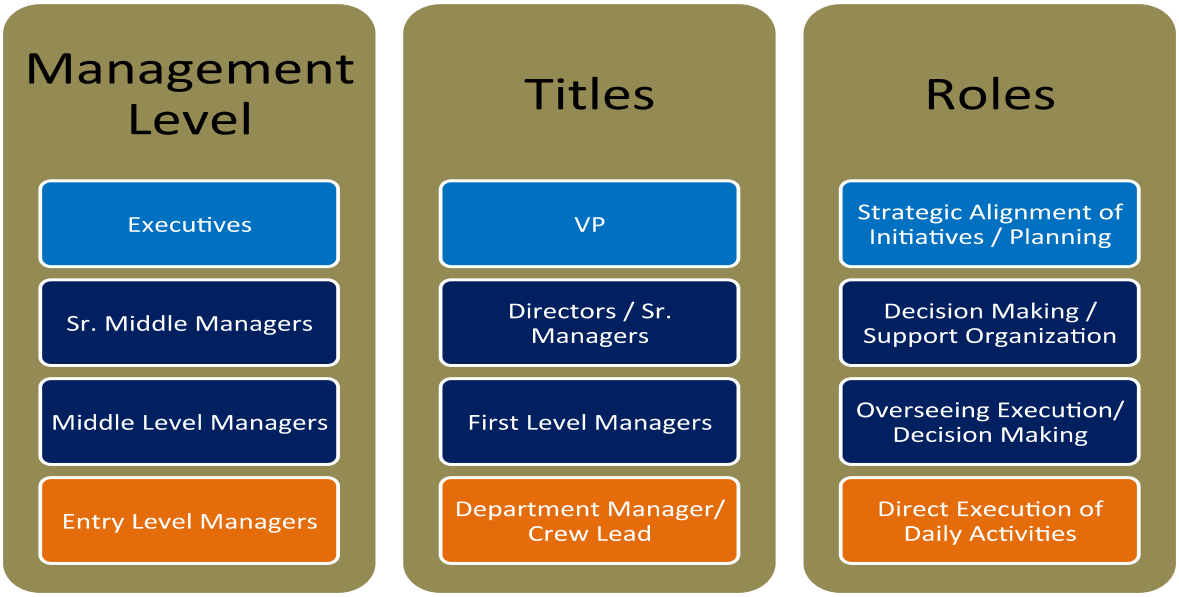
The population of this study focused on a specific level of management that is primarily responsible for the decision-making activities of the organization on a daily basis.

The level of management identified as “Middle Management” is the primary responsible group for the decision-making activities that involve information processing and utilization of information from the DSS within the ERP of the organization.

The selection of the population known as “Middle Managers” is justified based on the type of relationship they have relative to the DSS system and the tools within the system. One of the responsibilities of a Middle Manager is the requirement to make educated decisions based on factual data and information that is retrieved from the DSS. These decisions may include but are not limited to areas such as: financial information, inventory management information, logistical and product handling information, procurement and supplier related information, scheduling information, production information, quality and engineering information, and human resource information. Within each of these departments are middle managers that use the information on a daily basis, on an hourly basis and in many cases, even more frequently during the course of the workday. These decisions are considered to be tactical type decision-making events at the middle manager level of the management team.

Comparatively, the executive level managers provide more strategic alignment for the organization as well as visionary types of decisions that guide the organization. These choices are based on the decisions in the information that is provided to the middle managers by the DSS. The entry-level managers spend their time focusing on the day-to-day activities on the shop floor and are typically consumed with reactionary type functions rather than the higher-level tactical or strategic type decisions.

Figure 17. Management Levels and Roles Diagram



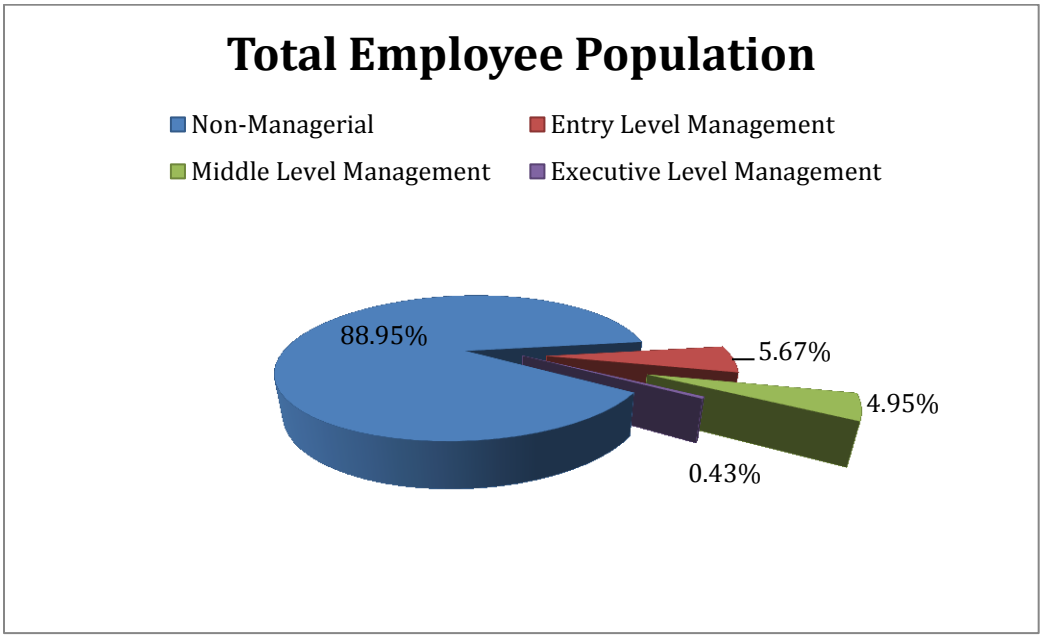
The population in the study focused on the middle-management level of management across several departments within an aerospace organization. This research specifically included aircraft industry professionals in the managerial field who were currently employed within an aerospace organization. These individuals were selected for their experience, level of management, and were involved on a daily basis in the decision-making responsibilities of the organization. To begin the selection process, the human resource department provided a list of potential participants who met the criteria of being a middle manager. Each of these participants was not only part of a similar classification but they were also within a similar grade level which included compensation as well as benefits.

As the research focused on the understanding of how behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system, the participants were selected using basic criterion. The participants must have engaged information from a DSS on a minimal daily basis and be considered a part of the middle manager population group. These two requirements ensured that the manager has been properly exposed to both the environment and the systems with a sufficient amount of frequency while performing managerial roles and responsibilities that required decisions to be made recurrently. The manager population consisted of first level managers, second-level managers, and directors from within the organizations middle-management team. Other than the two prerequisites, the participants were randomly selected throughout the organization.

3.5.3 Sample

The sample size of the population selected for participation in this research study was approximately ~137 managers, identified as middle level managers based on their criteria and level of responsibility. With the approximate total population of the organization at this division at ~ 2768, the sample size of managers relative to the total population of the division represented approximately 5% of the overall total population. With the approximate total population of executive level managers, middle level managers, and entry-level managers equaling ~306, the sample size of middle managers relative to the overall population of managers represented approximately 45% of the population.

Figure 18. Total Employee Population Sample



As the numbers suggest, the amount of middle managers available within the organization to conduct a research study far exceeded the number of required participants for the research. Given the fact that participant contribution to this study was completely voluntary, it was assumed that the number of willing participants to engage in an interview would diminish significantly through the course of participant selection. Morgan conclusively identified through his research that data saturation was established and that very little new data surface after conducting the 20th interview (Morgan, Fischhoff et al. 2001). However, Greg Guest *et al.,* in the article "How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability" established conclusions that identified a significantly different level of saturation through the conducting of interviews (Guest, Bunce et al. 2006). Based on their analysis, they found that data saturation had been

established once the research had analyzed 12 interviews. After the 12th interview, they had created 92% of the total number of codes developed across 60 interviews and very few new themes had emerged beyond the 12th interview. It was also observed that 70% of the themes had emerged after they coded the interview data within the first six interviews.

The above studies were conducted using qualitative methods only and Guest's qualitative methodology was similar to this research, therefore the same sampling strategy was adopted in this research regarding the number of interviews conducted. The decision had been made to select and interview a minimum of 12 participants from the sampling group until the establishment of data saturation has been concluded. Within this group of 12 voluntary participants, the interviews would be conducted with middle managers within the areas of Supply Chain Management (SCM), Operations, Engineering, Quality, Finance, and Human Resources. The overall goal was to utilize participants within the middle level management group from each of the six areas of the organization.

As a part of the sample selection process, each participant was a part of the same organization even though their positions were in different departments of the organization. The researcher's specific role within the organization was identified as the "Business Manager" for the Supply Chain Management. None of the participants in the study ever report directly or indirectly through the business management department or reported directly or indirectly to the researcher. Additionally, the voluntary participants in this research study did not currently have or have ever had any previous personal relationship with the researcher at any given time. The only established relationship between the participant and the researcher was professional in nature as well as a fellow manager within the same organization. By eliminating participants that possessed a close friendship

or those with daily interaction with the researcher, the bias of the research was reduced to provide the research with increased validity and reliability.

Of the voluntary participants that contributed to the research study, the researcher clearly and effectively communicated the importance of confidentiality and privacy regarding anything that was said or disclosed during the interview. The information or any part of the interview process would not be disclosed to the company or any of the members of the organization at any time. All information would be coded and kept in a secure location that was accessible to the researcher only. The data was encrypted and stored in a location selected by the researcher that was considered to be secure at the conclusion of the research project. Even though substantial measures were performed to maintain complete confidentiality and privacy of their information, it was possible that the participants may still feel uneasy about the slight risk of taking part in the research. Each of the participants was provided with the option to discontinue the research.

3.6 Data Collection and Organization

Denzin elucidates that the interpretive interactionism epistemology requires qualitative researchers to maintain open-mindedness to utilize a variety of data sources for their research (Denzin 2001). Equally speaking, it is common for qualitative researchers to apply a relative theory to help guide the research and correlate it to other research within the field. As Marshall and Rossman explain, it provides the assistance to "map the topography of the specific concepts they will explore in detail" (Marshall and Rossman 2010).

Creswell illustrates the linear approach to establish the foundations of effective data collection and organization. As the stages are interrelated, they are not completely linear in execution of the research. The author's model describes four primary components to include data collection, data organization, data coding, and data analysis (Creswell 2009).

In the data collection phase, the researcher interviews participants and includes observations, recordings, field notes, and other relevant data to the research. After the participant interviews are completed, the data preparation phase of the research begins by transcribing the audio recordings. Each completed transcript will be reviewed by replaying the audiotapes to ensure complete clarity and accuracy of the transcription. Additionally, the observational field notes from interviews will also be typed and stored in a word processor format to enable future analysis and coding. Upon completion of all the collected and sorted information, the researcher will begin to prepare a systematic design protocol from the beginning of the process to provide systematic organizational and logical sense of the data.

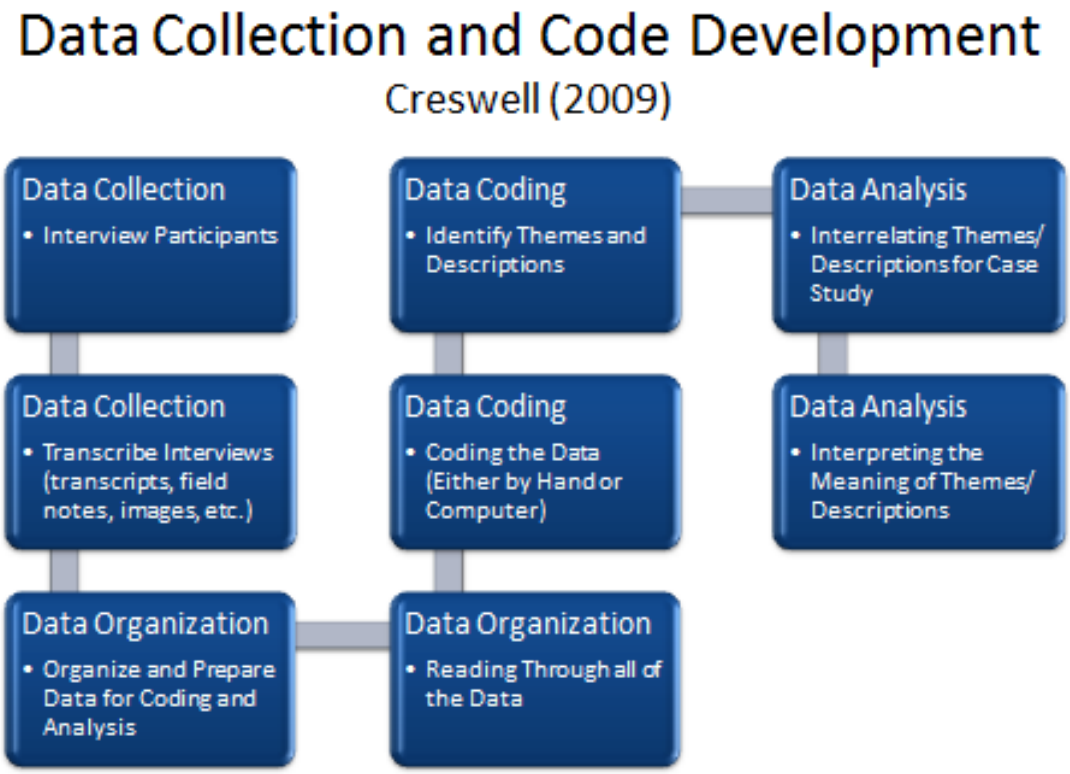
During the organization phase, the researcher prepares the data for analysis by sorting and arranging it into various categories, depending on the source of the data. The primary objective is to get an overall general sense of the information and identify the meaning that the information represents. For example (Creswell 2009):

- What general ideas or participants trying to communicate?
- What is the deliverable tone of the ideas and key points that they are trying to articulate?
- What is the impression of the overall depth, credibility, and use of the information?

The analysis process actually begins with the coding process. Rallis and Rossman define the process as "coding is the process of organizing the material into chunks or segments of text before bringing meaning to information" (Rallis and Rossman 1998). This process includes the incorporation of text data, pictures or images gathered during data collection and putting them into categories. This is followed by labeling those categories with the term based on specific language actually used by the participant.

Data Collection and Code Development

Figure 19. Data collection, organization, coding, and analysis for qualitative research



The study gathered data over the span of approximately two months. The data collection process began by sending out invitations for voluntary participants to be interviewed, provided they meet the necessary qualifications. This was accomplished by sending out a letter via email to the middle management staff within the organization thus requesting volunteers for the study (See Appendix B). The letter included a brief description about the project and addressed the issue of confidentiality and privacy.

Once the participants had been identified, the interview process began by scheduling times with each participant. After each interview, the observation notes were analyzed and the recordings were transcribed, and then analyzed. The observational descriptive notes provided descriptive information about the setting of the interview and reflective notes such as personal thoughts during the interview, feelings about tones and body language, and other impressions and prejudices (Bogdan and Biklen).

After reviewing the data, it was determined whether or not a follow-up interview would be needed to sufficiently answer any question that was not answered the first time. Utilizing this particular strategy would provide an opportunity in the follow-up investigation to probe identified emergent themes and issues that may have surfaced in the initial interview. Upon identification of such emerging themes, the study would seek data from multiple sources in order to establish increased data reliability using the triangulation method.

3.6.1 Observations

Qualitative observations are defined by Creswell (2009) as: "*those in which the researcher takes field notes on the behavior and activities of individuals at the research site. In these field notes, the researcher records, in a structured or semi structured way (using some prior questions that the inquirer wants to know), activities at the research site. Qualitative observers may also engage in roles varying from a non-participant to complete participant" (Creswell 2009).* Because the phenomenon of interest for this research study specifically addresses the behavioral intentions of managers within the Aerospace industry environment, observations were not conducted on an "observer as participant" role where the researcher is identified and openly known. This type of observer role can be interpreted as intrusive and could influence the participants in the research unknowingly.

However, the observational role was a "participant as observer" where the role is secondary to the participant role, providing the opportunity for unusual aspects of the phenomenon to be identified during observation (Merriam 1998, Creswell and Clark 2007). The challenge or limitation to utilizing the "participant as observer" method resides in the observing skills of the researcher. Conferring with the participant afterword, in the event that additional clarity is needed, will mitigate this particular limitation. This will allow the researcher to correlate what was actually said with the intended meaning of the participant from his or her own perspective.

Additionally, Creswell identifies four types of data that can be collected in a qualitative type of study; observations, interviews, documents, and audio-visual materials (Creswell and Clark 2007). As this research will utilize observations in conjunction with interviews, it's important to understand the distinction between interviews and

observations. Merriam explains the distinction as an occurrence within the natural setting of the phenomenon as opposed to an environment specifically designated to conduct interviews that is isolated from that phenomenon. She further explains how observational data is much more up close and personal for the researcher to engage with the phenomenon of interest as opposed to obtaining the information from the participant indirectly from their perspective only (Merriam 2009).

An important aspect of the data recording process is the selection of how the researcher will record the observational data. As Creswell explains, "researchers often engage in multiple observations during the course of a qualitative study and use an observational protocol for recording information while observing. This may be a single page with a dividing line down the middle to separate descriptive notes (portraits of the participants, a reconstruction of dialogue, a description of the physical setting, accounts of particular events, or activities) from reflective notes (Creswell 2009). This can emerge from the researchers personal thoughts, such as "speculation, feelings, problems, ideas, lunches, impressions, and prejudices" says Bogdan and Biklen (Bogdan and Biklen 1992).

Merriam explains how good interview questions are essential to effective qualitative research (Merriam 2009). She guides researchers to avoid multi-part questions, leading questions that could potentially influence the answers of the participants, and close-ended questions that do not encourage or allow participants to fully answer the question, as they deem necessary. This was the guidance that was applied to the research questions thus utilizing opening questions and avoiding leading, multiple question questions.

In order to achieve the proper breadth and depth needed for the data collection process via interview questions, additional guidance was applied to the development of the

questions. Legard et al. explains how content mapping questions, content mining questions, and probing questions can assist researchers in the extrapolation of data (Legard, Keegan et al. 2003). The use of content mapping questions help to open the boundaries of the research and allow participants to disclose additional dimensions of the research that were not originally considered. They further explain how the content mining questions are essential to understand the participant's perspective of the information in applying their own meaning to the words. Potentially one of the most important aspects is the incorporation of probing questions. This is essential in order to fully explore the thoughts, feelings, behaviors, and other influential factors that impact the participants. The developed research questions contained content mining questions as well as probing questions to fully extrapolate information from the participants for the research study. Since the type of data collected was being guided by the theory, the interest resided heavily on the perspective of the individual and the meanings of their answers.

Merriam (2009) further explains the four distinctive categories of interview questions that are specifically designed to give researchers a detail and descriptive data set: interpretive, hypothetical, devil's advocate, and ideal positioning (Merriam 2009). For this particular research, interpretive type questions are most applicable as it provides the pathway for researchers who seek to understand the deeper meaning into a particular phenomenon. This type of questioning includes content mining questions as well as probing questions as described previously.

During this research study, observational data was collected during a myriad of meetings and discussions regarding the phenomenon of interest. Even though the data collection process did not support my ability to be completely "Invisible", my presence at

the meeting was not be considered as "unusual" since these are meetings that I commonly attend, but do so in a support role only. The support role function required my participation in the event that something is needed from my department (but I am rarely required to perform this role.) This type of observation role holds true to the "participant as observer" role as described earlier and is considered as non-intrusive and non-participatory as much as possible. During the data collection process of the observation, the goal was to make observations about the activities and interactions of the participants in the meeting regarding behavioral intentions. Additionally, the data collection process attempted to identify other themes that might emerge from the observation and whether the observational notes would correspond or contrast with what the participants provided during the interview.

3.6.2 Authorization to conduct the research

Permission to conduct the research within the organization using the employee population was provided by the vice president (VP) of the division within the organization. This granted access was obtained in return for a pledge of anonymity to both the organization as well as the participants in the research study. As a result of this pledge, the identification and subsequent details that are obtained throughout the research would identify neither the organization involved nor the information about the participants, which would remain in the highest confidence of the researcher. In order to obtain a list of the managers who meet specific criteria, the human resource department was contacted to establish and provide a list of the individuals that would be considered as possible

voluntary participants. As it has been determined that the individuals within the middle management level of the organization are considered to possess decision-making capabilities, only those individuals were selected as potential voluntary participants for the study.

3.6.3 Research Design Approval

With all research, it is important for the researcher to obtain prior approval to conduct the research when using human subjects to conduct an investigation, explains Yin (Yin 2009). He further explains that many institutions require the researcher to participate in an institutional-based training program. One of the requirements by the Institutional Review Board (IRB) includes the development of the design to be accepted by the review board. There are specific guidelines and plans for study that must include specific details regarding the data collection process, the analysis of the data, and how the participants in the study will be recruited as well as engaged for the study. During the application process for the IRB approval, the rationale and recruitment were written as follows:

- ***Rationale for Exemption:*** *The proposed research involves a systematic investigation into the advancement in understanding of behavioral intentions of middle managers to use information produced by a data-driven decision support system in the aerospace industry. The research study applies the architectural foundation of the Theory of Planned Behavior (Ajzen, 1985, 1991, 2001, 2002, 2006) to understand how attitude, subjective norms, and perceived behavioral controls all play a role in determining the behavioral intentions by middle managers. Through the application of this theory, the*

research will assist organizations within the aerospace industry to better understand the implications of behavioral intentions by their managers who make decisions daily and are critical to the success of the organization. It is believed that this project should be exempted from the IRB review solely because it focuses on the attitudes and opinions of participants regarding the information that they engage with from a data-driven decision support system in order to make decisions as a part of their roles and responsibilities as a middle manager within the organization. The research study contains a list of interview questions, both unstructured and structured, that applies consistency of the questions by each and every participant followed by follow-up questions based on the initial question during the interview. The research study will only inquire about basic demographic information like age, gender, role within the organization, years with the company, and basic experiential type questions that cannot be identifiable information about the participants. The interviews and the content of the interview will be conducted in complete confidence and privacy in a mutually agreed-upon location that is deemed to be comfortable by the participant. There is little to no potential harm that could come to the participant due to the fact that the interview with the participant will be completely confidential and the researcher will retain no personal and identifiable data about the participants. The type of questions that will be asked will be contained to simply opinion of statements about information and the participants interaction with that information desk purposefully avoiding specific questions that introduce statements that could be considered detrimental to their career or their position within the company.

- ***Rationale for Recruitment:*** *The Aerosystems company have agreed to allow the research study of "The advancement in understanding of behavioral intentions by middle managers to use information produced by a data-driven decision support system" to be conducted at the Oklahoma division. The Aerosystems company is a non-OEM designer and manufacturer of aerostructures for commercial, military, and business/regional jets throughout the world. They bring more than eighty years of experience with the world's most successful and admired aircraft manufacturers. With a global footprint of sixteen million square feet, the facilities can be found in the United States, the United Kingdom, France, Russia, Malaysia, and China. They are a global leader in designing and manufacturing large complex, contoured assemblies to include composite and metallic aircraft fuselages, propulsion systems, and wing structures for both commercial and military manufacturers. Within the aerospace organization dwell two distinctive establishments that serve specific roles and functions for the company as a whole. These two areas are known as operations and support groups. The operations organization consists of individual programs that build assemblies and sub-assemblies for specific make and models of aircraft. The operations group programs also consist of a variety of business jets to commercial aircraft. Each one of the programs contains a distinctive hierarchy of first level managers, senior managers, and directors.*

  The support group organizations contain key functions that provide essential information, equipment, parts, tools, and logistics support for the operations organization. The support group organization consists of: Supply Chain Management, Quality, Engineering, Lean Manufacturing, Finance, and Human Resources. Similar to

the operations group, the support group organization contains the same distinctive hierarchy of first level managers, senior managers, and directors. This particular environment was selected for numerous reasons. First of all, the need for a greater understanding into the phenomenon of behavioral intentions to use information produced by a data-driven DSS within the aircraft organization exists throughout the operations group as well as the support group. The organization as a whole is undergoing significant and challenging environments for managers as they are given lots of information throughout the day to provide them the foundation for the decisions made. Secondly, there exists a need in the aircraft industry to provide additional insight into the understanding how behavioral intentions by middle managers to use information produced by a data-driven Decision Support System that specifically pertains to their environment. Like many other aircraft manufacturing companies, this organization contains large systems that integrate all areas of the business across the enterprise through an ERP (Enterprise Resource Planning) system. The ERP system contains several subsystems such as a DSS (Decision Support System) that provide information to managers to enable them to make logical decisions and adjustments to the organization for improved performance.

A list of potential participants who met the criteria of being a middle manager was provided by the human resource department to begin the selection of the participants. Each of these participants is not only part of a similar classification but they are also within a similar grade level which includes compensation as well as benefits. The sample size of the population selected for participation in this research study is approximately ~137 managers, identified as middle level managers based on their

criteria and level of responsibility. With the approximate total population of the organization at this division at ~ 2768, the sample size of managers relative to the total population of the division represents approximately 5% of the overall total population. With the approximate total population of executive level managers, middle level managers, and entry-level managers equaling ~306, the sample size of middle managers relative to the overall population of managers represents approximately 45% of the population.

With the exception of a few minor revisions, the IRB granted the exemption of the consent forms.

3.6.4 Confidentiality of the Data

Careful considerations and measures were applied to preserve the confidentiality of each participant. Pseudonyms or code numbers were used in place of names and the participants were properly informed about the data that is collected regarding the security and the length of the archive data (a maximum length of three years as required by Syracuse University guidelines followed by a proper means of destruction). It was also communicated to the participants that no one other than the direct researcher would have access to these files during or after the study for the sake of confidentiality and privacy. Additionally, the name of the organization and the location of their position would not be identified or disclosed in the research in order to retain the proper level of confidentiality.

Upon final completion of the coding in the data analysis process, the information that was provided by the participant would be available to them so they can verify their information is accurately portrayed and to confirm that additional statements were not

added to their transcript. In the event that the participant feels like the information was not accurate, they will be given the opportunity to review and apply changes as needed. The participants, and only the participants, were allowed to receive hard copies of the transcripts should they request information from the researcher.

3.6.5 Instrumentation

The interview questions were designed to elicit responses in order to provide insight into the participant's perspectives about information from a data driven decision support system. The interview instrument contained both structured and unstructured approaches to utilize a mix of questions appropriate to qualitative inquiries. The structured portion of the interview questions addressed specific information about the participant while the unstructured portion delved into the foundational components that make up the behavioral intentions of the managers to engage in the DSS. This structured and unstructured approach is a typical data collection process of qualitative research conducted with specific questions as well as open-ended questions.

The data collection process began with an email request by an Office Administrative Assistant within the organization-requesting volunteers to participate in a research study. At the time of the initial e-mail request for participants, correspondence did not include any details about the research and would specifically state that all participation would be completely voluntary and confidential. Once the participants are selected, the details about the research project would be defined and explained to each participant. Then they were given the opportunity to accept or decline as participants without any recourse or question. Listed below is the consent form that was provided to each participant after they agreed to be a part of the research study.

I, _____, understand that I am being asked to participate in a doctoral research project designed to understand the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system.

I understand that by participating in this study, I will be contributing to an effort to increase the body of knowledge in advancement in understanding of behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system.

The researcher hopes to generate an understanding of how this phenomenon is experienced in the aerospace field by collecting data from those affiliated with the environment daily. I understand that participation in this research will involve a one-hour interview with me and that the conversation will be recorded with a digital recorder. Following the interview, the data will then be transcribed and will be available to the participant upon their request. I will also be asked to provide the researcher with some basic demographic information during the interview. I understand that I have the option to refuse to participate in this study or to withdraw at any time without penalty or prejudice. I understand that I have the right to refuse to answer any specific questions without any reason. I understand that I will not be paid for my participation in this study but that I am welcome to request a copy of the final results once the study is completed. This copy will be provided to the participant at no cost.

I understand that material from my interview may be anonymously quoted or paraphrased in the report of the study to include future publications, but I have been assured that my confidentiality will be protected throughout the entire study. This means that at no time will my identity be revealed or disclosed in the study or future publications from the researcher.

I have read this form and I fully understand the terms of my participation in this research project. I have had the chance to discuss the project with the researcher and to ask questions. If additional questions arise during the course of the interview or after the interview is completed, I understand that I may contact the researcher and that he will provide satisfactory answers.

The instrumentation that was used in this study was selected to obtain specific information about the participant's thoughts, feelings, behaviors, social influences, and other prominent components which support the foundations that influence behavioral intentions identified in the Theory of Planned Behavior and the Tripartite Model. This research study collected information that provided a deeper understanding about managers in the aircraft industry. It identified the influential factors that impacted the behavioral intention predictability of the managers to engage with the system that provided essential information to the organization. It also examined personal and professional characteristics of each participant; management background, information regarding experience level as well as level of education.

The overall objective of the interview questions was to collect data about behavioral intentions relative to the Theory of Planned Behavior and the Tripartite Model. The

structure of the interview questions was guided by the theory, but for the most part were open-ended questions. A few of the questions were focus questions intentionally used in order to collect specific relative information about the participant. Over the course of the pre-pilot study and the pilot study, the research questions had evolved and were refined to specifically and more effectively collect data about behavioral intention. Initially, the research questions were complicated (they included multiple questions within a single question) and inquired about interesting data but not particularly relevant to the study of behavioral intention predictability using the theory.

It quickly became evident that the number of questions had to be much more concise and specific in relation to the desired objective. Additionally, the type of questioning used was too vast and lacked specific focus in any one particular area. By utilizing the guidance provided by previous researchers, the research question structure began to evolve and provide the necessary breadth and depth of questions needed for data collection.

The interview questions used the theory and the model to guide the data collection but did not prohibit additional components that could be considered beneficial. The interview questions were structured to collect information about behavioral intention of the three primary areas of the theory; attitude, subjective norms, and perceived behavioral controls. Within the attitude area, the questions were guided by the tripartite model to collect information regarding cognition, affect, and behavior. Below is a list of interview questions that were asked of the participants in the pilot study after refining the questions from the pre-pilot study but does not include the additional probing questions. The

probing questions were specifically asked based on the participants answer to the initial question therefore they are not included in the list below.

General Information:

1. *Please tell me the title of your position within the company, the roles and responsibilities of the position, and how long you have been in the position.*

Attitude (A) Questions:

2. *Tell me what you think about a DSS and describe how it impacts the decision-making function for you in your organization.*
3. *Give me your thoughts regarding the information that a DSS provides as well as the source of the information that feeds into the system.*
4. *Describe your feelings toward DSS information and provide an example of why you feel that way.*
5. *Give me an example of how those feelings affect the way you interact with the system now and how it might affect your perception to use the system in the future.*
6. *Tell me about a past experience with making decisions and how it affected your current ability to make decisions today.*
7. *Describe a past experience interacting with information from a DSS and how it affected your interest and willingness to use the system afterward.*

Subjective Norms (SN) Questions:

8. *How do you think others perceive you because you used DSS information?*
    a. *What about your peers?*
    b. *What about your supervisors?*
    c. *What about non-management personnel?*
    d. *What about executives?*

9. *When do you think it is important to comply or not to comply with the wishes of others and please give me an example of a past situation?*
    a. *What about your peers?*
    b. *What about your supervisors?*
    c. *What about non-management personnel?*
    d. *What about executives?*

Perceived Behavioral Controls (PBC) Questions:

10. *Describe the needed skill sets to utilize the information from a DSS and tell me about a time when you successfully or unsuccessfully demonstrated those skills.*
    a. *Do you have the ability to utilize the system/ system information?*
    b. *Do you have the knowledge to utilize the system/ system information?*
    c. *Do you have the skills to utilize the system/ system information?*

11. *Can you provide an example of the existing factors that may assist or impede your performance with the DSS/ DSS information from your own perspective?*

Closing Question:

12. *Are there any related situations that you would like to share or other questions that I have not asked that you would like to comment on?*

As a characteristic of qualitative research, the open-ended questions allowed the study to be open for any outcome as a result of the interviews (Yin 2009). The research did not attempt to predict the results of the study thus eliminating bias that could hinder new and unexpected themes from emerging during the interviews. In an attempt to increase validity, member checks were performed as suggested by Merriam (Merriam 2009). She suggests the use of member checks to eliminate subjective bias in the explanations of qualitative research. This was accomplished by presenting the data that was collected from the participants back to the participants in order to confirm what the data represented was truly what the participant intended to say.

3.6.6 Interview Setting

Prior to the interview each participant received a letter explaining the purpose and scope of the study as well as a statement of informed consent, which provided a detailed explanation of the researcher's commitment to confidentiality. The participants were also provided with information about their voluntary participation along with the choice of opting out of the study at any given time with or without reason or just cause. Participants were also informed that they reserve the right to not answer any questions they believe or feel are not ethical in nature or any questions that may make them feel uncomfortable.

The participants were also informed that the interviews would be face-to-face, the interviews would be audiotaped, and the researcher would take notes during the interview. The face-to-face interview format would provide an environment where the participants could be directly observed and allowed the researcher to maintain control over the line of questioning. As the interviews were audiotaped then transcribed, the ability to observe during the interview process allowed the researcher to take notes identifying any unusual characteristics of the participant in the interview. For example, the participant may have exhibited signs of deep emotional and or cognitive traits and they may use specific words to answer questions. These kinds of mannerisms would provide additional insight for the researcher. This type of data collection was collected through the use of observations during the interview. All interviews were taped and transcribed verbatim followed by the coding process to identify significant themes that emerged from the research process and potentially identified in the body of the professional literature regarding the Theory of Planned Behavior and the Tripartite Model.

After the participants agreed to the interview, the researcher then arranged for a scheduled time with each participant that was suitable to the formal interview process. Each participant received a 60-minute block of time with the interviewer. In the event that the interview was not completed within the 60-minute block of time, another day would be selected to continue the interview. Additional interview times would also be provided at the discretion of the interviewee should the participant voluntarily request another setting to discuss information they had not shared in the initial interview. The interviews were conducted at the sole discretion of the interviewee but it will be the recommendation of the researcher to suggest the office.

Ultimately, the research design allowed the research to go beyond the basic implications and converge to form a triangulation of data that will provide a greater level of willingness to participate on the part of the participants, and a greater level of accuracy on the part of the findings.

Before the formal interview process, the participant and the researcher reviewed the consent form for accuracy and agreement followed by signatures from both parties. The researcher reminded the participant of the nature of the study, provided an explanation of the participant's role in the study and how the participant can gain access to the results of the study. The researcher also provided a detailed explanation of how the interview contained complete confidentiality to protect the participant's identity as well as the identity of the organization in which they were employed.

This research used multiple sources of data collection in order to achieve the convergence of information in a triangulation manner as described by Yin (Yin 2009). The term triangulation refers to multiple or different source of data as substantiating evidence to "shed light on a seam or perspective" (Creswell 1998). By utilizing the triangulation method, researchers can confirm or dispute the findings from observations and interviews that are collected individually from one another. This triangulation method allows the researcher to more effectively identify specific patterns or themes within the dataset.

3.7 Planned Data Coding and Analysis

The data analysis within a case study occurs throughout the entire investigation of the study rather than at the conclusion of the study, which is found in other methodologies. The primary goal for the analysis is to identify specific problems and issues, build

hypotheses and concepts to draw conclusions, and to identify meaningful consistencies. Data analysis in a case study typically contains a series of steps (Creswell , Stake 1995):

- Organization of details about the case - these are the factual components about the case that are arranged in a logical and chronological order for evaluation.
- Categorization of data - throughout the process of data collection specific categories will emerge that can help group the data into meaningful collections.
- Interpretation of single instances - each document and singular piece of data needs to be examined for meaning interpretation relative to the case.
- Identification of patterns - all case data must undergo scrutiny in order to identify common themes and patterns among the data. This identification of patterns could potentially reveal important information that would otherwise be unidentifiable when viewed individually.
- Synthesis and generalizations - finally, an overall conclusion is drawn that may include findings not identified in previous studies.

Creswell also explains how the process of data analysis in qualitative research is actually considered to behave in a revolving manner as opposed to a linear manner (Creswell 1998). Specifically, this research study will perform data analysis on all recorded interviews and observational notes recorded by the researcher that have been coded and analyzed for emergent themes and other significant data. As the patterns and trends of the data developed into emergent themes, they will be graphically represented in a format that properly illustrates the prominent relationships between and across the various categories.

As described previously, utilizing Creswell's revolving data analysis methodology, the collected data is organized followed by previewing the data content by reading and making notes about initial identification of unique concepts or themes (Creswell 1998). He further explains how this process allows the researcher to become absorbed into the data itself thus becoming intimately familiar with the finite aspects of the data prior to forming an assessment of the overall scheme of the findings. The act of creating memos is essential to amalgamate the components of classifying, describing, and interpretation of the data (Creswell 1998). The use of computer-aided qualitative data analysis software (otherwise known as CAQDAS) supports the organization of the memos and other forms of data.

The data analysis process included the digitally recorded audio taped interviews with an approximate length of 60 minutes per interview and the researcher's notes through observations during the interview. The actual data analysis of this research project was performed using a qualitative computer software program to help code, organize, and sort information that will be essential to writing the qualitative study. The advantages of using computer software to perform data collection, organization, coding, and analysis are the efficient means of utilizing storage and organization of the data, the inquiry capacity of locating all text associated with specific codes, identification of interrelated codes for making queries of various relationships among those, and the import and export of qualitative data to quantitative programs such as spreadsheets or data analysis programs.

The research software that was used during the study is Researchware's – Hyper-research. As the use of software packages that perform qualitative data analysis and provide standardized means of undertaking the research, more and more researchers are

becoming increasingly aware of the significant advantages of using qualitative research software (Coffey, Holbrook et al. 1996). These software applications are characterized as "essential" for qualitative research and they are identified as increasingly utilizing the enabled technology that provides efficient handling and effective management with large datasets thus removing the drudgery of handling qualitative data (Lee and Esterhuizen 2000). Even though the level of acceptance for using software-based data analysis protocols for qualitative research has not been adopted by all researchers, critical debates for both those in favor of and against the use of computer-assisted data analysis software in qualitative research is an ongoing discussion.

One of the primary opportunities for using computer-assisted data analysis software and qualitative research is the assistance with data management and data analysis through better ordering and categorization of data as opposed to what would have been possible performing the task manually. The protocols of computer aided data analysis software provides researchers with the means of dealing with complexity that is important and central feature of qualitative data in some ways, qualitative researchers seek to address the complexity of the phenomenon, evidence and circumstances by attempting to extrapolate and amalgamate detailed data and information.

On the other hand, there also reside some risks to using computer-assisted data analysis software. Some researchers believe that the software increases the risk of the coding process becoming" and ended in itself". Additionally, researchers have also identified concerns regarding the standardized protocols that are based on implicit assumptions about the qualitative research.

As a part of the data analysis process, this research applied the use of the Theory of Planned Behavior and the Tripartite model to guide to research to collect data and to apply deductive as well as inductive qualitative content analysis. This was accomplished by applying the existing theoretical framework (TPB) during the analysis to specifically establish the existence or non-existence of certain factors revealed in and by the text within the data. The theory provided the foundation to establish the framework for coding categories that establish analysis by measuring the text transformed into quantifiable units. The use of deductive content analysis was applied during the part of the research that focused on understanding of the behavioral intentions of the participants and their experiences that influence the behavior.

This research also applied an inductive approach to content analysis by adopting the premise that hidden within the text of the data is unexpected information that provided additional insight into the phenomenon by careful process of analysis. Additionally, the use of inductive content analysis was applied during the research that focused on the understanding of the terms and phrases that were used by the participants. This approach focused on their perspective as well as the meaning of the terms and phrases that were selected by the participants. This particular type of analysis did not allow for the analysis of unexpected findings from the data.

The process of coding data was a way of analyzing qualitative information. In qualitative research, a code is considered a word or even a short phrase that symbolically represents a summation for a section of language-based data in text form. This code is a researcher-generated construct that symbolizes specific attributes interpreted meaning into separate datum for the specific goal of identifying patterns, establishing categories of

the codes, building and substantiating theories, as well as other analytical processes. In qualitative research, data can take form in various ways such as interviews, transcripts, participant observations, journals, documents, field notes, and many other types of media. The segment of data to be coded during the First Cycle coding process can vary in sheer size, from a single word to an entire paragraph or even, a complete page of text into an intense current of information and images. During the Second Cycle coding process, the amount of coded text can have the exact same units, but with longer passages or phrases, notes about the data, and even a redistribution of the codes into various organizational depictions. The process of coding is the essential link between data collection and explanation and interpretation of the meaning.

After the transcripts are completed, as described by (Creswell 2005), the research will then begin the coding process by identifying and establishing two types of coding procedures. These procedures are identified as:

1. *Descriptive Coding* – This method of coding is also known as "Topic coding" and is considered to be a first cycle type of coding method. This phase of the coding process includes reading through the data to identify specific words, phrases, and patterns, as described by (Bogdan). The words and phrases will be assigned to coding categories and writing significant words and phrases throughout the transcription of the interview. Descriptive Coding summarizes with a word or short phrase that which is important to the identifications of the topic itself. With this type of coding the topic is what is talked or written about in the content being the primary substance of the message. Descriptive Coding is appropriate for virtually

all types of qualitative studies with a wide variety of data forms to include interview transcripts, observational notes, and other varieties of media.

2. *Pattern coding* - this type of coding is considered to be a second cycle method and provides advanced techniques to re-organizing and re-analyzing coded data through first cycle methods. In this phase of the coding process, the connecting of seemingly unrelated facts in a logical sequence to develop a coherent meta-synthesis of the data is the desired result. Pattern coding contains explanatory and inferential codes that identify an emergent theme, configuration, or explanation. This method amalgamates a substantial amount of information into a more meaningful and parsimonious unit of analysis into summaries, which can then be used to develop themes or constructs.

For the pilot study data analysis, the first cycle coding process utilizes the descriptive coding method that is specifically aligned to the interpretivists epistemological approach used in the pilot study. The descriptive coding method specifically addresses the interpretivist epistemological approach and the type of research questions in the study by addressing research questions that inquire "How does…" or "What factors influence…" type of questions (Saldaña 2012). Originally, an open coding method had been considered to capitalize on the ability to examine specific constructs that are present within the data thus providing opportunities to identify emerging themes. However, additional research regarding the descriptive coding method proved to be a better fit for this research (Wolcott

1994). Saldana explains how pattern codes are explanatory in inferential codes that researchers used to identify emergent themes, configuration changes, or explanations.

The inductive analysis process began as the data collection and the descriptive coding process had started. As data was being collected, specific attention was directed to the participant's interviews with regard to understanding their perspective. This attention led to a wide array of codes initially and as more data was collected, the number of codes began to consolidate into a refined group. During the pattern coding process, the search began for patterns and themes to emerge along with key relationships among the dataset. As the data was being re-organized and re-analyzed, unique themes and patterns began to emerge.

As an example of these emergent themes, the data was beginning to identify issues and concerns regarding the information from the system using the TBP framework to guide the study. During the descriptive coding process, multiple codes had been created regarding specific issues such as: "information inaccuracy", "information inputs", "information outputs", "information source", and "information accuracy". After reviewing the commonalities between these codes, these concerns were all related specifically to the information concerns of the users. Therefore, a code category identified as "information" was created.

Additionally, other themes began to emerge that contained some commonalities to the "information" issues, which focused on the system rather than the information. Specifically, these codes also contained issues such as: "system frustration", "system problems", "lack of system functionality", "system limitations", and "system replacement". While these codes were system specific they were also related to issues that had emerged

regarding information. The common denominator between these particular codes within the "system" category and the "information category" revolves around behavior. Specifically, the codes had addressed issues and concerns from the participants regarding their past experience with the system or the information. Utilizing the pattern coding method identified the emergent theme of the user's experience of interacting with the system or the information in the system. Therefore, what was initially identified as "system" or "information" related to experience is now identified as the categorical code, "past behavioral experience".

Even though there were multiple ways to align the data, it was through the exercise of inductive content analysis that provided the process to describe and understand what the data were illustrating.

3.8.1 Deductive Content Analysis

During the process of Deductive Content Analysis, the analysis process was advanced forward through the use of an existing framework to establish the coding categories that set *`a priori'* (Neuendorf 2002). This existing framework was an established theory known as the Theory of Planned Behavior. This particular type of analysis includes a systematic process of the content analysis through the use of the intercoder reliability measurement. As previous qualitative case study analysis has not been conducted in this area, this research used the theory to provide the framework and the guidance through the deductive content analysis. This research relied on the framework of the TPB to provide the strength to the deductive content analysis. After performing the 2nd cycle coding using

the pattern coding method, the data was then re-organized to identify patterns and themes (Neuendorf 2002).

Lastly, the need to test the coding scheme was essential to establish effective intercoder reliability results. This process will be discussed in the following section in detail.

3.8.2 Inductive Content Analysis

Inductive and deductive qualitative content analysis are similar as they both provide an analytical technique that dives into the data to identify what is being communicated through the findings of the research. These findings are being communicated by means of written texts, recorded speech, photographs, videos, and artifacts of that are meant to convey meaning. This portion of the research study will provide a general description of the inductive qualitative content analysis and provide specifics about how it is applied it to the research. The creation of a codebook, also known as a coding protocol, is a part of content analysis (Neuendorf 2002). Codes provide the framework for the qualitative data analysis as described by Forman and Creswell et al. (Forman, Creswell et al. 2008).

> *Codes can represent topics, concepts, or categories of events, processes, attitudes or beliefs that represent human activity, and thought. Codes are used by the researcher to re-organize data in a way that facilitates interpretation and enables the researcher to organize and retrieve data by categories that are analytically useful to the study, thereby aiding interpretation. The thoughtful and deliberative development of codes*

> *provide rigor to the analytic process. Codes create a means by which to exhaustively identify and retrieve data out of a dataset as well as enable the researcher to see a picture of the data that is not easily discernible in transcript form… codes can be either deductive or inductive. Deductive codes exist a priori and are identified or constructed from theoretical frameworks, relevant empirical work, research questions, Data collection categories (e.g., interview questions or observation categories), or the unit of analysis (e.g., gender, rural versus urban, etc.). Inductive codes come from the data itself: analytical insights that emerged during immersion in the data and during what is called "preliminary coding". Although there are studies that use codes developed either deductively or interactively, content analysts most often employ a combination of both approaches (Forman & Creswell et al., 2008).*

The inductive content analysis that was implemented in this research study was initiated with a descriptive coding process followed by a secondary coding process known as pattern coding. The Theory of Planned Behavior (TPB) guided this coding process. Using the three primary elements of the theory (attitude, subjective norms, and perceived behavioral controls), the coding protocol was developed around these elements, which directly correlate with the research questions that seek to understand the behavioral intention predictability using this theory.

3.9 Validity and Reliability

3.9.1 Validity

For qualitative research, validity indicates that the researcher has checked for the accuracy of the findings by employing certain procedures and the instrument measures what it has been designed to measure. As a strength of qualitative research, validity is based on determining whether the findings are accurate from the perspective of the research, the participant, or the readers of the account (Creswell and Miller 2000).

One particular method of establishing validity to the research instrument is triangulation. This term refers to the application of different data sources of information by examining evidence from the various sources and using it to build a coherent justification of themes. Triangulation is established by utilizing the interview instrument in conjunction with the observational notes developed by the researcher.

Another way of increasing validity is the use of member checking. This method determines accuracy of the qualitative findings through validation of those specific descriptions or themes by the participants and to determine whether the participants felt the information was portrayed in an accurate manner. An additional way of increasing validity is achieved by requesting the participant to review the information that was transcribed from the interviews thus ensuring that the data that they provided is not being misrepresented in any way.

3.9.2 Reliability

Qualitative research reliability indicates that the researchers approach is consistent across different researchers in different projects (Gibbs 2007). Yin also posits that qualitative researchers e.g. document the procedures of other case studies as well as provide documentation of the steps within the procedure of the study (Yin 2003). This can be achieved by setting up a detailed case study protocol in a database to contain the data that was in the study. For this particular research study, the steps of the procedures in the case study protocol have been established while the qualitative computer software program contained the database and aided in the coding and analysis portion of the research.

Specific to this research, there were two reliability approach procedures to provide additional checks to determine consistency and reliability in the research. The first procedure addressed the transcripts to ensure that they do not contain obvious errors during the transcription process of the research. The qualitative computer software program contained a transcription module within the software to assist and reduce the margin of error during the transcription process. However, the researcher still needed to validate the transcript content to make certain it is properly represented by the participants input during the interview process. The second procedure addressed a drift in the definition of the codes. Gibbs advises researchers to be cognizant of a shift in meaning of the codes during the processing of codes (Gibbs 2007). This concern was thwarted by the researcher performing constant comparative data analysis with the codes and by maintaining notes about the codes and their definitions throughout the data collection and analysis process.

3.10 Inter-coder Reliability

The process of establishing intercoder reliability provides increased credibility to the research through reliable content analysis utilizing more than one person performing the coding. Not only does the intercoder reliability rely on more than one person, but, agreement must be established between each coder by discussing the process that is establishing consensus about the codes, by refining the codes within the codebook, and by communicating the expectations and means of the codes themselves. This process of intercoder reliability is considered to be a highly acceptable methodology in social science research.

In order to establish intercoder reliability during the pilot study, I employed the assistance of a recent Ph.D. graduate from the University of Oklahoma State who had experience with behavioral intention research. This recent graduate was familiar with the research but was not a part of the pilot study nor was he a part of the actual study. Having been a recent graduate of the doctoral program at the University of Oklahoma State, he was familiar with CAQDAS with specific experience regarding Hyper Research (which happens to be a very popular research tool for those using a Macintosh computer).

Even though he did not specifically study the TPB, he was familiar with the theory and the framework associated with it. Specific articles regarding the theory were also shared with him to better provide an understanding about the research. Several hours of performing coding on the test data were performed to establish agreement and began the discussion in order to establish a consensus about the codes and the meanings of the codes. The test data that had been used was data collected with the intention of using it during the pilot study but not used in the actual study.

As the process of discussing the codes began to unfold, the outcome of the process began to take on a very bleak and dismal outlook. It did not appear that intercoder reliability was going to be able to be easily ascertained through basic discussion of consensus. However, once discussion of the details regarding the codes and the meaning of those codes originated, the establishment of alignment began to appear. For example, some as specific areas that caused confusion involved the system and the information relative to the three constructs within the theory. Through the application of the interpretivist perspective, many discussions transpired about how to use the descriptive coding technique to capture the real meaning of what the participants were trying to communicate, transpired. The process began by coding a short amount of data (we decided to code each interview question individually and discuss one at a time) then sitting down together to discuss the code selected as well as the meaning behind the codes. Since he was available on a daily basis, we were able to meet each day for discussions over the span of about four weeks. On numerous occasions the questions required several discussions and several visits in order to establish clarity and consensus.

The first few coding discussions drew concerns about being able to ever get alignment but as discussed previously, we did, finally come to an agreement. The first few discussions during the pilot study resulted in an intercoder reliability agreement of less than 30%. As discussions about the disparity between the meaning and the codes began to evolve, the reliability percentage began to increase quite rapidly.

Through this process it became very evident that there were some ambiguous terms with multiple definition possibilities. During the discussion portion of such terms, the process of consensus was very difficult to establish. For example, the term "*trust"* could be

considered as a cognitive response or an affective response. Through the course of the discussions, the "*trust*" term was debated and discussed extensively and the conclusion was to assign the term based on the context of the question itself. Therefore, this particular term had multiple categorically significant possibilities and could not be assigned without careful consideration.

Krippendorf explains how intercoder reliability is considered to be acceptable when the reliability percentage reaches 85% in the social science research area (Krippendorf 2003). However, it was also acknowledged that for interpretivist qualitative research, intercoder reliability does not require such a high percentage level. This is because it could skew the perspective among the coders and inject a certain amount of over-simplification bias. Forman and Creswell et al. provide additional insight into this philosophy:

> *Qualitative researchers who follow a constructivists philosophy do not believe that quantitative measures of reliability are appropriate in content analysis, largely because of their view that unanimity among coders often leads to over-simplification that compromises validity, and that reflexivity and reason-giving are more important aspects of an agreement process and achieving a pre-specified level of agreement independently.*

3.10 The Pre-Pilot and Pilot Studies

As identified earlier, my research activity extended well beyond much of the literature regarding behavioral intentions in the aircraft industry, which inspired the pursuit of an explanatory, interpretivist type case study. This case study utilized a pre-pilot

study in order to establish the proper orientation needed to align with the pilot study. Originally, the pre-pilot study was designed as the pilot study but through careful data collection and analysis, the need to perform a more in-depth pilot was discovered. The original pilot study was also designed as a post-positivist approach and after further review, it was determined that this type of study will use an interpretivist perspective to fully capture the data from the participants viewpoint. Under the premise of preforming a postpositivist study, the pre-pilot utilized a coding method (Open and Axial) that was originally designed for a post-positivist approach rather than an interpretivist approach. This was a lesson learned during the pre-pilot study that was applied to the pilot study. The pre-pilot was also essential in refining the interview questions and re-selecting a different coding method to better support an interpretivist approach, which was applied to the pilot study. It was determined through research of coding methods (Saldaña 2012) that the Descriptive and Pattern coding method would be applied to the pilot (Miles, Huberman et al. 2013). This was another lesson learned from the pre-pilot. The pilot studies utilized the pre-pilot study to both build upon as well as determine what that needed to be completely changed. During the next section, the events of the pre-pilot are illustrated which identify the need to refine the method for the pilot study.

As the selected research instrument was interviews and observations in the professional environment, my initial concern was identifying just how willing and eager the participants would be to take part in the research study. The pre-pilot study was designed to select three middle managers from any department within the organization; regardless of their responsibilities within the organization. This was designed to gage the instrument, the willingness of the participants to volunteer, and the reactions of the participants in the

study to be completely open and honest. This of course included the understanding that the data collected during the pre-pilot study could not be used in the actual study itself. Therefore, the lessons learned were applied from the pre-pilot to the pilot study in order to further refine and clarify a potentially unsubstantiated process. Through the efforts of conducting two pilot studies, the research was provided with the guidance and the ability to effectively align the epistemological approach with the research questions, the coding methods, and the codes themselves in order to establish proper analysis and findings. Below is a table that represents the demographic data of the participants for the pre-pilot study and the pilot study.

Table 5. Demographics Table for the Pre-Pilot Study and the Pilot Study

Demographics Criteria	**Participants**						
	Pre-Pilot Study			**Pilot Study**			
	#1	**#2**	**#3**	**#1**	**#2**	**#3**	**#4**
Gender	*Female*	*Male*	*Male*	*Male*	*Male*	*Female*	*Male*
Age	*Age Group 3*	*Age Group 4*	*Age Group 2*	*Age Group 1*	*Age Group 4*	*Age Group 2*	*Age Group 3*
Tenure with Company	*> 10*	*> 10*	*< 10*	*< 10*	*> 10*	*> 10*	*> 10*
Tenure in Management	*> 3*	*> 3*	*< 3*	*< 3*	*> 3*	*< 3*	*> 3*
Department	*Logistics*	*Quality*	*Engineering*	*Finance*	*Production Control*	*Supply Chain Management*	*Operations*
Number of Years with DSS Experience	*< 7*	*> 7*	*< 7*	*< 7*	*> 7*	*< 7*	*> 7*

3.11 The Pre-Pilot Study

The pre-pilot study began with an email request by one the Office Administrative Assistants asking for management volunteers to participate in a research study regarding our systems, which happen to provide management support for a number of managers within the organization. The email did not state who was making the request nor did it include the topic details. Several managers offered to participate with two candidates being randomly selected from the volunteers. After selection, the three volunteers were contacted by phone and provided a detailed description of the research project. Both participants had been told about the selected research instrument of face-to-face interviews and they were also informed that the interview would be digitally recorded with the researcher takes notes during the interview. Then, the participants were provided information about their option to dropout of the study at any time without reason or just cause. They were also informed they have the right to not answer any question they feel is unethical or make them feel uncomfortable in any way without any recourse to them or their position within the company. They were told about the terms involving the confidentiality of the interview and of everything that would be discussed during the interview. After the participants agreed to be interviewed, the meetings were scheduled in the participant's office for a period of 60 minutes based on their schedule and availability.

Prior to the interviews, a brief discussion was conducted with each participant explaining the process and to inform them that notes would be taken in addition to the digital recording during the interview process. Both participants inquired about the content of the notes that would be taken and it was explained to them that the notes were

observations in addition to the interview for data triangulation purposes. Both participants were very comfortable during the process and neither one opted out of answering questions nor dropping out of the research study. The first set of interview questions included 24 open-ended questions. Following each broad, open-ended question, was a set of precise probing questions specifically applied to delve into the more information about the area in question.

3.11.1 Pre-Pilot Interview Questions

Demographic Information:

1. Please provide your job title and a brief description of your roles and responsibilities?
2. Would you consider your position with the company a middle manager level position?
3. How many years of experience do you have in your current role? How many years have you been with your current company?
4. What is your gender (male/ female)?
5. What is your age?
6. What is the highest level of education that you have achieved to date?

Attitude (A) Questions:

7. Please give me your opinion of the DSS and explain why?
    a. Do you think that a DSS is easy to use?
    b. Do you think that a DSS allows you to accomplish tasks quicker?
    c. Do you think you increase your productivity?
    d. Do you find it easy to get the DSS to do what you wanted to do?
    e. Is the DSS easy to navigate through the system?
    f. Do you think the DSS is important to your responsibilities as a manager? How?
    g. Do you enjoy using the system? Why?

8. How do you think a DSS positively or negatively impacts your decision-making abilities?
    a. Does the system enhance your abilities to make decisions?
    b. Does the system cause you to second-guess your decisions?

   c. Do you believe this system is intrusive in your ability to make sound decisions as a manager?
   d. Are there other tools that you feel would be more effective in assisting you with making decisions?
   e. Does the system draw conclusions similar to yours?
   f. Are you comfortable making decisions that are assisted by a computer system?

9. How do you think a DSS positively or negatively impacts the company and why?

   a. How do you think it impacts the company's productivity and efficiency?
   b. Do you think it enables the company to provide management support?
   c. How you think it impacts the company's ability to disseminate information?
   d. How do you think it impacts the attitudes of employees towards the adoption of new technologies?

10. Do you believe the information that is provided by the DSS and why?
   a. Do you believe the information provided by the DSS is useful to you?
   b. Do you think the information that the DSS concludes his accurate?
   c. Do you understand where the DSS obtains the information that uses to draw conclusions?
   d. Do you trust the source of the information from the DSS?

11. How does engagement or usage of a DSS system make you feel? Why?

12. How do you feel about the use of the information to fulfill the needs of the organization? Please explain why?

13. Do your feelings about the system effect whether or not you use the system? Please explain why?

14. Tell me about a time that you had difficulty or a bad experience with making decisions in the past and how did it affect your experience with the ability to make decisions afterwards?

15. Tell me about time that you had difficulty or a bad experience with a decision support system in the past and how did it affect your experience with future decision-support systems afterwards?

16. How much time do you spend outside of work interacting with a computer or a computer system? Tell me why and please elaborate.

17. Before your professional obligations to interact with a computer system, did you ever have an interest in computers or computer systems when you were younger? Please explain.

Subjective Norms (SN) Questions:

18. What is your opinion about the way others think about your use of the DSS information?
    a. What about your peers?
    b. What about your supervisors?
    c. What about non-management personnel?
    d. What about executives?

19. What is your opinion about the way others think about the DSS information?
    a. What about your peers?
    b. What about your supervisors?
    c. What about non-management personnel?
    d. What about executives?

20. Do you believe it is important to comply with the wishes of others?
    a. What about your peers?
    b. What about your supervisors?
    c. What about non-management personnel?
    d. What about executives?

Perceived Behavioral Controls (PBC) Questions:

Facilitating Conditions:

21. Do you feel that you have enough available resources needed to utilize the DSS information? Why?
    a. Do you have enough time to utilize the DSS information?
    b. Are there other specialized resources that are prohibiting you from utilizing the DSS information?
    c. Are there other environmental conditions that prohibit you from utilizing the DSS information?

Self-Efficacy:

22. Do you feel that you have the ability and/or the self-confidence to utilize a DSS? Why?
    a. Do you have the competency to understand the information?
    b. Do you have the knowledge to understand the information?
    c. Do you have the skills to understand the information?

23. Do you believe that you must have the ability and the self-confidence to utilize the DSS? Why?

24. Are there any other questions that I have not asked that you would like to comment on or share?

After the interviews, the digital audio file of the interview was transcribed into text then coded using a qualitative analysis computer research software tool. As discussed previously, this process included the concurrent process of data collection and data analysis. Additionally, the deductive and inductive content analysis approaches were used during the process.

3.11.2 Results of Pre-Pilot Study

As previously mentioned, the pre-pilot study was originally designed as the pilot study but as the data collection and analysis was performed, several weaknesses within the study began to emerge. For starters, the unit of analysis or the selection of the text in which to assign a code was not clear initially. Secondly, the assignment of the code to a particular selection of text was also somewhat ambiguous. In addition, once the code selection was determined and applied to the selected text, the determination of where the code would be applied to the theory was a point of contention based on the context in which it was expressed. The following codebook developed during the pre-pilot study was conducted using an open coding first cycle method and an Axial coding second cycle method. The first cycle coding utilized a deductive content analysis using the TPB framework as a guide to address the research questions. The second cycle coding used an inductive content analysis to identify and discover emergent themes from the data.

In the three tables below, the codes are shown applying the Open coding method guided by the TPB.

Table 6. First Cycle Codebook for Pre-Pilot (Attitude)

Theory of Planned Behavior: Attitude	**Codes**	**Participant Responses**
Cognition	Opinion of data	"My opinion is that some of the data is extremely reliable"
	Partial Information	"Some of it may or may not be giving us the whole information"
	Information Source	"You have to kind of know where it's coming from"
	Trust of Source	"I think you have to know who's adjusting it to really be able to understand it to trust it."
	Impact	"I think it positively impacts decision making because I can back up my choices with hard data"
	DSS need	"I think we need to have it particularly in our business it's so engineering heavy and data driven and numbers heavy"
	Data availability	"If we don't have the data available for a lot of people we keep searching for more and more data and that will delay in making more decisions."
	Decision making by managers	"And then I have seen other managers who will or are comfortable using it and you can occasionally get bad answers and good answers and they seem to really do much better with making their decisions from the company"
Affection	Unhappy with system	"No I am not real happy with those systems and how that is set up and um there are some other ones that might just be a comfortable level of how often you go in and work with them and use them so I get comfortable with it and I am fine"
	Distrust from managers	"I have seen an awful lot of managers around here that don't trust any data, if they see one piece that is slightly off, they immediate throw it all out the window"

	Positive feelings from assistance	"So I feel like it shortens my timeframe to get things done. I like to use it because it helps me accomplish what I need
	Enjoyment of DSS value	"Yes I feel over all it does provide value. I enjoy using the system everyday"
	Confident Results	"I occasionally feel confident in getting it to give me the kind of results I want in the format I want. Otherwise, it's just very frustrating"
	Format and presentation	"I feel like I can get the information in the format that I can understand and present to other people. This allows me to feel confident about the information I can provide to others"
	Excited people	"There's a whole lot of people who are so excited to try and get something in here new that's easier to work with"
	Scared people	"There's a few people that are really scared about having to relearn something and change"
Past Behavior	Working with the numbers	"So for me personally, I find that interesting and easily navigable for me. In previous jobs, I have been able to use the data to get what I needed and it comes easy to me "
	Past experience influence	"Because I look at it as I may have a gut feeling on one direction of something should go, so I go and take a look and if the numbers re-enforce that, then I'm like okay I am making good choices then if the data the numbers don't re-enforce it then"
	Validation	"To me it's like a puzzle and I need to go and find out why and I enjoy that, going in and looking finding out why ok its different and how's it going to affect my choice that I make my decision that I make. This was a something I learned in a previous role which was beneficial"
	Decision selection	"I was taught a certain way and it's the same way I do it now. It makes a little harder cause you have to decide if I'm going to go different than my initial choice was, I have to understand why I'm doing it and what and how is it going to impact everything"
	Types of data	"My case having the data can allow me to not use those other types of information to help my decision making and that's not a good thing"
	Using different styles	"I need to make sure I include all different styles of DSS"

	Negative experience with a system	"Uh, a company brought in an sps contain to try and have everybody kept track of their projects and we were responsible for putting certain projects in our managers were supposed to put in project assigned to us and unfortunately they left some gates open where other people could assign project to and the list went from 2 to 3 project to way too many for individual people to handle and then the program itself was not uh intuitive"
	Negative experience with user friendliness of past system	"And ask question on who is going to control it and who was going to update it and how is it going to interface as so it, what it did was a bad experience with the first one made me extremely nervous with how the user friendly the second one was going to be"

As illustrated in the table above, some of the participant responses were relatively simple thus determining the intent of the expression was straightforward. However, other participant responses contained verbiage that contradicted previous statements within the same response and even within the same sentence, which made deciphering the responses significantly more difficult. It was during the pre-pilot study that this concern was truly realized thus identifying it as an obstacle to address going forward. This was mitigated by closely examining the context of the question that was asked prior to the response and repeatedly reviewing the entire response before the specific selection of text would be assigned to a particular code. One method that was determined to be particularly helpful was to simply focus on the question of "what is the true intention of the message to be conveyed through this response?" This was very helpful to identify specific words or phrases within the response in which to apply the code.

Even this methodology possessed challenges, as I was purposefully cognizant of not applying bias and being presumptuous during the assessment process. It was later

determined that my skills in this area showed improved progress which was applied to the pilot study.

Table 7. First Cycle Codebook for Pre-Pilot (Subjective Norms)

Theory of Planned Behavior: Subjective Norms	**Codes**	**Participant Responses**
Social Influences	Opinion of others (bosses)	"So I feel like that some pretty high level trust that was placed there as far as co-workers, uh there's been enough people that come to me for help with their programs and stuff when they've had problems getting things to work and trying to do trying to help them with instructions and things like that"
	Self-confidence from others	"I feel that they trust what I am doing and where I am getting my information, I have made a couple of errors and I am up front about it. I go back and fix it figure out what's going on. I feel like they have confidence in me and tell me information"
	Complying with bosses	"Yes try and do what they ask you to do and if you do run into a problem, and have a problem with it, it's a common issue"
	Not complying	"Then I fully agree with talking to them with it, saying no this isn't working and this is why and here is your problem"
	Role with regards to employee	"My job isn't necessarily to make them happy all the time, my job is to help them do their jobs and that may not be the nicest work that we have to do"
	Failure due to culture	"Um it didn't work really well with our culture. It was a major departure and so people were having making such a quick change culture wise with it"

Secondly, the initial assignment of the code to a particular selection of text was also somewhat challenging. During the open coding process of the pre-pilot, selecting keywords within the participant responses and simply applying that piece of text as the code itself was how the codes were developed. This proved to be less effective as it failed to truly

capture the true meaning of the message being conveyed by the participant and it did not capture the interpretivist epistemological approach. For example, one particular code was identified as “types of data” because that particular phrase was a component of the selection of text and it was a key piece of the context. However, after further review it was evident that the true meaning of the text as a whole was addressing how the types of information assist in the decision-making rather than just the types of data. It was this process of constant re-evaluation of the selected text that help me to identify the true meaning of the selection of text rather than simply applying keywords with in the response.

This particular issue was a key lesson learned that was applied from the pre-pilot study to the pilot study and will be applied to the actual study. As I will describe later in the chapter, the descriptive coding method was better suited to capture the true meaning of the message of an interpretivist epistemological case study by understanding the whole meaning of the text from the perspective of the participant.

Table 8. First Cycle Codebook for Pre-Pilot (Perceived Behavioral Controls)

Theory of Planned Behavior: Perceived Behavioral Controls	**Codes**	**Participant Responses**
Perceived Behavioral Controls	Insufficient training	"No, um there has not been any training classes on the legacy system for probably a dozen years or more, so any training or information on that is kind of a word of mouth, and kind of historic knowledge on whom you talk to"

	Fewer people who knows system	"And there are fewer and fewer people that understand that system and how it works, so no I don't feel like I got all of the training ability that will help me do it the best"
	Personal knowledge hindering utilization	"Just short of my own personal knowledge that how the computer works or a particular programs works"
	Confidence in current skillset	"Yes I do, I feel like I have the background of engineering and science and I then I feel around the edges with finance helps me understand the type of information helps me and even with new programs, we are moving to SAP, I have switched computer systems before, and in the past and I think I can handle it"

An additional challenge that presented itself was the assignment of codes to a particular area. For example, the participant responses that addressed a cognitive process question were assigned to a cognitive related code and grouped with other cognition related codes. Initially, this process seemed to be relatively simple and straightforward. However, it was soon realized that many challenges regarding the assignment of these codes were present and had not been previously considered. Specifically, “trust” related codes were substantially more complicated to assign to specific areas based on the context in which the term was used in the participant’s response. This level of difficulty was compounded if the previous issues of addressing the unit of analysis and the assignment of the codes were not addressed. For example, if the term “trust” was used with a code that contained a small portion of the participant’s response, it could become easily misconstrued by not having the full context of the response available to understand the

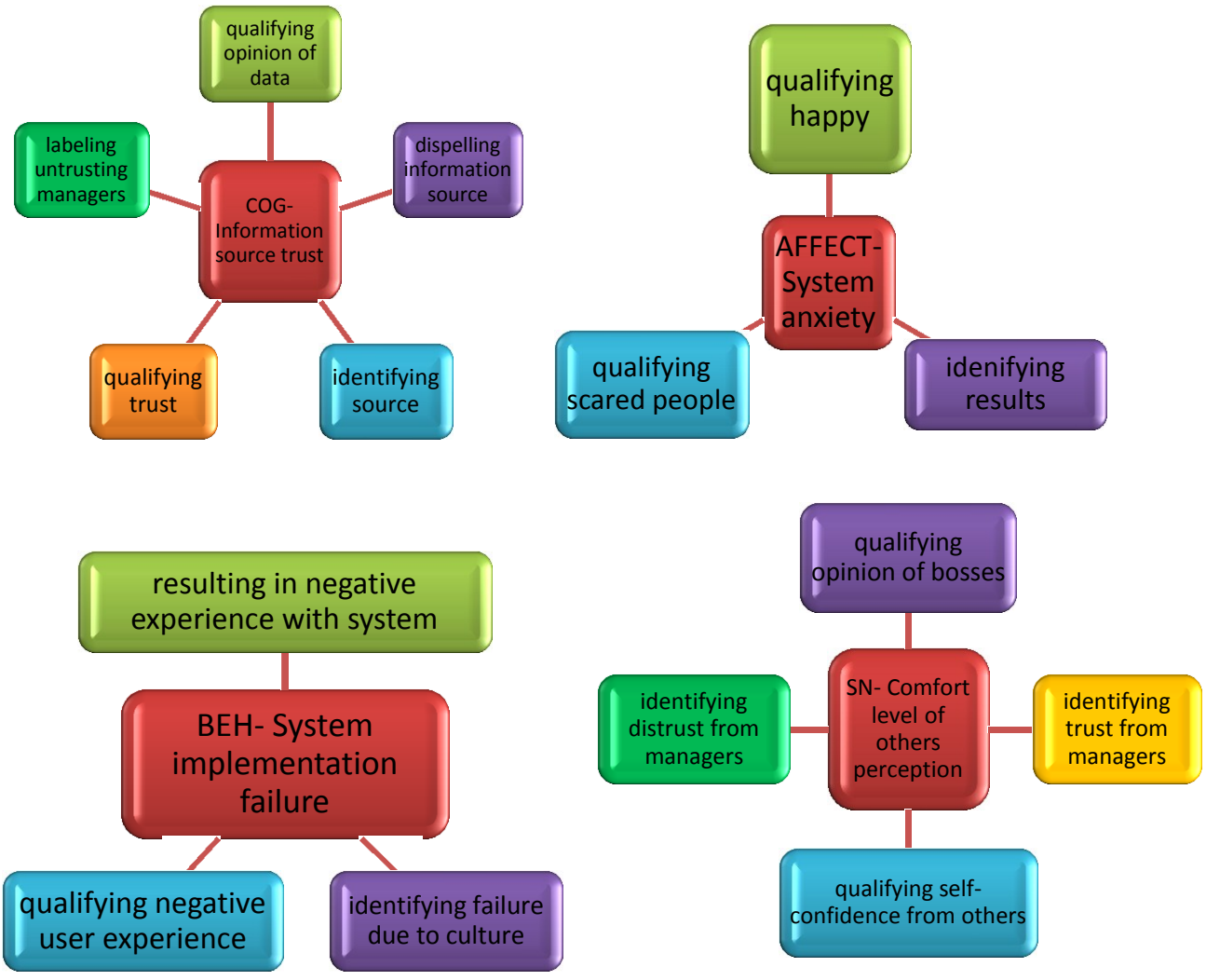
true meaning of the response. Since the term "trust" can be considered both a component of cognition or a component of affect, it was imperative that both the unit of analysis as well as the assignment of the code name be completely clear and thoroughly evaluated in order to be assigned to the correct section of the codebook. This is where I realized how important it was going to be to include intercoder reliability as a key piece of the process to validate the unit of analysis, the assignment of the codenames, and the section to which the code names would be assigned. The pre-pilot study did not contain an intercoder reliability component but it did illustrate the dire need to perform intercoder reliability during the pilot study as well as the actual study.

During the second cycle coding, emergent themes from the first cycle codes surfaced using an inductive content analysis method. Axial coding was performed to re-organize the dataset and apply focus to the more prominent themes. These are the themes that surface within the data more frequently or those that contained more emotion from the participant during the interview and reflected in the observational notes. The term "axial" associated subcategories to main categories (like the spokes of a wheel). For example, during the first cycle coding, the topic of "trust" was a common theme across many questions and became a key factor through the coding process. This theme was also directly tied to "source" through various associations. For example, in the second cycle coding axial diagrams, the participants expressed a direct correlation with "trusted source" with "trusted data".

As shown in the diagrams below, Axial coding is achieved by grouping similarly coded data together thus reducing the number of open codes while sorting them into conceptual categories. During the Axial coding process, the code was refined to identify a

theme across the open codes. This is the transitional process between open coding and axial coding.

Figure 19. Second Cycle Axial Coding Diagrams.



After the second cycle coding was completed, inter-relational elements were identified as "categorical" properties emerged. For example, an "If then" scenario existed with trusted decision making. If the participant perceived the source of the data was trustworthy, then they expressed the same trust in the data. If they perceived the data to be trustworthy then they felt positive about the decision that was based upon that data set. Additionally, if they felt positive about the decision that was made, they also indicated positive feelings as a result of that action. This also was directly tied to "positive feelings" on the affect side as well.

Table 9. Second Cycle Axial Coding During Pre-Pilot

Theory of Planned Behavior: Attitude	**Second Cycle Codes**	**Analysis**
Cognition	Decision support data	Trusted source ^ trusted data ^ trusted decision making ability ^ positive feelings
	Information source trust	
Affection	System fulfillment	System info from query ^ positive results ^ positive feelings
	System anxiety	
Past Behavior	System Implementation	Previous experience directly impacts trust level of intended interaction adoption of other systems
	Data use preference	
	Data selection experience	
Theory of Planned Behavior: Subjective Norms	**Second Cycle Codes**	
Social Influences	Perceived comfort level from others	Important: Being perceived as fluent with data extrapolation from system.
	Social acceptance	Not important: Influence of righteousness

Theory of Planned Behavior: Perceived Behavioral Controls	**Second Cycle Codes**	
Controlled Beliefs	Overall lack of training	Lack of formal training and tribal knowledge

3.11.3 Pre-Pilot Analysis

Using the Theory of Planned Behavior to determine behavioral intention predictability, findings were concluded in the pre-pilot study in the areas of attitude (RQ1), subjective norms (RQ2), and perceived behavioral controls (RQ3). As a subset of attitude, the three underlying components are cognition (RQ1.1), affect (RQ1.2), and behavior (RQ1.3). Using the theory as the guiding framework, analysis was developed from the Open and Axial coding methods. As the emergent themes began to surface, it was initially thought that Affect and Cognition were going to play the primary role of determining behavioral intention but upon the second cycle coding process, another factor emerged as the dominant determinant. The inductive content analysis process provided an emergent theme that had not been considered previously. The participant's previous experience continually emerged as a foundation for their thoughts and feelings toward intention. It was determined that the state of cognition or affect within attitude was not only influenced by past behavior but also driven by contingencies. Users expressed a change in cognition and affect responses with a variable change. For example, one participant explained how he would trust the data if he had more information about the source or confirmation that the process disciplines was being followed. This pattern emerged as a subset of the users

past experience regarding behavioral intention predictability of the users to use the information.

While the presences of both factors were strong influences, the desire to use the system and the information was consistent. It was often discovered after additional probing which led to changes in the interview questions and how they were worded. However, trust of the data source and the data itself was a substantial factor. Participants expressed this theme often and it was directly tied to the influence of feelings as described previously. Of the three primary components of the TPB, intention was significantly attributed to Attitude as a significant influence.

It was also discovered that the transfer of knowledge was a significant issue with participants, which was a perceived behavioral control component. This particular issue surfaced in various forms such as formal training but even more so in the form of transfer of tribal knowledge. This particular issue was identified as a current issue as well as a previous issue that contributed to the previous experience of the user. This particular influential factor was considered to be significantly more of a presence then initially perceived. The subjective norm factor of social influence had a low level of significance to the study. Even though the participants expressed importance with being perceived as fluent with data extrapolation from the system, they specifically discounted the influence of it to alter behavioral intention. Participants expressed minimal influence to use this system information simply based on the influence of subjective norms, regardless of their role. It was noted during the interview that each participant applied the most emphasis to the questions regarding Attitude. The inflection of their tone and body language was slightly to

moderately elevated during these specific questions. It was also noted that the participants showed the least amount of emphasis to the questions that addressed subjective norms.

3.11.4 Pre-Pilot Study Lessons Learned

For starters, willingness and participation of participants was a concern initially. However, during the pre-pilot study interviews, it became increasingly evident that the participants were willing to speak openly and appeared to feel comfortable and safe in their environment thus dismissing my initial concern. All participants during the pre-pilot study demonstrated the ability to tackle the issues and answer questions without confusion or reluctance. However, throughout the interview process, it became evident that some of the questions were considered to be redundant while others were thought to be less value-added to the research even though they were found to be intriguing. Another weakness identified in my pre-pilot study was the use of generalized questions that failed to get to the core of the information being sought. Upon further analysis of the answers provided by the initial participants, there resided a certain amount of ambiguity in the answers that appeared to be based on some experiential data as well as some hypothetically perceived data. This was addressed by developing the interview questions to seek out answers that specifically pertained to the personal experience of the participant thus bringing in a more subjective aspect to their answers. Each of the changes in data collection and analysis evolution throughout the pilot study was very helpful. It allowed the refinement of the questions necessary to collect the data needed for the actual research study.

During the reflection period after the pre-pilot study interviews, it was apparent that the list of interview questions contained an abundance of inquiries that did not support nor were they applicable to the theory. Therefore, re-examination of the questions

was undertaken to remove, consolidate, or re-word them to provide a condensed, robust list of inquiries for the interview. The consolidation of the questions also provided more time to probe deeper into the key areas while reducing the potentially exhaustive questioning thought to be redundant or irrelevant. Even the behavioral questions were considered to be an unknown but the answers provided indicated otherwise. Instead, it was deemed that the participants were more than willing to express their feelings and past behaviors, both positive and negative, about the research topic. For example, the participants were more than willing to share their opinion concerning the use of the system information but the true challenge was extrapolating the deeper driving forces behind their responses to the questions. Ergo, it became evident that development of a process was needed to probe deeper the answer provided. This could be accomplished by asking more about each answer until a foundational influence was established.

However, during the pre-pilot study, one of the participants requested a list of the interview questions well in advance of the actual interview. As a result of this request, the participant continually tried to answer the questions from a strictly technical perspective rather than simply answering the questions in the way that they were asked. It appeared that the participant had thoroughly studied the questions and instead of giving an interpretive or experience-based answer about his own thoughts and feelings, he chose to answer it from a technical aspect. This was found to be detrimental to the study; therefore interview transcripts were not provided to the participants prior to the interview. This particular lesson was applied to the pilot study in order to obtain a better reflection of the participant's actual thoughts and feelings.

As stated previously, the epistemology of the research had changed after reflection of the pre-pilot study. With this change accompanied a different coding method to better align with the new epistemology. During the pre-pilot study, an open and axial coding method had been considered to capitalize on the ability to examine specific constructs that are present within the data thus providing opportunities to identify emerging themes. However, additional research regarding the descriptive coding method proved to be a better fit for this research with the change in epistemology (Wolcott 1994). Saldana explains how pattern codes are explanatory, inferential codes that researchers apply to identify emergent themes, configuration changes, or explanations. Pattern coding is a method used to achieve grouping into summaries a smaller number of sets, themes, or constructs (Miles and Huberman 1994). These changes were lessons learned that were implemented during the pilot study. In addition to the changes in epistemological perspectives, the interview questions and techniques, and the selected coding method, other lessons learned regarding coding or applied to the pilot study. These lessons include unit of analysis, assigning of the codenames to a selected text, and categorization of the codes as described previously.

Intercoder reliability was not performed during the pre-pilot thus negating some of the integrity of the coding process. It was however used during the pilot, which will be explained in more detail in the pilot study. So therefore, a new codebook was developed utilizing the descriptive first cycle coding and the pattern second cycle coding method.

In Table 10, the first cycle coding utilizing the descriptive method was shown as an integral part of the lessons learned from the pre-pilot study. This table provided a list of some of the 1st cycle codes using the descriptive coding method along with a code

description of the code that was developed as a result of the lessons learned from the pre-pilot study. Through the experience of learning what part of the text to code, (also known as unit of analysis) properly assigned codenames to the correct selection of text, and learning how to properly categorize the codes, a new codebook was developed.

Table 10. Pilot Study Codebook used for Pilot Study and Actual Study

Theory of Planned Behavior: Attitude	First Cycle Codes (Descriptive)	Code Descriptions
Cognition	Cognitive Process	The thought process experienced by the participant
	Decision-Making Impact	The decision-making impact of the cognitive process
	Negative Thoughts	Expressed negative thoughts
	Positive Thoughts	Expressed positive thoughts
	Decision-Making Process Problem	The process related problems related to decision making
Affect	Information Distrust	Expressed distrust for the information in the system
	Negative Feelings	Expression of negative feelings
	Positive Feelings	Expression of positive feelings
	Reasons To Trust	Contributing factors to trust the information or the system
	Reasons to Distrust	Contributing factors to distrust the information or the system
	Information Trust	Expressed trust for the information in the system
	Positive Feelings with Contingency	Expression of positive feelings contingent upon something
	System Trust	Emotionally driven trust in the system itself

	System Distrust	Emotionally driven distrust in the system itself
Past behavior	Negative Experience	Participant described a negative experience regarding past behavior
	Positive Experience	Participant described a positive experience regarding past behavior
	Negative Past Behavior	Participant described a negative past behavior that influences current behavior
	Positive Past Behavior	Participant described a positive past behavior that influences current behavior
	Negative System Experience	Participant described a negative system experience regarding past behavior
	Positive System Experience	Participant described a positive system experience regarding past behavior
Theory of Planned Behavior: Subjective Norms	**First Cycle Codes (Descriptive)**	**Code Descriptions**
Social Influence	Did Comply	Provided example of complying to wishes of others
	Subjective Norm Employee	Participant felt the influential presence of an employee
	Subjective Norm Peers	Participant felt the influential presence of peers
	Subjective Norm Supervisor	Participant felt the influential presence of a supervisor
	Did Not Comply	Provided example of not complying to wishes of others
	Important to Comply	Participant expressed the importance to comply with the wishes of others
	Not Important to Comply	Participant expressed the importance to not comply with the wishes of others

Theory of Planned Behavior: Perceived Behavioral Controls	First Cycle Codes (Descriptive)	Code Descriptions
Perceived Behavioral Controls	System Problems	The system contains inherent problems that prevents optimal performance
	System Complexity	The system is too complex to optimally perform
	System Functionality	The system contains inherent functionality issues that prevent optimal performance
	System Limitations	The system contains limitations that prevents optimal performance
	System Outdated	The system is too outdated to improve performance
	System Slowness	The system slowness impedes performance
	Process Discipline	The impediment to performance is due to the lack of process discipline by the users
	Lack of Training	The impediment to performance is due to the lack of training
	Information Use	The impediment to performance is due to the way the information is used
	Information Source	The impediment to performance is due to the source of the information
	Information Inputs/Outputs	The impediment to performance is due to the correct or incorrect inputs/outputs of the information
	Information Inaccuracy	The accuracy of the system information is not correct
	Information Accuracy	The accuracy of the system information is correct

3.12 Pilot Study

As identified earlier, my research utilized a pre-pilot study in order to establish the proper orientation needed to align with the pilot study. During the next section, the events of the pilot study are illustrated which identified the change in epistemology, interview questions and techniques, and coding methods.

The pilot study also began with an email request by one the Office Administrative Assistants asking for management volunteers to participate in a research study regarding our systems, which happen to provide management support for a number of managers within the organization. The same pre-interview protocol was used in the pilot study that was used in the pre-pilot study. Additionally, each of the four participants had been explained about the process and they were briefed about their rights to stop to drop out at any time.

The pilot study set of interview questions was reduced from 24 down to 12 open-ended questions. Following each broad, open-ended question, was a set of precise probing questions specifically applied to delve into the more information about the area in question. The interview questions used during the pilot study were designed to be more specific while remaining open-ended and applied more of an experiential component thus subscribing to the interpretivist epistemological position. The questions were designed to extrapolate the perspective of the participants utilizing their own experiences to guide them. Below are the interview questions from the pilot study.

General Information:

1. *Please tell me the title of your position within the company, the roles and responsibilities of the position, and how long you have been in the position.*

Attitude (A) Questions:

2. *Tell me what you think about a DSS and describe how it impacts the decision-making function for you in your organization.*
3. *Give me your thoughts regarding the information that a DSS provides as well as the source of the information that feeds into the system.*
4. *Describe your feelings toward DSS information and provide an example of why you feel that way.*
5. *Give me an example of how those feelings affect the way you interact with the system now and how it might affect your perception to use the system in the future.*
6. *Tell me about a past experience with making decisions and how it affected your current ability to make decisions today.*
7. *Describe a past experience interacting with information from a DSS and how it affected your interest and willingness to use the system afterward.*

Subjective Norms (SN) Questions:

8. *How do you think others perceive you because you used DSS information?*
    a. *What about your peers?*
    b. *What about your supervisors?*
    c. *What about non-management personnel?*
    d. *What about executives?*

9. *When do you think it is important to comply or not to comply with the wishes of others and please give me an example of a past situation?*
    a. *What about your peers?*
    b. *What about your supervisors?*
    c. *What about non-management personnel?*
    d. *What about executives?*

Perceived Behavioral Controls (PBC) Questions:

10. *Describe the needed skill sets to utilize the information from a DSS and tell me about a time when you successfully or unsuccessfully demonstrated those skills.*
    a. *Do you have the ability to utilize the system/ system information?*
    b. *Do you have the knowledge to utilize the system/ system information?*
    c. *Do you have the skills to utilize the system/ system information?*

11. *Can you provide an example of the existing factors that may assist or impede your performance with the DSS/ DSS information from your own perspective?*

Closing Question:

12. *Are there any related situations that you would like to share or other questions that I have not asked that you would like to comment on?*

After the interviews, the digital audio file of the interview was transcribed into text then coded using a qualitative analysis computer research software tool. As discussed previously, this process included the concurrent process of data collection and data analysis. Additionally, the deductive and inductive content analysis approaches were used during the process.

Results of the Pilot Study

In the pilot study, the method of First Cycle coding was Descriptive Coding and the Second Cycle coding method was Pattern Coding. These codes were developed using the lessons learned during the pre-pilot and guided by the theoretical framework of the TPB (cognitive, affective, and past behavior). The following table illustrated the descriptive

coding protocols established using the categories of the TPB framework. The table included the categories of the theory, the codes that were developed using the theoretical framework, and the participant responses for the codes.

Table 11. First Cycle Coding (Descriptive Coding) for Pilot and Actual Study

Theory of Planned Behavior: Attitude	First Cycle Codes (Descriptive)	Participant Responses
Cognition	Cognitive Process	I think there are a lot of ways that we can refine I think there are certain disadvantages in the fact there are so many thousands of pieces of data that go into it and that might get updated on a weekly basis simply because of resource constraints in our company
	Decision-Making Impact	A decision that is going to make a really big difference or is it going to be a small minor decision that we can always reverse or maybe the permanent decision. I always think about this as I am making decisions
	Negative Thoughts	I don't think the data is good and I don't think its adequate to base decision on
	Positive Thoughts	The system gives you what you ask for you just have to know what your looking for. I think it gives good data but you have to know how to ask. I like the system.
	Thoughts With Contingency	I think the system gives us good information as long as everyone does what they should to maintain the data
	Trust	I know I have been able to get good information out of the system; I trust it.
	Does Not Trust	I don't trust the data because I think it has problems and its wrong
Affect	Emotionally Driven	Because I feel that its sufficiently wide in that to capture all of that information that I need
	Negative Feelings	Of course there's always feelings of frustration in developing that

	Positive Feelings	Ultimately when we find those problems and we fixed then I feel even more confident in what the DSS provides to me.
	Reasons To Trust	Related to that would be trust so trust in the factors that I am considering, trust in the people that I'm gathering information from, trust in perhaps the information itself, trust in the people using my decisions or trust in whatever input I'm giving with my decision
	Trust	So I have a lot of trust in the DSS process and what the DSS can do for me even if the data might not be 100% crystal clear.
	Does Not Trust	There was a lot of frustration and so I hesitate to interact with the system or to trust the data
Past behavior	Negative Experience	And so it was very frustrating to put all this effort into it and we would get an answer that either didn't intuitively make sense or we later doubled checked by bouncing it against some other method and found errors,
	Positive Experience	They knew it had problems but this was absolutely the right direction to go in, and I think that it was a positive experience, because no one else in the company had done it on a part number level,
	Negative Past Behavior	I pulled information from the DSS and maybe used it the context that didn't make sense on further reflection, it's important to understand that those fundamental functions so that you apply information in appropriate context. That was not a good experience with it.
	Positive Past Behavior	But I go back to the fact that it's the best way we can organize ourselves and that, and despite it's flaws, it has always given us a lot of value. I have always found it to be beneficial and because of that I will continue to use it.
Theory of Planned Behavior: Subjective Norms	**First Cycle Codes (Descriptive)**	**Code Descriptions**
Social Influence	Peer Influence	People are starting to realize that they can't pull the wool over my eyes like they did before. I now understand why this is and what happens and basically we developed a tool that gives us the

		information by bin count. And because of that my peers see me as an asset to them and they know I know my stuff which is important to me.
	Employee Influence	Sure, I would say with my employees maybe less important to comply with their wishes but it is important to consider.
	Boss Influence	Of course the executives, it's very important to comply with their wishes and so, typically we will have the decision we'll explain why we are bringing forth the set of assumptions and what the changes in the assumptions that they might propose in return
	People in General Influence	I think it's important to comply the wishes of others because if those in that instance if those assumptions aren't updated than the information or proposals or the projection won't be used or won't be trusted and so I think it's important to comply with the wishes of others in order to engage them in and to get their trust and participation in the process so they will use and get value from the proposal or projection.
Theory of Planned Behavior: Perceived Behavioral Controls	**First Cycle Codes (Descriptive)**	**Code Descriptions**
Controlled Beliefs	IT Support	Other factors related to computer stuff is maybe just IT Support, I feel like if we had more IT Support of programmers and that those terms of resources that the system could be further improved or automated or refined.
	System Complexity	Since they keep adding on modules to the system just to keep up, it causes complexities to learn the system and understand how the data moves throughout
	System Limitations	Well definitely computers system the DSS because it's so massive its very slow to use and only one person can use it at a time, it's not a shared DSS, so I find that's a limitation with the DSS, because of that sometimes pulling the information out of the system can be time consuming, so even though the information is up to data a lot sometimes it's difficult to pull the

		numbers out of the system
	Outdated System	I think the system is old, designed in 1963 and has had one update in 1969
	System Slowness	Because it's so old, its slow and buggy
	Information Accuracy	There again it's the frequency of the updating impedes the ability to keep track of everything we need to keep track of, so that's probably the biggest single factor is the frequency of the update because could pull the data, if you pull it on Monday right after it updated is the probably the only pure update to pull the data to make your decisions from. So basically you lose the only 6 days a week.

During the pilot study, intercoder reliability was performed to improve the quality of the codebook as previously discussed. This step however, was not performed on the pre-pilot study. The results of the intercoder reliability study are represented in Table 12 Intercoder Reliability Data.

As you can see below, the coding on the first pass was only about 28% initially but it began to improve immediately after having a discussion about the codes and how they were being applied. After discussions, the coding consistently established agreement ranged from 60% to 70% of the time and by pass number 3, agreement was consistently above 76%.

Table 12. Intercoder Reliability Data

Intercoder Reliability	**Pass 1**	**Discussion Time**	**Pass 2**	**Discussion Time**	**Pass 3**
Total Number of Codes Compared	62		62		62

Number of Agreed Upon Codes	17		41		47
Percentage of Agreement	28%		66%		76%

During the second cycle coding, emergent themes from the first cycle codes surfaced using an inductive content analysis method. Pattern coding was performed to re-organize the dataset and apply focus to the more important themes. These codes pulled together a substantial amount of material to form a meaningful and parsimonious unit of analysis. Pattern coding provided a way of pulling together the summaries and dividing them into smaller subsets, themes, or constructs (Miles and Huberman 1994). For example, during the first cycle coding, the topic of "trust" was a common theme across all participants and became a key factor through the coding process. This theme was also directly tied to a dependency through various associations. For example, the term "trust" was found to be a common area between both cognition and affect. The participants thought process as well as their emotional process determined the term "trust".

After the second cycle coding was completed, explanatory narrative elements were identified as "categorical" properties emerged. For example, an "if then" scenario existed with trusted decision making. If the participant perceived the source of the data was trustworthy, then they expressed the same trust in the data. If they perceived the data to be trustworthy then they felt positive about the decision that was based upon that data set. Additionally, if they felt positive about the decision that was made, they also indicated positive feelings as a result of that action. This also was directly tied to "positive feelings" on the affect side as well.

Table 13. Second Cycle Coding (Pattern Coding) for Pilot Study

Second Cycle Coding (Pattern)	First Cycle Codes	Explanatory Narrative
Cognitive Decision Making Process	Cognitive Process	Quality, reliable data from the system results in participant's confidence to make good decisions. Having the ability to make sounds decisions results in positive thoughts about system. Equally the same in reverse as well.
	Decision-Making Impact	
	Negative Thoughts	
	Positive Thoughts	
	Decision Making Problem	
Trust Factors (Cognition and Affect)	Reasons To Trust	Experiential reasons or data supported reasons to trust or not to trust results in trust or distrust.
	Trust	
	Reasons To Distrust	
	Does Not Trust	
Emotionally Influenced	Emotionally Driven	Experiential reasons or data supported reasons to develop emotions result in positive or negative emotions
	Negative Feelings	
	Positive Feelings With Contingency	
	Positive Feelings	
Past Experience Influenced Behavior	Negative Experience	Previous experience of interaction/ adoption of systems could possibly result in future influence of interaction/ adoption of systems.
	Positive Experience	
	Negative Past Behavior	
	Positive Past Behavior	
Social Influence in Organization	Peer Influence	Normative beliefs and motivations to comply result in importance of being perceived as fluent with data extrapolation from system
	Employee Influence	
	Boss Influence	
	People in General Influence	
Information Transfer	System Complexity	Insufficient training and transfer of tribal knowledge results in inadequately prepared professional
	System Limitations	
	System Training	
	Lack of Tribal Knowledge	
	Purpose of Info Use	
	Outdated System	
Inherent System Debilitations	System Slowness	Inherent system debilitations results in poor productivity and performance
	IT Support	
	Information Accuracy	

Second Cycle Coding (Pattern)	First Cycle Codes	Explanatory Narrative
Cognitive Decision Making Process	Cognitive Process	Quality, reliable data from the system results in participant's confidence to make good decisions. Having the ability to make sounds decisions results in positive thoughts about system. Equally the same in reverse as well.
	Decision-Making Impact	
	Negative Thoughts	
	Positive Thoughts	
	Decision Making Problem	
Trust Factors (Cognition and Affect)	Reasons To Trust	Experiential reasons or data supported reasons to trust or not to trust results in trust or distrust.
	Trust	
	Reasons To Distrust	
	Does Not Trust	
Emotionally Influenced	Emotionally Driven	Experiential reasons or data supported reasons to develop emotions result in positive or negative emotions
	Negative Feelings	
	Positive Feelings With Contingency	
	Positive Feelings	
Past Experience Influenced Behavior	Negative Experience	Previous experience of interaction/ adoption of systems could possibly result in future influence of interaction/ adoption of systems.
	Positive Experience	
	Negative Past Behavior	
	Positive Past Behavior	
Social Influence in Organization	Peer Influence	Normative beliefs and motivations to comply result in importance of being perceived as fluent with data extrapolation from system
	Employee Influence	
	Boss Influence	
	People in General Influence	
Information Transfer	System Complexity	Insufficient training and transfer of tribal knowledge results in inadequately prepared professional
	System Limitations	
	System Training	
	Lack of Tribal Knowledge	
	Purpose of Info Use	
	Outdated System	
Inherent System Debilitations	System Slowness	Inherent system debilitations results in poor productivity and performance
	IT Support	
	Information Accuracy	

3.12.1 Analysis

As the emergent themes began to surface, like the pre-pilot, it was initially believed that Affect and Cognition were going to play the primary role of determining behavioral intention but upon the second cycle coding process, another factor emerged as the dominant determinant. The analysis utilized a cross case-oriented strategy during the pilot study to summarize and compare findings from individual cases and multiple cases. This strategy used a cross-case strategy to integrate the approaches.

The inductive content analysis process provided an emergent theme that had not been considered previously. The participant's previous experience continually emerged as a foundation for their thoughts and feelings toward intention. It was determined that the state of cognition or affect within the attitude was not only influenced by past behavior but also driven by contingencies. Users expressed a change in cognition and affect responses with a variable change. For example, one participant explained how he would trust the data if he had more information about the source or confirmation that the process disciplines was being followed. This pattern emerged as a subset of the users past experience regarding behavioral intention predictability of the users to use the information. It was during the pilot study that this revelation was found to be even more influential than previously determined in the pre-pilot.

While the presences of both factors were strong influences, the desire to use the system and the information was again consistent. It was often discovered after additional probing which led to changes in the interview questions and how they were worded. However, trust of the data source and the data itself was a substantial factor. Participants expressed this theme often and it was directly tied to the influence of feelings as described

previously. The three primary components of intention were directly attributed to Attitude as the most significant influence.

The transfer of knowledge was revealed as a significant issue with participants, which was a perceived behavioral control component. This particular issue surfaced in various forms such as formal training but even more so in the form of transfer of tribal knowledge. Additionally, this particular issue was identified as a current issue during the pilot study as well as a previous issue during the pre-pilot study that contributed to the experience of the user. This particular influential factor was also considered to be more significant of a presence than initially perceived. Another code had surfaced that was not previously found during the pre-pilot. In addition to the information transfer code surfaced an inherent system debilitation issue. System related problems surfaced regarding slowness, inherent limitations, information availability, and inaccuracy. This contributed to poor productivity and performance experienced by the participants.
The subjective norm factor of social influence had a low level of significance to the study. Even though the participants expressed importance with being perceived as fluent with data extrapolation from the system, they specifically discounted the influence of it to alter behavioral intention. Participants expressed minimal influence to use this system information simply based on the influence of subjective norms, regardless of their role.

3.12.2 Pilot Study Lessons Learned

As the data collection process began to progress, it was becoming apparent that analysis of the data and the summary of the findings provided substantially more insight into the phenomenon of interest based on the plan and structure of the research

procedures. The findings illustrated how the selected data collection techniques were applied to collect the necessary information needed to better understand the problem and to provide a contribution into the field of research. With that said, it also became evident that adjustment of the data collection techniques provided even more depth into the planned research procedures and increased clarity regarding the research questions. I determined that my data collection techniques effectively assisted with answering the research questions with more depth.

For example, after refinement of the interview questions, the participants provided more information about their own experiences from their own perspective as well as their thoughts and feelings. This effectively aligned with the interpretivist approach applied during the pilot. Additionally, the changes made in the coding strategy also provided alignment with the interpretivist approach by utilizing the Descriptive and Pattern approaches. This change helped to discover additional factors that within the dataset that was not previously identified. In order to improve the reliability of the coding process over the pre-pilot, intercoder reliability was performed as well.

Overall, many weaknesses were identified during the pre-pilot and the pilot. As these changes were addressed, they provided even more alignment across the research study and provided a great deal of insight into my phenomenon of interest. After the changes were applied through the pre-pilot and the pilot, I determined that my data collection technique was appropriate to collect the necessary evidence for understanding the problem.

3.12.3 Design of the Final Study

This chapter has addressed the justification of the research problem through a qualitative case study methodology. This was followed by an overview of the case study design specific to the research. The final study benefited from the pre-pilot study and the pilot study in several ways. First, the pre-pilot illustrated the need to refine the interview questions and concentrate on the research questions. The pilot study then allowed me to understand additional ways of probing into specific questions that warrant deeper penetration of information, which will be used in the actual study. Additionally, the data collection technique of interviews and observations was used in the final study even though it underwent extensive refinements and changes during the pre-pilot study and the pilot study. Secondly, the coding scheme used in the pilot proved to be effective for the interpretivist perspective type of study. The use of the descriptive and pattern coding methods illustrated emergent themes of each participant responses as well as cross-case analysis of the demographic groups of the participants responses. Third, the data analysis procedures analyzed the understanding of events surrounding a demographic group while the cross-case analysis increased the generalizability to ensure the events are not wholly idiosyncratic. This was the method of analysis that was used during the actual study as it provided a systematic comparison of the data.

3.13 Summary

Information that is derived from a DSS cannot be considered to be effective unless the end user applies the information. Unfortunately, people sometimes make a conscious decision to not use the information. This is information that could potentially increase

performance, thus improving productivity and hopefully, ensuring success for the organization as a whole. This research study focused on the measurement of behavioral intention to use, not use itself. In order to capitalize on the use and the effectiveness of information from a system, it was essential to delve into the understanding of the phenomenon. There resided a need to understand how the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system impacts the organization. It provided organizations with the understanding of why managers interact with information that was essential to the success of the organization. By understanding how these influences effect people's perceptions about the information, organizations can begin to develop new and unique ways to effectively communicate. Thus, providing information that directly complemented the existing tribal knowledge found within that particular organizational culture. However, the true challenge that exists remains in the behavioral intention of the managers to use the information that is provided to them through the DSS (Kim, Sharman et al. 2007).

The decision-making process that manager's experience contained a fundamental satisfaction as it provided the essential elements necessary for the success of the manager's project. With this said, a supplementary system could possibly provide conflicting elements. Managers might consider being counterproductive or even contradictory to their own objectives. Most managers take great pride in making their own decisions based on the information they select. For many managers, the mere thought of taking actions based on a DSS is inconceivable and most show minimal interest in a formal DSS or for the need to use one in making managerial decisions (Yan and Davison 2011). This information often comes from various sources. While each person can interpret the data differently, the

reasons behind the level of behavioral intentions to use the information can be vastly diverse (Sprague Jr and Carlson 1982).

According to Young Hoon Kwak, Jane Park, Boo Young Chung, and Saumyendu Ghosh (Kwak, Park et al. 2012), future research could empirically investigate group or organizational level performance by employing hierarchical or longitudinal analysis. Over time, this would allow them to capture the influence of behavioral intention on a higher level and better understand behavioral intention influences (Kwak, Park et al. 2012). As the research focused on the single dimension of behavior, it was found that a multidimensional approach to identifying individual and organizational level behavior would provide significant insight. Specifically, the unknown that still remains is the behavioral dimension relative to the individual or the organizational dimension. Are there research contributions that can better understand how organizational influences regarding behavior vary from those on the individual level and if so, what are the other variables that provide the influential elements?

Additionally, Rania Shibl, Meredith Lawley, and Justin Debuse (Shibl, Lawley et al. 2012), the authors of " Factors Influencing Decisions for System Acceptance" had another perspective on suggestions for future research that involved user behavior (Shibl, Lawley et al. 2012). They contended that areas for future research include exploring additional factors that may influence the use or nonuse of DSS with regard to behavioral elements. Their contribution to the field of research lies with the practical implications of those who are involved in the use and dissemination of the decisions for the system. While past research has been conducted regarding the behavioral intention to use information from a DSS in other environments, there still exists an opportunity to probe into the behavioral

intention to use in an aircraft manufacturing organization. This can provide similar businesses with the insight to improve productivity and enhance the manager's ability to make decisions more effectively.

The standard belief today revolves around the premise that having systems that possess the latest information technology will provide decision-makers with the tools to make better decisions, but the reality is, it is not that simple. It is imperative to understand how people interact with the systems. What are their behavioral intentions to use the information they obtained from the system? This research advanced the knowledge and the thought procedure behind the selection procedure of choosing the best DSS. By satisfying the needs of the user, it will also serve the company in a manner that will provide them with a distinct market advantage. Even though it is not the goal of this research to get the attention of the designers of DSS, the results could conceivably be beneficial to them by providing additional insight into the user, the real customer of the system. DSS continues to evolve, but the field still contains many unknown phenomenon with regard to behavioral intention predictability in using the system and the system's information.

Researchers of data-driven decision support systems have a commonality with other decision support system types. They each have an ambitious set of issues, regarding the behavioral research concerns associated with DSS, which need to be resolved. These particular matters have often contained a low level of importance in past research. While technically related research regarding DSS is a common occurrence among researchers, the amalgamation of the systems' technical and behavioral dimensions is often inseparable and vastly misunderstood (Power and Sharda 2009).

4. Chapter Four: Case Study Findings

4.1 Overview of Actual Study

Similar to the pre-pilot and the pilot study, the actual study began with an email request by one the Office Administrative Assistants (OA) asking for management volunteers to participate in a research study. Then, as was performed in the pilot studies, the participants were randomly selected by the OA in order to address concerns regarding bias of the study. Then, the data collection technique of interviews and observations was used in the final study even though it underwent extensive refinements and changes during the pre-pilot study and the pilot study. Secondly, since the coding scheme using descriptive and pattern coding was used in the pilot and proved to be effective for the interpretivist perspective type of study, it was again selected for the actual study. As the intercoder reliability

Then, the data analysis procedures analyzed the understanding of events surrounding a demographic group while the cross-case analysis increased the generalizability to ensure the events are not wholly idiosyncratic. This was the method of analysis that was used during the pilot study as it provided a systematic comparison of the data which was used during the actual study as well. Intercoder reliability was performed during the actual study in the same manner that it was performed during the pilot study. I employed the assistance of a recent Ph.D. graduate from the University of Oklahoma State who had experience with behavioral intention research. This recent graduate was familiar with the research but was not a part of the pilot study nor was he a part of the actual study.

Even though he did not specifically study the TPB, he was familiar with the theory and the framework associated with it. Specific articles regarding the theory were also shared with him to better provide an understanding about the research. Several hours of performing coding on the data was performed in order to establish agreement. Then we began the discussion in order to establish a consensus about the codes and the meanings of the codes to ensure that the meanings of the codes and the codes themselves did not change from the pilot study codebook.

As the data were coded, it was noted that 78% of the codes had emerged from the data after the seventh interview and 95% of the codes had emerged after the 10th interview. Very few additional codes emerged beyond the 10th interview.

4.2 Overview of Data Analysis and Findings

This chapter reports on the findings of this case study. As was stated in previous chapters, advancement in understanding how behavioral intention influences the way people interact with information and systems within an organization can significantly increase productivity and efficiencies. The Theory of Planned Behavior (TPB) framework, which is also described in the previous chapters, is an extension of the Theory of Reasoned Action (TRA). It enhances the original models limitations of attitude and subjective norms by addressing behaviors in which people have inadequate volitional controls. The TPB proposes that in addition to attitudinal and normative influences, another component known as perceived behavioral control (PBC) also influences behavioral intentions and the

behavior itself. This additional component was found to play a significant role in previous research.

The research questions address three primary components and three secondary components. The primary components include the elements of the TPB framework, which are attitude, subjective norms, and perceived behavioral controls. Within the component of attitude reside three subcomponents identified as: cognition, affect, and past behavior. Since attitude is comprised of these three subcomponents, the research will begin with the findings that address the three subcomponents making up the attitudinal component. This then will be followed by the primary components of subjective norms and perceived behavioral controls. The research will address the findings using the following framework:

- RQ1.1 The Impact of Cognition on Behavioral Intentions to Use DSS Information
- RQ1.2 The Impact of Affect on Behavioral Intentions to Use DSS Information
- RQ1.3 The Impact of Past Behavior on Behavioral Intentions to Use DSS Information
- RQ1 The Impact of Attitude on Behavioral Intentions to Use DSS Information
- RQ2 The Impact of Subjective Norms on Behavioral Intentions to Use DSS Information
- RQ3 The Impact of Perceived Behavioral Controls on Behavioral Intentions to Use DSS Information

For each research question, the findings will address the first cycle codes developed during the coding process followed by examination of the second cycle coding process observing cross-case analysis. The cross-case findings examine the codes by reviewing trends across demographic categories in which themes or trends emerge.

The answers to these questions were largely derived through deductive content analysis tools but applied inductive content analysis through the interpretivist perspective lens. The deductive content analysis uses the TPB framework as a guide to address the research questions while incorporating inductive content analysis to illustrate the true meaning of the participant's responses. The research will also overlay the demographic data in Table 14 such as age, experience with a DSS, gender, years in management, and tenure with the company relative to the theoretical constructs (Attitude, Subjective Norms, and Perceived Behavioral Controls) to identify emergent themes that ordinarily would not be distinguishable during the cross-case analysis. The research study will utilize computer-aided software for qualitative research studies. This software was selected to assist the researcher in sorting, arranging, and identifying themes within the dataset.

Table 14. Demographics Data

DEMOGRAPHICS DATA			
AGE			
GROUP 1	GROUP 2	GROUP 3	GROUP 4
GENDER			
MALE		FEMALE	
TENURE WITH COMPANY			
< 10 YEARS		> 10 YEARS	
TENURE IN MANAGEMENT			
< 3 YEARS		> 3 YEARS	
DSS EXPERIENCE			
< 7 YEARS		> 7 YEARS	

Similar to the pre-pilot and the pilot study, the actual study began with an email request by one the Office Administrative Assistants (OA) asking for management volunteers to participate in a research study regarding our systems. The OA provides management support for a number of managers within the organization. Like the previous pre-pilot and pilot studies, the email did not state who was making the request nor did it include the topic details. Several managers offered to participate but only twelve candidates were randomly selected from the volunteers. The selection process included a close proportion of females and males relative to the actual ratio of male/female managers in the plant. The Office Administrative Assistant selected the individuals randomly by selecting from a list of numbers which I had assigned the participants names to each number. After selection, the twelve volunteers were contacted by phone and provided a detailed description of the research project. Each participant had been explained about the selected research instrument of face-to-face interviews and they were also informed that the interview would be digitally recorded with the researcher takes notes during the interview. Then, the participants were provided information about their option to dropout of the study at any time without reason or just cause. They were also informed they have the right to not answer any question they feel is unethical or make them feel uncomfortable in any way without any recourse to them or their position within the company. They were told about the terms involving the confidentiality of the interview and of everything that would be discussed during the interview. After the participants agreed to be interviewed, the meetings were scheduled and conducted in the participant's office for a period of 60 minutes during the day based on their schedule and availability.

Prior to the interviews, a brief discussion was conducted with each participant explaining the process and to inform them that notes would be taken in addition to the digital recording during the interview process. Each of the participants inquired about the content of the notes that would be taken and it was explained to them that the notes were observations in addition to the interview for data triangulation purposes. All participants were very comfortable during the process and none of the participants opted out of answering questions or dropping out of the research study. The interview questions in the actual study consisted of 12 open-ended questions. Following each broad, open-ended question, was a set of precise probing questions specifically applied to delve into the information about the area in question. The questions were designed to extrapolate the perspective of the participants utilizing their own experiences to guide them. Similar to the pilot study, the 12 interview questions using the pilot study with the same 12 questions used in the actual study. During the interviews, the participants were more than willing to express their feelings, thoughts and past behaviors about DSS Systems.

The table below provides the demographics of the participants used in the actual study.

Table 15. Participants Demographics Data

Demographics Criteria		Gender	Age Group	Tenure with Company	Tenure in Management	Department	Number of Years with DSS Experience
Participants	**#1**	*Female*	*2*	*< 10*	*< 3*	*Spares*	*< 7*
	#2	*Male*	*1*	*< 10*	*< 3*	*Cost Management*	*< 7*
	#3	*Male*	*4*	*> 10*	*> 3*	*Operations*	*> 7*
	#4	*Female*	*2*	*> 10*	*> 3*	*Engineering*	*< 7*
	#5	*Male*	*3*	*> 10*	*> 3*	*Quality*	*> 7*
	#6	*Male*	*4*	*> 10*	*> 3*	*Logistics*	*> 7*
	#7	*Male*	*2*	*< 10*	*< 3*	*Business Management*	*< 7*
	#8	*Female*	*4*	*< 10*	*< 3*	*IT*	*< 7*
	#9	*Male*	*3*	*< 10*	*> 3*	*Supply Chain*	*< 7*
	#10	*Male*	*3*	*> 10*	*> 3*	*Finance*	*> 7*
	#11	*Male*	*1*	*< 10*	*< 3*	*Production Control*	*< 7*
	#12	*Male*	*3*	*< 10*	*< 3*	*Supplier Delivery*	*> 7*

The data analysis of the actual study is based on the pilot study. The actual study utilizes the same interview questions as the pilot study and utilizes the same codebook for the first cycle codes as the pilot study. Similar to the pilot study, the actual study did not provide participants with the transcripts of the interview questions prior to the interview, which was a lesson learned during the pre-pilot.

Additionally, the actual study uses the same descriptive coding method for the first cycle codes and pattern coding for the second cycle codes as described in the pilot study. The changes that were made in the coding strategy from the pre-pilot to the pilot study proved to be very beneficial during the actual study. Like the pilot study, the actual study

utilized a coding strategy that aligned with the interpretivist approach by employing the Descriptive and Pattern coding methods. While the actual study uses the same second cycle coding method, the actual codes themselves are different for the actual study due to the frequency of the first cycle codes and the variation of the data between the two studies. This was no surprise given the fact that there were significantly more participants in the actual study. The codebooks used in the actual study were not used in the pre-pilot but rather an evolution of the coding method used throughout the pre-pilot and the pilot study.

The analysis of the first cycle codes examined the number of times a particular code was applied to the text along with the maximum amount per participant and the average number of times each participant expressed context of the particular code. This provided the amount of emphasis applied to a certain code relative to the other codes. Standard deviation was also calculated as a part of the process. Within each demographic category, a determination was derived whether or not the findings were significant based on the data during the first cycle coding. Then, the second cycle coding identifies the significance of the data relative to the specific demographic classification and theoretical construct. This method is used universally for each classification for each construct equally. Intercoder reliability was established using the same method as the pilot study and the same individual was used to perform the intercoder reliability for the actual study. This was another lesson learned from the pre-pilot study.

4.3 The Impact of Cognition on Behavioral Intentions to Use DSS Information (RQ 1.1)

4.3.1 Cognition Overview

The cognitive based interview questions focused on the status of the participant's thoughts as well as the relationship to the decision-making process. First cycle coding identified both problems and the impact of the decision-making process. It also identified factors such as positive thoughts and negative thoughts from the participant's perspective. In addition, many of the participants chose to elaborate on the selection of their thought process by explaining why they felt positive or negative about the system. As shown in Table 16, the cognitive process was more prevalent than the expression of process problems.

Table 16. Cognition Codebook

Code	Total	Max	Mean	Std Dev
Cognitive process	26	6	2.167	1.801
Decision making impact	16	3	1.333	0.888
Decision making process problem	9	2	0.75	0.622
Negative thoughts	17	4	1.417	1.084
Positive thoughts	24	5	2	1.477

They expressed their opinions regarding the rationalization and/or justification for indicating a negative or a positive thought about the system identified as "cognitive process". The participants also explained how the decision-making process was sometimes

problematic but more importantly they expressed the consequence of the impact of the decision which had originally led to the positive or negative thought. There were other influential factors that played a role in decision making as well which will be discussed later in this chapter. While the majority of the participants expressed concern about the impact of the decision-making based on the information of the system, a few did identify a process problem related to that process.

4.3.2 Cognition Cross-Case Findings

One of the main reasons that this research utilizes a cross-case analysis is to enhance the generalizability to other contexts. The cross case analysis utilizes specific demographic data to identify emergent themes that are illustrated in the analysis.

4.3.2.1 Cognition by Age

The cross case findings begins with demographic data by age group. The age groups are divided into four categories, which are shown in table 17.

These are also the same groups in each of the other research questions as well.

Table 17. Age Groups

AGE GROUPS	AGE CATEGORY
AGE GROUP 1	20-29 YRS OF AGE
AGE GROUP 2	30-39 YRS OF AGE
AGE GROUP 3	40-49 YRS OF AGE
AGE GROUP 4	50+ YRS OF AGE

Group 1

In age group 1, the participants expressed more than the average codes for cognitive process and decision-making impact while also expressing virtually all positive thoughts over negative thoughts. This particular group also showed more interests in expressing the rationale of their thought process, explaining or justifying why they had positive or negative thoughts. This particular group also showed more interest in the impact of their decisions with minimal identification of decision process problems.

Code	Age Group 1
Cognitive process	8
Decision making impact	4
Decision making process problem	2
Negative thoughts	1
Positive thoughts	4

While this group is generally very positive and conscious about the system and the impact of their decision, it is possible that they are naïve about the data integrity of the system and are overconfident about the data accuracy. This data signifies a link between positive thoughts and over-confidence with system information due to life experience or the amount of exposure to DSS systems.

Group 2

In age group 2, the participants expressed more balance between the positive and negative thoughts with a slightly more negative thought focus. This group also expressed more balance between the decision process problems and the impact of the decision-making process.

Code	Age Group 2
Cognitive process	6
Decision making impact	5
Decision making process problem	2
Negative thoughts	4
Positive thoughts	10

Overall, the balance in the thought process as well as the decision-making process could possibly be attributed to the experience with the system or other similar systems, given their age range.

Group 3

In age group 3, the participants expressed substantially more negative thoughts than positive thoughts. Additionally, this group also expressed more problems, the need to explain those problems, and how it impacts them.

Code	Age Group 3
Cognitive process	12
Decision making impact	7
Decision making process problem	4
Negative thoughts	7
Positive thoughts	4

In this particular group, the same people that expressed significantly more negative thoughts about the system information also stressed the magnitude of the problems regarding their decision-making ability due to the system.

Group 4

In age group 4, the participants expressed substantially more positive thoughts and negative thoughts. Coincidentally, this group also had very few cognitive process codes, which could indicate that this group failed to see the need or the desire to explain and/ or justify the position of their thoughts about the system information.

Code	Age Group 4
Cognitive process	2
Decision making impact	2
Decision making process problem	2
Negative thoughts	5
Positive thoughts	10

When the process problem code surfaced within this group it was isolated to one particular individual rather than shared by all participants of the group.

4.3.2.2 Cognition by Gender

Gender was selected as a demographic classification to identify possible themes and trends among the groups of men and women. While the men expressed a slightly more positive outlook toward assessment information, it was also found they were more decisive in identifying the problems and the impact their decisions had based on the information system.

Male

In the male group, the participants expressed a slightly more positive thought process towards information system relative to gender as a whole. This group also expressed the need to describe the cognitive process of why they thought more positively.

Code	Cognition Male
Cognitive process	24
Decision making impact	14
Decision making process problem	8
Negative thoughts	14
Positive thoughts	17

Additionally, this particular group also expressed a substantial need to address the impact of their thoughts in the decision-making process much more than the female group. Incidentally, this was also accompanied with the identification and expression of the problems that were associated with the system and information much more than the other groups or the female group.

Female

In the female group, the participants expressed a balance in the positive and negative thought process. With that balance accompanied very little amounts of problem identification, impact relation to their thought process, or the need to express the cognitive process to justify why they felt thoughts of a positive or negative nature.

Code	Cognition Female
Cognitive process	2
Decision making impact	1
Decision making process problem	2
Negative thoughts	3
Positive thoughts	4

4.3.2.3 Cognition by Tenure with Company

Tenure with the company was selected as a demographic classification to identify any possible trends and/or themes based on how long the participants had been with the company. As the sample group contained participants that had been with the company for a substantial amount of time, this classification was statistically divided into two groups using the ten-year dividing mark to separate the two groups equally.

Less than 10 Years Tenure with Company

In the group with less than 10 years tenure with the company, the findings showed they had substantially more positive thoughts about the information system than the group with more than ten years.

Code	Cognition < 10Yrs Tenure with Company
Cognitive process	16
Decision making impact	12
Decision making process problem	6
Negative thoughts	6
Positive thoughts	15

There was also concern with identification of higher problems within the system and a much higher concern for the impact of those problems. This group also expressed a strong presence of a cognitive process in wanting to explain why they felt as they did.

More than 10 Years Tenure with Company

In the group with more than 10 years tenure with the company, the findings showed that they had more of a balance between the positive and negative thoughts regarding systems information and they also had fewer concerns with identifying problems with the system.

Code	Cognition >10Yrs Tenure with Company
Cognitive process	10
Decision making impact	4
Decision making process problem	3
Negative thoughts	10
Positive thoughts	9

Additionally, they did not express a substantial amount of concern about the impact that the information systems had on their decision-making ability.

4.3.2.4 Cognition by Tenure in Management

Tenure in management was selected as a demographic classification to identify any possible trends and themes based on how long the participants had been in the field of management, thus providing potential indication of how that experience could play a role in the findings. As the sample group contained a diverse group of participants in the

management role, this classification was statistically divided into two groups using a three-year dividing mark to separate the two groups equally.

Less than 3 Years Tenure in Management

In the group with less than three years of management experience, the findings showed that this group had more positive thoughts versus negative thoughts relative to the group with more than three years of management experience. This particular group also expressed a much more positive outlook related to the problems and impacts of the system and information than the group with three years or more management experience.

Code	Cognition < 3 Yrs Management
Cognitive process	15
Decision making impact	12
Decision making process problem	5
Negative thoughts	5
Positive thoughts	19

It is possible that this more than average perspective on the system and information could be due to inexperience in management, thereby helping to create a much more optimistic viewpoint.

More than 3 Years Tenure in Management

In the group with more than three years of management experience, the findings showed that this group had a much more negative outlook and focused on the problems

associated with the system and the information relative to the group with less than three years of management experience.

Code	Cognition > 3 Yrs Management
Cognitive process	13
Decision making impact	6
Decision making process problem	4
Negative thoughts	12
Positive thoughts	9

The findings show that there is a possible link to the years in management and the pessimistic perspective on the system and the information within the system.

4.3.2.5 Cognition by DSS Experience

The DSS experience of the participants was selected as a demographic classification to identify any possible trends and themes based on how long the participants had been familiar and engaged with a DSS providing a potential indicator of how their experience could play a role in the findings of the research. As the sample group contained experienced users within a DSS system, this classification was statistically divided into two groups using a seven-year dividing mark to separate the two groups equally.

Less than 7 Years DSS Experience

In the group with less than seven years experience with a DSS system, the findings showed that this group was much more positive than negative about their thoughts regarding the information and the system relative to those participants in the group with more than seven years of DSS experience.

Code	Cognition < 7 Yrs DSS
Cognitive process	15
Decision making impact	8
Decision making process problem	5
Negative thoughts	10
Positive thoughts	15

The findings also showed that this group identified the impact of the decision making to be a much more important factor than the group that had more than seven years of experience with a DSS. Coincidentally, this group did not express much concern for the problems, which could either indicate some naivety with the problems and issues with the system, or it could be experience with advancements in the systems that are truly less problematic due to the recent notice of their experience.

More than 7 Years DSS Experience

In the group with more than seven years experience with the DSS system, the findings showed that this group had a balance of positive and negative thoughts. This group also had more of a cognitive process to explain and rationalize why they selected the positive or the negative thoughts relative to the system in the information.

Code	Cognition > 7 Yrs DSS
Cognitive process	11
Decision making impact	6
Decision making process problem	4
Negative thoughts	9
Positive thoughts	9

While they expressed problems with the system it was not substantially more than the group with less than seven years of experience.

4.3.4 Emergent Themes of Cognition

Within the demographic classification of age group, an interesting theme had emerged. The findings indicated that as age increased (groups one, two, and three), as did the negative perspective on the information and the systems until the age of 50. However, after the age of 50, the participants in this age category returned back to the original state of thinking more positively rather than negatively. Furthermore, as the age increased, the need or interest in expressing the rationale of their thought process decreased to the point where the oldest group had only one cognitive process code and one problem code.

In summary, the participants showed growing negativity, as they got older until reaching the age of 50 plus. This age group was more positive but for different reasons. While they shared the same positive thoughts as the youngest group, they also had minimal problems to share and demonstrated a significant increase in confidence of their response and less need to rationalize their position.

Within the demographic classification of gender, very few significant variations between the two groups were identified. While the male group had a slightly more positive thought process towards information, the female group demonstrated a similar balance in

positive and negative thoughts. Therefore, no significant findings were determined through the gender classification.

Within the demographic classification of tenure with company, the group with less than ten years of tenure with the company expressed substantially more positive thoughts than the group with more than ten years of tenure with the company. While the higher tenured participants had more of a balance between positive and negative thoughts they also identified fewer concerns and problems with the system as well as fewer concerns about the impact of the information on their decision-making ability. Not only did the group with less tenure identify significant problems and concerned for the impact on the decision-making, they felt a strong need to explain the details of those concerns and problems. The data suggests that tenure with the company resulted in advanced understanding of the systems and increased confidence in their ability to make decisions based on that information. With such confidence accompanies a decreased need to explain the rationale of their thought process.

Within the demographic classification of tenure in management, the group with three years or less of management experience expressed more positive thoughts about the information the systems in the group with three years or more of management experience. The group with more management experience focused on the negative outlook and the problems associated with the system while the least tenure group in management had a very positive outlook related to the problems of the system and the impact to decision-making. The findings indicate that there is a link from the tenure in management to the perspective on the system and the information within the system relative to their ability to make sound decisions.

Within the demographic classification of DSS experience, the group with seven or more years of DSS experience expressed a balance of positive and negative thoughts while the group with less DSS experience expressed a more positive position about their thoughts of the system. The group with fewer years of experience expressed the impact of the decision-making to be much more important factor than that of the group with more experience. The expression of problems with the system was similar between the two groups. While the group with less experience expressed more concern about the impact of the decision-making, no substantial findings were found in the category of DSS experience.

In table 18, the findings of the demographic classifications relative to cognition are summarized followed by the second cycle coding using the pattern coding technique.

Table 18. Cognition Summary Findings

COGNITION	FINDINGS SUMMARY	SECOND CYCLE CODES
AGE	Data shows link between age and opinion of the system to fulfill their needs	Age is a factor in perception of quality reliable data to instill confidence to make good decisions
GENDER	NO SIGNIFICANT GENDER FINDINGS	
TENURE WITH COMPANY	Data shows link between tenure with company to confidence with system in making decisions	Tenure with the company results in advanced understanding of the system and increase confidence to make decisions based on the system
TENURE IN MANAGEMENT	Date shows link between tenure in management to the perspective on the system relative to their ability to make decisions	Tenure and management impacts perspective of the system and the ability to make decisions
DSS EXPERIENCE	NO SIGNIFICANT DSS EXPERIENCE FINDINGS	

4.3.5 Cognition Summary

In summation, findings show that age, tenure with company, and tenure in management all play a significant role in the impact of cognition relative to behavioral intention. Within the demographic classification of age, the findings not only identified the link between age and the perception of quality, reliable data to make decisions, it also identified a trending bell curve across the age groups. This trending data shows how increase in age negatively impacts the perception of the manager with the information within the system. Additionally, tenure with the company and tenure in management both play a role in the manager's confidence in the information and their ability to make decisions based on that information.

As a part of the cognition summary, it was noted during the interview process that the participants in the younger age groups expressed a much more positive outlook even though they were not as quite as assertive with their opinions regarding the system as the groups with older participants. Interestingly enough it was the younger age group that felt more compelled to express and provide a rationale of basis for why they expressed the way they did. This was also in contrast to the older group as they did not feel like they had to justify or explain themselves as to why they selected or expressed their opinion in a certain manner. It was very clear that the level of confidence was much greater as the age groups increased in regards to both the responses and the confidence level of the response.

4.4 The Impact of Affect on Behavioral Intentions to Use DSS Information (RQ 1.2)

4.4.1 Affect Overview

The affect based interview questions focused on the status of the participant's feelings. The questions directly inquired about information trust/distrust, system trust/ distrust, and positive/negative feelings. The term "trust" can be considered either as a cognitive (thought based) term or an affective (emotional based) term but for this research the context of the term is directed toward affect. Through the first cycle coding process, initial themes began to surface. For example, negative feelings outnumbered the positive feelings until the positive feelings with contingency were added. This code signifies that the participant had positive feelings only when certain criteria were met. The term "trust" is broken down into two categories (information and system) along with the reasons for the trust and distrust. As shown in Table 19, the effect of affect was quite substantial.

Table 19. Affect Codebook

Code	Total	Max	Mean	Std Dev
Information distrust	28	4	2.333	1.073
Information trust	20	6	1.667	1.67
Negative feelings	29	5	2.417	1.084
Positive feelings	20	5	1.667	1.67
Positive feelings with contingency	13	3	1.083	1.24
Reasons to distrust	8	2	0.667	0.778
Reasons to trust	4	2	0.333	0.651
System distrust	17	5	1.417	1.379
System trust	11	2	0.917	0.9

Overall, while the positive feeling with the contingency slightly outnumbered the negative feelings but without the contingency, the results would have been substantially more negative. As far as the trust factor indication, information distrust was significantly greater than trust while system distrust followed suit with significantly more codes than system trust. The participants also felt the need to provide more explanation about the reasons for selecting negative responses over positive responses, which could be an indication of stronger feelings for the selected feeling.

4.4.2 Affect Cross-Case Findings

The cross case findings provide the data within the context of affect to identify emergent themes across various cases based on the demographic category.

4.4.3.1 Affect by Age

Similar to cognition, the cross case findings use demographic data by age group that are divided into four categories shown in table 16.

Group 1

In age group 1, the participants expressed more positive feelings than negative feelings but with the caveat that the positive feelings were with a contingency. While this group expressed more information distrust than information trust, it was primarily driven by the lack of training provided to them early on within their tenure at the company.

Code	Affect Age Group 1
Information distrust	4
Information trust	3
Negative feelings	5
Positive feelings	5
Positive feelings with	2
Reasons to distrust	0
Reasons to trust	1
System distrust	3
System trust	3

Additionally, this age group had equal amounts of system distrust as they did with system trust. Overall, this group expressed an equal amount of trust and distrust between the system and the information while continuing to maintain more positive feelings about the system and the information that they interact with on daily basis. The data signifies a link between their age and their positive feelings.

Group 2

In age group 2, the participants expressed a balance between information distrust and information trust. However this particular age group also described substantial amounts of system distrust while only one person expressed system trust. This same age group expressed more than double the amount of negative feelings relative to the positive feelings expressed but with the addition of the positive feelings with contingency, the positive feelings expressed balance equally with the negative feelings expressed.

Code	Affect Age Group 2
Information distrust	9
Information trust	9
Negative feelings	8
Positive feelings	4
Positive feelings with	4
Reasons to distrust	2
Reasons to trust	0
System distrust	6
System trust	1

This group also explained that the reasons for the negative feelings resided primarily in the lack of training as well as lack of tribal knowledge transfer of information. The contingency with the positive feelings primarily surrounded the trust of the source of information into the system itself.

Group 3

In age group 3, the participants expressed significant amounts of information distrust relative to information trust. However, this same age group also expressed more positive feelings the negative feelings without including the positive feelings with contingency. The inclusion of the positive feelings with contingency more than doubles the positive feelings over the negative feelings expressed by this age group.

Code	Affect Age Group 3
Information distrust	6
Information trust	3
Negative feelings	7
Positive feelings	9
Positive feelings with	7
Reasons to distrust	3
Reasons to trust	2
System distrust	6
System trust	3

While this age group expressed more positive feelings they also expressed more than double the amount of system distress relative to system trust. Overall, the data indicates that this group is much more distrustful of the information in the system yet they also exhibited substantial more positive feelings than negative feelings about the system and the information as a whole.

Group 4

In age group 4, the participants expressed substantially more information distrust than information trust. This particular age group also expressed more than 4 times the amount of negative feelings over positive feelings. Even though this particular age group expressed substantial more distrust for the information than trust, ironically they indicated that they had more trust for the system relative to distrust for the system.

Code	Affect Age Group 4
Information distrust	9
Information trust	5
Negative feelings	9
Positive feelings	2
Positive feelings with	0
Reasons to distrust	3
Reasons to trust	1
System distrust	2
System trust	4

The participants specifically explained how the distrust for the information was solely due to the distrust for the inputs of the information going into the system. Ergo, they expressed trust for the inherent capabilities of the system itself rather than distrust for the system.

4.4.2.2 Affect by Gender

While gender group was selected as a demographic classification to identify possible trends and themes, the data shows various similarities between the two groups as well as differences. The female gender group had almost double the ratio of information distrust relative to information trust compared to the male gender group. The female gender group also had significantly more negative feelings expressed in relation to the positive feelings relative to the male gender group. Another interesting theme included the sheer number of distrust and trust codes expressed by the female gender group relative to the male gender group. The female gender group expressed twice as many system distrust codes and system trust codes even though the group was one quarter the size of the male

gender group. The data indicates that the female gender group felt much stronger about the system distrust as well as the system trust relative to the male gender group.

Male

In the male gender group, the participants expressed slightly more distrust for the information than trust for the information. Equally, they also expressed slightly more distrust for the system than they did trust for the system.

Code	Affect Male
Information distrust	19
Information trust	15
Negative feelings	21
Positive feelings	14
Positive feelings with	12
Reasons to distrust	7
Reasons to trust	3
System distrust	10
System trust	8

As for the feelings the male gender group expressed more negative feelings than positive feelings but with the contingency that expressed more positive feelings overall than they expressed feelings of a negative nature.

Female

In the female gender group, the participants expressed almost double the amount of information distrust as information trust. Equally, they expressed more than double the amount of system distrust as they did system trust.

Code	Affect Female
Information distrust	9
Information trust	5
Negative feelings	8
Positive feelings	6
Positive feelings with	1
Reasons to distrust	1
Reasons to trust	1
System distrust	7
System trust	3

Additionally, they expressed a significant amount of negative feelings over positive feelings, which solidified the negative context and distrust that the female gender group expressed about both the information the system and their feelings towards the information system.

4.4.2.3 Affect by Tenure with Company

Overall, the tenure with the company category had more information distrust over information trust. The negative feelings were again more prevalent than the positive feelings unless the positive feelings with contingency were include, in which case the positive feelings were more prevalent. The differences resided in the reasons to trust and the system trust/distrust code set.

Less than 10 Years Tenure with Company

In the group with less than 10 years with the company, the findings showed that they had a balance of trust/ distrust for the information in the system. This group also expressed more positive feelings than negative feelings for the system and the information.

Code	Affect <10 Yrs Tenure
Information distrust	17
Information trust	15
Negative feelings	14
Positive feelings	13
Positive feelings with contingency	10
Reasons to distrust	3
Reasons to trust	2
System distrust	13
System trust	7

However, they expressed strong feelings of system distrust over system trust. The distrust of the system was primarily due to system crashes and other system related problems.

More than 10 Years Tenure with Company

In the group with more than 10 years tenure with the company, the findings showed that the group had significantly more distrust for the information than trust for the information.

Code	Affect >10 Yrs Tenure
Information distrust	11
Information trust	5
Negative feelings	15
Positive feelings	7
Positive feelings with contingency	3
Reasons to distrust	5
Reasons to trust	2
System distrust	4
System trust	4

They also expressed substantial more amounts of negative feelings than positive feelings even with the contingency factor. However, the system trust/distrust was balanced even though they expressed more reasons to explain the distrust over the trust of the system.

4.4.3.4 Affect by Tenure in Management

Overall, the tenure with the management category had more information distrust over information trust even though the two groups had opposing opinions about this topic. Both groups expressed more negative feelings over positive feelings but one group felt much stronger about the difference than the other. Once the contingency factor is included, the positive feelings outweigh the negative feelings. As far as system trust, both groups felt more distrust for the system as opposed to trust for the system.

Less than 3 Years Tenure in Management

In the group with less than three years of management experience, the participants expressed the balance of information distrust and information trust. In regard to feelings

however, this group of participants expressed more negative feelings than positive feelings until the positive feelings with contingency are included, then the overall expressed feelings are positive.

Code	Affect <3 Yrs Management
Information distrust	15
Information trust	14
Negative feelings	13
Positive feelings	8
Positive feelings with contingency	8
Reasons to distrust	1
Reasons to trust	2
System distrust	11
System trust	7

This group of participants also expressed more distrust in the system than trust in the system and an equal amount of reason to trust or distrust.

More than 3 Years Tenure in Management

In the group with more than three years of management experience, the participants expressed substantially more information distrust then information trust. They also expressed more negative feelings than positive feelings, but again when adding positive feelings with contingency; the positive feelings were balanced with the negative feelings.

Code	Affect >3 Yrs Management
Information distrust	13
Information trust	6
Negative feelings	16
Positive feelings	12
Positive feelings with contingency	5
Reasons to distrust	7
Reasons to trust	2
System distrust	6
System trust	4

As this group expressed significantly more reasons to distrust information than reasons to trust information, they equally expressed the system and distrust more than system trust.

4.4.2.5 Affect by DSS Experience

Overall, the DSS Experience category had more information distrust over information trust. Additionally, the negative feelings expressed by this group far outweighed the positive feelings expressed, but again when the feelings with a contingency are included, the positive feelings surpass the negative feelings expressed by the participants. In terms of system trust and distrust, overall, the group expressed more system distrust and trust even though the two groups expressed very different perspectives about this particular topic.

Less than 7 Years DSS Experience

In the group with less than seven years experience with a DSS System, the information distrust and trust was fairly balanced with a slight edge going to information

distrust. Interestingly enough, the negative feelings and the positive feelings were exactly equal but when the positive feelings with contingency or included, the positive feelings are much more prevalent.

Code	Affect <7 Yrs DSS
Information distrust	18
Information trust	15
Negative feelings	16
Positive feelings	16
Positive feelings with contingency	8
Reasons to distrust	4
Reasons to trust	2
System distrust	12
System trust	6

In this particular group, system distrust had more than double the codes of system trust and this group chose to express their reasons for distrust more than twice the number of times relative to the reasons to trust. This group was much more optimistic about their feelings especially when the contingency was included. The positive nature was due to the possibility of increasing data integrity of the inputs going into the system.

More than 7 Years DSS Experience

In the group with more than seven years DDS experience, the findings show that this group had substantially more distrust in the information than trust in the information. Additionally, this same group expressed substantial feelings of negativity as opposed to positive feelings even with the contingency. As far as system trust and distrust, this group expressed a balance between the two, while selecting to explain more about the distrust versus the trust reasons.

Code	Affect >7 Yrs DSS
Information distrust	10
Information trust	5
Negative feelings	13
Positive feelings	4
Positive feelings with contingency	5
Reasons to distrust	4
Reasons to trust	2
System distrust	5
System trust	5

There appears to be a link from the more experienced group of users to the information distrust and the negative feelings associated with it. This is primarily due to the integrity of the data going into the system rather than the system itself but some participants found fault with the checks and balances of the system to mitigate them. This was the driving reason behind the system distrust.

4.4.3 Emergent Themes of Affect

Within the demographic classification of age group, themes had emerged surrounding the construct of affect. The findings indicated that the first two age groups had expressed balance between information distrust and information trust. The 2 groups did not feel strongly about one or the other in relation to the information in the system. However, age group 3 and age group 4 both had at least twice as many information distrust codes as they did an information trust code, which indicates a significant change, as the participants get past the age of 40.

The findings also indicate that in age group 1 and in age group 2 the negative feelings and the positive feelings are balanced but in age group 3 the positive feelings more than doubled the negative feelings overall. However, that positive trend takes a turn in age

group 4, as the positive feelings are less than a quarter of the negative feelings experienced by the system and the information as a whole. System distrust and system trust are the 2 most interesting codes where the emergent theme takes a couple of turns. In group 1 system trust and distrust are balanced, yet in group 2, system distrust is substantially greater than system trust and this trend follows through age group 3. However, in age group 4 this trend takes a completely different turn, as system trust is equally favorable to system distrust as system distrust was in age groups 2 and 3.

In summary, the findings show that the participant's perception of information changes based on information feelings and the system. Within this age group category, several things have emerged such as the information distrust after the approximate age of 40. It has also identified how age group 4 contains much more negative feelings overall about the system and the information as a whole, yet it is the one group that expresses more trust for the system than any of the others. The data indicates a link between age in system trust and distrust as well as information trust and distrust.

Within the demographic classification of gender, some interesting themes have emerged surrounding the construct of affect. The female gender group had significantly more negative feelings expressed in relation to positive feelings relative to the male gender group. Another interesting theme included the sheer number of distrust and trust codes expressed by the female gender group relative to the male gender group. The female gender group expressed twice as many system distrust codes and system trust codes even though the group was one quarter the size of the male gender group. The data indicates that the female gender group felt much stronger about the system distrust as well as the system trust relative to the male gender group. While the negative and the positive feelings

were balanced within the participating female gender group, system distrust was expressed by each of the three members yet one individual had the vast majority of the codes identified as system distrust. However, this individual did not contain as many information distrust codes as the other two participants. Therefore, no significant findings are present in the construct of age and affect.

Within the demographic classification of tenure with the company, each group expressed certain amounts of information distrust yet the group with 10 or more years of tenure with the company found information in the system to be much more distrustful than the group with less than 10 years tenure with the company. The group with more tenure also expressed substantially more negative feelings than positive feelings, yet they expressed more balance in the system trust and distrust category. The findings would indicate that tenure with the company could be responsible for advancing an understanding of the system thus creating more trust of the system itself, yet distrusting the information within the system as an offsetting factor. This could also be a driving force explaining why the group with 10 years or more tenure with the company possess more negative feelings overall.

Within the demographic classification of tenure in management, a similar theme indicates that the group with more than 3 years of management experience expressed much more distrust for the information than trust where the group with less than 3 years of management experience expressed more of a balance in the category. It comes as no surprise that the group with more than 3 years major experience have much more of a balance in regard to system distrust versus trust whereas the group with less than 3 years management experience find more fault and distrust with the system itself. The findings

indicate a similar situation found in the previous classification where the more tenured group find more trust in the system, yet substantially more distrust in the information as well as negative feelings towards the system.

Within the demographic classification of DSS experience, a similar theme once again has emerged. The group with more than 7 years of DSS experience finds balance in the system trust versus system distrust. The group with less than 7 years of DSS experience finds the system to be substantially more distrustful. While both groups expressed more distrustful information than trust for the information, the group with more than 7 years of DSS experience indicates that the distrust is a much stronger feeling and the overall negative feelings are substantially greater relative to the positive feelings. The findings indicate a similar situation once again, as in the two previous classifications, regarding trust in the system and distrust in the information as well as increased negative feelings towards the system for the group with more experience.

In table 20, the findings of the demographic classifications relative to affect are summarized followed by the second cycle coding using the pattern coding technique.

Table 20. Affect Summary Findings

AFFECT	FINDINGS SUMMARY	SECOND CYCLE CODES
AGE	Data shows a link between participant's ages, experience with systems, management, and company tenure to trust in the system, distrust in the information, and negative feelings about the system.	Age is a factor in trust, distrust, and negative feelings relative to the system and the information in the system
GENDER	Data shows a link between age in both the system/information to trust and distrust	
TENURE WITH COMPANY	NO SIGNIFICANT GENDER FINDINGS	Data shows a link between participants experience with systems, management, and company tenure to trust in the system, distrust in the information, and negative feelings about the system.
TENURE IN MANAGEMENT	Data shows link between tenure with company to more trust in the system, distrust in the information, and negative feelings toward the system	
DSS EXPERIENCE	Data shows link between tenure in management to more trust in the system, distrust in the information, and negative feelings toward the system	

4.4.4 Affect Summary

In summation, the findings show that age, tenure with the company, tenure in management, and DSS experience all play a significant role in the impact of affect relative to behavioral intention. Within the demographic classification of age, the findings show a distinct link between the age groups beyond 40 and the system/ information to trust, distrust, and negative feelings. The findings also indicate a link across tenure with the

company, tenure and management, and DSS experience equally. This data shows a distinct link between the participant's experience with systems, management, and company tenure to trust in the system, distrust in the information, and negative feelings about the system.

With regard to affect, one of the most interesting observations that was made during the interview process was how the level of emotional expression changed during the interviews. Initially, I had assumed that perhaps the young girls or the female groups would possess more emotion when presented with the emotional-based questions but there was not a distinct commonality between them. Ironically, it was somewhat sporadic but what was interesting was the fact that the ones that did express more motion, expressed significantly more emotion. It was evident that they were harboring feelings that were being released in the environment that they felt safe. Therefore, they were more than willing to provide an untethered explanation of what they felt and why they felt the way they did. In one particular interview, the participant was expressing themselves through extensive hand and arm gesturing and even with their fist raised up in the air to further emphasize their level of a motion for a particular topic.

4.5 The Impact of Past Behavior on Behavioral Intentions to Use DSS Information (RQ 1.3)

4.5.1 Past Behavior Overview

The past behavior based interview questions focused on the status of the participant's experience and past behavior. The interview questions directly inquired

about the participant's experiences in general, experiences with the system, and past behavior from a positive and/or negative perspective. Through the course of the interviews, participants were asked to provide specific examples of their experiences, both positive and negative. Inquiry of this type was performed to establish a better understanding of their perspective while exercising the interpretivist approach to the research. After the participants described their experience, additional probing was conducted to identify, from their perspective, the past behavior (if any) that contributed to their positive or negative experience. As shown in Table 21, both the positive and the negative responses are represented.

Table 21. Past Behavior Codebook

Code	Total	Max	Mean	Std Dev
Negative experience	31	5	2.583	1.24
Negative past behavior	12	3	1	0.853
Negative system experience	11	2	0.917	0.669
Positive experience	14	4	1.167	1.267
Positive past behavior	16	3	1.333	0.985
Positive system experience	3	1	0.25	0.452

Overall, the negative experiences expressed by the participants more the double the positive responses. The average response from each participant was more than twice the amount of the positive responses from the same group of participants. As far as the past behavior, even though the expressed negative responses were twice that of the positive

responses, the past behavior was slightly more positive in nature. However, the system's specific experiences were again substantially more negative than the positive system experiences expressed by all participants.

4.5.2 Past Behavior Cross-Case Findings

The cross case findings provide the data within the context of past behavior to identify emergent themes across various cases based on the demographic category.

4.5.2.1 Past Behavior by Age

Similar to affect, the cross case findings use demographic data by age groups that are divided into four categories. As the analysis of the category of age group was being conducted some principal themes began to emerge, such as the dominance of negative experience over positive experience across each one of the age groups. Another emergent theme that surfaced was the negative system experience code, which was more prominent over the positive system experience in each one of the groups.

Group 1

In age group 1, the participants expressed more than double the negative experiences over the positive experiences. Both the positive and the negative experiences hinged on the formal training received in the tribal knowledge transfer during initial engagement of the system.

Code	PB Age Group 1
Negative experience	5
Negative past behavior	2
Negative system experience	2
Positive experience	2
Positive past behavior	2
Positive system experience	0

The indicators show that past behavior (both positive and negative) influenced current behavior. The negative experience ratio was more prevalent with this group relative to all the participants in the study. In fact, it was actually double the average of the entire group. Conceivably, this could be due to the recent lack of experiences with regard to training and the tribal knowledge transfer that occurred incorrectly or not at all. However, within this age group past behavior was balanced in the negative system experience code surface twice relative to 0 occurrences of positive system experience.

Group 2

In age group 2, the participants expressed a similar dominance of negative experience relative to a positive experience. The participants explained that the rationale for these codes was based on training and tribal knowledge transfer as well.

Code	PB Age Group 2
Negative experience	7
Negative past behavior	3
Negative system experience	3
Positive experience	2
Positive past behavior	3
Positive system experience	0

They also indicated that this was partially due to current encounters and more experience based situations. In this age group the negative past behavior and the positive past behavior had an equal balance.

Group 3

In age group 3, the negative experience again was much more substantial over the positive experience. However, in this age group the positive past behavior was more than double that of the negative past behavior expressed by the participants.

Code	PB Age Group 3
Negative experience	11
Negative past behavior	4
Negative system experience	3
Positive experience	7
Positive past behavior	8
Positive system experience	2

While this group expressed more negative experience and more positive past behavior, they also had a balance of negative system experience and positive system experience.

Group 4

In age group 4, once again the negative experience far supersedes the positive experience. Similar to the other age groups, this particular age group had a balance between negative past behaviors and positive past behaviors.

Code	PB Age Group 4
Negative experience	8
Negative past behavior	3
Negative system experience	3
Positive experience	3
Positive past behavior	3
Positive system experience	1

They also expressed significantly more negative system experiences relative to only one positive system experience across the entire age group.

4.5.2.2 Past Behavior by Gender

While the gender group was selected as a demographic classification to identify possible trends and themes, the data shows similarities and distinct differences between the groups. The male gender group had more than double the ratio of negative experiences compared to positive experiences. The female gender group had just slightly more negative experiences over positive experiences. In comparison to the male gender group, the female gender group had less than a fourth of the negative experiences. Equally speaking, the female gender group had less than a fourth of the negative system experiences as compared to the male gender group. Even when you consider that the male gender group is three times the size of the female gender group, as a ratio the male gender group still had more native experiences and more negative system experiences than the female gender group.

However, while the male gender group had more than three times the number of participants, the positive experiences in the male gender group were only slightly double of

that of the female gender group. This trend followed suit with the positive past behaviors expressed by the participants as well by each group respectively.

Male

In the male gender group, the participants expressed a significant amount of negative experiences over positive experiences. Equally, they expressed negative system experiences substantially more than positive system experiences.

Code	PB Male
Negative experience	25
Negative past behavior	11
Negative system experience	9
Positive experience	10
Positive past behavior	11
Positive system experience	2

However, the male gender group expressed more positive past behaviors than negative past behaviors even though the negative experiences dominated the positive experiences overall.

Female

In the female gender group, the participants expressed only a slightly more negative experience or positive experience. This particular group also expressed more negative system experience over positive system experience but not by a significant amount.

Code	PB Female
Negative experience	6
Negative past behavior	1
Negative system experience	2
Positive experience	4
Positive past behavior	5
Positive system experience	1

Similar to the male gender group, the female gender group expressed more positive past behavior and negative past behavior but in this group the ratio was much more significant toward the positive past behavior compared to the male gender group.

4.5.2.3 Past Behavior by Tenure with the Company

Overall, tenure with the company category contains substantially more negative experiences than any of the other experiences. The two groups of tenure were divided by those participants with less than 10 years and those with more than 10 years. The group with less than 10 years of tenure with the company had more negative experiences to express then the group with more than 10 years of tenure with the company. Comparatively speaking, the other categories are relatively balanced between the two groups. No substantial findings came out of the comparison between the two groups.

Less than 10 Years Tenure with Company

In the group with less than 10 years tenure with the company, the findings showed the negative experiences more than doubled the positive experiences similar to many of the other comparisons.

Code	PB <10 Tenure with Company
Negative experience	17
Negative past behavior	8
Negative system experience	7
Positive experience	8
Positive past behavior	9
Positive system experience	2

Like so many of the other groups, positive past behavior was expressed as more of a prominent theme than negative past behavior. The negative systems experiences were more than three times that of the positive systems experiences.

More than 10 Years Tenure with Company

In the group with more than 10 years tenure with the company, the findings showed that the group expressed substantially more negative experiences relative to the positive experiences just as the groups expressed in the previous categories.

Code	PB >10 Tenure with Company
Negative experience	14
Negative past behavior	4
Negative system experience	4
Positive experience	6
Positive past behavior	7
Positive system experience	1

Similar to the group with less than 10 years tenure with the company, the participants in this group also expressed more positive past behaviors relative to negative past behaviors while expressing significantly more negative system experiences over positive system experiences.

4.5.2.4 Past Behavior by Tenure in Management

The two groups were divided by participants that had less than 3 years of management experience and by participants that had more than 3 years of management experience. Overall, the tenure in management category contained substantially more negative experiences than any of the other codes, similar to each of the past categories and groups. As a whole, the negative experience more than doubled the positive experience expressed by both groups. Similar to the other previous categories, positive past behavior was significantly more than the negative past behavior, while the negative system experience far surpassed the positive system experience as a whole. This particular category follow suit with the other categories in terms of experience, past behavior, and system experiences.

Less than 3 Years Tenure in Management

In the group with less than 3 years of management experience, the participants in this group expressed more than 3 times the negative experience as positive experience. Once again, this trend follows suit with the groups in the other categories as a major theme. Additionally, the negative system experience is much more substantial than the positive system experience.

Code	PB <3 Yrs Management
Negative experience	12
Negative past behavior	8
Negative system experience	6
Positive experience	4
Positive past behavior	6
Positive system experience	1

Ironically, this is where the similarities end. This particular group of participants with less than 3 years of management experience expressed more negative past behavior than positive past behavior and is the first group to do so.

More than 3 Years Tenure in Management

In the group with more than 3 years of management experience, the participants expressed more negative experience than positive experience by almost a 2 to 1 ratio. Similar to the other groups and the other categories, this particular group also expressed more negative system experiences over positive system experiences while expressing more positive past behavior over negative past behavior.

Code	PB >3 Yrs Management
Negative experience	19
Negative past behavior	4
Negative system experience	5
Positive experience	10
Positive past behavior	10
Positive system experience	2

With this group, all 3 categories of experience, past behavior, and system experience more than doubled the opposing position within each category.

4.5.2.5 Past Behavior by DSS Experience

The two groups were divided by participants that had less than 7 years of DSS experience and more than 7 years DSS experience. Overall, the experience with a DSS system category contained substantially more negative experiences than positive experiences which once again is similar to each of the past categories and groups. Between the 2 groups they shared a theme across negative past behaviors yet the differences resided in the positive experiences and the positive past behavior. In these 2 categories the group with less than 7 years DSS experienced substantially more positive variances and more past behavior codes than the group with greater than 7 years of DSS experience. Additionally, the group of less than 7 years of DSS experience also expressed more positive past behavior over negative past behavior, whereas the group with more than 7 years of DSS experience expressed the same amount of negative past behavior as they expressed for the positive past behavior.

Less than 7 Years DSS Experience

In the group with less than 7 years experience with the DSS system, the participants expressed substantially more negative experiences or positive experience which once again is very similar to the other categories and other groups previously discussed. Additionally, in a very typical fashion, this group also expressed more positive past behaviors relative to the negative past behaviors. Equally this particular group also

expressed substantially more negative system experiences relative to positive system experiences.

Code	PB <7 Yrs DSS
Negative experience	19
Negative past behavior	6
Negative system experience	7
Positive experience	10
Positive past behavior	10
Positive system experience	2

Overall, this group expressed more optimistic perspectives towards the system than the group with more DSS experience. The data indicates that there is a link between participants that have less experience who typically have more optimism and more of a positive outlook on the experiences and the engagement of the system.

More than 7 Years DSS Experience

In the group with more than 7 years of DDS experience, the participants expressed substantially more negative experiences in comparison to positive experiences. This, once again, follows the trend from the previous groups and categories. In similar fashion, this group also expresses more negative system experiences than positive system experiences but that is where the similarities end.

Code	PB >7 Yrs DSS
Negative experience	12
Negative past behavior	6
Negative system experience	4
Positive experience	4
Positive past behavior	6
Positive system experience	1

Unlike the majority of the others, this group expressed a balance between the negative past behaviors and the positive past behaviors. This is primarily due to the past experiences with this system as well as other systems. This particular group possessed a different outlook on the system even though they had more negative experiences the past behaviors from those experiences were more balanced as more experiential knowledge was acquired from the various interactions of the system.

4.5.3 Emergent Themes of Past Behavior

Within the demographic classification of age group, several themes began to emerge surrounding the construct of past behavior. The dominant theme that emerged was the overwhelming responses of negative experiences over positive experiences by the participants. This particular theme was shared throughout each classification and throughout each group within the classifications as well. Other emergent themes consisted of negative system experiences over positive system experiences and the presence of more positive past behavior across the entire age group as a whole. It is also noted that each group contained a balance of the past behavior experiences between positive and negative except for age group 3 which had more than double the positive responses over negative responses.

The findings indicate that there is a consistent theme of negative feelings overall. It is also noted that the negative feelings were expressed by each one of the participants, though at various levels. The expressed negative experiences by the participants were primarily driven by inadequate training and distrust in the information being provided to them. Additionally, this distrust among participants was also driven by the source of the data inputs into the system, which was expressed as incorrect or untrusting inputs. The negative system experience was by proxy an extension of the negative experience as a whole. However, an additional interesting theme was the expressed positive past behavior code presence. Each participant in the age group expressed either a balanced perspective in this area or a more positive perspective. While each participant expressed both positive and negative past behaviors, the overall theme entailed learning from both the negative experience and the negative past behaviors then applying that in a positive form during their next experience in a similar situation.

In summary, the demographic category of age expressed a strong presence of negative experiences in addition to a slightly less negative experience with the system itself. In regard to past behavior, the positive past behavior was expressed slightly more than the negative past behavior. Both positive and negative past behaviors were expressed by each one of the participants. The data does not indicate a link between the overall experiences, system experiences, to any particular age group. They all expressed similar responses. With that said, there was a slight variation in the past behavior with regard to the age group 3 but the variation was so insignificant that a substantial finding or trend was not evident.

Within the demographic classification of gender, some themes emerged surrounding the construct of past behavior. While the male gender group had a substantial amount of negative experience codes, as a ratio, they were less than the female gender group. Both groups had a substantial amount of negative experiences, which follows the pattern of the previous classification but, does not provide any substantial findings as a classification or group. The code of negative and positive system experience also followed suit with the negative experiences code applying more negative system experiences as opposed to positive system experiences. This code also provided no substantial findings as a classification or a group. While the past behavior code followed suit with the age group classification in regard to the prevalence of positive past behavior in comparison to negative past behavior, no major theme emerged as a result of the findings. Overall, the data did not link any substantial findings to the demographic classification of gender nor did it link anything to the individual groups within the demographic classification. Therefore, no significant findings are present in the construct of gender and past behavior.

Within the demographic classification of tenure with the company, each group expressed a similar amount of negative experiences relative to positive experiences. These indicators follow suit with the previous classifications within the construct of past behavior as well. While the group with less than 10 years tenure with the company had more overall negative experiences with the system in comparison to positive experiences, the ratio was comparable to the group with more than 10 years tenure with the company. As far as the code of past behavior, overall both groups expressed a similar amount even though the group with less than 10 years tenure had almost double the positive codes as negative codes, the ratio was balanced thus negating the opportunity for any substantial findings in

the group of tenure with the company. Overall, the findings found the negative feelings expressed by the participants a common theme across all groups but not in the specific groups within the classification to apply to the construct of past behavior. Therefore no significant findings are present in the category of tenure with company and past behavior.

Within the demographic classification of tenure in management, the theme of negative experience again follows suit with the other classifications and the other groups within those classifications. The group with less than three years of management experience had fewer experience codes overall but a larger percentage of them were negative in nature relative to the group with more management experience. However, the group with more than three years management experience also expressed significantly less negative past behavior codes, which indicates an emergent theme of fewer negative experiences, associated with a more experienced management team. The findings show a link between more tenured management team to more positive past behavior regarding how they respond to the adversity of the system challenges. This was expressed even though positive system experience was expressed less for their particular system but behavior was more positive. Therefore, significant findings were found to be present in the category of tenure in management and past behavior.

Within the demographic classification of DSS experience, the same theme emerged in this classification that was found to be present in the previous classifications. The negative experience was found to be substantially greater as expressed by the participants in both groups even though the group with more than 7 years experience had more negative experiences from a ratio perspective than the group with less than 7 years experience. Additionally, the negative system experience was much more substantial than

the positive system experience which also follows suit with the other classifications previously discussed. However, with the code of past behavior, as a classification, the group expressed significantly more positive past behavior as compared to negative past behavior. Although, the group with more than 7 years of DSS experience expressed more of a balance between positive past behavior and negative past behavior the group with less than 7 years DSS experience expressed almost double the positive past behavior codes. The findings indicate that the group with less experience with DSS systems expresses a more positive past behavior outlook. As a classification, the findings identify a link between DSS experience and the positive past behavior of the participants to the construct of past behavior.

In table 22, the findings of the demographic classifications relative to past behavior are summarized followed by the second cycle coding using the pattern coding technique.

Table 22. Past Behavior Summary Findings

PAST BEHAVIOR	FINDINGS SUMMARY	SECOND CYCLE CODES
AGE	NO SIGNIFICANT AGE FINDINGS	Data shows a link between negative feelings and negative system experience with a positive past behavior outlook relative to age, gender, tenure with company, tenure in management, and DSS experience
GENDER	NO SIGNIFICANT GENDER FINDINGS	
TENURE WITH COMPANY	NO SIGNIFICANT COMPANY TENURE FINDINGS	
TENURE IN MANAGEMENT	Date shows link between tenure in management to a positive past behavior perspective	
DSS EXPERIENCE	Data shows link between DSS experience to positive past behavior	

4.5.4 Past Behavior Summary

In summation, the findings show that age, gender, tenure with the company, tenure in management, and DSS experience all play a significant role in the impact of past behavior relative to behavioral intention. Within each one of the classifications, the findings show a distinct link between all age groups and negative experiences expressed by the participants. Additionally, each classification also expressed a significant negative system experience. However, past behavior was expressed applying more concentration on the positive side, which was shared by each of the classifications as well.

An interesting aspect of this particular construct emerged as it was related to the themes that presented themselves during the interviews from the participants directly. For

example, one participant explained how their experiences with the system were directly attributable to the régime of management at the time. They explained how the system data would become less polluted if the management team understood and enforced the policies directly impacting the system data. Likewise, the system data would deteriorate when a different and less disciplined management team would replace the more disciplined one. Typically, they had some past experiences with the existing management prior to going into the executive level so they could anticipate or predict the impact that the management change would have on the data. This was expressed by more than one participant and it was very evident that it dramatically altered the attitude of the participants who expressed this particular issue.

4.6 The Impact of Attitude on Behavioral Intentions to Use DSS Information (RQ 1)

4.6.1 Attitude Overview

The theoretical construct of Attitude is comprised of cognition, affect, and past behavior according to the Tripartite Model of Attitude. Each construct of the Tripartite Model of Attitude was discussed previously in detail. This particular section will provide a summation of cognition, affect, and past behavior within each demographic classification. The objective of the Attitude section is to review each demographic classification individually culminating with the three constructs of the model into a single finding known as Attitude. The Attitude assessment is based on the culmination of code frequency for each respective area. The more the participants express a certain feeling, thought, or

experience toward an object, the more weight it will carry in the assessment of Attitude as a whole.

4.6.2 Attitude Cross-Case Findings

The cross-case findings will analyze the data within the contexts of each construct within the Tripartite Model of Attitude to identify emergent themes that are illustrated in the analysis.

4.6.2.1 Attitude by Age

Within the demographic classification of age, several themes emerged across a combination of the constructs.

Group 1

In age group 1, the participants have a very positive outlook on the system and the information in the system. Their optimism is evident through their positive thoughts about the system and the information in the system. While they trust the system and the capabilities of the system, they do not trust the information in the system for various reasons to be identified in later sections. Their overall feelings about the system, and the system and the information are neutral. Their experiences overall with the system have been predominately negative while their perspective of their past behavior was expressed as predominately positive probably due to applying knowledge from past behavior to the next experience.

Attitude	Code	Cognition Age Group 1
Cognition	Cognitive process	8
	Decision making impact	4
	Decision making process problem	2
	Negative thoughts	1
	Positive thoughts	4
Affect	Code	Affect Age Group 1
	Information distrust	4
	Information trust	3
	Negative feelings	5
	Positive feelings	5
	Positive feelings with	2
	Reasons to distrust	0
	Reasons to trust	1
	System distrust	3
	System trust	3
Past Behavior	Code	PB Age Group 1
	Negative experience	5
	Negative past behavior	2
	Negative system experience	2
	Positive experience	2
	Positive past behavior	2
	Positive system experience	0

The overall attitude of this age group is very positive with an optimistic outlook about the system and the information within the system. Even though they trust the system and the inherent capabilities of the system, they do not trust the information in the system. Since their previous experiences with the system have been overwhelmingly negative in nature, their positive attitude overcomes it and they persevere. This also could be attributable to their lack of experiences and/or naivety with experiences interacting with systems in general. Another possibility is the willingness and forgiveness of systems due to the level of exposure throughout their adolescence.

Group 2

In age group 2, the participants have more of a balanced approach to the outlook of the system and the information in the system. This group expressed positive thoughts about some elements while expressing serious concerns about others but not heavily weighted in one direction or the other.

Attitude	Code	Age Group 2
Cognition	Cognitive process	6
	Decision making impact	5
	Decision making process	2
	Negative thoughts	4
	Positive thoughts	10
Affect	Code	Affect Age Group 2
	Information distrust	9
	Information trust	9
	Negative feelings	8
	Positive feelings	4
	Positive feelings with	4
	Reasons to distrust	2
	Reasons to trust	0
	System distrust	6
	System trust	1
Past Behavior	Code	PB Age Group 2
	Negative experience	7
	Negative past behavior	3
	Negative system experience	3
	Positive experience	2
	Positive past behavior	3
	Positive system experience	0

They expressed trust for the system but not for the information in the system, similar to the previous group. The overall feelings expressed by the group were again balanced with positive and negative feelings. Their overall experiences with the system were negative even though they indicated that their experiences with the system were

predominantly positive. This positive system experience was also reflected in the perception of their past behavior. The findings indicate that while they had more negative experiences overall, it was primarily due to the information rather than the system itself from their perspective. The overall attitude of the group is neutral. Their attitude about the information in the system is negative due to significant distrust in the system and partially with the information in the system. This group expressed significant negativity in system experiences as well as general experiences because they distrust the system itself. Even with the balance of feeling and thoughts, this group expressed more positive past behavior. This could be attributable to their increased experience. Additionally, this group had more negative thoughts than the previous group even though their trust for the information was more balanced. The overall attitude for this group was expressed as more negative with the system but they were positive about how they were applying the lessons learned.

Group 3

In age group 3, the participant's thoughts grew increasingly negative over the previous groups. This particular age group expressed substantially more negative thoughts than positive thoughts in regard to the system and the information. They also expressed significant distrust with the system and the information in the system yet they had different feelings. This group expressed positive feelings overall, focusing on not what the system was currently providing, but rather what they felt the system had the potential to provide.

Attitude	Code	Cognition Age Group
Cognition	Cognitive process	12
	Decision making impact	7
	Decision making process	4
	Negative thoughts	7
	Positive thoughts	4
Affect	Code	Affect Age Group 3
	Information distrust	6
	Information trust	3
	Negative feelings	7
	Positive feelings	9
	Positive feelings with	7
	Reasons to distrust	3
	Reasons to trust	2
	System distrust	6
	System trust	3
Past Behavior	Code	PB Age Group 3
	Negative experience	11
	Negative past behavior	4
	Negative system experience	3
	Positive experience	7
	Positive past behavior	8
	Positive system experience	2

The difference was described as system discipline and other human factors influencing the system rather than the inherent system limitations. This group described more of an understanding for the intricacies of the system. While their overall previous experiences are negative, they expressed a more balance position with the experiences of the system itself. Again, this group also expressed a more positive past behavior with the same rationale as the previous two groups. The findings indicate that while they expressed positive past behavior and positive feelings for the system, the overall attitude of this group was negative. This was due to the negative thoughts and distrust for the present users responsible for proper discipline with the system.

Group 4

In age group 4, the participants expressed predominantly positive thoughts. They also expressed distrust for the information in the system while expressing trust for the system itself. Unlike the other age groups, this age group expressed substantial amounts of negative feelings collectively. This group, like the previous group, expressed how the distrust for the information was due to the inputs going into the system and the lack of process discipline associated with the inputs. This particular group has had a significant amount of interaction with the system and they understand how it functions under ideal circumstances, but they also know those circumstances are not what they are experiencing currently.

Attitude	Code	Cognition Age Group 4
Cognition	Cognitive process	2
	Decision making impact	2
	Decision making process problem	2
	Negative thoughts	5
	Positive thoughts	10
Affect	Code	Affect Age Group 4
	Information distrust	9
	Information trust	5
	Negative feelings	9
	Positive feelings	2
	Positive feelings with contingency	0
	Reasons to distrust	3
	Reasons to trust	1
	System distrust	2
	System trust	4
Past Behavior	Code	PB Age Group 4
	Negative experience	8
	Negative past behavior	3
	Negative system experience	3
	Positive experience	3
	Positive past behavior	3
	Positive system experience	1

Their experiences are being expressed as negative overall and their system specific experiences are also being expressed as negative even though they possess positive thoughts and system trust. It is the experience that is driving the positive thoughts, the negative feelings and information distrust, along with the system trust. As this age group expressed each of these things, they possessed a balance on their past behavior, which is unlike any of the other age groups. The findings indicate that with the overwhelmingly negative outlook on the information, experiences, and their feelings, the overall attitude for this age group is negative.

4.6.2.2 Attitude by Gender

While the Attitude of the gender group varied between females and males, the female group had significantly more feelings toward their opinion of the information system relative to the male gender group. The findings showed that this was a significant factor in the overall attitude of the female gender group. Even though the male gender group expressed a more positive attitude towards information system, they also expressed significant amount of negativity but just slightly less.

Male

In the male gender group, the participants expressed more positive thoughts towards the information in the system. The participants in this group also expressed more distrust for the information and more distrust for the system. However, this same group

also expressed more positive feelings overall. Even though they express more positive feelings, they also explained how their experiences have been mostly negative as well as the experiences of the system.

Attitude	Code	Male
Cognition	Cognitive process	24
	Decision making impact	14
	Decision making process problem	8
	Negative thoughts	14
	Positive thoughts	17
Affect	Code	Affect Male
	Information distrust	19
	Information trust	15
	Negative feelings	21
	Positive feelings	14
	Positive feelings with	12
	Reasons to distrust	7
	Reasons to trust	3
	System distrust	10
	System trust	8
Past Behavior	Code	PB Male
	Negative experience	25
	Negative past behavior	11
	Negative system experience	9
	Positive experience	10
	Positive past behavior	11
	Positive system experience	2

Like many of the other groups, this particular group expressed more positive past behaviors than negative behaviors. Overall, the findings show that the attitude of this particular group is more positive with significant amounts of distrust for various reasons.

Female

In the female gender group, the participants expressed more negative thoughts. The female gender group also expressed substantially more distrust for the information and distrust for the system.

Attitude	Code	Female
Cognition	Cognitive process	2
	Decision making impact	1
	Decision making process	2
	Negative thoughts	3
	Positive thoughts	4
Affect	Code	Affect Female
	Information distrust	9
	Information trust	5
	Negative feelings	8
	Positive feelings	6
	Positive feelings with	1
	Reasons to distrust	1
	Reasons to trust	1
	System distrust	7
	System trust	3
Past Behavior	Code	PB Female
	Negative experience	6
	Negative past behavior	1
	Negative system experience	2
	Positive experience	4
	Positive past behavior	5
	Positive system experience	1

Equally, this group expressed more negative experiences overall and more negative system experiences. Like the male gender group, the female gender group also expressed more significance towards positive past behavior. Overall, the findings show that the attitude of this particular group is more negative towards the information as well as the system altogether.

4.6.2.3 Attitude by Tenure with Company

Generally, findings showed that while there is a slightly more positive attitude toward the system, there is also a strong distrust for the information in the system and the system as well.

Less than 10 Years Tenure with Company

In the group with less than 10 years with the company, the findings showed that this group has substantially more positive thoughts and more positive feelings. This group also expressed a balance of trust and distrust for the information in the system while they shared their strong feelings of system distrust. Equally, this group expressed more negative experiences as well.

Attitude	Code	< 10Yrs Tenure with Company
Cognition	Cognitive process	16
	Decision making impact	12
	Decision making process problem	6
	Negative thoughts	6
	Positive thoughts	15
Affect	Code	Affect <10 Yrs Tenure
	Information distrust	17
	Information trust	15
	Negative feelings	14
	Positive feelings	13
	Positive feelings with contingency	10
	Reasons to distrust	3
	Reasons to trust	2
	System distrust	13
	System trust	7
Past Behavior	Code	PB <10 Tenure with Company
	Negative experience	17
	Negative past behavior	8
	Negative system experience	7
	Positive experience	8
	Positive past behavior	9
	Positive system experience	2

Overall, the findings indicate that this group expressed a more positive attitude with a sense of distrust for the system.

More than 10 Years Tenure with Company

In the group with more than 10 years with the company, the findings showed that this group expressed a balance between positive and negative thoughts and a balance between system trust and distrust. However, they expressed more distrust for the information in the system and negative feelings overall. This group also expressed more

negative experiences and more negative system experiences yet they maintain a more positive outlook regarding past behaviors.

Attitude	Code	>10Yrs Tenure with Company
Cognition	Cognitive process	10
	Decision making impact	4
	Decision making process problem	3
	Negative thoughts	10
	Positive thoughts	9
Affect	Code	Affect >10 Yrs Tenure
	Information distrust	11
	Information trust	5
	Negative feelings	15
	Positive feelings	7
	Positive feelings with contingency	3
	Reasons to distrust	5
	Reasons to trust	2
	System distrust	4
	System trust	4
Past Behavior	Code	PB >10 Tenure with Company
	Negative experience	14
	Negative past behavior	4
	Negative system experience	4
	Positive experience	6
	Positive past behavior	7
	Positive system experience	1

Largely, the findings indicate that this group expressed a more negative attitude towards the information and the systems.

4.6.2.4 Attitude by Tenure in Management

Overall, the findings showed that the attitude of the participants expressed a more negative attitude towards the information in the system as well as the system.

Less than 3 Years Tenure in Management

In the group with less than 3 years tenure in management, the findings showed that this group had much more positive thoughts while expressing more negative feelings. This group also expressed a balance of information trust and distrust while also expressing more distrust in the system. Their experiences were described as significantly more negative both from a system perspective as well as overall, yet they also described more positive past behavior.

Attitude	Code	< 3 Yrs Management
Cognition	Cognitive process	15
	Decision making impact	12
	Decision making process problem	5
	Negative thoughts	5
	Positive thoughts	19
Affect	Code	Affect <3 Yrs Management
	Information distrust	15
	Information trust	14
	Negative feelings	13
	Positive feelings	8
	Positive feelings with contingency	8
	Reasons to distrust	1
	Reasons to trust	2
	System distrust	11
	System trust	7
Past Behavior	Code	PB <3 Yrs Management
	Negative experience	12
	Negative past behavior	8
	Negative system experience	6
	Positive experience	4
	Positive past behavior	6
	Positive system experience	1

By and large, the findings indicate that this group expressed a more negative attitude to include a sense of distrust in the system.

More than 3 Years Tenure in Management

In the group with more than 3 years tenure in management, the findings showed that this group had much more negative thoughts associated with the system and information along with more negative feelings. The participants in this group also described significant amount of distrust in the system as well as more distrust in the information.

Attitude	Code	> 3 Yrs Management
Cognition	Cognitive process	13
	Decision making impact	6
	Decision making process problem	4
	Negative thoughts	12
	Positive thoughts	9
Affect	Code	Affect >3 Yrs Management
	Information distrust	13
	Information trust	6
	Negative feelings	16
	Positive feelings	12
	Positive feelings with contingency	5
	Reasons to distrust	7
	Reasons to trust	2
	System distrust	6
	System trust	4
Past Behavior	Code	PB >3 Yrs Management
	Negative experience	19
	Negative past behavior	4
	Negative system experience	5
	Positive experience	10
	Positive past behavior	10
	Positive system experience	2

Equally this group expressed more negative experiences overall in system experiences while possessing a positive experience with past behavior In general, the

findings indicate that this group expressed a more negative attitude to include a sense of positive past behavior.

4.6.2.5 Attitude by DSS Experience

Overall, the findings show that the attitude of the participants was more positive toward the system and more negative toward the information in the system.

Less than 7 Years DSS Experience

In the group with less than 7 years DSS experience, the findings showed that this group expressed more positive thoughts towards the information and the system. Additionally, this particular group expressed a balance between information trust and distrust while the system itself had significantly more distrust. This group also expressed positive feelings towards the system. However, both the overall experience and the system experience were expressed as substantially negative while the past behaviors were more positive.

Attitude	Code	< 7 Yrs DSS
Cognition	Cognitive process	15
	Decision making impact	8
	Decision making process problem	5
	Negative thoughts	10
	Positive thoughts	15
Affect	Code	Affect <7 Yrs DSS
	Information distrust	18
	Information trust	15
	Negative feelings	16
	Positive feelings	16
	Positive feelings with contingency	8
	Reasons to distrust	4
	Reasons to trust	2
	System distrust	12
	System trust	6
Past Behavior	Code	PB <7 Yrs DSS
	Negative experience	19
	Negative past behavior	6
	Negative system experience	7
	Positive experience	10
	Positive past behavior	10
	Positive system experience	2

Overall, the findings indicate that this group expressed a more positive attitude while containing distrust for the system and the information.

More than 7 Years DSS Experience

In the group with more than 7 years DSS experience, the findings showed that this group expressed a balance of positive and negative thoughts and more distrust for the information in feelings of negativity. Additionally this group also expressed a balance of system trust and distrust. Experientially, this particular group expressed more negative experiences overall and more negative system experiences. Unlike the other groups, this

particular group expressed a balance between negative past behaviors and positive past years.

Attitude	Code	> 7 Yrs DSS
Cognition	Cognitive process	11
	Decision making impact	6
	Decision making process problem	4
	Negative thoughts	9
	Positive thoughts	9
Affect	Code	Affect >7 Yrs DSS
	Information distrust	10
	Information trust	5
	Negative feelings	13
	Positive feelings	4
	Positive feelings with contingency	5
	Reasons to distrust	4
	Reasons to trust	2
	System distrust	5
	System trust	5
Past Behavior	Code	PB >7 Yrs DSS
	Negative experience	12
	Negative past behavior	6
	Negative system experience	4
	Positive experience	4
	Positive past behavior	6
	Positive system experience	1

Overall, the findings indicate that this group expressed a more balanced approach in attitude.

4.6.3 Emergent Themes of Attitude

Within the demographic classification of age group, many emergent themes surfaced within the three constructs. First of all, cognition evolved more negatively as the age groups increased until the approximate age of 50. The findings indicated that after the

age of 50 the participants expressed more positive feeling thus coming full circle back to a positive state as described by the first age group. From a state of affect, the age groups 3 and 4 both expressed information distrust while age group 4 expressed a substantial amount of negative feelings overall. From a state of past behavior, the responses of experiences overall and with the system reflect a significantly negative overtone. Additionally, the participants expressed a balance of positive past behavior and negative past behavior but no significant findings by age group were substantial.

Overall, the category of age was found to be a significant determinant in the construct of attitude. While the thoughts and feelings varied from age group to age group, the findings found the category of age to be very influential in determining behavioral intention as a whole.

Within the demographic classification of gender, the data did not show any significant findings for the construct of cognition, affect, and past behavior. Even though the demographic category had minor variances across both gender groups, the findings were insignificant. Therefore, the findings did not indicate any substantial findings for attitude relative to gender.

Within the demographic classification of tenure with company, the findings showed emergent themes within the constructs of cognition and affect. However, the findings did not indicate any representation in the construct of past behavior as a sole category. Within the construct of cognition, the group with less than 10 years of tenure with the company expressed substantially more positive thoughts while the more tenured group expressed more of a balance between positive and negative thoughts. Within the construct of affect, the group with 10 or more years of tenure with the company expressed more distrust for

the information in the system and also expressed substantially more negative feelings overall. This same group expressed more balance in the system trust/ distrust category as well.

Overall, the category of tenure with the company was found to be a significant determinant in the construct of attitude. The specific variations and the findings between the two groups indicate a possible link between tenure and trust of the information in the system.

Within the demographic classification of tenure in management, the findings showed emergent themes across all three constructs. In the construct of cognition, the group with three years or less of management experience expressed more positive thoughts about the information. This could indicate a link from tenure in management to the information within the system relative to their ability to make sound decisions. As for the construct of affect, the group with more than three years of management experience expressed more distrust for the information while the other group found more distrust with the system itself. The findings indicate that the more tenured group had a tendency to trust the system and not the information and attitude was indeed relative to tenure in management. With the construct of past behavior, the group with less than three years management experience expressed a large percentage of negative experiences versus the other group. The findings show a link between the more tenured management team to more positive past behaviors in regard to how they respond to adversity with the system.

Overall, the category of tenure in management was found to be a significant determinant in the construct of attitude. The findings indicate a link between tenured management and positive past behavior.

Within the demographic classification of DSS experience, the findings showed emergent themes across the constructs of affect and past behavior. In the construct of affect, the group with less than seven years of DSS experience found the system to be substantially more distrustful which implies increased negative feelings towards the system with the group that has more than seven years of DSS experience. As for past behavior, the group with more than seven years of DSS experience had more negative experiences overall and expressed more negative system experiences. The findings indicate that a link between DSS experience and positive past behavior to the construct of past behavior and attitude.

In table 23, the findings of the demographic classifications relative to attitude are summarized.

Table 23. Attitude Codebook

ATTITUDE			
	COGNITION FINDINGS	**AFFECT FINDINGS**	**PAST BEHAVIOR FINDINGS**
OVERALL	Data shows a link between participant's age, tenure in management, and company tenure to positive and negative thoughts about the system.	Data shows a link between participant's age, experience with systems, management, and company tenure to trust in the system, distrust in the information, and negative feelings about the system.	Data shows a link between negative feelings and negative system experience with a positive past behavior outlook relative to age, gender, tenure with company, tenure in management, and DSS experience
AGE	Data shows link between age and opinion of the system to fulfill their needs	Data shows a link between age in both the system/information to trust and distrust	NO SIGNIFICANT AGE FINDINGS
GENDER	NO SIGNIFICANT GENDER FINDINGS	NO SIGNIFICANT GENDER FINDINGS	NO SIGNIFICANT GENDER FINDINGS
TENURE WITH COMPANY	Data shows link between tenure with company to confidence with system in making decisions	Data shows link between tenure with company to more trust in the system, distrust in the information, and negative feelings toward the system	NO SIGNIFICANT COMPANY TENURE FINDINGS
TENURE IN MANAGEMENT	Date shows link between tenure in management to the perspective on the system relative to their ability to make decisions	Data shows link between tenure in management to more trust in the system, distrust in the information, and negative feelings toward the system	Date shows link between tenure in management to a positive past behavior perspective
DSS EXPERIENCE	NO SIGNIFICANT DSS EXPERIENCE FINDINGS	Data shows link between DSS experience to more trust in the system, distrust in the information, and negative feelings toward the system	Data shows link between DSS experience to positive past behavior

4.6.4 Attitude Summary

In summation, the findings show how the constructs of cognition, affect, and past behavior play a role in the demographic classifications of age, gender, tenure with company, tenure in management, and DSS experience. As previously explained, attitude is comprised of these constructs therefore it's essential to identify the individual role each construct plays in behavioral intention. Table 24 illustrates how each construct relates to the classification with an overall finding for each individual construct. Each classification was found to be significant overall with the exception of gender.

Table 24. Attitude Summary Findings

ATTITUDE	SECOND CYCLE CODES
COGNITION	Age, tenure in management, and company tenure link to positive and negative thoughts about the system. Each play a role in attitude and behavioral intention
AFFECT	Age, tenure in management, and tenure with company link to trust in the system, distrust in the information, system experience, and negative feelings about the system. Each play a role in attitude and behavioral intention
PAST BEHAVIOR	Tenure in management and DSS experience link to negative feelings, negative system experience, and positive past behavior. Each play a role in attitude and behavioral intention

Table 24 illustrates the three constructs with the second cycle code for the aggregate of attitude.

Overall, the findings discovered emergent themes in the construct of cognition relative to age and tenure that are significant to attitude and behavioral intention. Additionally, in the construct of affect, the findings also discovered emergent themes relative to age, company tenure, and management tenure. Each of these findings is significant to attitude as well as behavioral intention. Finally, in the construct of past behavior, the findings discovered emergent themes relative to tenure in management, and DSS experience. Each one of these findings is significant to attitude and behavioral intention. Although some of the demographic classifications did not contain emergent themes within each of the three constructs, cognition, affect, and past behavior, all provided emergent themes that were indeed significant to attitude as well as behavioral intention.

4.7 The Impact of Subjective Norms on Behavioral Intentions to Use DSS Information (RQ 2)

4.7.1 Subjective Norms Overview

The interview questions for subjective norms focused on the influences of people in social environments relative to behavioral intention. Subjective norms identify the beliefs of people and the weighted influence of others opinions that influence behavioral intention. Therefore, the interview questions focused on the social environment of an aircraft manufacturing facility. The questions were designed to probe into their interactions with supervisors, peers, and employees in relation to their motivation to comply or not comply

with their wishes. This was also followed by a query about whether or not they did or did not choose to comply. As shown in Table 25, there was an overall importance to comply and the majority of the participants explained that they did comply.

Table 25. Subjective Norms Codebook

Subjective Norms Codes	Total	Max	Mean	Std Dev
Did comply	9	2	0.75	0.754
Did not comply	3	1	0.25	0.452
Important to comply	19	3	1.583	0.793
Not important to comply	11	2	0.917	0.515
Subjective norm employees	5	1	0.417	0.515
Subjective norm peers	7	2	0.583	0.669
Subjective norm supervisors	14	5	1.167	1.403

In general, the majority of the influence came from the supervisor 2 to 1 over the peer influence and almost 3 to 1 over the employee influence. The standard deviation also represents this influence from the supervisors. Additionally, the findings indicate that the influence of participants to comply outweigh the influence not to comply and equally so, the participants expressed how the influence motivated them to comply 3 to 1 over not complying. As a whole, the group expressed the desire to comply with the wishes of others, especially the wishes from their supervisors but they did provide examples of circumstances when it was not acceptable to comply and they did not comply as a result.

4.7.2 Subjective Norms Cross-Case Findings

The cross case findings provide the data within the context of subjective norms to identify emergent themes across various cases based on the demographic category.

4.7.2.1 Subjective Norms by Age

Similar to the other constructs, the cross-case findings use demographic data by age groups that are divided into four categories. The age groups 1 through 3 had very similar themes. Generally this consisted of complying with the wishes of their supervisor and expressing the importance of complying with the wishes of others. However, group 4 had a different perspective on the situation. They expressed more passion for not complying in general but only when it warrants the request, regardless of the person or position making the request. The findings in this group are significant as an emergent theme.

Group 1

In age group 1, the participants expressed the importance to comply with the wishes of their supervisor more than others, but they did express the desire to comply with their employees even though they did not report to them. However, this particular age group did not identify the need to comply with the wishes of their peers. They did express the importance to comply with the wishes of others more than not complying but they expressed the need to explain their position of not complying.

Subjective Norms Codes	SN Age Group 1
Did comply	1
Did not comply	0
Important to comply	4
Not important to comply	3
Subjective norm employees	2
Subjective norm peers	0
Subjective norm supervisors	3

Under certain circumstances, this group expressed the need to not comply as well, even though this was infrequent and not typical. The findings indicate that this group expressed the importance to comply with supervisors and employees and the likelihood of complying.

Group 2

In age group 2, the participants expressed the importance to comply with the wishes of their supervisors more than 4 to 1 over employees and peers. They did not express a strong need to comply with their peers and they did not express any interest in complying with the wishes of their employees at all. This particular age group also expressed an importance to comply almost 2 to 1 over not complying. Additionally, this group explained how they did comply in the past and expressed minimal amount of information regarding not complying.

Subjective Norms Codes	SN Age Group 2
Did comply	2
Did not comply	1
Important to comply	5
Not important to comply	3
Subjective norm employees	0
Subjective norm peers	2
Subjective norm supervisors	6

While this group did not have specific examples of not complying, they hypothetically provided examples of when it would be appropriate.

Group 3

In age group 3, the participants expressed the importance to comply with the wishes of their supervisor more than twice as much as their peers. This group also expressed minimal interest in complying with the wishes of their employees but did express interest in complying with their peers. This group expressed a great deal of interest in complying overall, while expressing very minimal interest in not complying. Equally, they provided examples of when they did comply 5 to 1 over the examples of not complying. Overall, this group expressed the need to comply with the wishes of others as a whole and comply with the wishes of their supervisors.

Subjective Norms Codes	SN Age Group 3
Did comply	6
Did not comply	1
Important to comply	7
Not important to comply	2
Subjective norm employees	1
Subjective norm peers	3
Subjective norm supervisors	9

While not as significant, they did express interest in complying with peers as well. They also provided examples of situation when they did comply, while only providing one example of not complying.

Group 4

In age group 4, the participants expressed a balance to comply with the wishes of their supervisor with the wishes to comply with the wishes of their peers. This particular age group expressed a much different perspective to complying than the other three age groups. This particular group explained how their wishes to comply are not influenced by title or position as much as it is influenced by the logic of the actual request itself. Therefore, the request is not based on who is asking but rather what is being requested and why. Equally as interesting is their importance to comply. Once again, this group expressed a balance of importance to comply as importance not to comply. They once again explained how their opinion of the request was more important than who is making the request.

Subjective Norms Codes	SN Age Group 4
Did comply	0
Did not comply	1
Important to comply	3
Not important to comply	3
Subjective norm employees	2
Subjective norm peers	2
Subjective norm supervisors	8

Ultimately, this group indicated that should they be forced to comply they would but it would be under protest and they would profusely oppose it with extensive explaining and rationale included. Additionally, they provided an example of when they chose to not comply while neglecting to provide examples of complying. It was very evident that the emergent theme with this group included noticeably more independence and less compliance. This group expressed the importance of not complying with standard social norms but rather explaining and defending their position.

4.7.2.2 Subjective Norms by Gender

In the category of gender, both groups of participants expressed more desire regarding the importance to comply with their supervisors than their peers. Additionally, both groups expressed the overall importance to comply as a whole and provided examples of such behavior. The findings show that there are no marked distinctions between the two groups as a demographical classification therefore no significant findings were discovered.

Male

In the male gender group, the participants expressed the importance to comply with the wishes of others substantially more than the desire to not comply by more than 2 to 1.

Subjective Norms Codes	SN Male
Did comply	8
Did not comply	2
Important to comply	16
Not important to comply	8
Subjective norm employees	4
Subjective norm peers	4
Subjective norm supervisors	18

The supervisor was identified as the significant person in this capacity with the supervisory role being the primary influence, the peer group being secondary. However, the employee influence was not significant enough to be considered in the findings.

Female

In the female gender group, the participants expressed a slightly different perspective into the social factor of influence. In this group, the participants identified the significant influence as the supervisor similar to that of the male gender group. This group selected the supervisor 2 to 1 over the peer influence even though they were identified as a significant factor.

Subjective Norms Codes	SN Female
Did comply	1
Did not comply	1
Important to comply	3
Not important to comply	3
Subjective norm employees	1
Subjective norm peers	3
Subjective norm supervisors	9

However, differences in perspective began to emerge as the importance to comply was coded. In the female gender group, they expressed a completely balanced approach to the importance to comply influence. They expressed the need and importance of not complying to the wishes of others if logic presents a better option. This group also expressed equal and balanced representation in the experiential category of did comply/ did not comply. Thus, further validating the importance to comply influence.

4.7.2.3 Subjective Norms by Tenure with Company

In the category of tenure with company, both groups of participants expressed similar concerns regarding the importance to comply with their supervisors more than their peers though, not as much. Additionally, both groups expressed the overall importance to comply as a whole and provided examples of such behavior. The findings show that there are no significant distinctions between the two groups as a demographical classification therefore no significant findings were discovered.

Less than 10 Years Tenure with Company

In the group with less than ten years tenure with the company, the participants expressed a slightly more influential factor with supervisors than peers. Again, this group expressed the importance of the peer network but explained how the supervisor role was more of a significant influence to comply overall. Additionally, this group expressed the importance to comply in general as an overwhelmingly significant factor relative to not complying.

Subjective Norms Codes	SN <10 Tenure with Company
Did comply	6
Did not comply	0
Important to comply	12
Not important to comply	7
Subjective norm employees	3
Subjective norm peers	4
Subjective norm supervisors	18

Equally, this group provided examples of experiences when they did comply more than when they did not comply. Overall, this group expressed the importance to comply and expressed the primary factor of influence to be the supervisor.

More than 10 Years Tenure with Company

In the group with more than ten years tenure with the company, the participants expressed supervisors as a slightly more influential factor than peers. Again, this group expressed the importance of the peer network but explained how the supervisor role was more of a significant influence to comply overall.

Subjective Norms Codes	SN >10 Tenure with Company
Did comply	3
Did not comply	3
Important to comply	7
Not important to comply	4
Subjective norm employees	2
Subjective norm peers	3
Subjective norm supervisors	9

Similar to previous groups, this group expressed the importance to comply almost twice as much as the importance not to comply. Equally, this group discussed numerous experiences when they did comply while not providing a single experience when they did not comply with the wishes of others.

4.7.2.4 Subjective Norms by Tenure in Management

In the category of tenure in management, both groups of participants expressed similar concerns regarding the importance to comply with their supervisors most of all and peers as well, though not as much. Additionally, both groups expressed the overall importance to comply as a whole and provided examples of such behavior. The findings show that there are no significant distinctions between the two groups as a demographical classification therefore no significant findings were discovered.

Less than 3 Years Tenure in Management

In the group with less than three years in management, the participants expressed the importance to comply with the wishes of their supervisor more than twice the amount

of their peers. This group also expressed minimal interest in complying with the wishes of their employees but did express interest in complying with their peers as a key factor of social influence.

Subjective Norms Codes	SN <3 Yrs Management
Did comply	4
Did not comply	0
Important to comply	9
Not important to comply	7
Subjective norm employees	3
Subjective norm peers	4
Subjective norm supervisors	15

Additionally, this group expressed the importance to comply with the wishes of others but not by a large margin. Additionally, this group expressed the importance to comply in general as a significant factor relative to not complying. Equally, this group provided examples of experiences when they did comply but did not provide any examples of experiences of when they did not comply.

More than 3 Years Tenure in Management

In the group with more than three years management experience, the participants expressed supervisors as a slightly more influential factor than peers. Again, this group expressed the importance of the peer network but explained how the supervisor role was more of a significant influence to comply overall. Similar to previous groups, this group expressed the importance to comply more than twice as much as the importance not to comply.

Subjective Norms Codes	SN >3 Yrs Management
Did comply	5
Did not comply	3
Important to comply	10
Not important to comply	4
Subjective norm employees	2
Subjective norm peers	3
Subjective norm supervisors	12

Equally, this group provided examples of experiences when they did comply more than when they did not comply. Overall, this group expressed the importance to comply and expressed the primary factor of influence to be the supervisor.

4.7.2.5 Subjective Norms by DSS Experience

In the category of DSS experience, both groups of participants expressed similar concerns regarding the importance to comply with their supervisors most of all and peers as well even though not as much. Additionally, both groups expressed the overall importance to comply as a whole and provided examples of such behavior. The findings show that there are no significant distinctions between the two groups as a demographical classification therefore no significant findings were discovered.

Less than 7 Years DSS Experience

In the group with less than 7 years' experience with a DSS, the participants expressed the importance to comply with the wishes of their supervisor more than twice the amount of their peers. This group also expressed minimal interest in complying with

the wishes of their employees but did express interest in complying with their peers. This group expressed a great deal of interest in complying overall while expressing very minimal interest in not complying.

Subjective Norms Codes	SN <7 Yrs DSS
Did comply	5
Did not comply	1
Important to comply	12
Not important to comply	7
Subjective norm employees	3
Subjective norm peers	3
Subjective norm supervisors	16

Equally, they provided examples of when they did comply 5 to 1 over the examples of not complying. Overall, this group expressed the need to comply with the wishes of others as a whole and comply with the wishes of their supervisors. They also provided examples of situation when they did comply while only providing one example of not complying.

More than 7 Years DSS Experience

In the group with more than 7 years' experience with a DSS , the participants expressed the importance to comply with the wishes of their supervisor most of all but they did express the desire to comply with their peers even though they did not report to them.

Subjective Norms Codes	SN >7 Yrs DSS
Did comply	4
Did not comply	2
Important to comply	7
Not important to comply	4
Subjective norm employees	2
Subjective norm peers	4
Subjective norm supervisors	11

However, this particular experienced group did not identify the need to comply with the wishes of their employees very often. They did express the importance to comply with the wishes of others more than not complying but they expressed the need to explain their position of not complying. Under certain circumstances, this group expressed the need to not comply as well although not typically and infrequently. The findings indicate that this group expressed the importance to comply with supervisors and peers but not employees. This group also expressed the likelihood of complying as a whole.

4.7.3 Emergent Themes of Subjective Norms

Within the demographic classification of age group, the first three groups expressed similar social influences of complying with supervisors and peers while expressing the importance to comply overall as well. However, age group 4 expressed a different perspective. They contended that not complying was equally as acceptable providing the situation warranted such action regardless of the person or the role of the person making the request. The findings show a link between age and importance to comply, considered significant as an emergent theme regarding the age and the construct subjective norm.

Within the demographic classification of gender, both groups of participants expressed similar desires regarding the importance to comply with their supervisors and both groups expressed the overall importance to comply as a whole and provided examples of such behavior. The findings show that there are no significant distinctions between the two groups as a demographical classification therefore no significant findings were discovered.

Within the demographic classification of tenure with the company, both groups of participants expressed similar concerns regarding the importance to comply with their supervisors most of all and peers as well. Both groups also expressed the overall importance to comply as a whole and provided examples of such behavior. Therefore, the findings show that there are no significant distinctions between the two groups as a demographical classification therefore no significant findings were discovered.

Within the demographic classification of tenure in management, both groups of participants expressed similar concerns regarding the importance to comply with their supervisors and peers. Both groups also expressed the overall importance to comply as a whole and provided examples of such behavior. Therefore, the findings show that there are no significant distinctions between the two groups as a demographical classification therefore no significant findings were discovered.

Within the demographic classification of DSS experience, both groups of participants expressed similar concerns regarding the importance to comply with their supervisors and they expressed the importance to comply as a whole and provided examples of such behavior. Therefore, the findings show that there are no significant

distinctions between the two groups as a demographical classification therefore no significant findings were discovered.

In Table 26, the findings of the demographic classifications relative to subjective norms are summarized.

Table 26. Subjective Norms Summary Findings

SUBJECTIVE NORMS	FINDINGS SUMMARY	SECOND CYCLE CODES
AGE	Data shows a link between age and importance to comply	Data shows a link between age and importance to comply with regards to subjective norms
GENDER	NO SIGNIFICANT GENDER FINDINGS	
TENURE WITH COMPANY	NO SIGNIFICANT COMPANY TENURE FINDINGS	
TENURE IN MANAGEMENT	NO SIGNIFICANT MANAGEMENT TENURE FINDINGS	
DSS EXPERIENCE	NO SIGNIFICANT DSS EXPERIENCE FINDINGS	

4.7.4 Subjective Norms Summary

In summation, the findings show that only age contributes as a significant role in the impact of subjective norms relative to behavioral intention. Within the classification of age, the findings show a distinct link between age and importance to comply with regards to subjective norms. While age was the only social influence, common themes began to emerge across the construct as a whole that identified it as a significant factor in behavioral intention.

As an observation regarding subjective norms, the younger participants were much more willing to comply and they felt more compelled to comply with the wishes of others in general. One participant expressed the willingness to comply with whatever his supervisor asked as a need to retain his employment at all cost regardless of ethical standard. Contrarily speaking, one of the older participants expressed the defiance to not comply regardless of employment retention if they felt strongly about the opposition to the request. They had described previous experiences where the previous management had put them in a precarious position and used them as a scapegoat for the problem in the area which explains why they felt the way they did.

4.8 The Impact of Perceived Behavioral Controls on Behavioral Intentions to Use DSS Information (RQ 3)

4.8.1 Perceived Behavior Controls Overview

The interview questions for perceived behavioral controls focused on the influences of the participant's perceived ease or difficulty of performing a particular behavior determined by accessible controlled beliefs. The control beliefs are the presence of factors that may facilitate or impede their performance of the desired behavior. Therefore, the interview questions focused on the things that the participants perceive as facilitating or impeding their performance. The questions were designed to probe into the factors listed in table 23. While each factor was identified, some were expressed as more significant and influential than others. Based on their experiences with the system and the information in

the system, the participants expressed their perspective of the inhibiting factors and with each expression, a code was assigned. The four primary themes that emerged from the codes were information, system, process discipline, and training as illustrated below in table 27.

Table 27. Perceived Behavioral Controls Codebook

Code	Total	Max	Mean	Std Dev
Information accuracy	8	3	0.667	1.073
Information inaccuracy	14	5	1.167	1.403
Information inputs/outputs	11	3	0.917	0.9
Information source	12	5	1	1.414
Information Use	6	2	0.5	0.674
Lack of Training	19	4	1.583	1.311
Process Discipline	28	4	2.333	1.303
System complexity	17	4	1.417	1.379
System functionality	9	2	0.75	0.622
System limitations	22	6	1.833	1.697
System outdated	8	3	0.667	0.888
System problems	15	6	1.25	1.658
System slowness	6	2	0.5	0.674

Overall, the majority of the influence was expressed as process discipline as a single point of influence with 28 codes. However, once the categories of information and systems are combined together, the total for systems and information related influence is 77 and 70 respectively. Lastly, the remaining code was lack of training with 19 codes. The code of information accuracy/ inaccuracy represented the positive and negative attributes of the

overall information. The code of "information inputs/outputs" represented the data going into the system and coming out of the system. The code "information source" represents the person or persons responsible for the information inputs. The codes that had less than six occurrences were considered to be outliers and therefore addressed as of insignificant relevance to the construct of perceived behavioral controls.

4.8.2 Perceived Behavioral Controls Cross-Case Findings

The cross-case findings will analyze the data within the context of perceived behavioral controls to identify emergent themes that are illustrated in the analysis.

4.8.2.1 Perceived Behavior Controls by Age

Similar to the other constructs, the cross-case findings use demographic data by age groups that are divided into four categories.

Group 1

In age group 1, the participants expressed significantly more complexity with the system relative to the other codes as impediments to performance. Within this group, the participants expressed the many challenges of navigating within the system and learning how to access information correctly in the needed format.

Code	PBC Age Group 1
Information accuracy	0
Information inaccuracy	0
Information inputs/outputs	2
Information source	1
Information Use	1
Lack of Training	3
Process Discipline	3
System complexity	4
System functionality	1
System limitations	2
System outdated	0
System problems	0
System slowness	1

The next two codes that were deemed as being significantly represented were process discipline and lack of training. The secondary groups of codes expressed were information input/output and system limitations.

Group 2

In age group 2, the participants expressed more concerns with the information, specifically inaccuracy and the source. These two codes primarily addressed the concerns with distrust for the information in the system and the distrust with the person or persons inputting the data. The next two significant codes for this demographic classification was system related.

Code	PBC Age Group 2
Information accuracy	5
Information inaccuracy	8
Information inputs/outputs	2
Information source	8
Information Use	2
Lack of Training	2
Process Discipline	6
System complexity	8
System functionality	2
System limitations	3
System outdated	1
System problems	7
System slowness	1

System complexity and system problems were identified as key impediments to performance. Like the participants in age group 1, this group expressed concerns about the system difficulty in navigation and obtainment of the right kind of information. However, unlike age group 1, this group expressed concerns regarding the inherent problems of the system itself. Additionally, this group also expressed performance impediments due to process disciplines.

Group 3

In age group 3, the participant's primary concerns for impediment to performance were expressed as process disciplines and lack of training. This particular group explained how the disciplines of the system being followed incorrectly caused them the most consternation.

Code	PBC Age Group 3
Information accuracy	3
Information inaccuracy	2
Information inputs/outputs	3
Information source	2
Information Use	1
Lack of Training	10
Process Discipline	11
System complexity	4
System functionality	4
System limitations	6
System outdated	3
System problems	4
System slowness	2

This was followed by the lack of training that they received, pressuring them to figuring out things on their own. The secondary group of codes dealt with system related issues such as limitations of the system and system problems. One of the participants described problems with the system crashing frequently.

Group 4

In age group 4, the participants expressed system limitations as their primary impediment to performance. They explained how the system failed to provide data in a timely manner (daily or immediately at times) since it was designed to perform weekly updates.

Code	PBC Age Group 4
Information accuracy	0
Information inaccuracy	4
Information inputs/outputs	4
Information source	1
Information Use	2
Lack of Training	4
Process Discipline	8
System complexity	1
System functionality	2
System limitations	11
System outdated	4
System problems	4
System slowness	2

The other substantial impediment expressed by this group was, again, the process discipline mentioned by previous groups. Once again the participants explained how this issue creates a significant amount of confusion and added work for everyone. The remaining secondary codes were expressed as lack of training, information inaccuracy, and system problems.

4.8.2.2 Perceived Behavior Controls by Gender

While the group gender was selected as a demographic classification to identify possible trends and themes, the data shows many similarities between the two groups with insignificant amounts of differences. The two groups both selected process disciplines and system limitations as the top two primary drivers of impediments to performance even though they selected alternate top picks for the group. However, the male gender group selected lack of training as one of the top perceived impediments to performance yet this particular code did not even register as significant within the female gender group. As this

particular code is a very common theme across the other groups, the findings indicate that this particular variation is a significant finding in the gender group.

Male

In the male gender group, the participants expressed process disciplines as the primary impediment to performance with the system. Like many of the other groups, this group focused on the aftermath that is described by the lack of process disciplines throughout the data entry process.

Code	PBC Male
Information accuracy	3
Information inaccuracy	6
Information inputs/outputs	9
Information source	4
Information Use	4
Lack of Training	17
Process Discipline	22
System complexity	9
System functionality	7
System limitations	19
System outdated	7
System problems	8
System slowness	5

Additionally, the system limitations were the next expressed concern from this group as they further concluded that timely information was indeed a substantial impediment to performance. The other significant finding was lack of training. Like many of the other expressed impediments, this group expressed frustration for the obtainment of knowledge on how to navigate the system effectively and efficiently.

Female

In the female gender group, the participants expressed system limitations as the primary impediment to performance. This group also expressed how difficult it was working in a system that provides delinquent data (by as much as a week) and relying on it to make decisions multiple times a day.

Code	PBC Female
Information accuracy	2
Information inaccuracy	7
Information inputs/outputs	2
Information source	8
Information Use	3
Lack of Training	2
Process Discipline	7
System complexity	7
System functionality	2
System limitations	8
System outdated	1
System problems	7
System slowness	0

Additionally, this group identified process discipline and information inaccuracy as other impediments to performance. Secondary codes expressed by this group include system complexity and system problems. An interesting note about this group was their identification of system complexity, yet concerns about the lack of training only consisted of a few codes.

4.8.2.3 Perceived Behavior Controls by Tenure with Company

In the category of tenure with company, the code of process discipline emerged in both groups as the number one perceived driving factor for impediments to performance. Both groups also selected lack of training and system limitations as one of the top drivers for problems inhibiting performance. The findings show similar characteristics between the two groups as no significant findings emerge in the demographic classification of tenure with company.

Less than 10 Years Tenure with Company

In the group with less than 10 years of tenure with the company, the findings showed that the group expressed process disciplines as the primary impediment to performance. Once again the participants recognize the importance of system discipline within the system or within the organization to protect the integrity of the data used to make decision.

Code	PBC <10 Tenure with Company
Information accuracy	5
Information inaccuracy	9
Information inputs/outputs	6
Information source	7
Information Use	4
Lack of Training	10
Process Discipline	14
System complexity	14
System functionality	5
System limitations	15
System outdated	3
System problems	11
System slowness	3

Additional concerns were expressed about system related issues such as limitation and complexities within the system. The participants in this group expressed the lack of training as a significant factor. Lastly, this particular group also identified information inaccuracy as another factor impacting performance.

More than 10 Years Tenure with Company

In the group with more than 10 years of tenure with the company, the findings showed that this particular group expressed process discipline as an overwhelmingly significant factor of impediment performance. In this particular group, this one code was represented 33% more than the next code. The findings show that this particular group felt very strongly about this particular barrier and felt compelled to address it and discuss it repeatedly.

Code	PBC >10 Tenure with Company
Information accuracy	3
Information inaccuracy	5
Information inputs/outputs	5
Information source	5
Information Use	2
Lack of Training	9
Process Discipline	14
System complexity	3
System functionality	4
System limitations	7
System outdated	5
System problems	4
System slowness	3

Additionally, lack of training was also a significant factor in the impediment of performance. The participants in this group also expressed significant informalities to the training regimen provided to them, which often proved to be less than effective and sometimes unsuccessful. Another factor expressed by this group was the system limitations. This issue surfaced less frequently than the other 2 codes, but a few of the participants felt strongly about this particular topic. It was very evident that years of frustration and trepidation were being expressed.

4.8.2.4 Perceived Behavior Controls by Tenure in Management

In the category of tenure in management, both groups expressed process discipline and system limitations as key drivers to impediments to performance. However, in the group with more than 3 years of management experience, the group identified lack of training as a key factor in the overall influence, yet the group with less than 3 years of management experience did not identify lack of training as a significant factor. This particular finding constitutes a significant and emergent theme in the demographic classification of tenure and management.

Less than 3 Years Tenure in Management

In the group with less than 3 years of management experience, the findings showed that the participants in this group expressed system related issues as the primary component to impediments of performance. The three primary systems related drivers were complexity, limitations, and problems. The participants in this group expressed

significant frustrations with basic navigation skills throughout the system. They were upset with the problems they experienced during data extrapolation (that was current and valid for the specific time and date that they were attempting to use it for decision-making purposes.)

Code	PBC <3 Yrs Management
Information accuracy	3
Information inaccuracy	8
Information inputs/outputs	6
Information source	6
Information Use	4
Lack of Training	8
Process Discipline	10
System complexity	14
System functionality	5
System limitations	13
System outdated	2
System problems	10
System slowness	2

This accompanied with various inherent system problems causing failures at inopportune times drove this particular code to a high ranking. Additionally, once again process discipline surfaced as one of the primary drivers in the impediment to performance. This issue, in various magnitudes, is being expressed equally across each of the group

More than 3 Years Tenure in Management

In the group with more than 3 years of management experience, the findings show that this particular group expressed process discipline as the primary driver and

impediment to performance by an overwhelmingly large margin. This particular code was more than 45% greater than the next code in terms of relevancy in importance to the factors that influence perception. Additionally, the lack of training once again was recognized and heavily expressed as a primary driver of perceived influences inhibiting performance.

Code	PBC >3 Yrs Management
Information accuracy	5
Information inaccuracy	6
Information inputs/outputs	5
Information source	6
Information Use	2
Lack of Training	11
Process Discipline	18
System complexity	3
System functionality	4
System limitations	9
System outdated	6
System problems	5
System slowness	4

This group also expressed concerns about timeliness of data and accuracy of the information from the system. The other two codes that surfaced were system limitations and information inaccuracies, which further align with the process discipline issue and the lack of training associated with these particular problems.

4.8.2.5 Perceived Behavior Controls by DSS Experience

In the category of DSS experience, both groups expressed process discipline as the primary factor for impediments to performance. Each of these groups also identified

system limitations as a common theme as well as lack of training. Both of the groups within the tenure of management demographic classification selected similar process codes, therefore no significant emergent themes were identified.

Less than 7 Years DSS Experience

In the group with less than 7 years of DSS experience, the findings show that this particular group expressed process discipline as the primary driver impediment to performance by a slight margin. This particular group expressed great frustration once again about the process discipline that the organization was experiencing. The next two codes that surfaced as an emergent theme were expressed as system related.

Code	PBC <7 Yrs DSS
Information accuracy	7
Information inaccuracy	10
Information inputs/outputs	5
Information source	11
Information Use	5
Lack of Training	9
Process Discipline	16
System complexity	13
System functionality	4
System limitations	13
System outdated	2
System problems	9
System slowness	3

Both complexity and limitations of the system were identified as impediments to performance, due to issues regarding navigation and data extrapolation, as perceived by the participants. Equally, the problems experienced by the participants regarding dated

information and inability to use the data in the system to make decisions propelled these issues to surface as an emergent theme in the findings.

More than 7 Years DSS Experience

In the group with more than 7 years DSS experience, the findings show that this particular group expressed process discipline as the primary driver and impediment to performance by a slight margin. Once again this code was expressed as a significant barrier to effective and efficient data extrapolation in the system throughout the entire organization.

Code	PBC >7 Yrs DSS
Information accuracy	1
Information inaccuracy	4
Information inputs/outputs	6
Information source	1
Information Use	1
Lack of Training	10
Process Discipline	12
System complexity	4
System functionality	5
System limitations	9
System outdated	6
System problems	6
System slowness	3

Another point of trepidation was expressed as the lack of training experienced by each of the participants in this group. This group described the training as being extremely informal and inconsistent over time as the content dwindled into basic on-the-job training

practices. This group also expressed concerns for the limitations of the system and the issues that it was causing providing data that was once again dated and inaccurate.

4.8.3 Emergent Themes of Perceived Behavior Controls

Within the demographic classification of age group, some themes are surrounding the construct of perceived behavioral controls. While in all four age groups a common theme emerged expressed as process disciplines, two other themes emerged identifying a difference. In age group 1 and age group 2, the participants identified system complexity as a top driver for impediments to performance while this particular code did not surface as a significant factor with age groups 3 and age group 4. Equally, the expressed concern regarding the lack of training surfaced as a primary factor in age group 3 and age group 4 yet this particular factor did not play a significant role in either age group 1 or age group 2. Therefore, the demographic classification of age group contains a significant finding that is considered to be significant to behavioral intention.

Within the demographic classification of gender, the male gender group selected lack of training as one of the top perceived impediments to performance yet this particular code was not identified as significant with the female gender group. As a result, this emergent theme has indicated a significant finding within the demographic classification of gender and is considered to be substantial to behavioral intention.

Within the demographic classification of tenure with company, both groups identified similar characteristics in the perceived driving factor for impediments to performance as the findings present similar characteristics between the 2 groups, there are

no significant findings that emerge in the demographic classification of tenure with the company.

Within the demographic classification of tenure and management, the group with more than 3 years of management experience expressed the lack of training as a key factor in the overall influence to performance yet the group with less than 3 years of major experience did not identify lack of training as a significant factor. Therefore, this particular finding constitutes a significant emergent theme of the demographic classification of tenure in management and is considered substantial to behavioral intention.

Within the demographic classification of DSS experience, both groups expressed process discipline as the primary factor for impediments to performance and both groups identified system limitations as a common theme. Therefore, the demographic classification of DSS experience did not provide any substantial or significant emergent themes and the findings are considered to be insignificant.

In Table 28, the findings of the demographic classifications relative to perceived behavioral controls are summarized.

Table 28. Perceived Behavioral Controls Summary Findings

PERCEIVED BEHAVIORAL CONTROLS	FINDINGS SUMMARY	SECOND CYCLE CODES
AGE	Data shows a link between age and perceived information inaccuracy, source to perceived behavioral controls	Data shows a link between age, gender, and tenure in management to information inaccuracy/source, and lack of training with regards to perceived behavioral controls
GENDER	Data shows a link between gender and perceived lack of training to perceived behavioral controls	
TENURE WITH COMPANY	NO SIGNIFICANT COMPANY TENURE FINDINGS	
TENURE IN MANAGEMENT	Data shows a link between tenure in management and perceived lack of training to perceived behavioral controls	
DSS EXPERIENCE	NO SIGNIFICANT DSS EXPERIENCE FINDINGS	

4.8.4 Perceived Behavior Controls Summary

In summation, the findings show that age, gender, and tenure in management all play a significant role in the impact of perceived behavioral controls relative to behavioral intention. Within each one of these classifications, the findings show a distinct link between each group and both system and information related impediments to performance. While there were minor variations in factors of influence, common themes began to emerge across the construct that identified it as a significant finding.

It was observed and noted during the interviews that the issues regarding process discipline and system limitations continually came up as issues. Additionally, several participants became very adamant about this issue and became very emotional about the process discipline issue. One participant expressed such a high level of frustration regarding this issue. They explained how they had even considered leaving the company

because they "simply cannot perform their job to the level to which they were expected" due to the bad data in the system. This was accompanied with sincere frustration in their face and body, and even tears.

4.9 Summary of Findings

This chapter provided the main discoveries of this case study investigated for this doctoral thesis. RQ1, RQ1.1, RQ1.2, and RQ1.3, all addressed the construct of attitude and the sub-constructs that make up attitude. The findings showed that within the construct of attitude, the sub-constructs of cognition, affect, and past behavior provided emergent themes that were significant to attitude and behavioral intention. Within the construct of cognition, the classifications of age, tenure in management, and tenure with the company, contributed to attitude and behavioral intention. Within the construct of affect, the classifications of age, tenure in management, and tenure with company, contributed to attitude and behavioral intention. Within the construct of past behavior, the classification of tenure in management and DSS experience contributed to attitudes and behavioral intention. Within the construct of attitude overall, the classification of age, tenure with the company, tenure in management, and DSS experience, each contributed to the thoughts, feelings, and experiences about the system and information thereby providing a contribution to behavioral intention.

Table 29. Theory of Planned Behavior Summary Findings

TPB	FINDINGS
ATTITUDE	Data shows a link between age, tenure with company, tenure in management, and DSS experience to the thoughts, feelings, and experiences about the system and information relative to attitude
SUBJECTIVE NORMS	Data shows a link between age and importance to comply relative to subjective norms
PERCEIVED BEHAVIORAL CONTROLS	Data shows a link between age, gender, and tenure in management to information inaccuracy/source, and lack of training with regards to perceived behavioral controls

RQ2 addresses the construct of subjective norms, which focuses on the influence of people in a social environment. In this construct, the findings showed that subjective norms were not as significant as attitude or perceived behavioral controls but the findings did indicate a link between age and the importance to comply.

RQ3 addresses the construct of perceived behavioral controls, which focuses on the influences of the perceived ease or difficulty of performing a particular behavior. In this construct, the findings showed that perceived behavioral controls were very significant to behavioral intention. The findings discovered a link between age, gender, and tenure in management to information inaccuracy/source, and lack of training to perceived behavioral controls.

In summation, the Theory of Planned Behavior has proven to be an effective theory for predicting behavioral intention. Each construct within the TPB proved to be a contribution to behavioral intention. However, the findings showed that perceived behavioral controls played a vital role as a determinant of influences. The participants

expressed in great detail the impediments to performance associated with the system from their own perspective. Attitude also played a significant role as it identified the thoughts, feelings, and past behavior of the participants. The findings showed that in many cases, their attitudes were a direct result of the influences of performance impediments. Additionally, while subjective norms were determined as significant, it was the least significant of the three constructs within the theory. Through the application of this theory, behavioral intention could become more of a focus in understanding the phenomenon as well as applying those understandings to the organization for improved performance.

4.10 Implication of Findings

In the literature review section, Chapter 2, the three theories were examined and compared to identify the best fit for this particular research study. As these theories have had significant exposure over the years, many arguments for and opposed to each theory exists. In this section, the findings of this research study will be compared to those in the literature review to identify commonalities and contrasts with previous research.

Two of the primary differences between TPB and TAM are the constructs of social variables and behavioral controls which happens to be the focal of the arguments. Neither Davis (Davis 1989) nor Mathieson (Mathieson 1991) identified a significant relationship between subjective norms and intentions but their studies were not conducted in an organizational setting. However, even Davis suggested in later studies that subjective norms may be influential in more realistic organizational settings as subjective norms have been identified to be more important in the early stages of system development (Davis, 1993). Additionally, recent studies in organizational settings have determined that

subjective norms are a significant determinant of intention or self-reported use of information technology (Hartwick and Barki 1994). In this research study, the construct of subjective norms was indeed determined to be a factor of influence as determined by Hartwick and Barki.

As for the construct of behavioral controls, since TPB identifies the important control variables for each specific situation first and foremost rather than a generic situation, it is more probable that it will capture situation specific factors that help define behavioral controls (Taylor and Todd 1995). In this research, the construct of perceived behavioral controls was determined to be an important construct in capturing specific factors. In fact, this particular construct identified important and specific impediments to performance that influenced the manager's behavioral intention.

Overall, it was determined through their comparison research of the TAM and the TPB that the TPB predicted intention better than the TAM. Arguably, if the primary goal of the study is to predict use, then it can be concluded that TPB is preferable (Taylor and Todd 1995). TPB also contains a slightly higher explanatory power because it includes constructs such as, subjective norms and perceived behavior controls. The findings of this research concur with Taylor and Todd about the predictability ability of TPB as well as the explanatory power of TPB.

Another finding of this research that aligned with the literature pertained to the data coding point of saturation through the conducting of interviews. As previously discussed, Greg Guest established conclusions that specifically identified a significantly different level of saturation through the conducting of interviews through an experiment with data saturation and variability. He found that data saturation had been established

once the research had analyzed 12 interviews. Through his experimentation, 92% of the total number of codes was developed by the 12 interview and very few new themes have emerged beyond that point. He also identified and observed that 70% of the themes that emerged after they coded the interview data within the first 6 interviews.

In this research study, the findings represent a similar level of data saturation. It was observed that 77% of the themes had emerged through the coding process of the interview data within the first 6 interviews. This research study concluded a slightly more accelerated percentage of the emerged themes relative to the experiment performed by Greg Guest. However, 94% of the total number of codes developed had emerged by the conclusion of the ninth interview. In fact, only four additional codes had emerged beyond the tenth interview. Overall, based on the analysis the data saturation, it had been established slightly sooner than previously performed in the experiment by Greg Guest but only by a slight margin. It also supports his established conclusions determined by his experiment regarding different levels of saturation through the process of conducting of interviews. Additionally, his conclusions were conducted using qualitative methods only, which is similar to the qualitative methodology used in this research study.

5. Chapter Five: Discussion and Implications

"What we need to do is learn to work in the system, by which I mean that everybody, every team, every platform, every division; every component is there not for individual competitive profit or recognition, but for contribution to the system as a whole on a win-win basis." ~ W. Edwards Deming

5.1 Overview of Discussion

The case studies of this research study are first and foremost Human-Computer Interaction (HCI) research as it delves into the phenomenon regarding behavioral intention of DSS information. This research study contains theoretical contributions to TPB but more importantly provides additional insight into the behavioral intention that will contribute to practitioners in the aircraft industry or other industries. The focus of this chapter is primarily centered on the implications of this research into the manufacturing environment or other related environments that could be the recipient of this research.

In order to understand the practical implications of this research study, essential associations are needed across each of the three constructs with the TPB. By probing into (RQ1), the attitudinal related research question, (RQ2) the subjective norm research question, and (RQ3), the perceived behavioral control research question, the associations of the three constructs are examined to determine the feasibility of the theory to the aircraft industry. This will provide a more holistic picture addressing the phenomenon of interest posed at the beginning of this research study: *behavioral intention predictability of*

middle managers to use information from a DSS. This research study provides organizations with an advanced understanding of how middle managers interact and perceive the system, the information in the system, and other influences to performance impediments related to the system. This advanced understanding should provide organizations with some high level insight into the perceptions of the middle managers that interact with the system and the information on a daily basis. This information may serve them well as they implement full upgrades to systems or add partial or supplementary systems to an existing DSS or ERP.

This chapter will also include attitudinal implications, subjective norm implications, and perceived behavioral control implications to discuss how each construct influenced the research study and how the lessons learned can be applied to the organization in the study. Practical applications will follow, as it will provide an overview of how this study could benefit other organizations and how they could apply the lessons learned to their environment as well. Finally, this chapter will discuss the limitations to the study and future research.

5.2 Attitudinal Implications

The findings show that attitude plays a significant role in determining behavioral intention as a construct in the TPB. Within the attitudinal construct, each individual construct (cognition, affect, and past behavior) determines the overall attitude of the individual. In this research study, the attitudinal factor of cognition identified an interesting emergent theme. The thought process of the participants began very positive. The negativity of this thought process grew increasingly more dominant up to about the

age of 50 then returning back to a positive thought process. The interesting aspect of this finding was the rationale for the positive thought process. In this age group, the participants expressed a deeper understanding of the system and the capabilities of the system and it was evident that they too started out very positive and grew increasingly negative up to a certain point. This point occurs when the individual no longer has ideas involving unrealistic expectations of the system. They understand it is capabilities, strengths, and weaknesses. It is this understanding that enables them to have a better understanding therefore a more positive outlook without being naïve about what the system is capable and not capable of performing.

Another interesting theme in the construct of cognition is the link between system confidence and tenure with the company. It is evident that the longer the participants are with the company the more they understand about the system therefore their confidence level is significantly higher than those with less experience and less tenure with the company. The other theme within the cognition construct was tenure in management. The more tenured group expressed grave concerns about the ability for the system to provide accurate data needed to make effective decisions. The group with less tenure and management were much more positive and optimistic about the information in the system as well's the system itself.

The implications of this research and the findings determined within the construct of cognition can assist the organization in mitigating these issues in several ways. First of all, the evidence shows that the thoughts of the participants in each of the age groups could equal that of the more tenured group. For example if each one of the participants regardless of age group were to have the same level of understanding about what the

system has the capabilities to do and not do, as well as understanding the ramifications of a particular act based on the process flow of information through the system. If the managers understand how each step of the process works they would encourage and even enforce process disciplines that would maintain the integrity of the information through the system that is inherent to the capabilities of the system. Therefore, the organization could use this information by implementing a formal and consistent training regimen that would require all managers to understand each aspect of the system and to be responsible for enforcing needed process disciplines of the system in order to maintain the integrity of information.

Additionally, the implementation of a formal and consistent training regimen would advance the level of understanding each managers possesses thus providing other managers with the additional support of process flow discipline throughout the entire system. As the managers grew more confident and increased their understanding, their confidence in the information and in the ability to make decisions quicker and more efficiently could grow substantially. The group with more tenure and management expressed similar concerns and the implications of their managers not understanding the system and the capabilities of the system as well as the process flow discipline importance. Through the implementation of a sound training program, the organization cannot only change the thoughts of the middle managers but it can also have an equally positive effect on their feelings and their experiences currently best influencing other systems and implementations in the future.

The findings show that affect also plays a significant role in determining attitude. Distrust for the information grew significantly after about the age of 40. However, distrust

for the system itself does not appear until after the age of 50. One of the interesting themes about the age group 4 is how they expressed positive thoughts for the system, yet they also expressed significant amounts of distrust for the system and the information in the system. This is due to the fact that while they understand and have positive thoughts about the capabilities of the system, they distrust the information in the system because of the source and the inputs of that information. Once the participant experiences distrust in the information or distrust in the system, an unsettling amount of fear sets into the mind of the middle manager. He knows he has to make decisions based on that distrusted information.

The managers expressed how once they use the information in the system to make a decision and that information was not correct, they would rarely trust the information again. The participants also expressed how this would cause them to lose credibility with supervisors and peers thus appearing to be competent in navigating throughout the system to acquire the information and to be able to depend on them to obtain needed information for their decision-making as well. The participants explained how acquiring a reputation for not understand the system or not being able to extrapolate the correct information from the system could be considered a career limiting and/or ending experience. This was expressed as the distrust for the information and was in conjunction with distrust for the managers themselves as being capable or competent of performing their job in making sound decisions. This is a very powerful incentive to obtain and maintain trust of the participants in regards to the system and the information. Additionally, the feelings over all were much more negative after the age of 40.

The implications of this research and the findings determined within the construct of affect can assist the organization to mitigate these issues by understanding the fears of

the participants in the middle management team and address them. As discussed previously, by implementing a formal and consistent training program that would advance the level of understanding for each of the managers,(they would begin to experience more favorable conditions best improving their level of trust of the system and the information in the system through improvements of process discipline.) This would assist the organization by encouraging more managers to use the system and would also protect their interests by maintaining the process discipline that is so integral to information integrity. Also, as managers begin to trust the system more they will also use it to their advantage to make better and more timely decisions, which equals improved efficiencies and productivity in their performance. With additional trust also comes the willingness to adapt new technologies and systems as the organization decides to upgrade or add supplementary systems onto the existing system.

The findings also indicate that past behavior contributes significantly in determining attitude. Within the construct of past behavior, the participants expressed overwhelming responses of negative experiences overall. Equally as significant, the participants also expressed a similar response of negativity regarding the experiences of the system itself. The experiences of the system and the overall experiences were described as being influenced by numerous factors that were addressed previously in the perceived behavioral controls section. Some of these influential factors were identified as lack of training, process discipline, and numerous information related concerns. Some of the participants provided specific examples and situations of a previous experience, either positive or negative, which altered their opinion about the system itself and the information in the system. The participants explained how the experiences that they had

with the information and with the system would often deter them from engaging with the system or using or trusting the information that was an output of the system.

The implications of this research and the findings determined within the construct of past behavior can assist the organization by understanding how the experiences of the participants play a role in the behavioral intention to use the information in the system. Overall, their experiences in both the system and system information influences whether or not they willingly use it based on their thoughts and feelings. Future behavioral intention is based on the experience in which they encountered the influence. Once the organization identifies the existence of the factor of influence, they can take the necessary steps to diminish the negative behavior. By examining the specifics, such as lack of training, process discipline, and system/information related issues, positive changes can start to occur. For example, if the manager has encountered negative experiences previously, the organization can address it by providing training classes to ensure the manager has the needed skillset to effectively navigate through the system and extrapolate data as needed. Then, ensure that the process disciplines are being followed throughout the enterprise so data integrity is consistent. As the manager begins to experience more and more information and system interactions in a positive manner, the more likely the manager is to use the system to its fullest potential. Increased use and interaction with the system is critical for the organizations systems to be the most efficient.

5.3 Subjective Norms Implications

The findings also showed how the influences of people in social environments, known as subjective norms, play a role in determining behavioral intention, even though it

was determined that this particular construct was not as significant as the other constructs. While the majority of the influence was derived from the expressed need to comply with the wishes of others, many of the participants did indeed express the importance to not comply with the wishes of others. As the majority did express the importance to comply, almost 2 to 1 over not important to comply, the overall sample population provided situational examples of when they did in fact comply. Additionally, the participants expressed the importance of complying with the wishes of their supervisors as the most influential factor. This was expressed once again by the participants 2 to 1 over the peer group which was substantially more than the employee group.

The managers expressed how they typically felt the need to comply with the wishes of others unless circumstances dictated otherwise. An example of this kind of circumstance was expressed as being given a directive from their supervisor that was based on incorrect information which therein made the request invalid for what the supervisor had originally wanted to know. The managers would explain that they would present their concerns to their supervisors, but in the end they would ultimately comply with their wishes and provide them with incorrect data or data that was not intended for the requested purpose. They showed great frustration at having a supervisor that did not understand the system, nor understood the challenges regarding the integrity of the data. This often caused significant dismay with their supervisory relationships simply because the level of understandings of the system did not match.

The implications of this research and the findings within the current organization could be substantial regarding subjective norms. They determined that the organization not only has voids of management's misunderstanding of the system, but the findings show

that the problem is a systemic issue throughout the organization. This was determined by the expressed concern of this nature from the participants throughout each of the departments. The true benefit of this research study could be utilized by providing extensive training and information sharing. Provide knowledge of how the process flow works throughout the enterprise on a high level and then provide a deeper level of training on the areas specific to the manager. This would provide each manger with the overall perspective of how their actions or inactions impact those departments down the line. Working under the premise that the managers want to do a good job and want to perform at their highest level, the organization must seek to understand the rationale behind the problems in order to correctly address them. It is equally important for the organization to obtain and exercise the insight of capitalizing on the desires of the managers to perform at a high level should they be given the proper tools and controls. This leads into the next construct of perceived behavioral controls.

5.4 Perceived Behavioral Controls Implications

The findings in this research study show how perceived behavioral controls play a significant role in determining behavioral intention. As previously discussed, perceived behavioral controls focus on the influences of the participants perceived ease or difficulty of performing a particular behavior, which is determined by accessible control beliefs. Essentially, these are the things that the managers identify as impediments to performance in their role as a manager. While there are many variables in this particular category, the primary themes that emerged involved the process discipline, lack of training, and information/system issues. Overall, the managers expressed great concern in regard to the

process discipline of the individuals that were interacting with the system on a daily basis. These concerns were primarily focused on the lack of knowledge or experience of the people interacting with the system. Individuals that are inputting information from various sources without understanding the implications of their inputs, for whatever the reason, begins a chain reaction of bad data filtering throughout the system, possibly affecting multiple and/or all areas.

Each one of the perceived behavioral controls identified by the participants in this research study represents a significant concern for the organization. As the findings were coded and calculated within this construct, the codes that had less than 6 appearances were not considered to be significant thus not included in the table of codes. Even with the removal of the infrequent codes, the participants provided and expressed a substantial amount of impediments to performance. These must be acknowledged and addressed by the organization in order to improve the situation. The codes that the participants were defining were very substantial in constituted a potential foundation for the rationale of the managers to disengage with the system and to completely ignore the information in the system. Accompanied with this rationale are the distrust and the negative thoughts that the participants expressed in the previous sections.

The implications of this research and the findings determined within the construct of perceived behavioral controls can assist the organization through identification and acknowledgment of the impediments to performance experienced by the participants in the study. This section will address the primary factors of perceived behavioral controls identified and expressed by the participants. First, the organization must put substantial focus in addressing the most prominent concern expressed by the participants known as

process discipline. When the participants were discussing process discipline they were expressing a concern for individuals who were given the authority to make changes in the system without proper training, understanding of the process flow, and the ability to disregard or circumvent the demonstration of the required skills. As one participant expressed, the current culture of the organization has allowed complete and total anarchy in regard to system disciplines and standard protocols involving permission levels based on the individual's roles and responsibilities. The organization must address this by reestablishing the structure and the permission levels assigned to each group or individual based on the requirements needed to fulfill the responsibilities of only their job. This must also include a structured and organize training regimen. A training that not only provides the necessary skills of navigating through the system, but also applies testing procedures to ensure that each individual is capable and competent in performing the tasks to which they are assigned. They must also be willing to prohibit any individual who does not meet these requirements from having access into the system, which will ensure the integrity of the information not only in their area or department but also throughout the entire enterprise.

Another organizational mandate that must be implemented is the training program. As identified previously, the training program is essential to ensure that each participant understands what they need and are provided with the tools and skill sets required to efficiently and effectively perform their job. The organization must enforce a very strict adherence to a policy that would mandate every individual to participate in the training program. If the person chose not to participate they would not be provided with access to the system in any form. With this process discipline and training program adherence, organizations may temporarily experience some resistance from the culture of

the people as well as the management team as a whole as it will restrict and limit certain individuals who have complied with the requirements and fulfilled the necessary training.

Lastly, the organization must address the system and information concerns from a technical perspective. While several of the system and information related issues were really addressing process discipline and training factors, others were addressing system crashes, system slowness, and limited functionality of the system itself. This issue will continue to be a problem unless the organization is willing to update the system, provide a supplementary system to address the weaknesses of the present system or simply remove the existing system and replace it with a current, up-to-date system. Additionally the participants expressed the system limitations as a primary issue, which focused on the frequency of updating the system across the entire enterprise. Unfortunately, the current system only updates once a week, which does not provide information on a real-time basis. Each of the perceived impediments to performance must be addressed and dealt with if the organization intends on improving the interaction between the managers and the current system, but it is possible. One of the key points that the organization must communicate effectively to the entire enterprise, in regard to the system, is the fact that the responsibility of data integrity falls on the shoulders of each and every person in the enterprise, not just the "system". If this message is resonated throughout the organization and each person understands the vital importance of his or her actions, information integrity is an inevitable part of the future.

5.5 Practical Implications

This research study provides an unprecedented perspective and insight into the behavioral intentions of middle managers to use information from a DSS. While this information can provide a substantial amount of organizational acumen, it can also provide value in organizations in other fields or industries. While this research study cannot be considered as encompassing for all industries, it can provide a sound base of potential knowledge from the perspective of the participants within the organization. This knowledge base can be applied to environments from banking to sports. It can pertain to any industry with a system that uses data inputs to provide information that allow their managers and employees to make information based decisions.

For example, as the research determined the importance of process discipline and controls adherence with respect to specific areas of the system based on user responsibilities, one particular industry that could significantly benefit from this research study would be the banking or financial industry. As an inherent component of the nature of the business in the financial industry, the application of specific controls in respect to the users responsibilities could be considered as a foundational component to an existing system or a potentially new system being implemented.

This is especially important when you consider the various roles within the financial institutions such as the teller, the loan officer, financial analysts, financial examiners, or even the branch president. Since these responsibilities include a wide variety of needed access to various parts of the system, it would be essential to understand the behavioral intentions behind the establishment of such controls and how could potentially influence the users willingness to engage with the system or to use the information in the system.

Additionally, the importance of this process discipline and control adherence extends equally to the way the people employed in this capacity assist customers with their paperwork and permissions to access their own information in a secure fashion. The security is essential when assisting customers with opening and closing accounts, performing deposits, and applying for loans and other services offered by most financial institutions. This would also include those individuals working behind the scenes such as the managers, analysts and other professionals with a myriad of tasks and responsibilities that are very diversified.

Through advance understanding into the phenomenon of behavioral intention of managers to use information from a DSS, organizations can apply measures to increase the level of trust and positive thoughts of the users. By improving their experiences through increasing the level of trust, organizations can encourage their users to engage in the system more frequently and with more confidence that the information provided is both accurate and valid. As many organizations today have the potential to experience some form of system related issue, this research study could provide them with some foundational components of impediments to performance that could be hindering their user's ability to maximize efficiencies and productivity.

As this research study provides the findings of an aircraft manufacturing organization, one of the key factors to acknowledge is the size of the organization. Due to the fact that the organization was large and the system processes very complex, it contained an inherent risk potential for the information to become polluted with inaccurate information or unsubstantiated sources. Therefore this particular research project would benefit larger organizations with many opportunities for multiple levels of

injection points of information throughout the process. Additionally, larger organizations also have challenges with process discipline and permission restrictions in regard to the amount and/ or the area of access for the users. Again, this kind of environment would benefit from the research, anything from the manufacturing area to the aircraft industry.

Finally, this research study addresses the key points in understanding how behavioral intention can play a vital role in any industry or field utilizing the Theory of Planned Behavior. Even though the size of the organization could possibly change some factors of influence regarding the impediments to performance, the one constant that still remains is the human factor within the organization. The human will continue to have some form of interaction with the computer and technology on a daily basis. It is this strength of interaction that organizations must seek to understand and embrace in order to extrapolate maximum efficiency and productivity from their employees, their managers, and their executive team.

As stated earlier, the motivational aspect for this research was derived from the observed need for better manager training under real-life circumstances. By applying the findings to potential manager training software, software engineers can better understand some of the behavioral aspects of the users that could be cause for concern during the development process. This advancement in understanding could also increase the probability of the users to willingly engage with the system therefore providing organizations with additional insight about the behavioral intentions of their managers.

5.6 Application of Findings

The aircraft industry, like so many other manufacturing environments, remains in constant pursuit of new and innovative ways to increase productivity and efficiency

throughout the organization. This research study provides advancement in understanding into the phenomenon surrounding the behavioral intention of middle managers to use information from a DSS. Therefore, by applying the understanding gained from the research, aircraft companies can proactively address the concerns and apprehensions expressed by the participants, thus encouraging them to willingly embrace all aspects of the system. For example, process discipline can be addressed by applying better control of inputs and sources to those individuals who understand the ramifications of their actions. By effectively communicating the process flow to those individuals interacting with the system, it will ensure enhanced understanding of the repercussions of their actions downstream to other departments and individuals who trust or want to trust the data that they are receiving. This is also known as the ripple effect.

Another way of applying the findings of the research to the organization would be through improved training methods and increased frequency. By formalizing the training agenda and methods, the organization would introduce increased consistency of information and knowledge transfer to the managers utilizing the system. Equally, by conducting formal classroom training in addition to on-the-job training, managers would be exposed to more breath of knowledge about the system and the intricacies of the system in a generalized environment as well as the environment specific to their particular area and responsibility.

Additionally, the findings of the research can benefit the organization by addressing the numerous system and information related issues. Relative to the information, most of the issues that were addressed by the participants could be mitigated simply by addressing the previous two issues: process disciplines and improved training. Once the process

disciplines are being followed, the accuracy of the information improves as well as the training (this is the information inputs in the information sources). As for the system, the issue of complexity and limitations could be addressed fully or partially by improved training. The other issues related to system are either technical in nature or other common system related problems inherent to older and less robust systems.

5.7 Limitations of Study

There are limitations to the study (as with any research) that are important to address in order to have a full understanding of the research. Within the qualitative methodological approach, case study research is typically bound by a specific timeframe and space (Yin 2009). Therefore, as this study involves the technological advancements of a DSS system, it only stands to reason that the study is subject to the frequent advancements in system capabilities that evolve daily. These advancements in systems could potentially address the concerns expressed by the participants in the study thus rendering a portion of the issues moot. In should be noted that since the study occurred, the organization has begun the implementation process of a newer system but not completely implemented enterprise-wide. As the findings and implications of this research revolve around the participant's perspective of the system and the information in the system, as their knowledge and experience evolve, so will their perception. Equally, their perspective could change as the newer system becomes fully implemented and integrated across the enterprise. The data collection process was conducted in a small window of time rather than over an extensive time, which could potentially change the perspective of the participants.

Another limitation involves the methodology of qualitative case studies. Chapter 3 includes an in-depth perspective of the techniques specifically used to address validity and reliability. However, by employing the practices of previously experienced qualitative researchers, this research study capitalizes on the case study research generalizability. This case study research fell into the domain of a very particular set of contexts. Meaning, the study was conducted in an aircraft manufacturing environment and the sample consisted of middle managers across the enterprise. While this does not imply that the study lacks validity and reliability, it also does not indicate that the results are not generalizable. The true indicator of this means that if one deduces the generalizability from the study, they must understand that the entire research study must be examined thoroughly and carefully prior to drawing any conclusions about the outcomes of the study. This is especially true if the intent is to apply it directly to an existing organization. Additionally, the research study presented here is not a "solution" to the problems related to behavioral intention of middle managers to use information in a DSS.

Another limitation to the study is the sample and the environment. This particular case study was conducted in a single organization with a sample group consisting of only middle managers in the aircraft industry. Therefore, readers must understand and acknowledge the fact that the findings of the study may vary based on a range of factors. One of these factors would include the environment. A similar study might experience different findings in an environment outside of the aircraft industry or manufacturing altogether. Another factor would include the sample group selected. The findings might reflect very different things if the sample group were the mechanics on the shop floor or the executive team. Another factor might be the single organization factor. By performing

a research study in multiple organizations or even different locations within the same organizations, the findings might reflect a different outcome.

Finally, this research study represents the activities of a single researcher attempting to provide advancements in understanding of the phenomenon regarding behavioral intention in the organization. It is undoubtedly necessary for future research to delve into this phenomenon in order to provide a deeper understanding thus benefitting both the academic field as well as the professional practitioner.

5.8 Future Research

The research study in this doctoral thesis was focused on vigorously investigating the behavioral intention of middle managers to use information from a DSS at an aircraft manufacturing facility. This particular type of empirical study is unprecedented in the industry as it applies a psychological theory within an HCI study in the manufacturing environment using an interpretivist lens. Therefore, it is important that future studies build on the work necessary to develop a richer understanding of how behavioral intention impacts organizations in any industry. Ideally, future research would also consider various levels of management, such as the executive level or the entry-level management groups. Another option could include the employees or a mix of employees and management groups for comparisons. Either way it is important to examine the different levels and build on the understanding of the phenomenon.

While this research study employs a qualitative case study methodology, future research could utilize the inherent advantages of a quantitative methodology and use a substantially larger sample size. Quantitative survey studies could be quite beneficial in

establishing substantially more breadth regarding behavioral intention across an organization. Additionally, through the application of a quantitative survey study, the study could collect substantially more data within an organization as well as spanning several organizations operating under similar systems and perhaps even similar cultures. Therefore, it is highly encouraged that a quantitative methodology be used as a compliment to the qualitative methodology to gain a different perspective on the topic.

As organizations grow and develop, it is common practice for them to utilize the advances in technology to improve efficiency and performance of their systems and processes. Another avenue for future research could involve probing into the phenomenon of behavioral intention in regard to conversion from an old system to a new system. This type of research study would contribute to the field by providing more understanding of the challenges from the perspective of people other than those who are performing the implementation. The study could delve into the cultural aspect, as well as the technical aspect of change that occurs during implementation of a new system from an existing, possibly, outmoded system. It would be highly recommended to conduct a research study on this topic, which could provide additional insight for anyone experiencing this type of endeavor.

Future research studies could also benefit from the comparison of system implementations in different organizations. One perspective could include two different organizations into separate fields or two different organizations within the same field. The benefit of this type of research could provide organizations with a similar perspective of implementation challenges within their own field and provide additional insight to some of the challenges that are experienced in other fields or industries and could be applied to

their own organization. Additionally, this particular type of research study could provide more insight to different size organizations. This perspective could significantly benefit smaller organizations that are experiencing rapid growth. It could give them more insight into possible problems that may occur during this period of change.

Appendix A: Letter to Participants

APPENDIX A

CONFIRMATION LETTER TO PARTICIPANTS ENGAGING IN THE STUDY

Dear (Name of Participants),

First of all, I would like to thank you for agreeing to participate in my doctoral research project. As I mentioned in the participant request, I am interested in learning about the advancement in understanding of behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system.

To date, the professional literature does not address this issue within the aerospace environment. This research project will provide an additional level to both the theoretical form as well as the manufacturing environment. Hopefully, with your contribution of time and experience, an established advancement in understanding into the phenomenon will surface and illuminate future research into the field.

Enclosed is a Participant Informed Consent Form, please read the form carefully and sign. Upon signing, return the form via email at kmbrand@syr.edu or please feel free to call me at 316-633-2876 for a physical address as well.

I am looking forward to meeting with you on the scheduled date and time of the interview. The interview will take approximately one hour and the interview process will be digitally recorded during the entire time. This process is to ensure that your responses are not

misinterpreted by the researcher and upon completion of the transcription; you will be able to review the transcripts for accuracy.

Again, thank you for taking the time to participate in my research and your willingness to be interviewed as a part of the study.

Sincerely,

Keith M. Brand

Appendix B: Consent Form

APPENDIX B:

SYRACUSE UNIVERSITY SCHOOL OF INFORMATION MANAGEMENT INFORMED CONSENT FORM

I, _____, understand that I am being asked to participate in a doctoral research project designed to understand the behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system.

I understand that by participating in this study, I will be contributing to an effort to increase the body of knowledge in advancement in understanding of behavioral intention predictability of managers in the aircraft industry to use information produced from a decision support system.

The researcher hopes to generate an understanding of how this phenomenon is experienced in the aerospace field by collecting data from those affiliated with the environment daily. I understand that participation in this research will involve a one-hour interview with me and that the conversation will be recorded with a digital recorder. Following the interview, the data will then be transcribed and will be available to the participant upon their request. I will also be asked to provide the researcher with some basic demographic information during the interview.

I understand that I have the option to refuse to participate in this study or to withdraw at any time without penalty or prejudice. I understand that I have the right to refuse to

answer any specific questions without any reason. I understand that I will not be paid for my participation in this study but that I am welcome to request a copy of the final results once the study is completed. This copy will be provided to the participant at no cost.

I understand that material from my interview may be anonymously quoted or paraphrased in the report of the study to include future publications, but I have been assured that my confidentiality will be protected throughout the entire study. This means that at no time will my identity be revealed or disclosed in the study or future publications from the researcher.

The interviewer cannot be held responsible beyond this interview; however, the interviewer is willing to help with finding additional resources to assist with unresolved feelings should the participant desire.

I have read this form and I fully understand the terms of my participation in this research project. I have had the chance to discuss the project with the researcher and to ask questions. If additional questions arise during the course of the interview or after the interview is completed, I understand that I may contact the researcher and that he will provide satisfactory answers.

I can reach Keith M. Brand at 316-633-2876 or at kmbrand@syr.edu

Signature of Participant _____ Date _____

I have explained the procedures of this study and have answered the participant's questions to the best of my ability.

Signature of Investigator _____ Date _____

Appendix C: Interview Questions

Interview Questions

General Information:

13. ***Please tell me the title of your position within the company, the roles and responsibilities of the position, and how long you have been in the position.***

Attitude (A) Questions:

14. ***Tell me what you think about a DSS and describe how it impacts the decision-making function for you in your organization.***
15. ***Give me your thoughts regarding the information that a DSS provides as well as the source of the information that feeds into the system.***
16. ***Describe your feelings toward DSS information and provide an example of why you feel that way.***
17. ***Give me an example of how those feelings affect the way you interact with the system now and how it might affect your perception to use the system in the future.***
18. ***Tell me about a past experience with making decisions and how it affected your current ability to make decisions today.***
19. ***Describe a past experience interacting with information from a DSS and how it affected your interest and willingness to use the system afterward.***

Subjective Norms (SN) Questions:

20. ***How do you think others perceive you because you used DSS information?***
    a. ***What about your peers?***
    b. ***What about your supervisors?***
    c. ***What about non-management personnel?***

d. What about executives?

21. When do you think it is important to comply or not to comply with the wishes of others and please give me an example of a past situation?

a. What about your peers?

b. What about your supervisors?

c. What about non-management personnel?

d. What about executives?

Perceived Behavioral Controls (PBC) Questions:

22. Describe the needed skill sets to utilize the information from a DSS and tell me about a time when you successfully or unsuccessfully demonstrated those skills.

a. Do you have the ability to utilize the system/ system information?

b. Do you have the knowledge to utilize the system/ system information?

c. Do you have the skills to utilize the system/ system information?

23. Can you provide an example of the existing factors that may assist or impede your performance with the DSS/ DSS information from your own perspective?

Closing Question:

24. Are there any related situations that you would like to share or other questions that I have not asked that you would like to comment

Appendix D: Institutional Review Board (IRB)

SYRACUSE UNIVERSITY

Institutional Review Board

MEMORANDUM

TO: Ping Zhang

DATE: October 30, 2013

SUBJECT: **Determination of Exemption from Regulations**

IRB #: 13-260

TITLE: *Advancement in Understanding of Behavioral Intentions by Middle Managers to Use Information Produced by a Data-Driven Decision Support System*

The above referenced application, submitted for consideration as exempt from federal regulations as defined in 45 C.F.R. 46, has been evaluated by the Institutional Review Board (IRB) for the following:

1. Determination that it falls within the one or more of the five exempt categories allowed by the organization;

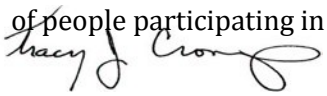
2. Determination that the research meets the organization's ethical standards.

It has been determined by the IRB this protocol qualifies for exemption and is assigned to category **2**. This authorization will remain active for a period of five years from **October 29, 2013** until **October 28, 2018**.

CHANGES TO PROTOCOL: Proposed changes to this protocol during the period for which IRB authorization has already been given, cannot be initiated without additional IRB review. If there is a change in your research, you should notify the IRB immediately to determine whether your research protocol continues to qualify for exemption or if submission of an expedited or full board IRB protocol is required. Information about the University's human participants protection program can be found at: http://orip.syr.edu/human-research/human-research-irb.html Protocol changes are requested on an amendment application available on the IRB web site; please reference your IRB number and attach any documents that are being amended.

STUDY COMPLETION: Study completion is when all research activities are complete or when a study is closed to enrollment and only data analysis remains on data that have been de-identified. A Study Closure Form should be completed and submitted to the IRB for review (Study Closure Form).

Thank you for your cooperation in our shared efforts to assure that the rights and welfare of people participating in research are protected.



Tracy Cromp,

M.S.W. Director

Note to Faculty Advisor: This notice is only mailed to faculty. If a student is conducting this study, please forward this information to the student researcher.

DEPT: Information Studies – Doctorate of Professional Studies -288 Hinds Hall **STUDENT:** Keith Brand

Office of Research Integrity and Protections

121 Bowne Hall Syracuse, New York 13244-1200

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EXECUTIVE MANAGEMENT & SUPPLY CHAIN/ LOGISTICS SPECIALIST

OBJECTIVE:

Exploring Executive Management opportunities utilizing my proven experience in Aircraft Operations Management, and Supply Chain Management with a Multi-site, Multi-state Business.

PROFESSIONAL PROFILE:

A dedicated, results-oriented professional with a 25+ years of diverse experience as an Executive Manager in Operations, IT, Logistics, Project Management, as well as VP of Supply Chain.

Areas of Expertise:

Supply Chain Management	Financial Accountability	Procurement
HR Development & Training	Budget Preparation/Management	Inventory Control
Manufacturing Scheduling	Vendor Relations	Business Operations Project Management
Store Acquisitions Management		ERP Implementation

Special Honors / Certifications:

- Recognized in the Top 10% of Production Foreman to Mentor Future Cessna Leaders
- Six-Sigma and Lean Manufacturing Certifications
- Military Top Secret Security Clearance to Grade 7

Major Accomplishments:

- Established/implemented SAP system and procedures to increase overall profitability by over 15%.
- Reduced inventory adjustments from $486,000 in 2002 to under $43,000 the following year.
- Provided the leadership for setting new sales records 12 months out of the past 2 years.

Additional Strengths:

- Communicate effectively with people at all levels of Business.
- Experience recruiting, training, motivating, scheduling and supervising production personnel.
- Knowledgeable in ISO9000/9002, OSHA regulations, and DOT regulations.

EDUCATION:

SYRACUSE UNIVERSITY, Syracuse, NY
2014 – Doctorate of Professional Studies in Information Management
December 2014

FRIENDS UNIVERSITY, Wichita, KS
2003 – Masters of Business Administration (GPA: 4.0) (Graduated Summa Cum Laude)

2001 – Bachelor of Science in Organizational Management (GPA: 3.9) (Graduated Magna Cum Laude)

EXPERIENCE:

Spirit AeroSystems, Inc. Aerosystems **09/12 to Present**
Tulsa, Oklahoma

Tulsa Division cERP Implementation Sr. Manager (1/13 – Present)
Sr. Business Manager Supply Chain Management (09/12 – 12/13)

Integrates program, customer, product and in-service strategies into source selection, negotiation and contracting strategies. Negotiates pricing and contract terms and conditions. Prepares and executes negotiated contractual documents and binding agreements. Conducts risk, issues and opportunities management. Manages supply and demand, schedules, supplier quality, delivery and financial performance. Initiates and executes supplier improvement activities and integrates results into contracting strategies. Provides oversight and management of supply and demand, schedules, supplier quality, delivery and financial performance. Leads negotiation of pricing and contract terms and conditions. Prepares and executes negotiation strategies resulting in contractual documents and binding agreements. Interprets and enforces contract terms and conditions. Consults with external customers to resolve supplier performance issues. Leads supplier performance teams to develop strategic supplier solutions across programs and commodities. Participates on supply chain process improvement teams and identifies improvement opportunities for potential integration into supplier contract strategies.

Northeastern State University **08/14 to Present**
Tahlequah, Oklahoma

Adjunct Instructor
Course: Business Communications

CAP Carpet Inc. **12/02 to 07/12**
Wichita, Kansas (KS, OK, NE, IA, IL, NC, & MO)

Chief Operating Officer (2005-2012)
VP of Supply Chain Management (2002-2005)

- Manage and direct all operations for 17 divisions in a 5-state area in the Midwest.
- Recruit, hire, and develop personnel to the management level.
- Coordinate and oversee the management of 130+ personnel division-wide.
- Handle sales on all corporate and key accounts.
- Provide technical and IT support.
- Direct new site selection, development and construction through division opening.
- Set and oversee annual budgets for each of the 17 divisions.
- Oversee Warehousing, Inventory Control, Distribution, and Purchasing.
- Coordinate Sales and Merchandising activities.
- Project Management.

Cessna Aircraft **04/00 to 11/02**
Wichita, Kansas

Foreman - Production

- Managed operations and supervised 65+ personnel, including leads and crew chiefs.
- Managed projects and ensured that rates, deadlines, and quality standards were met.
- Department Rep to the Union from Sheet Metal Fabrication and Production Departments.
- Hired/fired, trained, motivated, and evaluated personnel.

MILITARY SERVICE:

KANSAS AIR NATIONAL GUARD 1992 – 1994
Precision Measurement Equipment Laboratory (PMEL)
UNITED STATES AIR FORCE (Honorable Discharge) 1989 – 1992
Nuclear Cruise Missile Technician
Top Secret Security Clearance to Grade 7

CIVIC INVOLVEMENT:

Volunteer, BIG BROTHERS BIG SISTERS, Wichita, KS