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Evaluating the Impact of Culture on Customer Satisfaction for FMS Projects

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EVALUATING THE IMPACT OF CULTURE ON CUSTOMER SATISFACTION FOR FOREIGN MILITARY SALES CONSTRUCTION PROJECTS IN THE MIDDLE EAST

THESIS

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Abstract

The cost, time, and quality pillars of the iron triangle in project management are often considered the most important factors for managers to consider when striving to achieve project success. However, recent literature suggests customer satisfaction and end-user benefit are the most important elements to prioritize during project development. This research analyzes the Air Force Security Assistance Center Construction Division and Foreign Military Sales (FMS) joint construction operations in relation to two Project Management Body of Knowledge (PMBOK) knowledge areas, project stakeholder management and project risk management. Project stakeholder management is addressed by identifying the relationship between cultural competency and customer satisfaction during FMS construction projects. Project risk management is emphasized by using a value-focused thinking (VFT) and multiple objective decision analysis (MODA) approach to identify objectives for mitigating risks that negatively impact the satisfaction of FMS partner stakeholders. The VFT and MODA highlighted four fundamental objectives and eleven critical success factors for improving the satisfaction of partner stakeholders at the conclusion of FMS construction development. Prioritizing the fundamental objectives and their resultant critical success factors can aid FMS managers in increasing the satisfaction of partner stakeholders, furthering the mission of FMS to improve foreign relations and build international security partnerships. These findings offer valuable implications to project management in cross-cultural environments.

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EVALUATING THE IMPACT OF CULTURE ON CUSTOMER SATISFACTION FOR FOREIGN MILITARY SALES CONSTRUCTION PROJECTS IN THE MIDDLE EAST

I. Introduction

This chapter provides background material on the history and development of the Foreign Military Sales (FMS) program. The background will also explain the importance of the FMS program in accomplishing U.S. national policies and interests. The Air Force Security Assistance Center's (AFSAC's) Construction Division provides construction services for partner nations if they lack the infrastructure to house items purchased through FMS transactions. Due to the benefits provided by the FMS program, it is important for FMS project managers to prioritize the customer satisfaction of foreign partners during FMS construction development. During interactions, it is important for FMS managers to be cognizant of the values and desires of their foreign stakeholders. Understanding their value system will aid FMS managers in fulfilling their requests and exceeding their expectations, which ultimately helps further the mission of the FMS program to build security partnerships.

Background

Foreign Military Sales (FMS) is a program used by both the U.S. Department of Defense (DoD) and the U.S. Department of State (DoS). The purpose of FMS is to support the goals of national security and security assistance (SA) foreign policy by providing international allies with defense capabilities (Defense Security Cooperation

University, 2020b; Gilman et al., 2014; Serafino, 2016). These FMS transactions assist the DoD in creating long-lasting foreign relationships. These relationships safeguard against catastrophic global events and increase operational readiness surrounding partner nations (Defense Security Cooperation University, 2020b; Gilman et al., 2014; Serafino, 2016).

Global military-based transactions between different governments have been occurring since the early days of the military. However, the process of entering agreements with foreign partners remains complex. To alleviate difficulties in U.S. government to foreign government processes during the Cold War era, Congress established the Mutual Defense Assistance Act of 1949, which was signed by President Truman ("Mutual Defense Assistance Act," 2020). Congress established the Mutual Support Act of 1979, amended the Foreign Assistance Act of 1961, and amended the Arms Export Control Act of 1976 to allow the Secretary of Defense to authorize agreements that better arm and prepare U.S. military forces in global operations (Defense Security Cooperation University, 2020a; Serafino, 2016). The U.S. government contends that securing national policy and security objectives involves fostering long-lasting relationships with foreign partner nations (Serafino, 2016). These relationships bolster the military forces of both the United States and its partner nations against potential enemies (Henrichsen, 2018; Serafino, 2016). Therefore, the FMS program is an essential element that aids the U.S. government in furthering U.S. foreign policy and bolstering global stability.

Security cooperation (SC) and SA programs were created to give greater priority towards building and strengthening global security partnerships (Epstein and Rosen,

2018). These partnerships are instrumental due to their ability to help the U.S. and foreign partners cooperatively deter terroristic aggression. SC refers to U.S. government work with allies to protect vital interests and develop allied self-defense capabilities for international operations (Gilman et al., 2014; Serafino, 2016). SC is one method used by the DoD to enhance U.S. security, promote democracy, and improve military-to-military relationships with foreign partners (Defense Security Cooperation University, 2020c). SC is a program under Title 10 of the United States Code and is executed by the DoD (Defense Security Cooperation University, 2020c). The primary goal of SA programs is to aid other governmental bodies through the provision of services and training (Defense Security Cooperation University, 2020a). SA is a sub-component of Title 22 of the United States Code executed by the U.S. DoS, comprising of subsidiaries such as FMS, Foreign Military Financing (FMF), international training, and excess defense articles (Defense Security Cooperation University, 2020a). Achieving success in both programs is imperative to improving global stability and mutual defenses. Assisting allies in deterring aggression by providing the desired defense capabilities may prevent future threats to the U.S. homeland from adversaries.

The DoS primarily governs SA programs, while the DoD governs SC programs. However, the DoS authorizes the DoD to execute FMS operations due to the DoD's expertise on U.S. Defense Articles and Services, including military construction (Defense Security Cooperation University, 2020a; Gilman et al., 2014; Serafino, 2016). The DoD designated the Defense Security Cooperation Agency (DCSA) as the primary overseer of FMS operations (Defense Security Cooperation University, 2020a). The DCSA trains, equips, and educates U.S. military members and foreign partners in accordance with U.S.

objectives defined by the White House, DoD, and DoS (Defense Security Cooperation Agency, 2020).

FMS is not the only option available for purchasing U.S. defense articles for foreign partners. A second option is using Direct Commercial Sales (DCS), which is another SA service offered by the U.S. government. In DCS transactions, U.S. contractors and purchasing nations communicate and enter agreements without involvement from the U.S. government (Defense Security Cooperation University, 2020c; Gilman et al., 2014; Henrichsen, 2018). DCS is more flexible than FMS for foreign customers due to the increase in their leverage in negotiating and executing contracts. However, the increase in flexibility increases the number of obligations and risk for foreign customers (Defense Security Cooperation University, 2020c; Gilman et al., 2014). In FMS processes, the U.S. government possesses most contractual risks, whereas risk and administrative obligations are accepted by the foreign customer in DCS processes (Gilman et al., 2014; Defense Security Cooperation University, 2020c). Gilman et al. (2014) noted, "Many foreign customers prefer the 'total package approach' provided by FMS" (p. 38). This is primarily due to countries having the ability to leverage political relationships and preexisting contracts with the DoD to obtain lower charges (Gilman et al., 2014; Murray and Kotabe, 1999). The total package approach provides the purchasing country with defense services and additional resources needed to sustain the quality of the product over time (Gilman et al., 2014). Additional resources such as training and supporting equipment can also be provided by the FMS within a transaction.

Transactional agreements within FMS and DCS differ from typical nationwide transactions, although many people believe there are no differences (Defense Security Cooperation University, 2020b). These transactions transcend purchasing and selling products and services (Defense Security Cooperation University, 2020b). During FMS transactions, the Air Force Security Assistance Center's (AFSAC's) Construction Division is often brought in to create new facilities if a partner nation lacks appropriate infrastructure in FMS transactions. During these construction operations, FMS project managers prioritize the development of relationships with global partners. These relationships are developed or enhanced by providing adequate quality items and services throughout the procurement of the FMS transaction. Additionally, FMS and DCS transactions can persuade partner nations to conduct themselves in a manner that is in the best interest of both parties, which increases the ability to further the national policy agenda of the U.S. (Serafino, 2016). The actions and impressions made throughout the development, execution, and closure of a project can either form or destroy a relationship between nations. Figure 1 displays a network portraying the cooperation between the DoD and DoS in executing FMS operations.

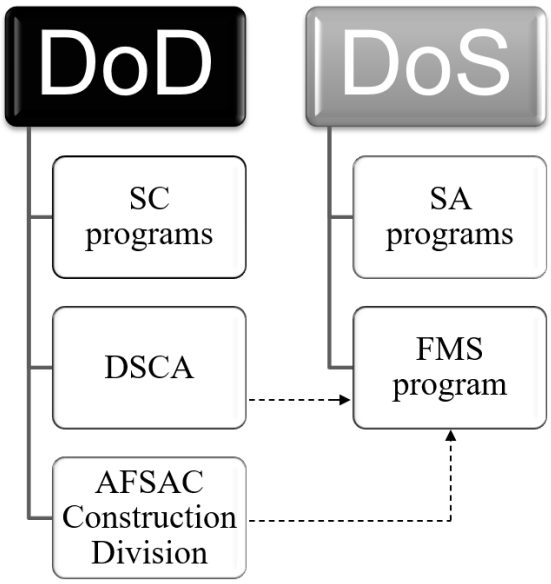

Figure 1. Network of Cooperation Between the DoD and DoS for the FMS Program

Presently, the U.S. government and military have an economic, political, and social presence around the world (Wunderle, 2006). In particular, the FMS program influences operations in foreign areas, primarily in the economic and political realms. This influence is created through various processes and agreements, including construction projects. Specifically, projects in the Middle East comprise a large portion of FMS construction development. Figure 2 displays countries in the Middle East where current U.S. FMS construction projects are underway.

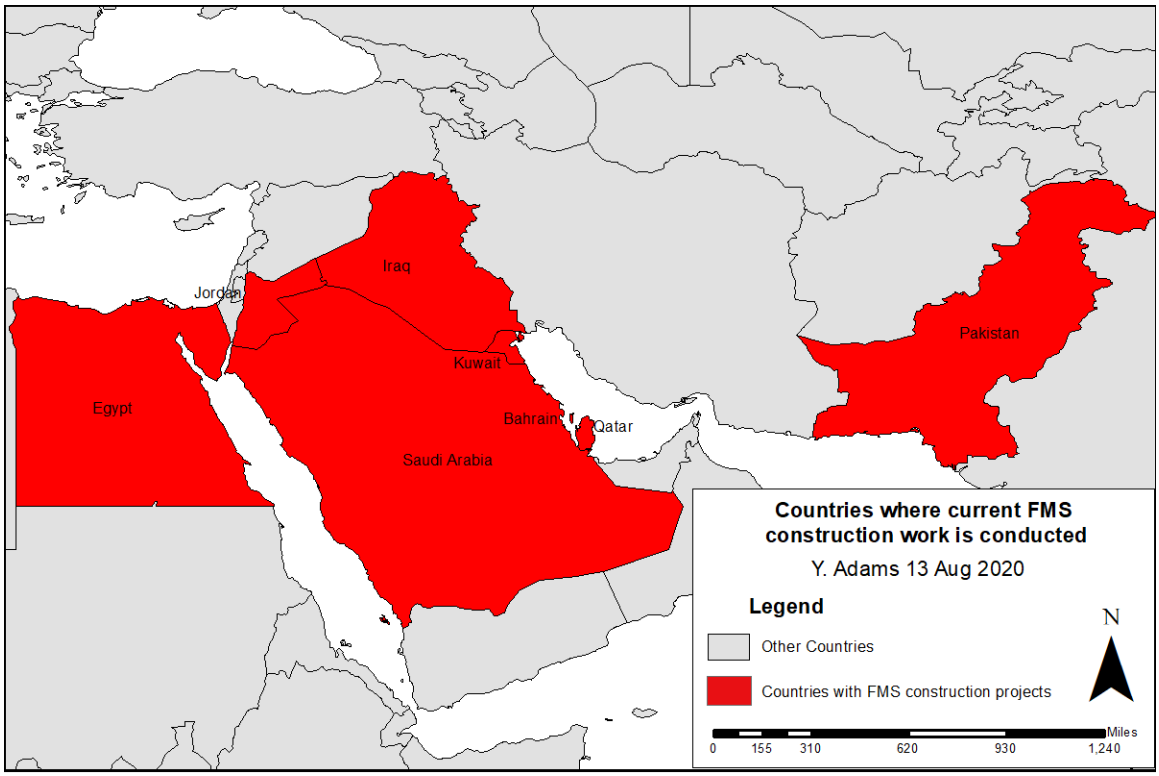

Figure 2. Current U.S. FMS Construction Development in the Middle East

The Middle East has been an area of interest for the United States for decades. Kingston and Farrar-Hockley (1984) noted, "The Middle East is a historical bridge between West and East—a cross-roads between Europe, Asia, and Africa" (p. 14). Approximately 65% of the world's petroleum reserves are located within the region; therefore, the region affects the welfare and politics of many Western countries, including the U.S. (Harris and Moran, 1991). Retaining the influence acquired within the region is essential because the region is recognized as being a geo-economic pivot (Kingston and Farrar-Hockley, 1984; Morrissey, 2009).

In the Middle East, Saudi Arabia is one of the most important foreign partners for the United States. After reaching an agreement over diplomatic relations in 1933, the U.S. and Saudi Arabia combined their efforts towards stabilizing the Gulf region (Department of State, 2019b). The Department of State (2019b, para. 2) states, "The region is going through a period of great transformation and Saudi Arabia plays an important leadership role in working toward a peaceful and prosperous future for the region." In 2016, Saudi Arabia was ranked as the largest FMS customer for the United States (U.S. Department of State, 2016), and it has continued to be the largest customer with a total of $126.6 billion in military defense transactions with the U.S. (U.S. Department of State, 2019a, 2020). When requested, the U.S. cooperates and supports Saudi Arabia through transactions and agreements (U.S. Department of State, 2020). The transactions between these two parties work towards improving Saudi military capabilities, improving technical support, and destabilizing threats imposed on the Middle East by terrorists (U.S. Department of State, 2019b). Cooperation between the United States and Saudi Arabia promotes regional stability by increasing military preparedness, defense article transactions, and counterterrorism capabilities (U.S. Department of State, 2016). As a result of continuous efforts in establishing and improving relations with Saudi Arabia, the 60-year SC relationship was a key factor in allowing the construction of a new 26-acre U.S. embassy away from the capital in the coming years (U.S. Department of State, 2020b).

Problem Statement

Many project managers consider the iron triangle of project management as the most important influence on a successful project (Caccamese and Bragantini, 2013; Dvir et al., 1999, 2003). The iron triangle of project management consists of three domains that directly influence whether a construction project is deemed successful: cost, time, and quality. However, projects can accomplish goals tailored to these domains but still result in failure (Dvir et al., 2003). Completing projects successfully is a complex task, and the idea of meeting time demands, satisfying budget constraints, and providing a quality product encompasses only a portion of the effort needed to be successful in project management (Dvir et al., 2003; Lin and Shen, 2007). Dvir et al. (2003) and Lin and Shen (2007) noted that other crucial factors have a large impact on the success of a project in terms of project management, such as ensuring the product satisfies the expectations of the end-user. Customer satisfaction and end-user benefit are the main goals of a project (Dvir et al., 1999, 2003; Pinto and Mantel, 1990; Lipovetsky et al., 1997; Shenhar et al., 1997). Therefore, project success should be examined through the lenses of two main stakeholders: the project manager and the end-user. Project managers hold the responsibility of explicitly stating expectations and targeted goals for a construction project. Thus, project management personnel directly influence how project objectives are achieved. Additionally, since FMS transactions involve foreign partners, management must be knowledgeable of cultural norms and desires to understand how actions and impressions made throughout construction development can impact the end-users. Understanding what is valued in a foreign partner's culture will help FMS managers develop methods to increase end-user satisfaction and achieve project success.

A review of literature indicated that this study is the first application of VFT concerning the interrelation of project management in foreign construction projects and the impact of culture on completing these projects successfully. Therefore, the information contained within this thesis will provide AFSAC and FMS decision-makers with an analysis regarding influential factors for increasing customer satisfaction. This analysis will also identify objectives that account for risks that impede the ability of FMS managers to increase customer satisfaction during FMS cross-cultural construction operations.

Purpose Statement

This research incorporates the consideration of an area that is rarely mentioned but heavily affects processes within construction projects – cultural awareness. The purpose of this research is to identify critical success factors that will best enhance the satisfaction of customers during AFSAC and FMS construction operations. These critical success factors will aid FMS project managers in attaining project success when conducting construction operations in cross-cultural environments. The critical success factors will be identified and articulated using the value-focused thinking (VFT) philosophy and a multiple objective decision analysis (MODA) from the viewpoint of a FMS project manager. By deriving numerical weight coefficients based on the preferences of a FMS decision-maker, the model will identify critical success factors for improving the effectiveness and efficiency of construction projects in Saudi Arabia. The critical success factors will be represented as tier 2 objectives in the value hierarchy. As a result, a decision support framework will be provided to AFSAC and FMS decision-makers with information regarding elements of construction that are most important to

increase the satisfaction of their foreign partners. This research will answer the following overarching question: How can project managers for AFSAC's Construction Division and the FMS program enhance customer satisfaction relating to project success when conducting projects with foreign partners? Specifically, the following three investigative questions will be considered.

(a) How does cultural competency play a role in enhancing customer satisfaction in Saudi Arabia?

(b) How can value-focused thinking and cultural considerations identify construction management objectives for enhancing customer satisfaction in cross-cultural environments?

(c) How can FMS managers mitigate the effects of risk towards increasing customer satisfaction when completing projects in Saudi Arabia?

Methodology

VFT is a philosophy created by Ralph Keeney (Keeney, 1996; Parnell and Hill, 2008). This philosophy uses the values and preferences of a decision-maker to identify and evaluate values that can improve a set of alternatives provided to decision makers concerning a decision problem (Keeney, 1996; Parnell and Hill, 2008). VFT has been used in a variety of subject areas, including but not limited to environmental concerns, day-to-day decision-making, construction projects, and asset management (Keeney and McDaniels, 2001). This research applies the VFT philosophy within the area of construction project management for the U.S. FMS program. Using the VFT philosophy, the values of FMS decision-makers will be evaluated to determine alternatives that lead

to FMS project success when working in cross-cultural environments. The idea of successful project management is complex, and the outlook of success for a project is highly subjective (Dvir et al., 2003; Freeman et al., 1992). Success can carry different meanings, depending on the societal and cultural factors to which a person is accustomed. Therefore, success criteria must consider different interests and viewpoints before leading to a multicriteria approach (Cooper et al., 1987; Dvir et al., 2003; Pinto and Mantel, 1990). These are the reasons for conducting the VFT analysis from the perspective of FMS decision-makers with intentions of satisfying the interests of their Saudi counterparts.

Parnell and Hill (2008) stated, "VFT uses the mathematics of Multiple Objective Decision Analysis (MODA) to quantify the values and evaluate the alternatives" (pg. 5). Due to the context of this research, only the initial five steps of the MODA will be covered. These steps will be further explained in Chapter II and Chapter III of this thesis. The MODA methodology employed in this research will incorporate the insight of two FMS project managers to identify areas of priority for increasing customer satisfaction with Saudi stakeholders. These decision-makers will also give insight into the construction environment for FMS operations in Saudi Arabia, further discussing elements of construction that have either yielded challenges or proved beneficial in increasing customer satisfaction. Once the critical success factors for enhancing customer satisfaction are articulated, courses of action (COAs) for improving customer satisfaction in AFSAC's construction projects will be recommended. As customer satisfaction increases, alliances and bonds will strengthen, which will further the mission of FMS to build strong, global alliances.

Research Scope

A great guiding resource for project management is the Project Management Body of Knowledge (PMBOK) Guide. The PMBOK defines ten critical knowledge areas for achieving success in project management (Caccamese and Bragantini, 2013; Hartney, 2016; Project Management Institute, 2018). The research questions posed within this thesis focuses on three of the ten PMBOK knowledge areas, the primary focus being project stakeholder management. Project risk management and project communications management are also prevalent, but to a lesser extent. Project stakeholder management involves the management of efforts towards enhancing customer satisfaction and engagement, specifically by identifying stakeholder concerns, values, and expectations (Hartney, 2016; Project Management Institute, 2018). Project risk management involves the identification, prioritization, and analysis of risks that might occur during the execution of a project (Hartney, 2016; Project Management Institute, 2018). Once the risks are analyzed, responses for mitigation can be addressed. Although military construction projects occur in many places, this research will provide insight relating to the two PMBOK knowledge areas within the scope of FMS construction projects, specifically in Saudi Arabia. Further studies may examine the use of MODAs and the VFT philosophy for other FMS partner nations or construction projects with cross-cultural interactions.

Thesis Outline

Following this introduction, Chapter II will provide a review of relevant literature on Saudi Arabia's cultural environment and construction environment, and the VFT

philosophy. Chapter III will go into detail regarding the methodology used in this research, including the formation of the value hierarchy, the creation of evaluation measures, and the structuring of value functions and numerical weights. Chapter IV will present an analysis of the insight gained from the MODA conducted in Chapter III. The insight gained from the analysis will facilitate the creation of COA's for FMS decision-makers to better achieve project success within Saudi Arabia. Lastly, Chapter V provides the conclusion, limitations, and recommendations for future research for this research.

II. Literature Review

Chapter II presents information gathered from a review of literature on (a) the cultural and construction environment of Saudi Arabia and (b) the value-focused thinking (VFT) philosophy. Aiding Saudi Arabia in constructing additional infrastructure presents opportunities for the U.S. Foreign Military Sales (FMS) program to further its mission of building security partnerships. During FMS construction in Saudi Arabia, local materials, labor, and equipment are outsourced. When labor is outsourced, an environment is created where different cultures interact with each other. In cross-cultural interactions, managers must be cognizant of the cultures surrounding them in the work environment. Awareness may lead to prevention of conflict and unexpected outcomes. Thus, improving customer satisfaction during FMS construction in Saudi Arabia requires a staff that is aware of the values and desires of their counterparts. Additionally, using an appropriate decision-making framework is essential to overcome the challenges faced when making decisions impacting a diverse group of individuals. The VFT philosophy provides a structured, scientific approach for making decisions that benefit the achievement of a particular end goal (Keeney, 1996). In addition, the multiple objective decision analysis (MODA) framework included in the philosophy can facilitate transparency and discussion to support complex decision situations where multiple stakeholders value objectives differently (Saarikoski et al., 2016). Therefore, this chapter will also provide a broad review of the steps in a MODA and the VFT philosophy. This review will provide more insight into the framework of MODAs and the VFT philosophy.

Defining Risk

The term risk can be defined in many ways depending on the context (Wolff et al., 2019; Aven, 2010; Raz and Hillson, 2005). In general, risk refers to anything that leads to unexpected outcomes, regardless of the subject area. In construction project management, Nieto-Morote and Ruz-Vila (2011) uses the definition of risk as defined by Cohen and Palmer (2004), "The potential for complications and problems with respect to the completion of a project task and the achievement of a project goal." Risk within this research is defined as the uncertainty surrounding the accomplishment of FMS mission objectives. Risk can be separated into two classifications: positive risk and negative risk (Raz and Hillson, 2005). The term "risk" often carries a negative connotation; however, there is a potential to receive positive outcomes from risk events. Risks with potential positive consequences are called opportunities whereas risks with potential negative consequences are known as threats (Raz and Hillson, 2005). This research is tailored towards identifying positive and negative risks that impact the customer's outlook on FMS construction processes. To identify these risks, a holistic understanding of Saudi culture is required to avoid conflict and misunderstandings during FMS operations. Therefore, assessing risks that impact Saudi stakeholders requires an adequate understanding of Saudi culture and their value system. Understanding the cultural impact on elements of construction is key in both mitigating and preventing negative influences on customer satisfaction during FMS operations. It has long been debated whether the iron triangle of project management is missing components. Culture shapes the values of individuals, influence how they perceive their surrounding environment, and reveal reasoning for demonstrated behaviors (Ajiferuke and Boddewyn, 1970). An important

element to consider when evaluating cross-cultural project risks is the impact of incorporating different cultures in construction processes. Furthermore, it is important to understand how different cultures can affect decisions or actions made within construction projects. Adequate understanding of these measures can aid efforts to increase productivity and customer satisfaction (At-Twaijri and Al-Muhaiza, 1996). An increase in both areas will lead to reduced costs, fewer delays, and growth in U.S. foreign relations.

What Is Culture?

Culture is a term that is difficult to restrict to one definition; in fact, there are more than 150 definitions describing culture in studies dating back to the 1950s (Telleria, 2015). Hofstede (1980) described culture as a shared mentality between many individuals who are conditioned by similar life experiences. Minkov and Hofstede (2010) described culture as a "mental programming" that a person develops throughout their lifetime from their social environment. For the purposes of this research, culture refers to the values, principles, and traditions that influence daily behavior and interactions (Telleria, 2015). Gaining knowledge of the culture of a region can improve the interactions between different cultural groups (Harris and Moran, 1991). Additionally, cultural awareness and cultural skills are important for adequate communication (Harris and Moran, 1991). To bridge the gap that culture naturally presents between international partners, it is imperative for individuals to learn about religions, beliefs, and practices in other countries (Harris and Moran, 1991).

Understanding the culture of a group of people helps in mitigating the risk of conflict and misunderstandings during interactions.

Cross-cultural Impacts on Construction Management

The Middle East usually acquires its labor force from other countries, including India, the Philippines, and Turkey (Enshassi and Burgess, 1991; Idris, 2007). Figure 3 displays the countries of origin for expatriates in Saudi Arabia's labor force. There was a law in place that required the workforce to predominantly consist of Saudi workers, but it was difficult to put individuals in charge who were not adequately equipped with the breadth of knowledge needed to accomplish work tasks properly. The school system in Saudi Arabia does not produce employable people due to the overemphasis on rote learning, separation of the sexes, and religious instruction (Harris and Moran, 1991). As a result, foreign labor makes up approximately 60% of the workforce and charges 30% less for services compared to Saudi counterparts (Harris and Moran, 1991).

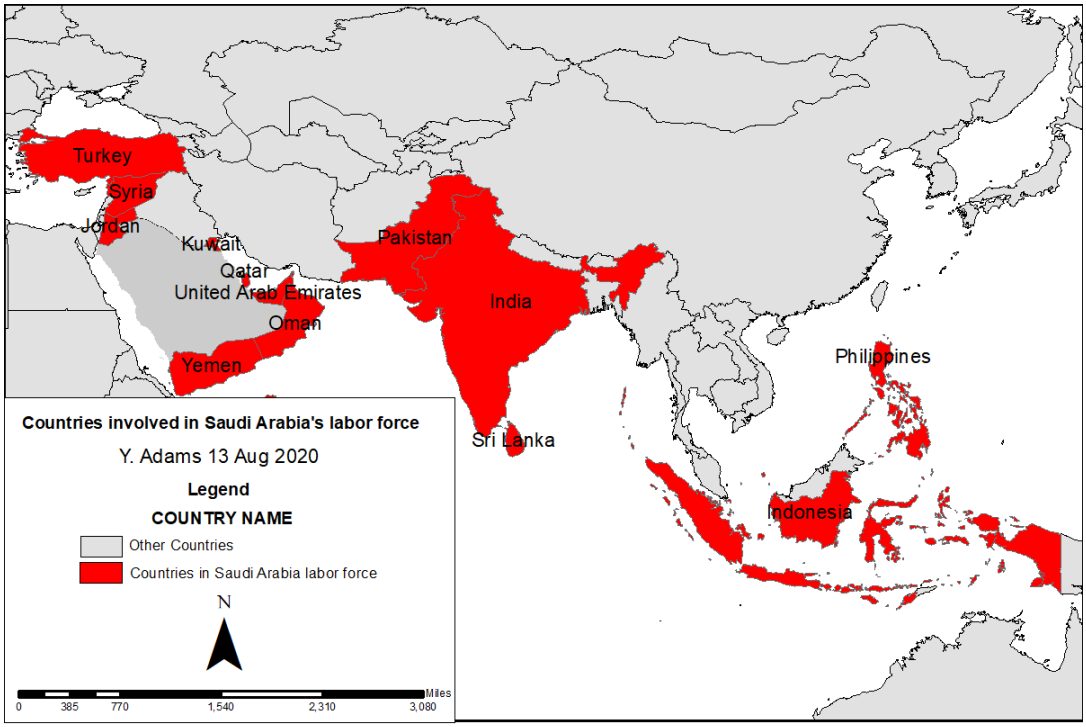

Figure 3. Origin of Expatriates in Saudi Arabia's Labor Force
(data obtained from Al-Asmari, 2008; United Nations, 2020)

Due to the reliance on outside labor by Saudi Arabia, project managers within the area are expected to balance different values, beliefs, and behaviors and create plans to deliver the best product effectively (Enshassi and Burgess, 1991; Imbert, 1987; Maloney, 1982; Rabbat and Harris, 1982). Enshassi and Burgess (1991) defined effectiveness as "the overall contribution towards the achieved level of a work force's productivity in construction projects" (p. 82). Participating in construction projects with cross-cultural elements requires well-trained representatives who possess effective leadership qualities (Enshassi and Burgess, 1991). Managers must constantly adapt to cultural differences to deal appropriately with extenuating circumstances. In terms of the military, many DoD projects fail because of how project managers handle conflict and uncertainty that arises

(Sutterfield et al., 2007). Managers who are aware of the value system, cultural tendencies, behaviors, and customs of the cultures involved in Saudi Arabia's labor force will be better equipped with the knowledge needed to coordinate plans to prevent negative consequences during construction projects. Understanding the differences in the ways that leaders, subordinates, and citizens of a culture think, act, and feel is one of the best ways to create solutions to mitigate negative outcomes in cross-cultural business interactions (Minkov and Hofstede, 2010). Ignoring these factors can be detrimental not only to the manager of a construction project, but also to the entire organization.

Hofstede's Cultural Dimensions

Cultural frameworks are studied to explain traditions and value systems of different societies. Geert Hofstede presented a cultural framework containing cultural dimensions that have been widely used in cross-cultural psychological and sociological studies (Khushman et al., 2009; Oliver, 2011; Vishwanath, 2003; Wu, 2006). Hofstede (1980) initially created four dimensions: power distance, collectivism–individualism, uncertainty avoidance, and masculinity–femininity. A fifth dimension, long-term orientation versus short-term orientation, was added to his studies in 1993 (Cavusgil, 2008). These cultural dimensions help one to understand the differences in behaviors and mentalities globally. From 1968 to 1973, Hofstede provided questionnaires to 116,000 employees working at IBM who represented 40 nations (Obeidat, 2012). Saudi Arabia was not included within his study; instead, he focused on a group of Arab countries that included Saudi Arabia and collectively scored them (Cassell and Blake, 2012). Hofstede's cultural dimensions answer two primary questions regarding behavior within

organizations: (a) who has the power to make changes and enforce rules and (b) what rules and procedures will best attain the desired result sought after (Minkov and Hofstede, 2010).

Hofstede's cultural framework is reviewed to identify cultural distinctions of Saudi Arabia that can affect project management during FMS construction operations. Exploring the nature of Saudi culture by understanding their value system, customs, and traditions can aid FMS managers in increasing customer satisfaction. Business leaders and executives primarily focus on business risks but ignore nonbusiness risks because they are less tangible, more unmanageable, and less understood (Keeney, 1996; Minkov and Hofstede, 2010). Being mindful and understanding of differing cultures in areas where FMS work is conducted can lead to the prevention or mitigation of most problems that can be encountered during cross-cultural interactions. Additionally, any issue of relevance to another stakeholder should be of relevance to the decision-maker (Keeney, 1996). Due to the impact that customer satisfaction has on classifying whether an FMS project is successful, U.S. FMS representatives should consider and understand the concerns, values, and desires of their partners during construction operations.

Power Distance

Minkov and Hofstede (2010) refer to power distance as "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (p. 61). Hofstede claimed that power distance can be an indicator to show how effective groups of people are in compromising disputes (Purohit and Simmers, 2006). Groups with high scores in power distance are more likely to be accustomed to taking orders or following guidance from their superiors (Purohit and

Simmers, 2006). Saudi Arabia, the Philippines, India, and Turkey all have high scores in power distance, whereas the U.S. scores low in this dimension. Figure 4 displays the power distance ranking assigned to Saudi Arabia and the countries involved in its labor force. Although Saudi Arabia scores high in this dimension, Harris and Moran (1991) noted that Saudi workers dislike taking orders. This dislike could be the result of an undeveloped trust with the individual giving orders and the masculine nature of the Saudi society. This inference will be covered in the following section that includes discussions on the dimensions of collectivism versus individualism and masculinity versus femininity.

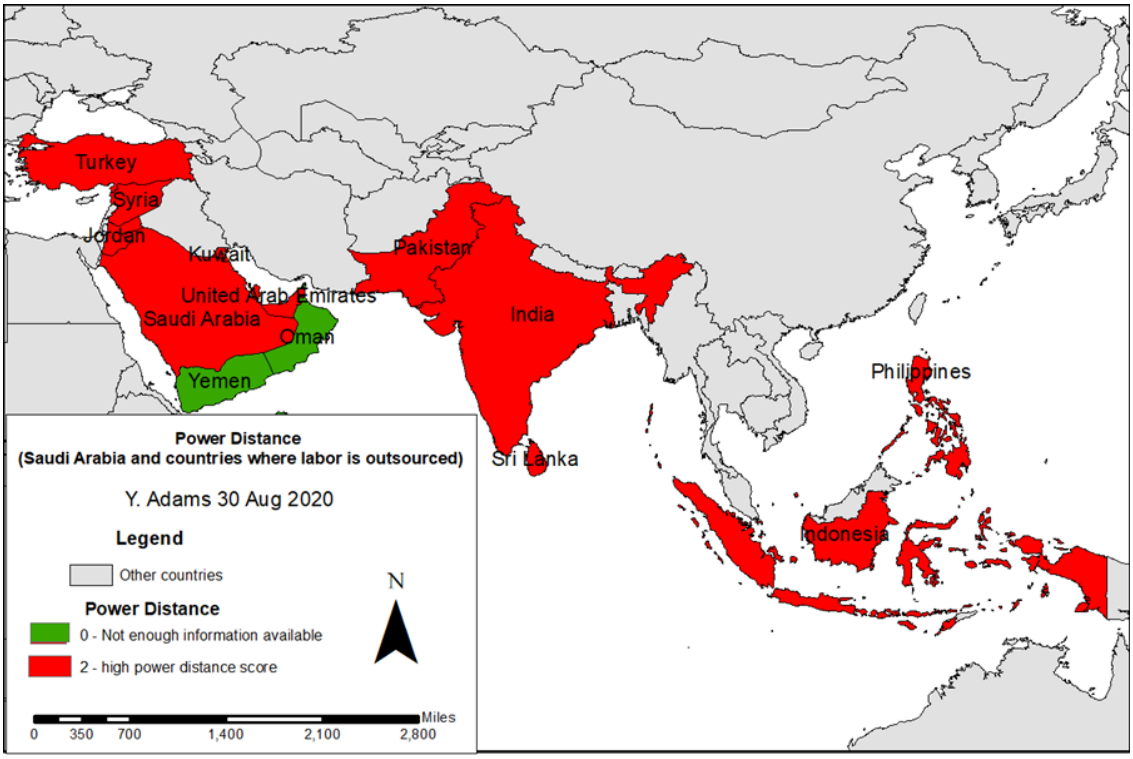

Figure 4. Hofstede's Power Distance Rankings

Knowledge of Saudi Arabia's political and legal framework gives insight into the scores that are represented in Hofstede's cultural dimensions, specifically power distance. Hofmann and Frese (2011) noted that societies with high power distance scores often contain traditions of centralized power in monarchical or oligarchic government structures. Saudi Arabia's government is an absolute monarchy. The Basic Law for this absolute monarchy was implemented in 1992, which states that the Holy Qur'an is the constitution of the country and the monarchy will be governed by the descendants of King Abd Al Aziz Al Saud (Cassell and Blake, 2012; Commins, 2005). Therefore, the three branches within the government of this monarchy (executive, legislative, and judicial) are all heavily influenced and governed by Islam and the Al Saud family (Cassell and Blake, 2012). For example, the king and prime minister, who are both descendants of Al Saud, hold the positions of chief of state and the head of government under the title Custodian of the Two Holy Mosques, respectively (Cassell and Blake, 2012). Similarly, the executive cabinet, known as the Council of Ministers, consists of members appointed by the monarch every 4 years who are predominantly descendants of the Al Saud family (Cassell and Blake, 2012). The exclusive rule of the Al Saud family in Saudi Arabia dates back centuries (Commins, 2005). Based on this information regarding the government of Saudi Arabia, Hofstede's power distance score is an accurate assessment that shows the high level of inequality in power and wealth within Saudi society (Cassell and Blake, 2012).

In societies where power distance indexes are low, subordinates do not rely heavily on the input and direction of their superiors (Minkov and Hofstede, 2010). Thus, conflict often arises due to the absence of fear in disagreeing or contradicting the

opinions and desires of the leader (Minkov and Hofstede, 2010). However, individuals in societies with high power distance indexes rely heavily on input from their superiors (Bhuian, 1998; Cassell and Blake, 2012; Minkov and Hofstede, 2010). The difference between both mind-sets regarding power distance societies presents challenges for the U.S. when managing in areas like Saudi Arabia. In the U.S. and other low power distance societies, it is frowned upon to micromanage or explicitly tell employees how to do their job. However, large power distance cultures view their superior negatively if they allow too much freedom among employees to exercise judgment in solving problems or completing tasks (Minkov and Hofstede, 2010). The mental programming accrued from taking orders throughout their lives has conditioned individuals from high power distance societies to view a less involved leader as ignorant or inferior (Minkov and Hofstede, 2010). To avoid losing the respect of their subordinates and peers, FMS managers must make their expectations and demands known within Saudi Arabia. Managing employees within this area cannot be done in the same fashion as managing employees in the U.S. and other low power distance societies.

During FMS construction in Saudi Arabia, Saudi officials and workers look to FMS representatives for direction in how to complete construction. Saudis admire the quality of American infrastructure. Therefore, the construction environment in Saudi Arabia provides a platform for FMS managers to provide direction and knowledge of U.S. construction processes. Due to this platform, Saudi officials and workers may generate a positive outlook on the U.S. government because of the engagement and teachings that are provided by FMS managers.

Collectivism versus Individualism

Collectivist societies are societies where a majority of the population believes that the interests and success of an in-group dominate over individual success, whereas individualists operate primarily within self-interests. In-groups are inner circles where individuals within the circle look out for each other and work toward achieving similar goals. Saudi Arabia is a collectivist society as defined by Hofstede's dimensions. Similarly, India, Turkey, and the Philippines also exhibit collectivist behavior (Minkov and Hofstede, 2010). Figure 5 displays the collectivism-individualism ranking assigned to Saudi Arabia and the countries involved in its labor force. In collectivist societies, children are taught at an early age to think of themselves as "we" instead of in terms of "I" (Minkov and Hofstede, 2010). These types of societies value loyalty; therefore, personal relationships, business agreements, and manager–employee relations within these societies require earning trust (Cassell and Blake, 2012; Minkov and Hofstede, 2010). Minkov and Hofstede (2010) noted, "A naïve Western businessperson who tries to force quick business in a collectivist culture condemns him- or herself to the role of out-group member and to negative discrimination" (p. 123). Minkov and Hofstede (2010) also noted that the workplace can be considered a separate collectivist society for societies that are classified as collectivist societies; this is important to consider during FMS agreements with the Royal Saudi Air Force (RSAF). A major part of conducting business for RSAF officials is building familiarity and trust with an opposite party through cultural displays of affection or gatherings. To further U.S.-Saudi relations and increase the satisfaction of RSAF officials, it is imperative for FMS managers to be knowledgeable and aware of the importance of gaining trust and familiarity.

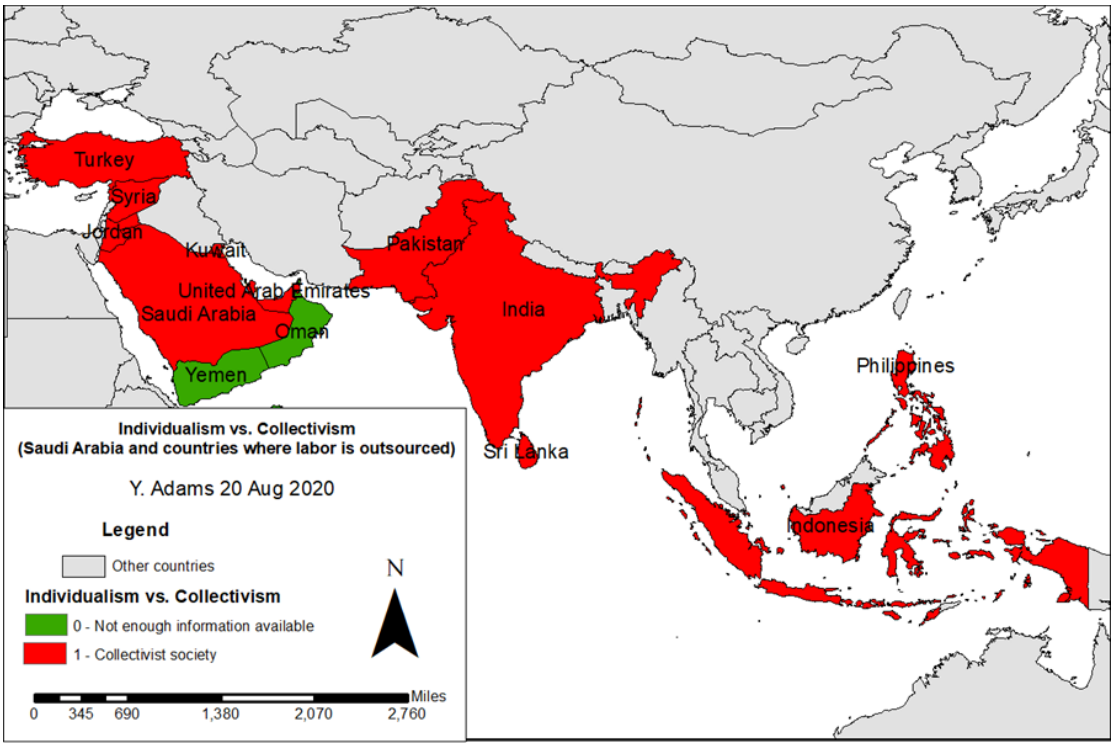

Figure 5. Hofstede's Individualism-Collectivism Rankings

Although the U.S. falls in the individualism realm of Hofstede's dimensions, there are regional differences concerning the collectivism versus individualism dimension. Vandello and Cohen (1999) found that collectivist tendencies are more prevalent in the Deep South, whereas individualist tendencies are more prevalent in the Mountain West and Great Plains. Since individuals in the U.S. can differ in terms of collectivist and individualist ideals, the interactions that can ensue between FMS managers and foreign subordinates can differ depending on these ideals. Regardless, FMS managers must be mindful that their management techniques should be tailored toward managing groups instead of managing individuals. In terms of feedback and performance expectations for Saudi workers, it is better to provide critiques indirectly to avoid losing face (Cassell and

Blake, 2012; Minkov and Hofstede, 2010). Losing face is a phrase created by the Chinese and is synonymous with being humiliated (Minkov and Hofstede, 2010). Face represents honor and dignity (Cassell and Blake, 2012; Minkov and Hofstede, 2010). In Saudi culture, maintaining face is extremely important in day-to-day interactions. In the U.S., it is a common occurrence to receive honest, direct feedback regardless of whether it seems insulting. However, this can promote the loss of face in Saudi Arabia and further introduce strife between FMS managers and Saudi individuals. This form of conflict is not needed in FMS interactions where the consequences of disrespecting one's culture can negatively affect the relationship between the U.S. and one of its most strategic partners in the region.

Uncertainty Avoidance

Uncertainty avoidance refers to how well a country tolerates unknown or vague situations. High scores in this dimension indicate that a country does not prefer uncertainty or vague situations. In contrast, low scores show that countries are not intimidated by uncertainty or vague situations. The U.S. usually falls in the medium to low range in terms of uncertainty avoidance, whereas Arab countries contain high scores (Duran et al., 2016; Hofstede, 1980; Oliver, 2011; Wu, 2006). Societies with higher scores in uncertainty avoidance normally require precise laws and specifications to avoid any ambiguity in expectations (Minkov and Hofstede, 2010; Obeidat et al., 2012). However, Ali and Al-Shakhis (1989) noted that Arab workers are well-known for not adhering to rules and regulations. Arabs often make decisions centered around intuition and personal feelings (Kalliny et al., 2006). As aforementioned, they view much of their

life as controlled by God, and nothing happens unless God wills for it to happen (Murphy, 2007; Obeidat et al., 2012). In Saudi Arabia, "Inshae Allah" is a common term which means, "If it is God's will, it will happen" (Murphy, 2007; Obeidat et al., 2012). The term is meant to be used with a positive connotation; however, it has been used in instances that Arabs deem trivial (Murphy, 2007). In terms of construction projects, the mind-set behind "Inshae Allah" often promotes lackluster effort. With this mind-set, employees question the need to perform certain tasks according to standards and specifications. With this information, FMS managers may consider implementing measures to ensure standards and specifications are upheld.

The countries providing labor to Saudi Arabia all have low uncertainty avoidance scores (Builtjens & Noorderhaven, 1996; Flaming et al., 2010; Kalliny et al., 2006; Purohit and Simmers, 2006). Figure 6 displays the uncertainty avoidance ranking assigned to Saudi Arabia and the countries providing labor. Lower uncertainty avoidance scores bring many risks to tasks that lack structure or adequate specifications, which can lead to shortcuts or inappropriate means to accomplish work tasks. Coupled with the efforts stated previously, providing detailed instructions in construction specifications will safeguard against inappropriate inclinations from workers. Reducing the amount of uncertainty and interpretation involved with specifications will help produce a work environment conducive to minimizing construction risks. Research has shown that Western ideals related to specifications and time management are not shared by Saudis (Harris and Moran, 1991; Nguyen and Galil, 2015). It is important to avoid forcing U.S. ideologies on cultures in areas where work is conducted. It is more efficient and respectful to recognize the tendencies that do not correlate well with U.S. ideologies and

plan to mitigate the effects of those tendencies if they occur instead of creating cultural conflicts between employees.

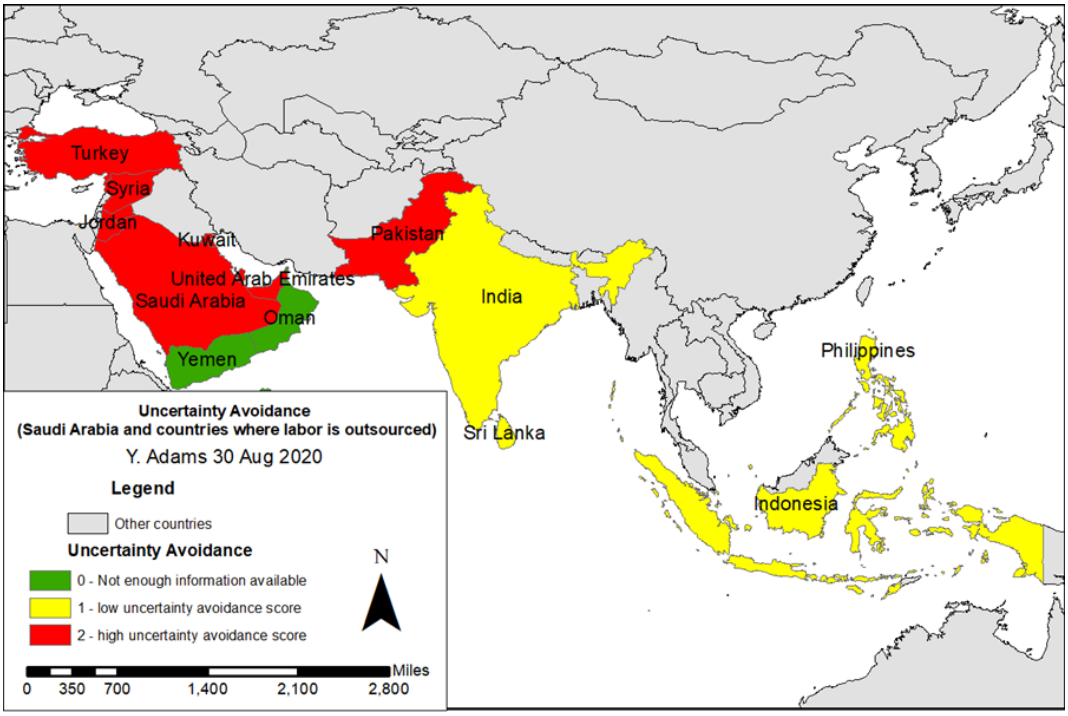

Figure 6. Hofstede's Uncertainty Avoidance Rankings

Masculinity Versus Femininity

Many researchers exclude this dimension because it is often considered offensive (Minkov and Hofstede, 2010). Nevertheless, some important takeaways can be inferred from the scores within this dimension. A masculine society is a society where gender roles are explicit, whereas feminine societies have overlap in gender roles (Minkov and Hofstede, 2010). Masculine societies have values of assertiveness, competition, and achievement, whereas feminine societies place importance on caring for others and the concept of working to live (Minkov and Hofstede, 2010; Obeidat et al., 2012). The U.S.,

the Philippines, Turkey, and India are all masculine societies (Banarjee, 2003; Minkov and Hofstede, 2012; Özkan and Lajunen, 2005; Tyner, 1999; Wu, 2006). Saudi Arabia has both moderate masculine and feminine characteristics. However, its score for this dimension would technically classify it as a masculine society (Obeidat et al., 2012). Figure 7 displays the masculinity-femininity ranking assigned to Saudi Arabia and the countries involved in its labor force. It is important to include this dimension within this research because masculine societies tend to battle or encounter conflict before reaching a resolution. Since the U.S. and many countries that provide labor within Saudi Arabia represent masculine societies, it is crucial to consider the risk of extreme conflict due to the assertive culture of all parties involved. To minimize the likelihood of conflict, compromise can play a crucial role in satisfying the wishes and desires of all stakeholders involved.

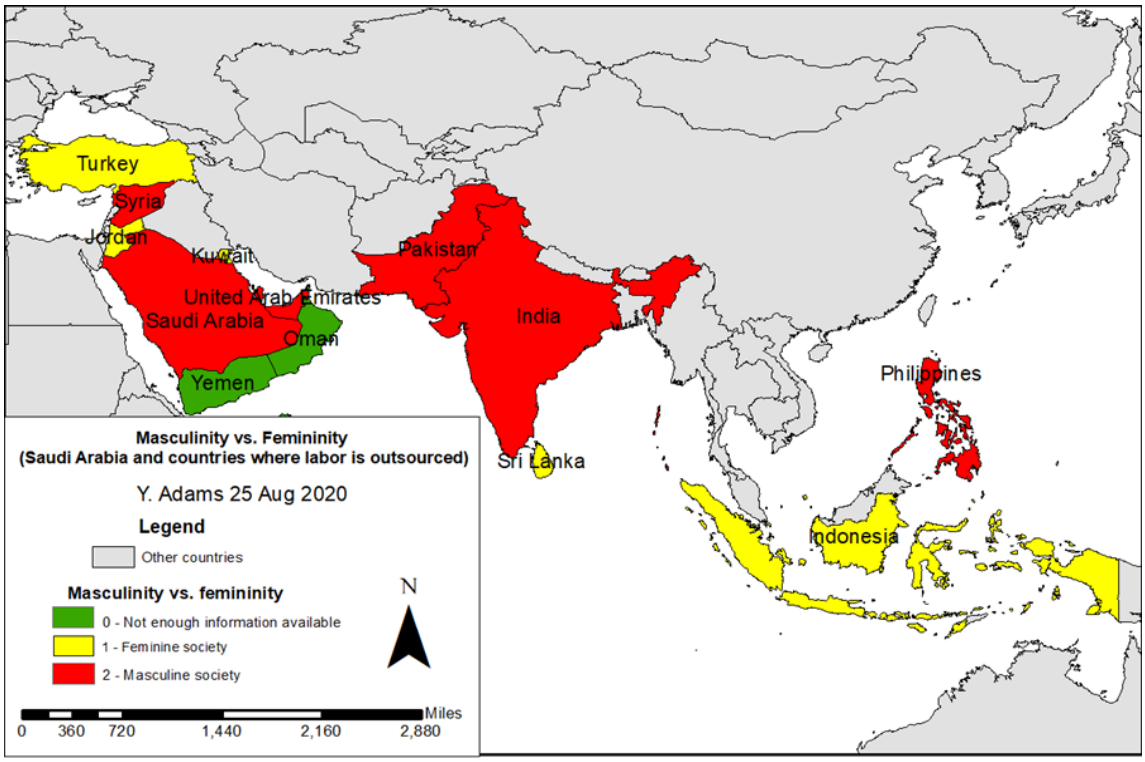

Figure 7. Hofstede's Masculinity-Femininity Rankings

Short-term Orientation versus Long-term Orientation

A high long-term orientation ranking indicates that a society values perseverance for long-term results, respect for circumstances, and willingness to exhibit submissive tendencies in efforts to fulfill a collective goal (Cassell and Blake, 2012; Minkov and Hofstede, 2010). On the contrary, short-term oriented societies value the preservation of face, respect traditions, and place effort toward achieving quick results (Cassell and Blake, 2012). The U.S. and Saudi Arabia scored 29 and 36, respectively; therefore, both are short-term oriented (Cassell and Blake, 2012). Figure 8 displays the short-term

orientation versus long-term orientation ranking assigned to Saudi Arabia and the countries involved in its labor force.

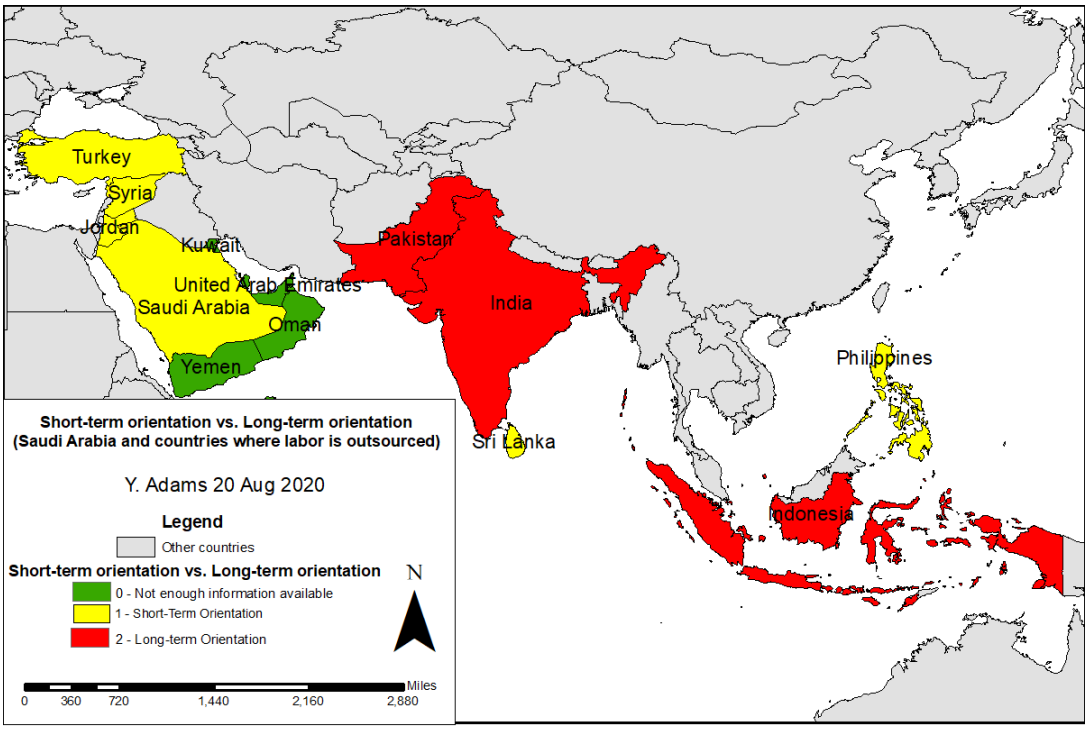

Figure 8. Hofstede's Short-term versus Long-term Orientation Rankings

Religion played a large role in Hofstede's short-term orientation vs. long-term orientation dimension (Obeidat et al., 2012; Parnell and Hatem, 1999). The influence of religion is evident through the description of short-term orientation, specifically the portion concerning respect for traditions. Obeidat et al. (2012) noted, "The Islamic value system requires a commitment to God and a belief that God is ubiquitous" (p. 515). Therefore, Islamic beliefs have a profound impact on many of the processes involved in business agreements, events, and allocation of resources (Obeidat et al., 2012). Islamic beliefs can significantly impact planning and scheduling concerns (Cassell and Blake,

2012). Miroshnik (2002) noted that groups belonging to Eastern cultures view time as an interminable resource. It may be necessary to delay or reschedule meetings if circumstances triggering religious duties occur. For example, FMS managers must account for the five daily prayer times and the religious holidays of Ramadan and Hajj during planning (Cassell and Blake, 2012). It is a common occurrence for Saudis to be "unpunctual compared to Western standards" (Cassell and Blake, 2012, p. 158) or for meetings to be frequently interrupted to fulfill other obligations. Despite the difficulties that the lack of punctuality may present to FMS managers and associates, it is imperative to exhibit respect for their traditions. Therefore, it is important for FMS managers to be cognizant of religious traditions during planning and execution phases. Such awareness will aid mangers in producing solutions to work around scheduling dilemmas in advance.

Validity of Hofstede's Cultural Dimensions

Many researchers have validated Hofstede's cultural model as an accurate representation of cultural characteristics in the workplace (Chiang, 2005). However, several researchers have mentioned valid critiques of his analysis. Obeidat et al. (2012) noted that many researchers wonder if a study representing results from one business can be used to describe cultures accurately. Others criticize Hofstede's work by saying that the results may have been tainted by Hofstede's cultural background (Chiang, 2005; Obeidat et al., 2012; Yeh, 1988). Because the study was conducted using questionnaires, the questions that Hofstede included could have represented his own cultural bias (Obeidat et al., 2012). It is hard for individuals to study and understand other cultures unless they have grown up within the environment (Obeidat et al., 2012). Additionally, in terms of Hofstede's decision to use questionnaires, Triandis (1988) and Obeidat et al.

(2012) criticized the nature of Hofstede's dimensions because the study is limited to work-related values. They argued that work-related values do not completely correlate to national values, despite the possibility of overlap between the two (Obeidat et al., 2012; Triandis, 1988). Lastly, many researchers have questioned whether Hofstede's results from 1968 through 1973 are valid in today's global environment (McSweeney, 2002; Obeidat et al., 2012; Smith et al., 1996; Søndergaard, 1994; Verbeke, 2000). These researchers mentioned the possibility that Western culture and modernization could have impacted the cultural characteristics within the region (McSweeney, 2002; Obeidat et al., 2012; Smith et al., 1996; Søndergaard, 1994; Verbeke, 2000). This critique has been refuted by many due to replications of Hofstede's experiment in succeeding decades (Smith et al., 1996). Despite the previously stated weaknesses in Hofstede's study, it is one of the best compilations of cross-cultural studies available. Ignoring the results of Hofstede's research is inexcusable for anyone researching cross-cultural interactions (N, 1998; Obeidat et al., 2012).

All dimensions within Hofstede's cultural analysis are interrelated, and characteristics in each dimension are considered in other dimensions. Therefore, efforts toward improving understanding in one dimension can favorably affect efforts in the remaining dimensions. Cassell and Blake (2012) provided a quote from Hofstede that explains the use of Hofstede's cultural dimensions in research.

> Dimensions do not directly predict any phenomena or dynamics. Applying them to make sense of what happens in the world always has to take into account other factors as well as culture - notably national wealth, history, personalities, and coincidences. There is no quick fix to understand social life after taking a dose of

> Hofstede. But the dimensions, when well understood, do allow to predict a little better what is likely to happen. And they become more useful as you go from the specific case to the trend, average, or expectation. (p. 158)

Key Takeaways from Hofstede's Cultural Dimensions

Table 1 displays a summary of Saudi Arabia's cultural score for each of Hofstede's cultural dimensions. The table includes a description of each dimension, Hofstede's ranking of Saudi Arabia in each dimension, and key considerations for FMS project managers to mitigate risks towards customer satisfaction. For the power distance dimension, the key consideration is concerned with the guidance and direction given by FMS project managers to Saudi officials or labor workers. In high power distant societies, the lower-class citizens respect and look up to high-ranking individuals. During FMS operations in Saudi Arabia, the FMS managers are given nearly the same respect as the high-ranking Saudi officials. Being in a position of "power" and respect, it is important for project managers to be explicit and clear when providing direction and guidance. Clear directions and guidance during pre-construction and planning phases will set the foundation for the project operations. The manner in which FMS managers relay expectations and guidance is also a key consideration for the uncertainty avoidance dimension. Providing explicit directions and expectations can reduce the likelihood of misinterpretation; thus, ensuring that all parties involved understand the goals and visons of the project. Additionally, setting clear expectations can discourage the mindset of "Inshae Allah" and lackluster effort during construction operations.

Table 1. Key Takeaways from Hofstede's Cultural Dimensions

Cultural Dimensions	Description	Hofstede's Ranking of Saudi Arabia	Considerations
Power Distance	The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally	High Power Distance	Guidance and Direction
Uncertainty Avoidance	Refers to how well a country tolerates unknown or ambiguous situations	High Uncertainty Avoidance	Expectations Mindset – "Inshae Allah"
Collectivism-Individualism	Refers to whether a society has collectivistic or individualistic ideals	Collectivist society	Trust and Familiarity Preservation of Face
Masculinity-Femininity	Focuses on the extent to which a society values achievement or nurturing	Masculine society	Compromise
Short-term Orientation vs. Long-term Orientation	Refers to whether a society is focused on the future or focused on the past/present	Short-term Oriented society	Respect for traditions Preservation of Face

In the collectivism-individualism dimension, there are two key considerations: the importance of building trust and familiarity with Saudi officials and the preservation of "face" during interactions. Building trust and familiarity with Saudi officials allows FMS managers to enter the "in-group" that dominates the interests of collectivist societies. Once the FMS manager has gained trust, stronger bonds and ties between the manager and Saudi officials can be created. These bonds and ties will help FMS managers create a good impression that reflects well on the FMS program. As aforementioned, the manner in which FMS managers give direction and guidance is critical. The manager must not only be mindful to avoid demeaning the face of their Saudi counterparts, but also preserving their face. Therefore, it is important to avoid any actions that could degrade or humiliate themselves during construction operations and interactions.

The last two dimensions are masculinity-femininity and short-term orientation versus long-term orientation. The literature regarding Saudi Arabia's masculinity-femininity scores emphasized the nature of conflict in masculine societies. Because of

this, compromising can play an instrumental role in reducing the likelihood of extreme conflict and satisfying the wishes and desires of all stakeholders. In contrast, the short-term orientation versus long-term orientation dimension reflects Saudi Arabia's strong commitment to their history and cultural ideals. In Saudi Arabia, greater priority is given to religious beliefs. As a result, many Western ideals related to scheduling and promptness is not shared by Saudis. Therefore, it is crucial for FMS managers to be considerate in scheduling when religious circumstances like the five daily times of prayer or religious holidays occur.

Value-Focused Thinking (VFT) versus Alternative-Focused Thinking (AFT)

Since the beginning of time, people have had to make choices that have the ability to impact large audiences of people. Decision analysis research aims to improve the likelihood of achieving desired outcomes in the face of uncertainty. VFT is a rapidly growing philosophy for decision-making that promotes the generation of ideas and the efficient use of resources. The concept stems from the belief that better quality decision-making occurs when there is a focus on values early in the decision-making process (Keeney and McDaniels, 2001). Keeney (1996) stated, "The standard way of thinking about decisions is backwards." People often rush into choosing alternatives that do not coincide with their objectives or satisfy all requirements needed to accomplish their mission (Keeney, 1996). Identifying essential criteria through values prevents businesses and people from overlooking vital requirements and options for their solution.

The four basic sources that serve as barriers to analyzing alternatives effectively in decision-making are the complexity of the decision, the uncertainty of the situation, the

existence of multiple competing objectives, and conflicting perspectives from multiple stakeholders (Bengoz, 2012). Therefore, it is critical to use decision model analyses for important matters to strategically reach the most desired result, regardless of possible difficulties. There will always be uncertainty and difficulties within decision-making; therefore, it is imperative for the DoD to find ways to adapt over time and find better ways to combat them.

Kirkwood (1997) noted, "The one essential element of a decision is the existence of alternatives" (p. 2). However, alternatives should not be the first element considered when making decisions. This emphasizes the separation between VFT and alternative-focused thinking (AFT). AFT is a "reactive" decision-making approach that identifies all alternatives before examining which options present the best means to attain a desired result (Keeney, 1996). However, AFT presents many disadvantages. Brainstorming alternative decisions in the beginning of decision analysis limits the possibility of finding creative solutions (Keeney, 1996; Selart and Johansen, 2011). In contrast, Keeney described VFT as a proactive philosophy (Keeney, 1996); therefore, it is the job of the decision-makers in the FMS program to create decision opportunities that will provide the most benefit. Decision opportunities differ from decision problems because they are produced by the desire of the decision-maker rather than external pressures (Keeney, 1996).

Contrary to AFT, VFT allows decision-makers to focus on the overall values of an entity from which new ideas can be identified that are relevant for future solutions. VFT has been proven to improve the creativity and overall quality of ideas (Keeney, 1996; Selart and Johansen, 2011). Selart and Johnson (2011) explained, "Ideas are the

life force of corporations" (p. 196). Since the ideas generated by employees can influence the success or innovation of a business, the use of VFT can facilitate the production of quality ideas and objectives for surmounting risk and enhancing customer satisfaction of stakeholders in Saudi Arabia.

VFT Philosophy and MODA

As discussed in Chapter I, only Steps 1–5 of a MODA will be covered in this analysis. Figure 9 displays all ten steps of a typical MODA. Previous VFT studies that employed the initial steps of a MODA provided seminal contributions towards literature concerning VFT. For instance, Keeney (1994) used the initial steps to identify strategic objectives for a company called Conflict Management, Inc. Similarly, Sheng et al. (2005) applied the initial steps to aid a leading international publishing company in identifying objectives for improving customer satisfaction. Keeney and McDaniels (1992) also utilized the initial steps to identify objectives to guide decision-makers of a company called British Columbia Hydro and Power Authority in addressing a range of strategic issues. As evident in literature, studies that do not complete all steps in a MODA still provide adequate contributions to the topic area. The sections below delve into more information regarding all five steps of the MODA used in this research.

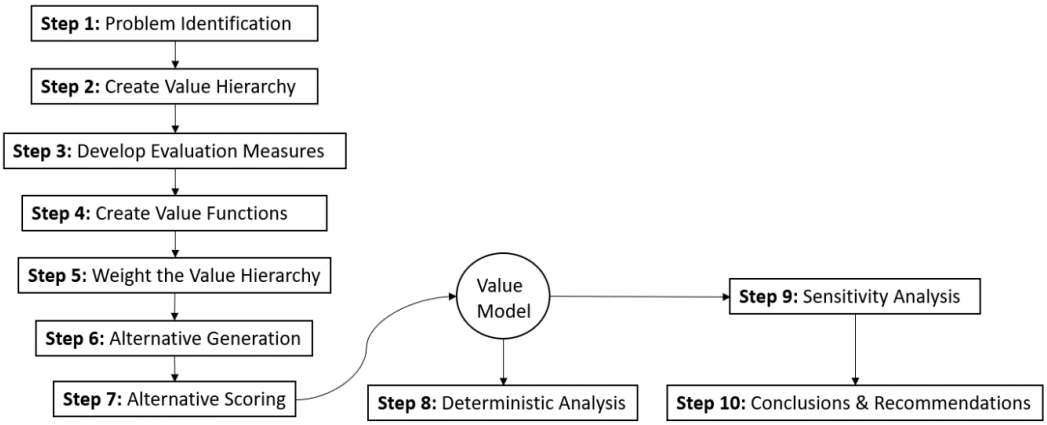

Figure 9. Steps of a Multiple Objective Decision Analysis Approach

Step 1: Problem Identification

Risk is presented in construction projects in a variety of domains, specifically safety, scheduling, and budgeting. In any construction project, the project managers are expected to balance and account for all areas of risk. Different from risks inherent in scheduling and budget concerns, there is no available option to navigate differences in traditions, values, and beliefs. Research suggests that U.S. employees tend to impose Western ideals when exposed to other cultures (Harris and Moran, 1991; Nguyen and Galil, 2015), suggesting a higher emphasis should be place on increasing cultural awareness. Although cultural training is required before becoming involved in foreign interactions, previous FMS decision-makers were not aware of critical tacit knowledge until after interacting with RSAF officials. FMS managers later understood that enhancing customer satisfaction could not be achieved with the present cultural awareness training. Since FMS project success stems from the perception of customer

satisfaction, it is important for FMS project managers to account for the risks involved when diverse groups of people interact. The goal of the FMS program is to create bonds and relationships with foreign partners. Having an inadequate knowledge of the culture of these foreign partners has the potential to lead to dissatisfied customers. Accounting for risks resulting from the interaction of different cultures will aid in creating objectives for enhancing customer satisfaction. The objectives will be created using a holistic view of the project risks inherent in Saudi Arabia's FMS construction environment, as described by the FMS representatives and literature. Therefore, the VFT philosophy and MODA approach used in this research is an alternative that can aid FMS managers in creating objectives with higher consideration towards Saudi customs and culture, thus placing a higher emphasis on customer satisfaction.

Step 2: Constructing the Value Hierarchy

The second step in this MODA approach is creating a value hierarchy that explicitly defines the overall strategic objective for solving the decision problem, the fundamental objectives that lead to achieving the overall strategic objective, the specification objectives that further decompose the fundamental objectives, and the evaluation measures that help determine how well the fundamental objectives are achieved. Value hierarchies allow a clear, explicit representation of the overarching values (Keeney, 1996). This representation ensures the decision-makers are aware of the focus areas, which allows the evaluation measures created to directly pertain to furthering the end goal. Value hierarchies are displayed vertically or horizontally, with lines connecting the overall fundamental objective to lower tier objectives and their respective

evaluation measures. In total, these connections create a tree diagram. An example of the structure is displayed in Figure 10.

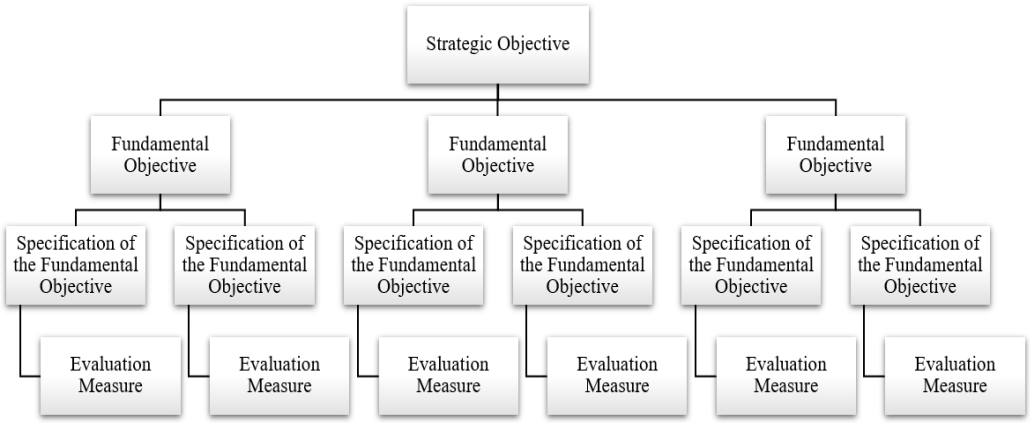

Figure 10. Sample Value Hierarchy

The Identification and Structuring of Fundamental Objectives

To identify the fundamental objectives, all objectives identified by a decision-maker regarding the decision problem must be categorized using two classifications: means objectives or fundamental objectives. Fundamental objectives are objectives that are necessary to accomplish to achieve an end goal and means-ends objectives are objectives that have implications on the achievement of the fundamental objectives (Keeney, 1996). To distinguish the two types of objectives, the objectives must be structured appropriately. Eden (2003) mentions that an analysis is meaningless without formality or structure. Therefore, it is important to incorporate a systematic process in delineating the means objectives and fundamental objectives.

The VFT philosophy incorporates concept mapping by identifying the fundamental objectives through a means-ends network (Keeney, 1996). Concept mapping is a systematic mapping method used to identify relationships between different concepts. Objectives displayed in a value hierarchy differ from objectives displayed in a means-ends objective network. In short, means-ends objective networks identify all objectives that should be considered for the value hierarchy, and the value hierarchy displays the finalized objectives chosen to evaluate the decision situation.

During concept mapping, it is best to display objectives in a hierarchical layout to keep the number of loops or crossing arrows to a minimum. Loops signify that there are counter-intuitive dynamics and complexities inherent between nodes (Ackermann and Eden, 2010; Eden, 1988, 2004). Therefore, avoiding loops in concept mapping is important for the creator and the reader as it reduces the amount of complexity involved in the decision problem. Reducing complexity improves the ability for readers to understand and interpret the linkages involved within the map.

Cognitive maps created using VFT show linkages between the objectives for the decision problem and the values of the decision-maker using a network of arrows and nodes (Ackermann and Eden, 2010; Eden, 1988, 2004; Giordano et al., 2005). Generally, the concept at the tail of an arrow indicates causality or influence in relation to the concept at the head of the arrow (Ackermann and Eden, 2010; Eden, 1988, 2004). Nodes that have arrows solely leaving objectives represent means concepts, also referred to as heads (Eden, 1988, 2004). Nodes that have arrows going in without any leaving are known as end concepts, also referred to as tails (Eden, 1988, 2004). Once the objectives and values are linked, the control of consequences test is used to distinguish the

fundamental objectives from the means objectives. According to Keeney (1996), the control of consequences test examines the influence and importance of achieving objectives for a decision context (Keeney, 1996). More information and specifics regarding the use of the control of consequences test in this research will be discussed in Chapter III.

Keeney (1996) mentions three critical issues to consider when structuring objectives using a value hierarchy and a means-ends network. First, the overall strategic objective for the decision situation must be clearly defined. The overall strategic objective for the decision situation in this research is to minimize risk to FMS project success by increasing customer satisfaction. Second, objectives must relate on different levels of the structures. In value hierarchies, the lower tier objectives show the aspects of the fundamental objectives that are most important (Keeney, 1996). It is essential for the lower tier objectives to be mutually exclusive and thorough (Keeney, 1996). If the lower tier objectives are not mutually exclusive, redundancy is introduced into the decision model. Redundancy poses the risk of double counting aspects of the decision situation in more than one objective. The third critical issue revolves around stopping the structuring process. In a means-ends objectives network, the structuring process ends when alternatives and classes of alternatives are clear and concise (Keeney, 1996). The fundamental objectives value hierarchy ends when reasonable attributes to measure the degree of achieving objectives are complete and clear enough to measure the decision problem (Keeney, 1996).

Step 3: Developing the Evaluation Measures

The evaluation measures, known as attributes, provide clarity to the meaning of the fundamental objectives (Keeney, 1996). Attributes measure the extent to which objectives are achieved using impact levels. Impact levels reflect levels of achievement and provide a basis for which the achievement of an objective is measured. Attributes are classified into three categories: natural, constructed, and proxy (Keeney, 1996). Natural attributes are used when the objectives can be directly explained quantitatively or through connections created from common knowledge (Keeney, 1996; Keeney and Gregory, 2005). Keeney and Gregory (2005) also mentioned that most natural attributes can be counted or physically measured. As an example, the objective "minimize fatalities in the U.S." can be measured by a natural attribute that evaluates the total number of fatal events in the U.S. Once the number and source of fatalities are identified, solutions towards minimizing fatalities can be created.

Constructed attributes are often used when it is inappropriate or untenable to use natural attributes (Keeney, 1996; Keeney and Gregory, 2005). These attributes provide a scale for measurement when a natural attribute does not exist for a particular objective (Keeney and Gregory, 2005). Constructed attributes are often used for objectives that possess subjective or qualitative elements. Using a similar example from Keeney and Gregory (2005), assume that there is an objective to reduce the amount of fear towards highway transportation felt by members of the public. A natural attribute that evaluates the number of people who experience fear when driving on the highway would not adequately assess the objective because the fear level of different individuals varies

tremendously. Therefore, a constructed scale with descriptions of each level may be more appropriate for evaluating the fear of the public towards highway transportation.

Proxy attributes measure performance of objectives indirectly (Keeney, 1996). Like constructed attributes, proxy attributes are used when it is difficult to create natural attributes (Keeney and Gregory, 2005). Like the previous example using the objective "minimize fatalities," an attribute that measures the number of fatalities due to vehicle accidents indirectly relates to the objective of minimizing fatalities (Keeney and Gregory, 2005). Although vehicle accidents do not account for all types of fatal events, measuring vehicle incidents can provide insight into how vehicle fatalities contribute to the number of fatalities overall.

If possible, it is best to use natural attributes as opposed to constructed and proxy attributes. Compared to natural attributes, constructed attributes do not provide measurement scales that are reliable nor familiar to readers examining the analysis (Keeney, 1996; Keeney and Gregory, 2005). Additionally, proxy attributes do not provide enough insight into the decision problem compared to natural attributes. Keeney and Gregory (2005) mentioned that proxy attributes are less informative due to their nature of indirectly measuring achievement.

Step 4: Create Value Functions

Value functions aid in calculating normalized values for all attributes. Normalized values are based on the decision-maker's preference and reflect the value increment designated to each impact level of attributes. These normalized values are used to determine which objectives are most prioritized and can lead to the best possible outcome related to the fundamental objectives. Value functions provide a means for

combining the evaluation measures "into a single index of the overall desirability of an alternative" (Kirkwood, 1997, p. 55).

Value functions are estimated using the following four methods: direct rating, piecewise linear, exponential, and bisection. However, piecewise linear and exponential value functions are used exclusively in this research. Piecewise linear value functions allow for approximation of nonlinear objective functions (Camponogara and Nazari, 2015). To create piecewise linear value functions, the decision-maker assesses the relative value increments between all impact levels of an attribute. Exponential value functions are derived from single dimensional value functions that vary depending on whether the preferences are monotonically increasing or decreasing in value. Depending on the extent to which an objective is achieved, exponential value functions help evaluate attributes that exhibit sharp increases or decreases in value preference between impact levels.

Step 5: Weighting the Attributes in the Value Hierarchy

To finalize the use of the MODA model within this research, weights will be calculated for all attributes in the analysis. The values of the weights do not reflect importance, but rather the decision-maker's preferences for achievement. The three methods commonly used to calculate weights for the value hierarchy are the trade-off method, the quantitative swing method, and the swing weight method. In the trade-off method, the decision-maker assesses how much of the most valued attribute must be given up in order to compensate for a change in the other attributes. In this assessment, the decision-maker participates in an indifference analysis. During this analysis, the decision-maker selects the intermediate level of the most valued attribute that provides

equal value in comparison to the highest level of the remaining attributes. Once the indifference analysis is completed, a trade-off analysis is conducted using hypothetical values of alternative outcomes for all attributes. These hypothetical values are used in multiple attribute value functions to calculate the weight for each attribute.

The quantitative swing method compares attributes by considering hypothetical value increment "swings" from the least preferred level to the most preferred level for all attributes. The decision-maker applies value increments for all attributes using the least preferred attribute as a basis for scaling. For example, the decision-makers may state that a value increment swing for the most preferred attribute is three times better than a value increment swing for the least preferred attribute. The weights for all attributes are then calculated using the value increments in multiple attribute value functions. In the swing weight method, the decision-maker gauges ratios of relative value between all attributes. For example, the most preferred attribute is weighted as 100, and the remaining attributes are scored based on their relative value to the most preferred attribute. Once each attribute is scored, the weights are normalized and distributed accordingly.

III. Methodology

Chapter III presents the value-focused thinking (VFT) philosophy and multiple objective decision analysis (MODA) applied within this research. When performing the MODA, it is important for the construction of the value hierarchy to focus strictly on the problem of interest in the appropriate manner. If the problem of interest is not properly defined, the model and analysis will be futile. Therefore, it is important to discuss details of the process used to create the value model. Chapter II discussed the characteristics of the VFT philosophy from a broad perspective, while this chapter presents specific details regarding the development of the fundamental objectives and evaluation measures for this research. This chapter will contain information pertaining to data collection and organization, specifically the development of means-ends networks, the identification and structuring of the fundamental objectives, a discussion explaining the extent to which the fundamental objectives aid in improving Royal Saudi Air Force (RSAF) customer satisfaction, the development of evaluation measures, the creation of value functions, and weight estimation.

Data Collection

This research uses the insight and experiences of two Foreign Military Sales (FMS) decision-makers. The first decision-maker is of Hispanic descent with 10 years of experience in the federal service and construction industry. Much of their field experience revolved around construction in Texas, where the labor force is predominantly Hispanic. This decision-maker worked with both the U.S. Army Corps of Engineers and

Air Force Civil Engineering Center. The second decision-maker is originally from Bangladesh but moved to Texas in 1990. This decision-maker is a civil engineer and has over 25 years of private and public sector experience in Civil Engineering Design, Construction, and Project Management. Initial discussions were conducted to lay the foundation for identifying the decision problem, the fundamental objectives, and the evaluation measures. Once the foundation was solidified, subsequent discussions continued over a span of eight months for clarity and understanding purposes.

Due to the pandemic, all consultations were conducted either over the phone or through Zoom software. The consultations were conducted separately to prevent the influence of peer pressure and groupthink in their responses. The initial conversations focused primarily on gathering answers for 11 questions from the FMS decision-makers. These initial questions are displayed in Appendix A. While discussing the 11 questions, both FMS decision-makers confirmed that sustaining high levels of customer satisfaction is the primary objective when deciding whether an FMS project is successful. Therefore, it was decided that the overall strategic objective for minimizing risk to FMS project success is to increase customer satisfaction. Once the initial discussions concluded, the answers provided by both decision-makers were analyzed and grouped according to similar responses using a means-ends network.

Development of Means-Ends Networks

During consultations with the FMS decision-makers, there were multiple approaches used to properly identify and structure the concepts and objectives displayed in the means-ends network. Table 2 displays common methods used to identify and

structure concepts in means-ends networks. In particular, the use of consequences, problems and shortcomings, wish list, goals, and different perspectives were used for this analysis. The use of consequences method identifies objectives by analyzing the impact of actions on fulfilling the goal in a decision context (Keeney, 1996). To articulate the use of consequences, the decision-makers were asked, "Are there any actions that would be unacceptable during U.S. FMS construction projects?" The use of the problems or shortcomings method works towards identifying objectives that will help mitigate the consequences of common problems in processes or policies (Keeney, 1996). This method was incorporated by asking the decision-makers, "What major challenges have you experienced while conducting construction in Saudi Arabia?" The use of a wish list and the use of different perspectives approaches were combined during the discussions. The use of a wish list method identifies objectives by placing a decision-maker in the position of a different stakeholder, whereas the use of different perspectives method identifies the respondent as the "ultimate decision-maker" without limitations (Keeney, 1996). These approaches allow the decision-maker to articulate key areas for improvement through the assumption that the decision-maker is not limited to any constraints. The two methods were included by asking the decision-makers, "If you were the ultimate decision-maker with no constraints, what would you do to minimize risk in FMS projects and why?"

Table 2. Methods for Identifying and Structuring Concepts (Jurk, 2002)

Technique	Questions
Develop a wish list	What do you want? What do you value? What should you want?
Identify alternatives	What is a perfect alternative, a terrible alternative, some reasonable alternative? What is good or bad about each?
Consider problems and shortcomings	What is wrong or right about your organization? What needs fixing?
Predict consequences	What has occurred that was good or bad? What might occur that you care about?
Identify goals, constraints, and guidelines	What are your aspirations? What limitations are placed on you?
Consider different perspectives	What would your competitor or constituency be concerned about? At some time in the future what would concern you?
Determine strategic [values]	What are your ultimate [values]? What are your values that are absolutely fundamental?
Determine generic [values]	What [values] do you have for your customers, your employees, your shareholders, yourself? What environmental, social, economic, or health and safety objectives are important?

Figure 11 displays the means-ends network for the first FMS decision-maker, and Figure 12 displays the means-ends network for the second decision-maker. These networks display objectives and values that reflect previous actions performed and goals accomplished during FMS construction that were deemed critical in achieving FMS project success. The objectives and values within the congregated map are characterized by a decision context, an object, and a direction of preference (Keeney, 1992). The

decision context defines the scope for the creation of alternatives for a particular decision situation (Keeney, 1992). The decision context for this research is FMS project management during Air Force Security Assistance Center (AFSAC) construction in Saudi Arabia. Objects define the specific area of interest within the decision context. The object for this research is customer satisfaction. The direction of preference represents a decision-maker's inclination for certain outcomes. For the direction of preference, an increase in customer satisfaction is preferred as opposed to a decrease. Combining the maps of both decision-makers led to the extraction of 35 objectives and values for the congregated means-ends concept map displayed in Figure 13. The 35 objectives and values mapped in Figure 13 reflect previous actions performed and goals accomplished during FMS construction that were deemed critical in achieving FMS project success. Analyzing the chart from the heads to the tails answers the question, "How can the objective be accomplished?" For example, the question "How can you promote comfortability with Saudi officials?" is answered with focusing on transparency, bridging cultural differences, increasing cultural awareness, exhibiting respect for their traditions, and exhibiting friendliness. On the contrary, analyzing the chart from the tails to the heads answers the question, "Why is this concept important?" Again, consider the concept under investigation is promoting comfortability. Promoting comfortability is important because it helps to build a close relationship with Saudi officials, improve communication with Saudi officials, and ensure a successful turnover concluding construction development. In Figure 13, The mean concepts are displayed towards the top of the network and end concepts are towards the bottom of the network.

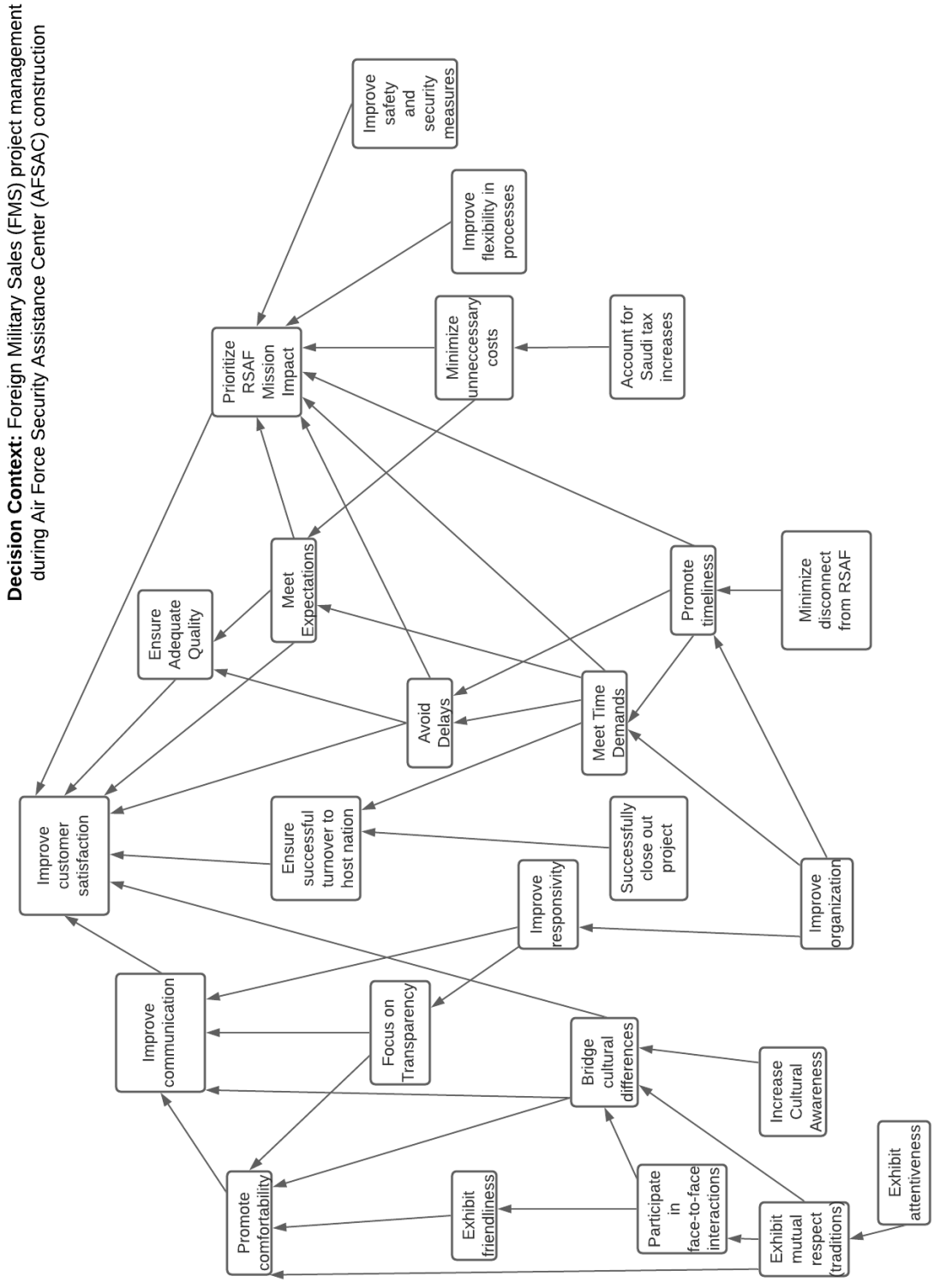

Figure 11. Means-Ends Network for Decision-Maker 1

Figure 12. Means-Ends Network for Decision-Maker 2

Figure 13. Congregated Means-Ends Network

Identifying and Structuring Fundamental Objectives

Keeney (1996) mentions that fundamental objectives must have criteria to distinguish the strategic objectives that are means objectives from the fundamental objectives. To do so, a test known as the control of consequences is conducted. As discussed in Chapter II, the control of consequences test examines the influence and importance of achieving objectives for the decision context (Keeney, 1996). Candidate fundamental objectives are objectives that must undergo the "Why is it important?" test before being classified as a fundamental objective (Keeney, 1996). They are initially considered candidate fundamental objectives because they must undergo the control of consequences test to determine whether they are means objectives or fundamental objectives (Keeney, 1996).

The control of consequences test identifies the objectives that are prime contributors to the achievement of the decision problem by examining whether the objective has other alternatives beyond the decision context that can influence its achievement (Keeney, 1996). If the objective is too broad, alternatives outside of the decision context can have implications on its achievement; therefore, it is not considered a valid fundamental objective (Keeney, 1996). As a simple illustration of the control of consequences test, this research offers the decision situation in which the FMS program is deciding among different strategies to improve their ability to increase customer satisfaction. One candidate fundamental objective for this decision is the objective "prioritize RSAF mission impact" displayed in Figure 13. For this analysis, there is a decision context formed by a class of alternatives relating to "FMS project management during AFSAC construction." This decision context includes different options to

increase customer satisfaction in FMS construction operations within the domains of project management. An analyst may conclude that "prioritize RSAF mission impact" is not a legitimate fundamental objective because there are other factors excluding the alternatives encompassed in the considered decision context can influence how the mission of RSAF is impacted.

Keeney (1996) mentions that if a candidate fundamental objective fails the control of consequences test, there must be a means objective connected to the candidate fundamental objective that is a fundamental objective. Examining Figure 13, the objective "meet time demands" is a means objective that is linked to the broader objective "prioritize RSAF mission impact." The only way to impact project scheduling concerns is through project management, namely the alternatives inside of the decision context. In this case, an analyst may say the objective "meet time demands" is a fundamental objective for this decision situation. The final fundamental objectives concluding the control of consequences test are improve communication, meet time demands, increase cultural awareness, and ensure successful turnover to the host nation. Once the fundamental objectives were identified, the value hierarchy displayed in Figure 14 was created.

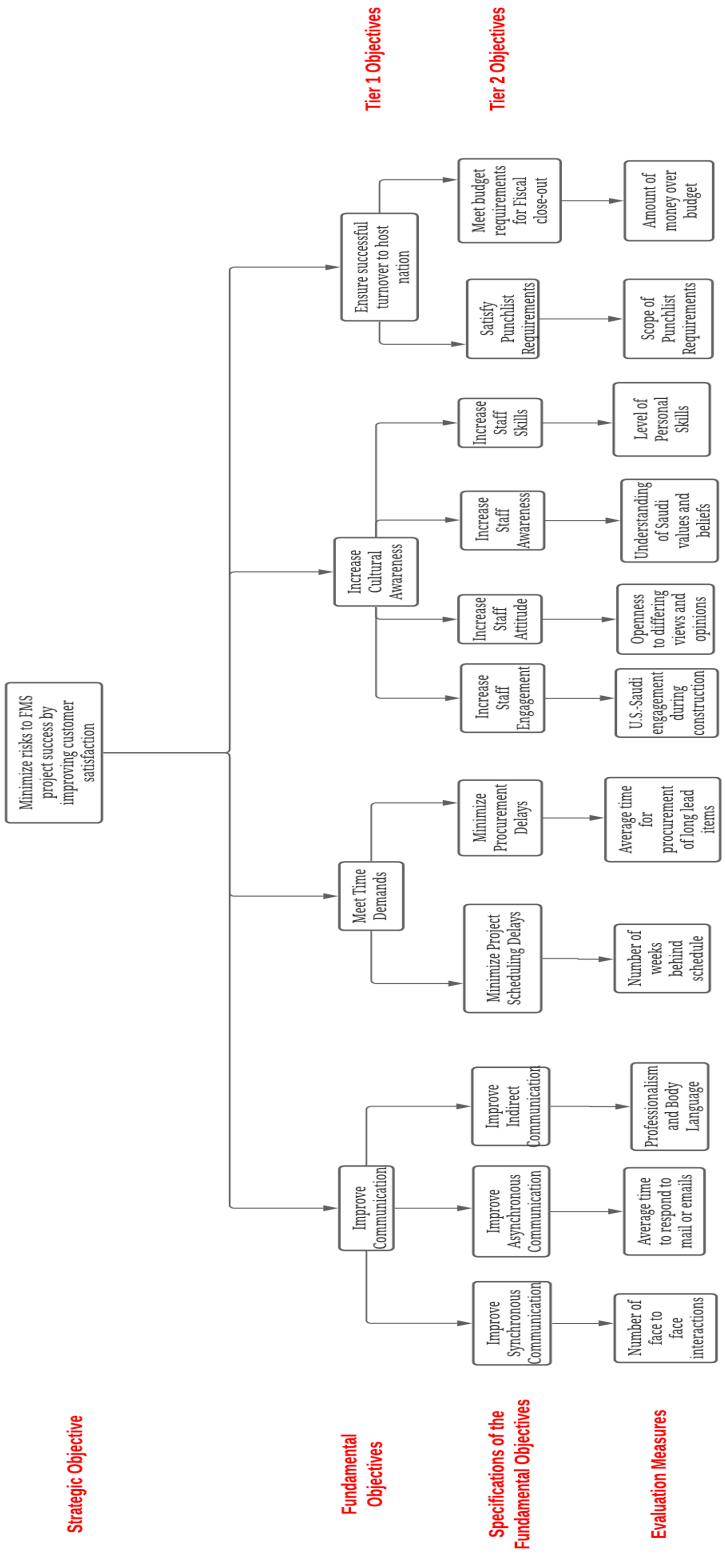

Figure 14. Value Hierarchy for FMS Construction

Discussion of Fundamental Objectives

The means-ends network aided in identifying the fundamental objectives to guide FMS decision-makers in increasing the satisfaction of Saudi stakeholders. Based on the feedback from the decision-makers, the goal of construction development with foreign partners is to provide good service and increase customer satisfaction. This section provides a discussion surrounding why the tier 1 objectives are key areas of interest for FMS construction success. The discussion will help in interpreting the extent to which the objectives would be useful in improving customer satisfaction.

Improving Communication

Adequate communication during pre-planning phases of construction allows all parties to set expectations. Often, foreign customers are not familiar with performing construction operations in the same manner as the United States. Foreign customers have different customary processes than the U.S. due to being accustomed to a different background. Through communication, the U.S. can understand Saudi needs and requirements, thereby ultimately providing them the ability to translate the requirements into a language that is understandable for both parties. With the translated agreement, all parties are aware of their roles and responsibilities before initiating construction operations.

Adequate communication between FMS managers and the Directorate of Programs (DoP) in the Royal Saudi Air Force (RSAF) is extremely important. The DoP manages all Saudi Air Force bases and is the ultimate decision-maker for base operations. Avoiding a disconnect with the DoP is a huge point of emphasis for maintaining a good relationship with Saudi Arabia. Maintaining open channels with the directorate helps

ensure satisfaction from the primary stakeholders. The directorate should be notified of any adjustments and changes to the project requirements because they may have a different outlook on what should be done. According to the FMS decision-makers, Saudis admire U.S. infrastructure and prefer their own infrastructure to resemble characteristics of big cities in America. However, their recommendations are often out of scope based on the project requirements. If an item is out of scope, it is important to avoid discouraging Saudis or outright denying their request. Instead, it is better to find a way to either accommodate their interests, explain why the item cannot be implemented, or discuss its negative consequences on the mission of RSAF. If uncertainty and questions arise regarding the usage of out-of-scope items, the DoP provides the ultimate vote on whether extra costs and time should be allocated. The goal of FMS managers is to meet on a weekly basis to discuss project updates and any challenges encountered. If challenges cannot be resolved, RSAF expects to receive a timely notice with an explanation. Some challenges cannot be avoided and that is understood between both parties.

To improve customer satisfaction and avoid a disconnect with RSAF, the FMS program implemented the transfer of Air Force official liaisons into RSAF. One of the decision-makers that participated in this research is an official U.S. Air Force liaison in RSAF. U.S. Air Force liaisons are individuals who reside in the host nation and act as communicators between foreign officials and the U.S. government. It is important to include an official U.S. Air Force liaison as a decision-maker to gather insight from a person who lives and operates in Saudi Arabia daily. The decision to provide an official liaison in RSAF improved satisfaction with Saudi Arabia by establishing a personal point

of contact that can meet face to face, discuss challenges, and take opinions and ideas into consideration. Previously, exchanging letters was the primary outlet of communication between FMS representatives and Saudi officials. Currently, primarily due to the pandemic, communication between RSAF and the FMS program has shifted back towards exchanging letters. When receiving letters, FMS managers must focus on acknowledging all concerns with attention to detail. Showing acknowledgement and attention to detail to their requests will be instrumental for retaining the satisfaction of Saudi officials.

Discussing whether communication between FMS representatives and workers in the labor force is important provided contrasting answers. One decision-maker stated that FMS managers rarely communicate with workers in the labor force. According to this decision-maker, the role of communicating with labor force workers is given to contractors. However, the other decision-maker explained positive reasons why creating a comfortable relationship with labor force workers is extremely important. The second decision-maker believed adequate communication between FMS representatives and workers in the labor force will improve the overall health of projects by building comfortability.

Ensuring Successful Turnover

Ensuring a successful turnover helps improve the satisfaction of customers. During construction, the role of FMS managers is to observe and ensure quality work during construction development. As aforementioned, Saudis appreciate American infrastructure; therefore, it is common for the FMS program to develop end products that have elements of American infrastructure. For FMS managers, it is recommended to dig

deeper into the requirements and punch list given by RSAF. To improve customer satisfaction, it is important to avoid solely meeting requirements. Managers must emphasize to contractors that providing top-quality materials to improve functionality and desirability is important. Facilities built by U.S. contractors are, on average, more expensive compared to facilities built by Saudi contractors. This is primarily because the U.S. emphasizes the use of top-quality materials and equipment. RSAF is willing to sacrifice higher costs to receive top quality infrastructure; therefore, it is essential to strive to exceed quality expectations. To ensure adequate quality, the quality assurance team is used to conduct inspections during and after construction. Prioritizing adequate quality is essential to the FMS mission because Saudis take pride in their new facilities and infrastructure developed through FMS interactions. For example, the prince of Saudi Arabia performed a groundbreaking ceremony for the recent Air Warfare Center (AWC) created through FMS transactions with the U.S.

Cost is important in any construction project. RSAF bases have designated funds that are managed by the DoP in RSAF. These funds are fixed and divided among all bases; therefore, exceeding budgets in one project can decrease the amount of money available for future projects. FMS managers are given the freedom to divide the total budget for all bases. If cost overruns occur at a base, the FMS representatives must communicate with RSAF to ask for more money to complete future projects. Otherwise, challenges with fiscally closing out the project and budgeting future projects will occur. If the reasons for cost overruns are unreasonable, Saudi officials may assume that the projects are mismanaged by FMS managers.

Meeting Time Demands

Meeting time demands is extremely important for any project manager. Regarding meeting time demands during FMS and RSAF collaboration, late deliveries can significantly impact the mission of RSAF. Additionally, it is important for the facility or runway to be ready if resources are gained in a transaction. For example, the AWC is a recent RSAF infrastructure developed through the FMS program. If the completion date for the AWC was delayed, it would have delayed scheduled classes and training for Saudi pilots.

A crucial aspect of meeting time demands during construction is minimizing unnecessary excessive change orders. When extra costs and items are added after a contract has been settled, there are often associated consequences. For FMS processes, when customers add elements to a contract that is out of the original scope, the contractor must submit a claim to adjust the scheduling and pricing in the contract. Due to the inflation of Saudi taxes from five percent to fifteen percent, extending the time of contractors on-site can negatively impact budget and cost factors like overhead costs.

Contractor experience in FMS construction development is an important criterion for FMS managers to consider during source selection bidding. In the past, FMS managers have encountered issues with a contractor's inability to account for the shipment and procurement of long-lead items. In Saudi Arabia, long-lead procurement items must pass through Saudi customs where a lot of paperwork is required before acceptance. To reduce the likelihood of delays, FMS managers require contractors to provide a weekly item list with estimated shipping durations. If a delay occurs due to

procurement items, FMS managers will be able to notify and update RSAF with estimated arrival dates.

Starting and ending construction projects on time is extremely important. Effective time management is essential to meet budget and project targets successfully and efficiently. During the planning stage, all work activities should be properly understood and planned in detail to reduce the potential for "unknowns" to negatively impact the project. One concern that is often overlooked but important to FMS managers is gaining base access. To gain base access in Saudi Arabia, contractors must receive a letter from RSAF headquarters. The letter is drafted by RSAF and sent directly to selected bases depending on which base has construction activity. However, this process has delayed construction start dates because it can take up to a month to get in touch with RSAF headquarters. Without base access, materials and workers cannot get on base to begin work. To prevent this from happening, FMS managers implemented a strategy that allows the managers and contractors to have more control over the letters that permit base access. The FMS representatives personally take the letter and give it to RSAF bases instead of waiting for RSAF headquarters to fax it.

Increasing Cultural Awareness

In any FMS construction project, the satisfaction of the host nation is the most important factor when determining the success of a project. Providing end products that satisfy customers relies on understanding the customer's needs and values. Based on research and information gathered from the two FMS decision-makers, individuals from Saudi Arabia value trust, loyalty, respect, and flexibility. Much of Saudi business operations and agreements revolve around becoming familiar with the opposite party.

Often, personal information is exchanged to begin a foundation for trust. Saudi officials do not conduct business with people or groups who are unfamiliar or untrustworthy. Therefore, participating in activities such as accepting tea, accepting coffee, and breaking bread are great for building familiarity and the reputation of FMS managers with Saudi officials.

Showing respect for Saudi traditions by shaking hands, drinking tea, and breaking bread demonstrates to Saudi officials that the FMS representatives respect their culture and the way they do business. Accepting their cultural gestures while reciprocating cultural courtesies and customs not only builds trust and respect between both parties, but it also soothes the environment. Remaining attentive during their cultural gestures displays mutual respect. Other traditions, like Ramadan and other Saudi holidays, must also be taken into consideration due to their impact on scheduling and responsivity. The scheduled dates for Ramadan shift each year because the holiday is driven by moon cycles. Additionally, at the conclusion of the holiday, the King has the authority to extend the duration of Ramadan. The uncertainty surrounding the dates of Ramadan creates conflict and issues in scheduling due to the unavailability of base access and construction workers.

A primary focus of FMS managers is to establish a lasting impact on parties involved in the construction process. As aforementioned, construction processes in Saudi Arabia differ from American construction processes. Therefore, FMS managers place emphasis on educating Saudi officials and workers on how construction activity is conducted in the United States. Building runways, facilities, and taxiways are typical construction activities for the U.S.; however, these activities are not typical for Saudi

Arabia. Saudi officials appreciate when FMS managers educate them on why it is in their best interest to remain in scope of project requirements.

Development of Evaluation Measures

Proxy and constructed attributes are predominantly used within this analysis because there are few preexisting natural measures for many of the objectives. Due to lacking universally accepted means of measurement for many of the objectives, the use of constructed and proxy attributes help provide insight into the definition of contributing factors for each objective (Keeney, 1996). The evaluation measures discussed in the remainder of this section are grouped according to the fundamental objective they support. Appendix B displays a table providing definitions of each impact level for all evaluation measures used in this research. Evaluation measures that are natural are often the most preferred because they provide a generally accepted scale for measuring the attainment of specified objectives (Keeney, 1996). Constructed and proxy measures are least preferred because they force the analyst to develop metrics specifically tailored to evaluating the attainment of a related objective (Keeney, 1996). Due to the qualitative nature of this study, it is extremely difficult to identify direct quantitative measures for many of the evaluation measures. As a result, the analyst is forced to resort to a constructed or proxy scale.

Improving Communication

Table 3 provides a summary of the evaluation measures for the objective "improve communication." Communication concerns are decomposed into three specifications: synchronous communication, asynchronous communication, and indirect

communication. Synchronous communication occurs when messages and responses between parties are exchanged immediately. Therefore, synchronous communication is further specified as face-to-face interactions. Asynchronous communication occurs when parties are not communicating in real time. Asynchronous communication is measured by examining the average time of responsivity to emails and letters from Saudi officials. Indirect communication is described as the perception given to Saudi officials through the body language, attentiveness, and professionalism displayed during interactions. The attributes for synchronous and asynchronous communication are natural attributes and the attribute for indirect communication is a constructed attribute.

Table 3. Summary of Measures in the Improve Communication Branch

Third-Tier Hierarchy Value	Associated Measure	Lower Bound	Intermediate Lower Level	Intermediate Upper Level	Upper Bound
Synchronous communication	Number of face-to-face interactions	Once a month	Once every two weeks	Once a week	3x a week
Asynchronous communication	Average time to respond to mail or emails	Respond the next day	Within 8 hrs	Within 6 hrs	Within 4 hrs
Indirect communication	Professionalism and Body Language	Unprofessional	Neutral	Neutral	Approachable

Ensuring Successful Turnover

Table 4 provides a summary of the evaluation measures for the objective "ensure successful turnover." This fundamental objective examines how well the FMS program managed funds and ensured adequate quality during construction development. This

objective is decomposed into two specifications: satisfy punch list requirements and meet budget requirements for fiscal close-out. The specification of meeting budget requirements analyzes whether the project meets or exceeds the budget goals at completion, whereas the specification concerning punch list items analyzes whether the items of the project are in-scope or out-of-scope. Analyzing whether the project ended over budget or under budget can give insight into how well RSAF funds were managed by FMS managers. In addition, analyzing the punch list items will give insight into the degree to which the requirements of the RSAF officials were met. Both evaluation measures are proxy attributes due to the inability and difficulty of creating measures that directly measure a "successful turnover."

Table 4. Summary of Measures in the Ensure Successful Turnover Branch

Third-Tier Hierarchy Value	Associated Measure	Lower Bound	Intermediate Level	Upper Bound
Punch list Requirements	Scope of punch list items	Out-of-scope items	Neutral	In-scope items
Fiscal close-out (Program Level)	Amount of money over budget at completion	Extremely over program budget requirements	Over program budget requirements	Meet program budget requirements

Meeting Time Demands

The objective "meet time demands" focuses on analyzing the number of delays encountered during construction in Saudi Arabia. As shown in Table 4, meeting time demands is further specified as the number of weeks behind schedule and the average time for procurement of long-lead items. Table 5 provides a summary of the impact

levels for both evaluation measures under this fundamental objective. Both attributes relating to meeting time demands represent natural attributes.

Table 5. Summary of Measures in the Meeting Time Demands Branch

Third-Tier Hierarchy Value	Associated Measure	Lower Bound	Intermediate Lower Bound	Intermediate Upper Bound	Upper Bound
Project Schedule Delay	Number of Months Behind Schedule	> 12 months	6 months	3 months	No delays
Procurement Delay	Average time for procurement of long-lead items	6 months	4 months	2 months	2 weeks

Increase Cultural Awareness

The objective "increase cultural awareness" is further specified into four components that measure cultural competence: staff awareness, staff engagement, staff attitude, and staff skills. For this research, cultural competence refers to the ability to recognize and navigate cross-cultural differences to achieve mutual goals and ambitions. First and foremost, it is crucial for FMS managers and staff to have adequate cultural awareness. Without awareness, the FMS staff will not be able to recognize diversity-related values, beliefs, and stereotypes (Diversity Officer Magazine, 2018). Staff engagement focuses primarily on how FMS staff representatives interact with Saudi officials and workers. Personal and business interactions are somewhat synonymous in Saudi culture. Therefore, the interactions that ensue between FMS representatives and Saudi officials are instrumental in the development of the relationship that forms during

construction processes. Staff attitude examines the mindset of the FMS staff towards differing views and opinions. An online article on cultural competence states, "The stronger we feel about our beliefs and values, the more likely we will react emotionally when they collide with cultural differences" (Diversity Officer Magazine, 2018, para. 9). Therefore, the level of exposure of an FMS manager or staff member to differing cultures and views can significantly impact their ability to manage conflicting situations. Additionally, an aspect of staff attitude includes whether the FMS staff member enjoys their job role. A person who does not enjoy their job will not be fully invested in its success. Lastly, an FMS manager or staff member could have all the right characteristics and knowledge but still lack the ability to employ the learning in real-life situations. Therefore, having the ability and skills to transfer knowledge into practice during interactions is key in reducing cultural conflict and misunderstandings. All attributes for increasing cultural awareness are constructed attributes except for level of personal skills. Measuring the level of personal skills is a proxy attribute because it does not directly impact increasing cultural awareness. Having personal skills affects how well different FMS representatives implement cultural knowledge gained during training in real-life situations. Table 6 provides a summary of the evaluation measures for this fundamental objective.

Table 6. Summary of Measures in the Increase Cultural Awareness Branch

Third-Tier Hierarchy Value	Associated Measure	Lower Bound	Intermediate Lower Level	Middle Level	Intermediate Upper Level	Upper Bound
Staff Engagement	Level of U.S.-Saudi engagement during construction	Very Poor	Poor	Neutral	Good	Very Good
Staff Attitude	Level of openness to differing views and opinions	Very Poor	Poor	Neutral	Good	Very Good
Staff Awareness	Level of understanding for Saudi values and beliefs	Very Poor	Poor	Neutral	Good	Very Good
Staff Skills	Level of personal skills	Very Poor	Poor	Neutral	Good	Very Good

Creation of Value Functions

To begin the process of weighting the value hierarchy, value functions were created and assigned to all attributes. Value functions assign normalized values to all impact levels of given attributes, further indicating the decision-maker's satisfaction and preference towards specific outcomes (Keeney, 1996). These normalized values form value models for each attribute. For this research, the value functions for all attributes were estimated using either the piecewise linear method or the exponential method. The value functions constructed during this analysis are discussed below.

Piecewise Linear Value Functions

Piecewise linear functions use value increments between each possible impact level. These value increments are derived by comparing each impact level to the impact level with the smallest value increment identified by the decision-makers. For example,

the attribute "Asynchronous Communication" in Figure 15 is divided into four impact levels. Both decision-makers classified the smallest value increment, x, as the area between the impact levels "Within 8 hrs" and " ≥ 24 hrs." The value increment between "Within 6 hrs" and "Within 8 hrs" was classified two times greater than the value increment between "Within 8 hrs" and " ≥ 24 hrs." Similarly, the value increment between "Within 4 hrs" and "Within 6 hrs" was classified three times greater than the value increment between "Within 8 hrs" and " ≥ 24 hrs." Using the variables defined for each impact level, the normalized value of each specific outcome was calculated. The calculations for each normalized value for all piecewise linear value functions in this analysis are displayed in Appendix C. Appendix D displays the value models for all piecewise linear functions used in this analysis.

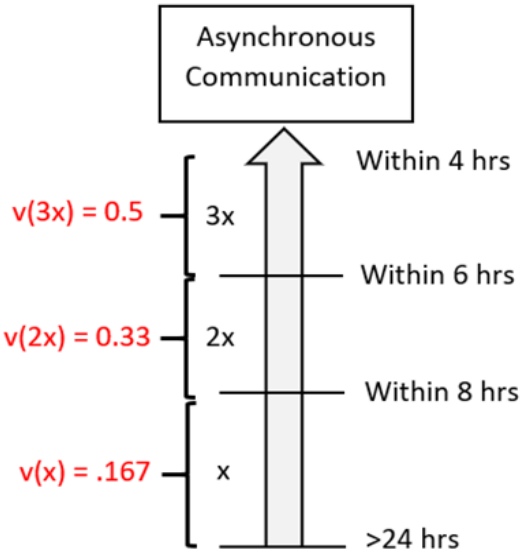

Figure 15. Asynchronous Communication Value Model

Exponential Value Functions

Exponential value functions are derived from single dimensional value functions that vary depending on whether the preferences are monotonically increasing or decreasing in value. In this analysis, all exponential value functions were monotonically decreasing. The function for monotonically decreasing exponential value functions is shown in Equation 1. Equation 2 is used when the value for ρ is equal to infinity.

$$V_i(x_i) = \frac{1 - \exp\left[-\frac{x_i - x}{\rho}\right]}{1 - \exp\left[-\frac{x_i - x_0}{\rho}\right]}, \rho \neq \text{Infinity} \quad (1)$$

$$V_i(x_i) = \frac{x_i - x}{x_i - x_0} \; \rho = \text{Infinity} \quad (2)$$

Calculating the value of ρ is the first step in determining the value of each impact level for exponential functions. Larger values of ρ produce less curved lines than smaller values of ρ. The ρ variable also indicates whether the exponential lines bow upwards or downwards. To determine ρ, the mid-value (x_M) of all impact levels was identified by the decision-makers. The difference between the "mid-value" (x_M) and the lowest impact level (x_i) is equal to the difference between the mid-value (x_M) and the highest impact level (x_0). The mid-value for each exponential attribute was normalized using the Equation 3.

$$Normalized\ mid-value\ (x_m) = \frac{x_i - x_m}{x_i - x_0} \quad (3)$$

Using the normalized mid-value, Figure 16 was used to find the exponential constants, R, for each exponential attribute. Figure 16 includes the normalized mid-values and their respective exponential constants. Equation 4 was then used to calculate the value of ρ for each attribute. Once the values of ρ were calculated, Equation 1 was used to determine the normalized value of each impact level for all exponential attributes. The calculations for all exponential value functions in this analysis are displayed in Appendix E. Appendix F displays the value models for all exponential functions used in this analysis.

$$\rho = R \cdot (x_i - x_0) \quad (4)$$

$z_{0.5}$	R
0.00	----
0.01	0.014
0.02	0.029
0.03	0.043
0.04	0.058
0.05	0.072
0.06	0.087
0.07	0.101
0.08	0.115
0.09	0.130
0.10	0.144
0.11	0.159
0.12	0.174
0.13	0.189
0.14	0.204
0.15	0.220
0.16	0.236
0.17	0.252
0.18	0.269
0.19	0.287
0.20	0.305
0.21	0.324
0.22	0.344
0.23	0.365
0.24	0.387

$z_{0.5}$	R
0.25	0.410
0.26	0.435
0.27	0.462
0.28	0.491
0.29	0.522
0.30	0.555
0.31	0.592
0.32	0.632
0.33	0.677
0.34	0.726
0.35	0.782
0.36	0.845
0.37	0.917
0.38	1.001
0.39	1.099
0.40	1.216
0.41	1.359
0.42	1.536
0.43	1.762
0.44	2.063
0.45	2.483
0.46	3.112
0.47	4.157
0.48	6.243
0.49	12.497

$z_{0.5}$	R
0.5	Infinity
0.51	-12.497
0.52	-6.243
0.53	-4.157
0.54	-3.112
0.55	-2.483
0.56	-2.063
0.57	-1.762
0.58	-1.536
0.59	-1.359
0.60	-1.216
0.61	-1.099
0.62	-1.001
0.63	-0.917
0.64	-0.845
0.65	-0.782
0.66	-0.726
0.67	-0.677
0.68	-0.632
0.69	-0.592
0.70	-0.555
0.71	-0.522
0.72	-0.491
0.73	-0.462
0.74	-0.435

$z_{0.5}$	R
0.75	-0.410
0.76	-0.387
0.77	-0.365
0.78	-0.344
0.79	-0.324
0.80	-0.305
0.81	-0.287
0.82	-0.269
0.83	-0.252
0.84	-0.236
0.85	-0.220
0.86	-0.204
0.87	-0.189
0.88	-0.174
0.89	-0.159
0.90	-0.144
0.91	-0.130
0.92	-0.115
0.93	-0.101
0.94	-0.087
0.95	-0.072
0.96	-0.058
0.97	-0.043
0.98	-0.029
0.99	-0.014

Figure 16. Normalized Mid-Values and their Respective Exponential Constants

Weighting Estimation

For this research, the trade-off method was chosen as the method for weight estimation. The trade-off method calculates the weights of each attribute by comparing two imaginary alternatives, H_A and H_B, that provide equal value to the decision-makers. To begin the trade-off method, the analyst asks the decision-makers, "Suppose that you can move one of the attributes from its lowest impact level to its highest impact level. Which attribute would you move?" Once the decision-makers answered the question, the analyst would ask, "If you could not move that attribute, which remaining attribute would you move?" This process is repeated until the decision-makers have ranked each attribute in terms of their preference in achieving the highest impact level. The order in which the two FMS decision-makers ranked the attributes for this analysis is displayed in Table 7.

Table 7. Attributes in Order of Greatest Value Increment for FMS Decision-Makers

11 independent attributes in order of greatest value increment
Synchronous Communication
Asynchronous Communication
Staff Engagement
Indirect Communication
Project Scheduling Delays
Level of Personal Skills
Staff Awareness
Punchlist Items
Program Fiscal Close-out
Staff Attitude
Procurement Shipment Time

Once the attributes were ordered in greatest value increment, the indifference analysis was conducted. For example, synchronous communication and asynchronous communication are analyzed in Figure 17. The analyst would ask, "Suppose you could either move asynchronous communication from its lowest impact level (≥ 24 hrs) to its highest impact level (Within 4 hrs) or move synchronous communication from its lowest impact level to an intermediate level. Which intermediate impact level for synchronous communication would make you indifferent between the two options?" For this example, the decision-makers chose the intermediate impact level "once a week."

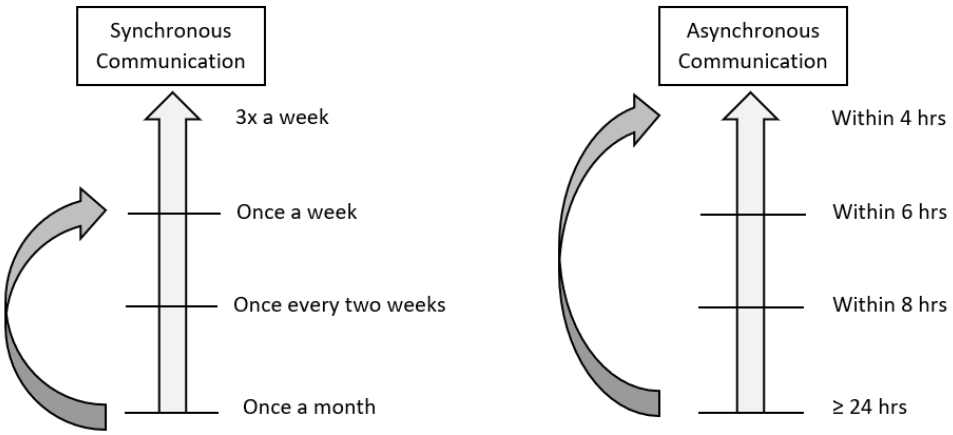

Figure 17. Indifference Analysis – Synchronous vs. Asynchronous Communication

Using the hypothetical values for the chosen intermediate impact level of synchronous communication, the highest impact level for asynchronous communication, and the lowest impact level for the remaining nine attributes in Table 8, the multiple attribute value function displayed in Equation 5 was created to solve for the weight of asynchronous communication with respect to the weight of synchronous communication.

The weighted relationship between asynchronous communication and synchronous communication is displayed in Equation 6. This process was repeated for all attributes and the final weights are displayed in Table 9.

Table 8. Hypothetical Alternatives (Synchronous vs. Asynchronous Communication)

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≤ 4 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds proHgram requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	6 months

$$0.5w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} \quad (5)$$

$$w_{ac} = 0.6w_{sc} \quad (6)$$

Table 9. Calculated Weights for Each Attribute

Attribute	Weight
Synchronous communication	.205
Asynchronous communication	.123
Staff engagement	.102
Indirect communication	.055
Project scheduling delays	.041
Level of personal skills	.041
Staff awareness	.102
Punchlist items	.125
Program fiscal close-out	.125
Staff attitude	.041
Procurement Shipment Time	.041

Figure 18 displays a visual aid showing the trade-off analysis conducted for synchronous communication and asynchronous communication. Appendix G displays the calculations that derived the weights for each attribute. Additionally, Appendix H displays the values used for each group of hypothetical alternatives used in this analysis, and Appendix I provides all visual representations for the trade-off analyses conducted with the decision-makers.

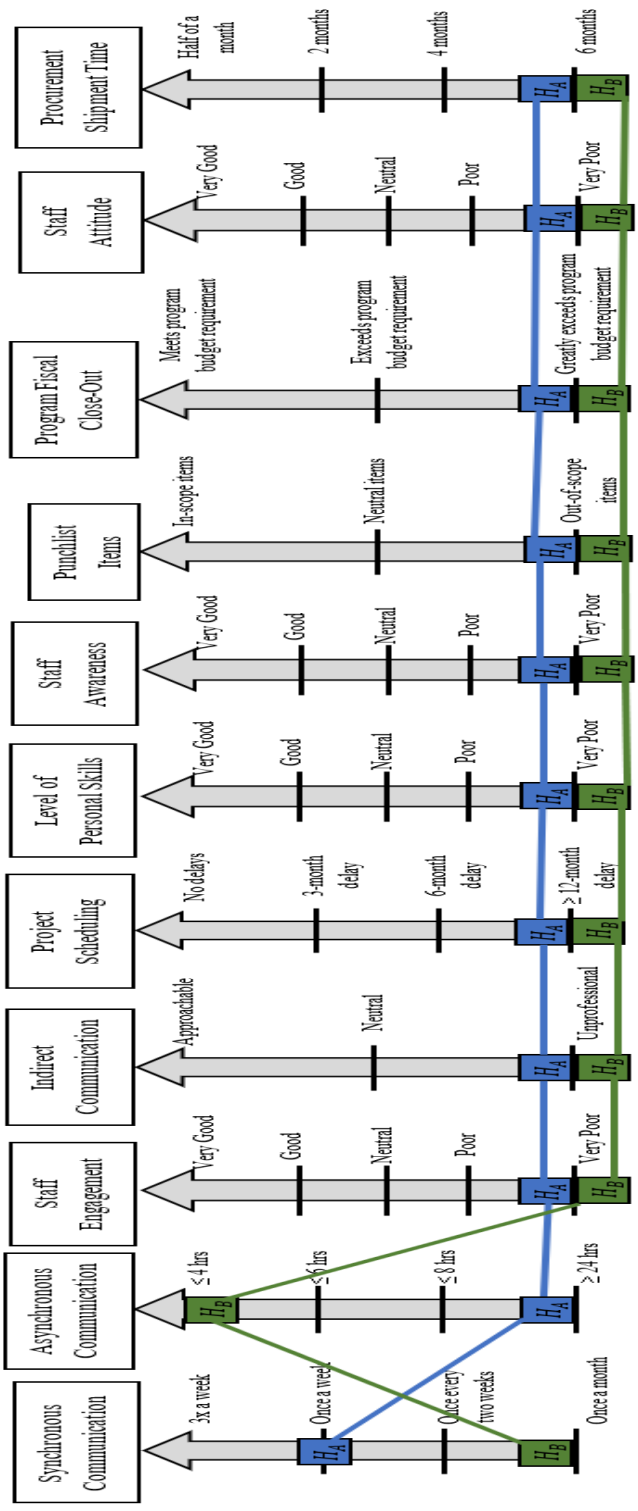

Figure 18. Trade-off Analysis - Synchronous vs. Asynchronous Communication

Summary

The VFT philosophy and MODA described above represents the methodology employed in this research. The complex problem facing the decision-makers of the FMS program is explicitly defined and the value trade-offs between all 11 attributes are evaluated at the strategic level. Chapter IV will present an analysis of the insight gained from the VFT philosophy and MODA described in this chapter.

IV. Analysis and Results

This chapter presents an analysis on the key takeaways from Hofstede's cultural dimensions in Chapter II and the multiple objective decision analysis (MODA) employed in Chapter III. Based on the responses of the decision-makers, the evaluation measures that were most important for achieving Foreign Military Sales (FMS) project success were weighted in the following order: synchronous communication, punch list items, program fiscal close-out asynchronous communication, staff engagement, staff awareness, indirect communication, project scheduling delays, level of personal skills, staff attitude, and procurement delays. However, before the indifference analysis, the decision-makers ranked the evaluation measures based on the perceived value when achieving their highest impact level. During the ranking process, the evaluation measures were ranked in the following order: synchronous communication, asynchronous communication, staff engagement, indirect communication, project scheduling delays, level of personal skills, staff awareness, punch list items, program fiscal close-out, staff attitude, and procurement delays. This chapter will include a discussion covering the similarities and differences between the literature on Hofstede's cultural dimensions and the experiences of the two FMS decision-makers, a discussion that provides a basis for the greatest value increment ranking process of the evaluation measures, and a discussion that provides a basis for the indifference analysis. The discussion concerning the ranking process of the evaluation measures will help in interpreting the extent to which these objectives would be useful in improving customer satisfaction in FMS operations. Similarly, the discussion regarding the indifference analysis will help in understanding

the extent of the value trade-off analysis to which these objectives were analyzed. This chapter will also discuss implications of weighting the value hierarchy in this analysis.

Discussion of Hofstede's Cultural Dimensions

This section provides a discussion connecting the key takeaways from Hofstede's cultural dimensions in the literature review to the experiences of the FMS decision-makers in Saudi Arabia. In comparing the two sections of information, similarities and differences were analyzed. The similarities and differences between the experiences of FMS decision-makers and literature on Hofstede's cultural dimensions are displayed in Figure 19. Literature is often considered to reflect society (Albrecht, 1956). However, its reflection of society may be a misrepresentation depending on whether the source is outdated. Culture is an intangible element that evolves and changes over time. People are constantly adapting to political, economic, and environmental changes. These changes may lead toward redefining or eliminating customary traditions altogether. Due to the evolving nature of culture, it is important to compare similarities and differences between past literature and the current social environment. Articulating these similarities and differences will aid readers in identifying connections between Hofstede's cultural dimensions on Arab countries and the relationships identified in the congregated map discussed in Chapter III.

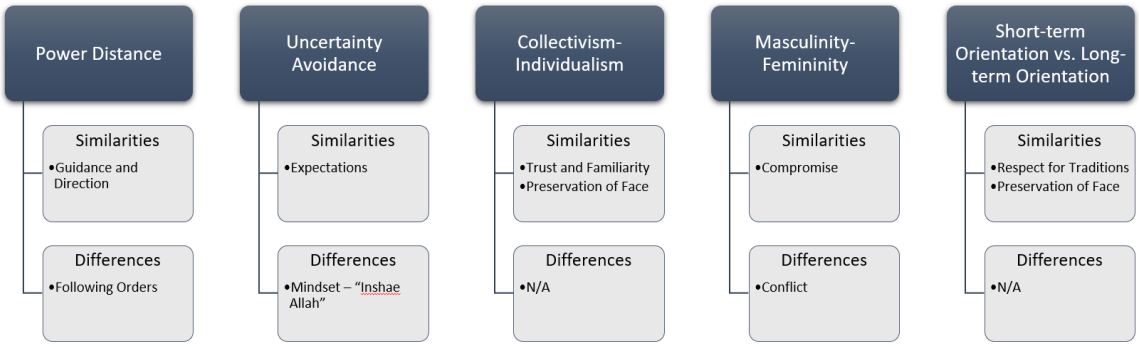

Figure 19. Mapping Hofstede's Dimensions to Experiences of FMS Decision-Makers

For the power distance and uncertainty avoidance dimensions, the experiences of the FMS decision-makers coincided with the information reviewed from Hofstede's cultural dimensions regarding the importance of providing explicit guidance and direction. From the perspective of FMS managers, providing explicit guidance ensures all parties involved in construction operations are with one accord. However, the insertion of Harris and Moran (1991) concerning the lack of following orders by Saudis proved to be unapplicable to today's current cultural environment in Saudi Arabia. The FMS managers spoke highly of the Saudi labor workers and their desire to conduct construction operations properly.

For the uncertainty avoidance dimension, the literature regarding the mindset of "Inshae Allah" did not correlate well with the experiences of the FMS decision-makers in Saudi Arabia. The FMS decision-makers recognized the terminology from previous conversations with Saudi labor workers; however, its usage and impact on promoting lackluster effort was not evident during their time in Saudi Arabia. The insight gained from the collectivism-individualism and short-term oriented versus long-term orientation

dimensions proved to be applicable to Saudi Arabia's current environment. For collectivism-individualism, the importance of building trust, building familiarity, and preserving "face" were all important elements of FMS-RSAF interactions that the FMS decision-makers deemed critical for furthering FMS goals and aspirations. Additionally, the values of short-term oriented societies correspond well with the current value system of Saudis. Respect for Islamic traditions and face are revered and are always given priority regardless of circumstances.

The last dimension, masculinity-femininity, provided insight that possessed elements that coincided and differed from the experiences of the FMS decision-makers in Saudi Arabia. The FMS decision-makers agreed that compromising plays a huge role in ensuring the desires of RSAF stakeholders are accounted for while also satisfying the requisites for FMS project success. On the contrary, the literature focusing on the masculine nature of Saudi Arabia and the U.S. mentioned the risk of extreme conflict between the two parties. However, the FMS decision-makers asserted that they never experienced anything close to extreme conflict. Negotiations and conflict resolution between RSAF and FMS stakeholders were not abnormal from standard business agreements.

Discussion of the Ranking Process for the Evaluation Measures

As aforementioned, the process for weighting the evaluation measures within the value hierarchy began with ranking the evaluation measures in order of preference for desired outcomes. In the hypothetical scenario where all attributes are at their lowest impact levels, the decision-makers decided that shifting synchronous communication

from its lowest impact level to its highest impact level was the most important. The literature and consultations both emphasized the importance of direct, face-to-face contact with Saudi stakeholders. With more contact time, FMS decision-makers, Saudi stakeholders, and other contracting parties involved may get to know each other, gather data, discuss events and future projects, and explicitly communicate project requirements and expectations. Improvements in communication normally resolve most conflicts encountered in construction projects. If improvements in synchronous communication could not be accomplished, asynchronous communication was the next best option for FMS decision-makers. Asynchronous communication includes outlets of communication like emails, letters, and conference call software. Asynchronous communication is often less preferred than synchronous communication due to Saudi's preference for in-person contact and relationship building. However, tasks and objectives accomplished during synchronous communication can also be accomplished using asynchronous communication. When asynchronous communication is the primary outlet of communication, higher rates of responsivity is required to ensure the customer remains satisfied.

If neither synchronous communication nor asynchronous communication were available to decision-makers, improving staff engagement from poor impact levels to high impact levels aids FMS representatives in increasing customer satisfaction. High impact levels for staff engagement aids FMS representatives in their efforts to exceed the expectations of Saudi stakeholders. As interactions ensue between the Saudi officials and FMS representatives, utilizing higher impact levels of staff engagement will promote

comfortability. A focus on promoting comfortability will improve customer satisfaction and the outlook of U.S.-Saudi relations by Saudi officials.

If achieving high staff engagement cannot be accomplished due to issues like staff shortages, the indirect communication attribute is next in importance. If shortages occur, the staff that is available must be approachable to ensure that Royal Saudi Air Force (RSAF) officials and Saudi workers feel comfortable conversing with them. Approachability is a key factor for building a working environment conducive towards achieving project success. Therefore, the working environment of construction projects can improve if FMS representatives encourage a welcoming and team building atmosphere.

Project scheduling delays was next in preferential order to experience a shift from its lowest impact level to its highest impact level. Assuming the remaining attributes are all at their lowest impact levels, focusing on minimizing negative consequences such as project scheduling delays can bring the satisfaction of Saudi officials to an acceptable level. With all the other attributes set at dissatisfactory levels, the FMS decision-makers believed that a focus on having the construction project on schedule is the best option to sustain customer satisfaction.

Level of personal skills and staff engagement are attributes that coincide with each other. While interacting with RSAF officials, incorporating individuals with high levels of personal skills can positively affect interactions between Saudi officials, labor workers, and FMS representatives. Merely participating in basic interactions with Saudi officials is insufficient to sustain and continue improving relations with Saudi Arabia. Therefore, employing individuals with high levels of personal skills can ensure that the

FMS representative makes a good impression on the Saudi officials. Like level of personal skills, staff awareness also coincides with staff engagement. For FMS representatives, it is important to do research and pay attention to factors that are liked and disliked in Saudi culture. Employing staff members who are aware of actions and behaviors that are appreciated in Saudi culture can significantly improve U.S.-Saudi relations, while the opposite could prove detrimental towards improving relations.

Ensuring that the punch list items do not veer too far out-of-scope is key in improving customer satisfaction and ensuring successful turnovers. Therefore, the FMS decision-makers selected punch list items as the next attribute where a shift from its lowest impact level to its highest impact level is most preferred. If the project is at risk of exceeding budget or not finishing on time, narrowing the scope of the project requirements by excluding out-of-scope items may help prevent outcomes that decrease customer satisfaction. Program fiscal close-out is an attribute that may negatively affect RSAF's satisfaction if the project ends over budget. If a project greatly exceeds its budget, a decision to narrow the scope of a project may need to occur to remain within budget. Despite narrowing the scope of the project and possibly removing elements that increase the satisfaction of Saudi officials, the FMS representatives can decide to add additional features to future projects as a way of compromising.

The last two attributes are staff attitude and procurement delays. An increase from the lowest impact level to the highest impact level in staff attitude is more preferred as opposed to procurement delays. Although rare, poor attitude by FMS representatives can negatively impact customer satisfaction. If someone is not happy with what they are doing in their job, their dissatisfaction can taint the atmosphere of the project. Tainting

the atmosphere can have drastic consequences in building and sustaining relationships with customers. In terms of procurement delays, this attribute is the lowest preferred evaluation measure because it involves processes that can easily be altered if negative consequences are expected. If the procurement delays for a project are at its lowest impact level, the FMS representatives can change suppliers or vendors to another supplier that can provide the materials and equipment within the specified period. Additionally, if the customs of Saudi Arabia cannot release the shipments sooner, the FMS representatives can cancel the order and place an order with local suppliers and vendors to receive the items sooner.

Discussion of the Indifference Analysis

The indifference analysis aided in identifying value trade-offs between synchronous communication and the remaining attributes. Identifying the value trade-offs between the most valued attribute and the remaining attributes assisted in deriving the numerical weight coefficients for each attribute. This section provides a discussion regarding the value trade-off analyses conducted in Chapter III. The discussion will explain the decision-maker's motivation behind each chosen intermediate impact level of synchronous communication.

Synchronous Communication vs. Asynchronous Communication

The decision-makers believed a shift from the lowest impact level of asynchronous communication to its highest impact level would negate the need to meet more times than needed. Therefore, the decision-makers found it unnecessary to meet in-person three times a week if high responsivity to emails and letters is sustained

throughout the lifecycle of a project. If the rate of responsivity is poor, it would be in the FMS representative's best interest to have more direct contact meetings to ensure that the needs and requirements from the Saudi officials are satisfied. Therefore, meeting face-to-face once a week coupled with a fast responsivity rate is equivalent to meeting three times every week with poor responsivity rates.

Synchronous Communication vs. Staff Engagement

Like the explanation for synchronous communication and asynchronous communication, an improvement in staff engagement to either of the higher impact levels negates the need to communicate as often. When staff engagement is poor, meeting frequently every week may provide compensation for lackluster effort during interactions. However, when staff engagement is at a satisfactory level, meeting once a week is enough time to go over any overarching project challenges, project concerns, or cultural bonding activities. Therefore, meeting once a week with high staff engagement is equivalent to meeting three times every week with poor staff engagement.

Synchronous Communication vs. Indirect Communication

Improving indirect communication can make a profound impact on promoting comfortability with FMS representatives. If an FMS manager is unprofessional, the impact of meeting face-to-face is often worthless. Regardless of the frequency of communication, unprofessionalism acts counterproductively to making a good impression on Saudi stakeholders. If an FMS representative is approachable, meeting once a week is enough time for all parties to become acquainted. Whether the conversation concerns personal matters or focuses primarily on construction challenges and requests, it is important for the FMS staff to encourage open dialogue with Saudi

officials, stakeholders, and labor workers. Therefore, meeting once a week with high impact levels of indirect communication provides equal value as meeting three times every week with poor impact levels of indirect communication.

Synchronous Communication vs. Project Scheduling Delays

As the likelihood of experiencing extreme delays decreases, it becomes unnecessary to engage in frequent meetings regarding project matters. Projects that do not experience delays encompass effective time management and communication strategies. Due to adequate communication and time management, meeting briefly once every two weeks is sufficient unless RSAF officials or stakeholders prefer to meet more often. Since the project shifted from experiencing extreme delays to operating on-schedule, there would not be many talking points to discuss during frequent meetings. Therefore, meeting once every two weeks with no delays provides equal value as meeting three times every week while experiencing extreme delays.

Synchronous Communication vs. Level of Personal Skills

An FMS manager with higher levels of personal skills will be able to establish or build relationships faster than an individual with poor levels of personal skills. For this attribute, higher levels of personal skills can provide benefits towards a positive perception of FMS representatives to Saudi officials and labor workers. Incorporating higher levels of personal skills will allow Saudi officials and laborers to feel more comfortable and open towards communicating. Therefore, the improvements in perception will allow for better overall communication regardless of the number of times that all parties are able to meet in person. If personal skills are poor, meeting more often would not provide any benefits towards customer satisfaction. Therefore, holding a

meeting once every two weeks with higher impact levels of personal skills provides equal value as meeting three times every week with poor levels of personal skills.

Synchronous Communication vs. Staff Awareness

Like the explanation given regarding the importance of incorporating FMS staff members with higher levels of personal skills, integrating high levels of staff awareness positively affects the perception of FMS staff to Saudi officials and labor workers. In improving staff awareness, FMS managers will be cognizant of actions, behaviors, and language that can inhibit or promote the satisfaction of Saudi stakeholders. With high levels of staff awareness, meeting once every other week allows enough time to give stakeholders personal updates and project updates. As aforementioned, Saudi officials are not always business first during FMS transactions. Often, Saudi officials prefer to discuss personal information and become acquainted with the other collaborating parties. Therefore, meeting once every other week with high levels of staff awareness provides equal value as meeting three times a week with poor staff awareness.

Synchronous Communication vs. Punch List Items

When items on the punch list are in-scope of project requirements as opposed to out-of-scope, there are normally less materials and requirements needed to complete the project. As the number of project requirements decrease, the project becomes less complex and easier to manage. The decision-makers decided that meeting once a week with items that are in-scope of project requirements provides equal value as meeting three times every week with items that are out-of-scope. The weekly meeting can be used to address quality assurance concerns. During meetings, it is important to identify all milestone tasks and their estimated durations for planning purposes. Completing the

milestone tasks on-time and coordinating inspections to ensure the end-product is of adequate quality at completion shows Saudi officials that FMS representatives prioritize customer satisfaction.

Synchronous Communication vs. Program Fiscal Close-out

Normally, scheduling delays and out-of-scope items cause higher final project costs. Therefore, if a project meets its budget requirements at completion, there is a high probability that the project remained on-schedule throughout its duration and included punch list requirements that were in-scope. For this comparison, meeting once every two weeks while meeting budget requirements provides equal value as meeting three times every week while exceeding budget requirements. If there are financial issues, the meeting can be used to plan solutions to alleviate financial difficulties for the next month. Due to the nature of budgeting and change order regulations, changes in fiscal processes occur at slow rates. Since fiscal processes are slow, meeting multiple times a week would not provide any benefit to the parties involved.

Synchronous Communication vs. Staff Attitude

For the FMS decision-makers, meeting once every other week with high levels of staff attitude provides equal value as meeting three times every week with poor levels of staff attitude. Staff attitude, along with the remaining attributes involving cultural awareness, focuses on actions and behaviors that can improve customer satisfaction by exhibiting respect for the culture of foreign partners. Incorporating additional cultural considerations in FMS processes allows the FMS program to consider customer needs during planning and execution phases. Placing the needs of the customer first is the best way to ensure future collaboration is not negatively impacted by negligence. If the

customers are satisfied with the end-product, satisfied with the FMS staff involved during the transactional process, and satisfied with the way the processes were conducted, the customer will more than likely continue entering transactions and agreements in the future. As relations continue improving due to the prioritization of customer satisfaction, meeting more often would not be required unless it is preferred by the Saudi officials.

Synchronous Communication vs. Procurement Delays

The procurement of materials and equipment are only important if they are on the critical path of the project. If the materials or equipment are on the critical path, long procurement times can be detrimental towards completing the project on time. When critical path items have long procurement times, the FMS staff can change the shipment of procurement items to a local manufacturer or supplier. Based on the experience of the two FMS decision-makers, local suppliers can supply materials or equipment in two weeks as opposed to the worst-case scenario of six months. When procurement items on the critical path require an expedited shipment from a local supplier, the FMS decision-makers prefer to meet once a week to discuss the logistics of the change order and its future effects on construction tasks. When procurement items are not on the critical path, the decision-makers prefer to meet once every other week. Despite having a long procurement time, items that are not on the critical path typically do not cause scheduling delays or negatively affect the contractor's ability to complete construction tasks. Therefore, these items would not pose risks towards on-time completion. Since the impact from long procurement times can vary depending on whether the item is on the critical path, the decision-makers decided that meeting once every other week with shorter procurement times provides equal value as meeting three times a week with

longer procurement times. Due to the ability of utilizing local suppliers, adjusting procurement plans to receive shipments from local manufacturers decreases the amount of uncertainty involved in procuring materials and equipment on time. Therefore, meeting more often is not required unless preferred by Saudi officials.

Implications of Weighting the Evaluation Measures in the Value Hierarchy

The weights calculated for the attributes in the value hierarchy offer insight into the elements of FMS construction that can maximize the satisfaction of RSAF stakeholders. Out of the 11 evaluation measures, synchronous communication was ranked first in weight value, asynchronous communication was ranked fourth, and indirect communication was ranked seventh. These results show that the ability to effectively communicate in remote areas is extremely valued by FMS decision-makers. Along with the attributes that stem from a focus on improving communications, understanding the cultural environment during meetings and interactions with Saudi officials proved to be critical in achieving project success. The manner in which the FMS staff engages during interactions was ranked fifth in weight value and the cultural awareness of the FMS staff was ranked sixth in weight value. The average weighting for both attributes reflects their contributions towards bridging cultural differences and creating a comfortable environment during FMS projects. The average weighting also reflects the importance of having cultural awareness to prevent cultural miscues during interactions. Lastly, the scope of punch list requirements and fiscal close-out were ranked second and third in weight value, respectively. Above average rankings for both attributes are expected primarily due to their universal significance in construction

projects. Despite its seemingly trivial implications, this decision support framework identified four fundamental objectives for FMS construction projects, the objectives that directly relate to the achievement of the fundamental objectives, and the critical success factors for the FMS program when managing construction operations in Saudi Arabia. Articulating these three aspects in the value hierarchy allowed FMS managers to generate project management objectives that promote the goals of the FMS program – build stronger partnerships and increase customer satisfaction.

Summary

Project managers tend to overly focus on meeting cost constraints and adhering to schedule demands. However, after using the VFT philosophy and MODA, it is evident that maintaining open communication channels and setting aside adequate amounts of time for relationship building is undoubtedly critical for achieving FMS project success in Saudi Arabia. Saudi officials rarely mind exceeding budget requirements or time demands when the quality of their end-product exceeds expectations unless there is a strict deadline for mission effectiveness. Working through the COVID-19 pandemic brought up many unforeseen issues that opened the eyes of FMS decision-makers to the importance of responding to emails and letters quickly when face-to-face contact time is limited. The pandemic also showed the importance of making project adjustments and changes in a timely manner to avoid negative consequences to both the mission of RSAF and the FMS program. U.S. governmental policy changes may be required in the future to allow more flexibility during contract changes and change orders. However, a focus on improving communication measures and establishing realistic expectations gives FMS

representatives all the necessary information needed to ensure the customer's demands are met regardless of unforeseen events and consequences in the future.

V. Conclusions and Recommendations

Due to its vast number of resources and strategic positioning, the Middle East will continue to serve as a strategic foothold for global opportunities. With increased competition, foreign partners may enter transactions and agreements with other governmental programs instead of the U.S. Foreign Military Sales (FMS) program. The mission of the FMS program is to continue building global security partnerships. Therefore, it is critical for the FMS program to evaluate whether there are areas of their processes that can be improved to promote customer satisfaction. Increasing customer satisfaction will help ensure U.S. partners remain satisfied with their experiences during transactional agreements. This chapter will provide closing remarks, discuss a course of action (COA) for retaining FMS tacit knowledge, discuss a limitation of this research effort, and offer recommendations for future research.

Closing Remarks

This research provided results to answer the following overarching research question: How can project managers for AFSAC's Construction Division and the FMS program enhance customer satisfaction relating to project success when conducting projects with foreign partners? This section will provide answers and insight pertaining to the overarching research question and the following three investigative questions:

a) How does cultural competency play a role in enhancing customer satisfaction in Saudi Arabia?

b) How can value-focused thinking and cultural considerations identify construction management objectives for enhancing customer satisfaction in cross-cultural environments?

(c) How can FMS managers mitigate the effects of risk towards increasing customer satisfaction when completing projects in Saudi Arabia?

Regarding the first investigative question, the FMS decision-makers confirmed that cultural competency and cultural awareness are instrumental aspects to consider in project stakeholder management. Cultural competency and cultural awareness can aid project managers in increasing customer satisfaction and reducing conflict during cross-cultural construction projects. One of the primary notions of this research is tailored towards the idea that achieving success in FMS operations depend largely on preventing the reduction of customer satisfaction. Projects that are completed behind schedule, have high costs, or produce poor-quality end items tend to decrease customer satisfaction. Similarly, projects that provide subpar service also tend to decrease satisfaction. To provide adequate service, it is important to understand the values and desires of the customer. In cross-cultural environments, like FMS construction projects, the values and desires of the customer are likely to align with the values of their culture. Therefore, FMS managers who are culturally aware of the customs, traditions, and value system of partner nations are better suited to fulfill the requests and exceed the expectations of partner stakeholders as opposed to managers who are not aware of the cultural environment.

Cross-cultural miscommunication can lead to cultural miscues during FMS-RSAF interactions, which can further undermine the progress of the 60-year relationship between the two parties. Therefore, cultural competency plays a huge role in the continuance of this partnership, and the ability of FMS managers to enhance customer satisfaction. To continue building the cultural competency of FMS managers and employees, the FMS program must not only emphasize the importance of studying and understanding common characteristics of a culture, but also the little nuances that can positively or negatively affect the satisfaction of their partners. Placing efforts in going above and beyond to build a culturally competent staff will show U.S. foreign partners that the FMS program values their partnership and will do anything to ensure their satisfaction is of priority.

To answer the second investigative question, working with different cultures presents a wide range of difficulties that FMS leadership and management must consider during planning and execution phases. The value-focused thinking (VFT) philosophy and multiple objective decision analysis (MODA) aided in conducting a project risk management assessment. This assessment identified objectives and their respective influence towards minimizing the effects of risks that can prove detrimental towards increasing customer satisfaction. By minimizing the effects of risks commonly experienced in FMS construction, FMS managers can ensure adequate efficiency and productivity, ultimately increasing the likelihood of improving the satisfaction of their customers.

This research answered the third investigative question by identifying four fundamental objectives and eleven critical success factors to ensure adequate efficiency

and productivity during FMS construction operations. To ensure adequate efficiency and productivity, FMS management must focus primarily on communication concerns. Implementing additional communication measures will allow for all parties to remain up to date on construction requirements, changes, and tasks throughout the project's duration. It is impossible to completely avoid negative consequences in construction. However, applying better communication measures can help prevent or mitigate the impact of negative project outcomes from the perspective of Saudi stakeholders. Timely notices of project challenges and adjustments is a respectful gesture in lieu of project delays. Adequate communication of project delays should be treated as a bare minimum to sustain customer satisfaction.

Course of Action (COA)

As aforementioned in Chapter II, the two FMS decision-makers were not aware of critical tacit knowledge concerning FMS construction in Saudi Arabia until after interacting with Royal Saudi Air Force (RSAF) officials. Many organizations implement knowledge management programs to retain the tacit knowledge and experiences of their employees. Nicholas and Steyn (2017) referred to knowledge management as a, "Formal process for capturing and disseminating knowledge (pg. 114). Therefore, the creation of a knowledge management program may allow the FMS program to have a formal process for retaining and sharing tacit knowledge gained from FMS managers over time. Currently, the FMS program does not have a knowledge management program that allows newcomers access to tacit knowledge of previous FMS managers. Implementing a knowledge management program can aid the FMS program in developing a

knowledgeable working staff. The staff will have access to, or knowledge of, critical information to make decisive, informed decisions and actions to enhance customer satisfaction.

Limitation of this Research

This research identified critical success factors for increasing the satisfaction of RSAF stakeholders and highlighted areas of risk during FMS construction using the perspective of two FMS managers. The multiple objective decision analysis may have been subjected to bias and inaccuracy by using the perspective of FMS managers to identify objectives that are based on their view of RSAF's sentiments regarding satisfaction. Therefore, the analysis may present an inaccurate depiction of the values and desires of RSAF stakeholders. This research could benefit from the insight and perspective of a Saudi RSAF decision-maker. The inclusion of a Saudi RSAF decision-maker may improve the validity and reliability of the critical success factors in this research.

Recommendations for Future Research

To further the research that was accomplished in this thesis, future researchers should continue to seek input from Foreign Military Sales decision-makers and subject matter experts. The input from these decision-makers may vary as each individual recommends their own solutions to the decision problem. However, combining their respective knowledge and experiences to reach a consensual solution will provide leverage for validating and continuing the MODA in the future. The value hierarchy presented in this research was developed using information gained from literature and

FMS Saudi Arabia experts. The FMS experts substantiated values and objectives found in the literature and provided recommendations for values that were overlooked. Therefore, including the insight and support of subject matter experts improved the ability to create specific target capabilities and goals for Saudi Arabia. Such expertise can provide well-defined end goals for other foreign partners involved in transactions with the FMS program. Additionally, having access to high-level decision-makers provided the insight necessary to weight the value hierarchies. Weighting the value hierarchy is impossible to complete without input from individuals who can implement realistic changes. With the support of high-level decision-makers, objectives can be assigned weights according to their appropriate levels of significance.

Gaining validation for the value hierarchy, the parameters used for evaluation measures, and the solicitation of weights provides enough support to construct operational value models. With a complete value model, the federal government has the capability to evaluate and rank newly developed FMS construction strategies. The rankings are based on aspects that are valued in the FMS decision context. This decision analysis method provides a defendable and repeatable process to support the provision of federal resources and policies in the future. While further approval from individuals higher up in the chain of command is needed before changes can be implemented, this decision analysis model could aid in screening tactics by identifying value discrepancies in present proposals.

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Appendix A. Opening Questions for Consultations with Decision-Makers

1. What do you feel is important to minimize risk? What is important about minimizing risk? Is this important to you and why?
2. What is a perfect/terrible outcome for a project in Saudi Arabia?
3. If you can make modifications to the FMS construction processes or policies in Saudi Arabia, what would they be?
4. Is Saudi Arabia's satisfaction important to the U.S. FMS program? If so, why? If not, why not?
5. What factors are important for completing projects in Saudi Arabia?
6. Are there any specific managerial techniques or characteristics used by FMS project managers in Saudi Arabia?
7. Are the domains cost, time, quality important to the U.S. FMS program?
8. Are there any other areas of top priority for minimizing project risk?
9. Are there any actions by FMS managers that are unacceptable?
10. What major problems have you encountered performing construction tasks in Saudi Arabia?
11. If you were the ultimate decision-maker with no constraints, what would you do to minimize risk and why?

Appendix B. Descriptions of each Impact Level for all Evaluation Measures

Table B-1. Impact Levels of Synchronous Communication

Impact Level	Description of Synchronous Communication
3x a week (3)	All parties involved meet a substantial number of times to build a relationship, discuss challenges, and coordinate project logistics.
Once a week (2)	All parties involved meet a few times which enhances the extent that they can build relationships, discuss challenges, and coordinate project logistics.
Once every two weeks (1)	All parties involved rarely meet to build a relationship, discuss challenges, or coordinate project logistics.
Once a month (0)	The ability for all parties involved to build a relationship, discuss challenges, and coordinate project logistics are significantly diminished.

Table B-2. Impact Levels of Asynchronous Communication

Impact Level	Description of Asynchronous Communication
≥ 24 hrs	The average time of responsivity between FMS managers and RSAF officials is inefficient and creates communication issues for all parties involved in the construction process.
Within 8 hrs	The average time of responsivity between FMS managers and RSAF officials disrupts contractor's ability to fulfill obligations.
Within 6 hrs	The average time of responsivity between FMS managers and RSAF officials provides minimal disruption.
Within 4 hrs	The average time of responsivity between FMS managers and RSAF officials is reasonable and efficient.

Table B-3. Impact Levels of Indirect Communication

Impact Level	Description of Indirect Communication
Approachable (-1)	The FMS representative's body language, attentiveness, and professionalism exceeds Saudi expectations.
Neutral (0)	The FMS representative's body language, attentiveness, and professionalism meets Saudi expectations.
Unprofessional (-1)	The FMS representative's body language, attentiveness, and professionalism are below Saudi expectations.

Table B-4. Impact Levels of Project Scheduling Delays

Impact Level	Description of Project Scheduling Delays
≥ 12-month delay	Delays to project scheduling have significantly decreased the likelihood of completing the project on time.
6-month delay	Delays to project scheduling have decreased the likelihood of completing the project on time.
3-month delay	Delays to project scheduling is an area of concern and requires adjustments to complete the project on time.
No delays	There are no delays to project scheduling; therefore, there is a high likelihood of completing the project on time.

Table B-5. Impact Levels of Procurement Shipment Time

Impact Level	Description of Procurement Shipment Time
6 months	The average time for procuring long lead items has significant negative impacts on project scheduling and productivity.
4 months	The average time for procuring long lead items has caused major disruptions to project scheduling and productivity, ultimately requiring accelerated work operations to meet deadlines.
2 months	There average time for procuring long lead items has caused minimal disruption to project scheduling and productivity.
2 weeks	The average time for procuring long lead items satisfies scheduling constraints and does not impact the productivity of labor workers.

Table B-6. Impact Levels of Staff Engagement

Impact Level	Description of Staff Engagement
Very Good (2)	There is significant and easily perceived staff engagement from FMS managers with Saudi officials and labor force
Good (1)	There is adequate perceived staff engagement from FMS managers with Saudi officials and labor force
Neutral (0)	No change in staff engagement evident
Poor (-1)	The staff engagement from FMS managers with Saudi officials and labor force is below par.
Very Poor (-2)	There is extremely poor staff engagement from FMS managers with Saudi officials and labor force

Table B-7. Impact Levels of Staff Attitude

Impact Level	Description of Staff Attitude
Very Good (2)	There is significant and easily perceived staff attitude from FMS managers with Saudi officials and labor force
Good (-1)	There is adequate perceived staff attitude from FMS managers with Saudi officials and labor force
Neutral (0)	No change in staff attitude evident
Poor (-1)	The staff attitude from FMS managers with Saudi officials and labor force is below par.
Very Poor (-2)	There is extremely poor staff attitude from FMS managers with Saudi officials and labor force

Table B-8. Impact Levels of Staff Awareness

Impact Level	Description of Staff Awareness
Very Good (2)	There is significant and easily perceived staff awareness from FMS managers with Saudi officials and labor force
Good (1)	There is adequate perceived staff awareness from FMS managers with Saudi officials and labor force
Neutral (0)	No change in staff awareness evident
Poor (-1)	The staff awareness from FMS managers with Saudi officials and labor force is below par.
Very Poor (-2)	There is extremely poor staff awareness from FMS managers with Saudi officials and labor force

Table B-9. Impact Levels of Personal Skills

Impact Level	Description of Level of Personal Skills
Very Good (2)	There is significant and easily perceived increase in levels of personal skills from FMS managers with Saudi officials and labor force
Good (1)	There is an adequate level of personal skills from FMS managers with Saudi officials and labor force
Neutral (0)	No change in the level of personal skills evident
Poor (-1)	The perceived level of personal skills from FMS managers with Saudi officials and labor force is below par.
Very Poor (-2)	The level of personal skills from FMS managers with Saudi officials and labor force is extremely poor

Table B-10. Impact Levels of Punchlist Items

Impact Level	Description of Punchlist Items
In-scope items (-1)	Items on the punch list are in-scope; therefore, the ability for FMS managers to successfully turnover the end-product is not impacted.
Neutral items (0)	There is a mix of out-of-scope and in-scope items on the punch list. The ability for FMS managers to successfully turnover the end-product is slightly impacted.
Out of scope items (1)	Items on the punch list are out-of-scope and negatively impacts the ability for FMS managers to successfully turnover the end-product.

Table B-11. Impact Levels of Program Fiscal Close-out

Impact Level	Description of Program Fiscal Close-out
Meets budget requirements (-1)	The final project costs align with budget constraints; therefore, costs allocated towards future projects are not impacted.
Exceeds budget requirements (0)	The final project costs exceed budget constraints; therefore, costs allocated towards future projects are slightly impacted.
Greatly exceeds budget requirements (1)	The final project costs greatly exceed budget constraints; therefore, costs allocated towards future projects are significantly impacted.

Appendix C. Calculations for each Piecewise Linear Value Function

Asynchronous Communication:

$$3x + 2x + x = 1$$
$$6x = 1 \ \therefore x = \frac{1}{6}$$
$$v(3x) = 3 \cdot \left(\frac{1}{6}\right) = 0.5$$
$$v(2x) = 2 \cdot \left(\frac{1}{6}\right) = 0.33$$
$$v(x) = \frac{1}{6} = 0.167$$

Indirect Communication:

$$3x + x = 1$$
$$4x = 1 \ \therefore x = \frac{1}{4}$$
$$v(3x) = 3 \cdot \left(\frac{1}{4}\right) = 0.75$$
$$v(x) = \frac{1}{4} = 0.25$$

Punchlist items:

$$x + 0.5x = 1$$
$$1.5x = 1 \ \therefore x = \frac{2}{3}$$
$$v(0.5x) = 0.5 \cdot \left(\frac{2}{3}\right) = 0.33$$
$$v(x) = \frac{2}{3} = 0.67$$

Program Fiscal Close-out:

$$x + 2x = 1$$
$$3x = 1 \ \therefore x = \frac{1}{3}$$
$$v(x) = \frac{1}{3} = 0.33$$
$$v(2x) = 2 \cdot \frac{1}{3} = 0.67$$

Staff Engagement:

$$x + x + 2x + 3x = 1$$
$$7x = 1 \ \therefore x = \frac{1}{7}$$
$$v(x) = \frac{1}{7} = 0.14$$
$$v(2x) = 2 \cdot \frac{1}{7} = 0.29$$
$$v(3x) = 3 \cdot \frac{1}{7} = 0.43$$

Staff Awareness:

$$x + x + 2x + 3x = 1$$
$$7x = 1 \ \therefore x = \frac{1}{7}$$
$$v(x) = \frac{1}{7} = 0.14$$
$$v(2x) = 2 \cdot \frac{1}{7} = 0.29$$
$$v(3x) = 3 \cdot \frac{1}{7} = 0.43$$

Staff Attitude:

$$x + x + 2x + 3x = 1$$
$$7x = 1 \ \therefore x = \frac{1}{7}$$
$$v(x) = \frac{1}{7} = 0.14$$
$$v(2x) = 2 \cdot \frac{1}{7} = 0.29$$
$$v(3x) = 3 \cdot \frac{1}{7} = 0.43$$

Level of Personal Skills:

$$x + x + 2x + 3x = 1$$
$$7x = 1 \ \therefore x = \frac{1}{7}$$
$$v(x) = \frac{1}{7} = 0.14$$
$$v(2x) = 2 \cdot \frac{1}{7} = 0.29$$
$$v(3x) = 3 \cdot \frac{1}{7} = 0.43$$

Appendix D. Value Models for all Piecewise Linear Functions

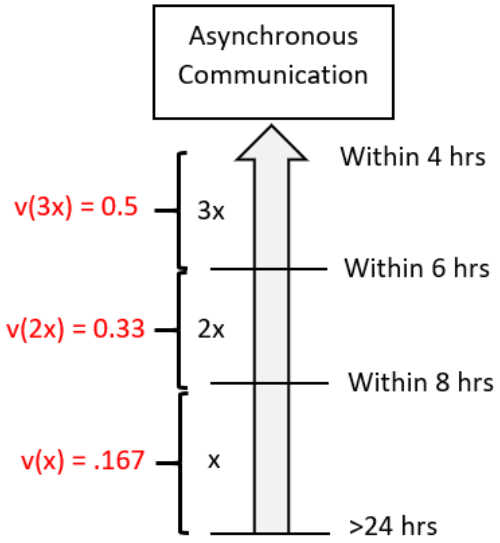

Figure D-1. Asynchronous communication piecewise linear value model

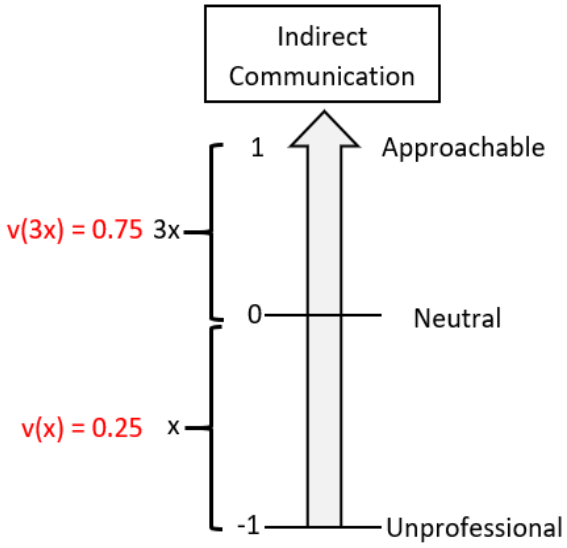

Figure D-2. Indirect communication piecewise linear value model

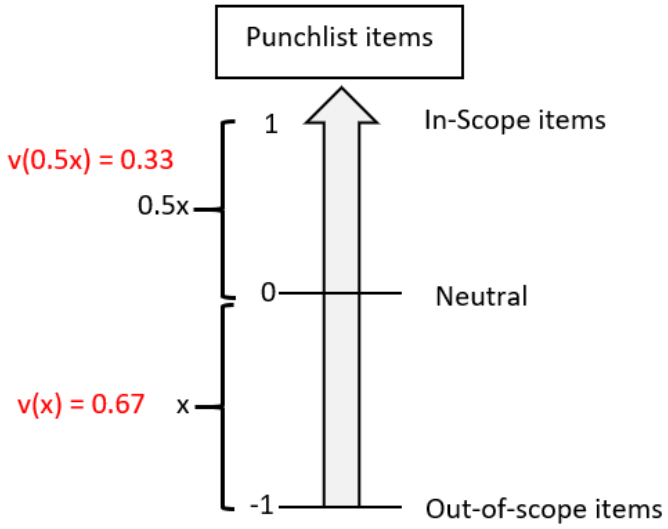

Figure D-3. Punchlist items piecewise linear value model

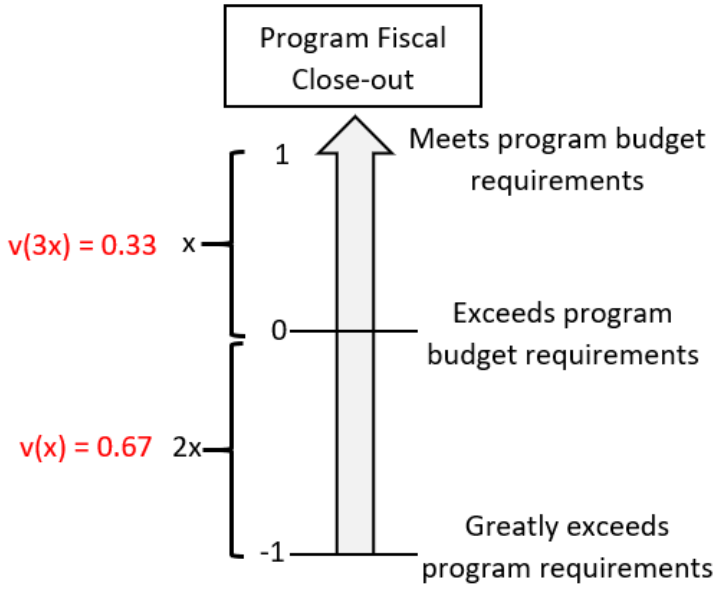

Figure D-4. Program fiscal close-out piecewise linear value model

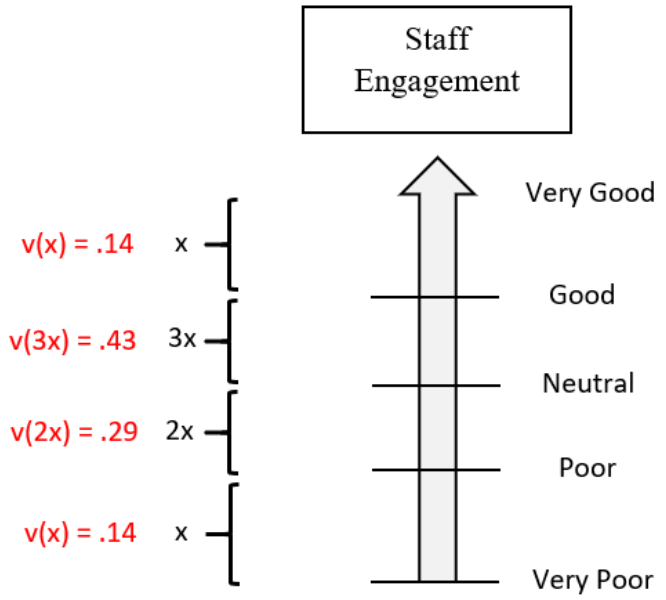

Figure D-5. Staff Engagement piecewise linear value model

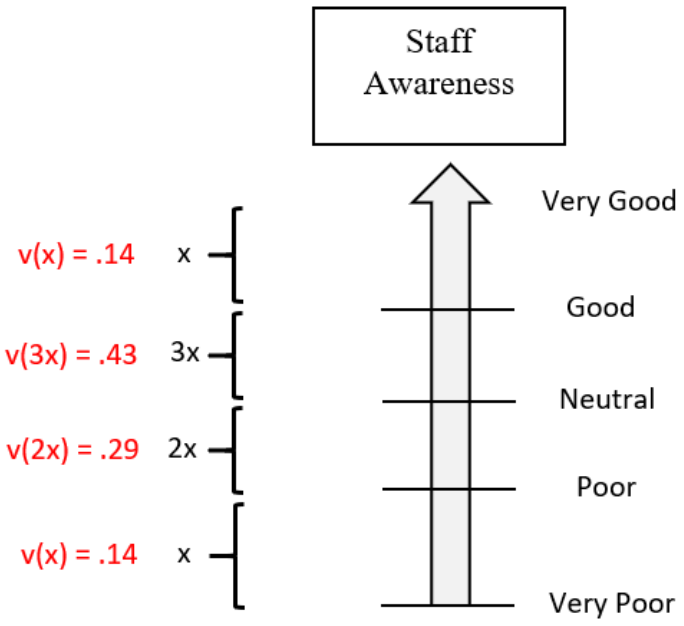

Figure D-6. Staff Awareness piecewise linear value model

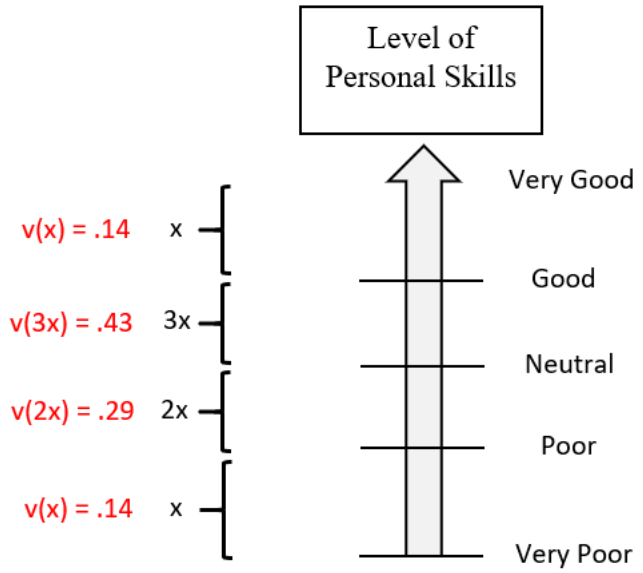

Figure D-7. Level of Personal Skills piecewise linear value model

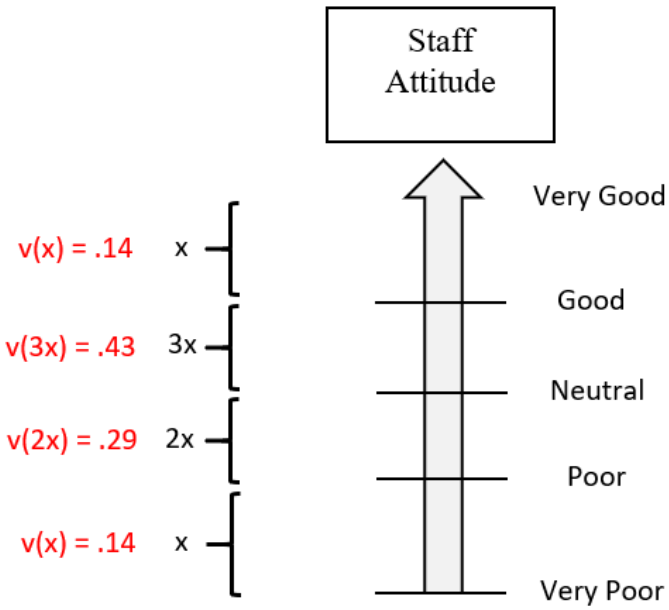

Figure D-8. Staff Attitude piecewise linear value model

Appendix E. Calculations for each Exponential Value Function

Synchronous Communication:

$$Normalized\ mid-value\ (z_{0.5}):\ z_{0.5}=\frac{x_i-x_M}{x_i-x_0}=\frac{0-2}{0-3}=0.67$$

$$R=\ -0.726$$

$$\rho=R\ \cdot[(x_i)-(x_0)]$$

$$\rho=-0.726\ \cdot(0-3)=2.178$$

$$v_{sc}(Once\ every\ two\ weeks):V_i(x_i)=\frac{1-\exp\left[-\frac{x_i-x}{\rho}\right]}{1-\exp\left[-\frac{x_i-x_0}{\rho}\right]}=\frac{1-\exp\left[-\frac{0-1}{2.178}\right]}{1-\exp\left[-\frac{0-3}{2.178}\right]}$$

$$=\ 0.20$$

Project Scheduling Delays:

$$Normalized\ mid-value\ (z_{0.5}):\ z_{0.5}=\frac{x_i-x_M}{x_i-x_0}=\frac{12-3}{12-0}=0.75$$

$$R=\ -0.410$$

$$\rho=R\ \cdot[(x_i)-(x_0)]$$

$$\rho=-0.410\ \cdot(12-0)=-4.92$$

$$v_{sd}(6-month\ delay):V_i(x_i)=\frac{1-\exp\left[-\frac{x_i-x}{\rho}\right]}{1-\exp\left[-\frac{x_i-x_0}{\rho}\right]}=\frac{1-\exp\left[-\frac{12-6}{-4.92}\right]}{1-\exp\left[-\frac{12-0}{-4.92}\right]}=0.23$$

Procurement Shipment Time:

$$Normalized\ mid-value\ (z_{0.5}):\ z_{0.5} = \frac{x_i - x_M}{x_i - x_0} = \frac{6-4}{6-0.5} = \overline{0.36}$$

$$R = 0.917$$

$$\rho = R \cdot [(x_i) - (x_0)]$$

$$\rho = 0.917 \cdot (6 - 0.5) = 5.04$$

$$v_{pd}(2\ months): V_i(x_i) = \frac{1 - \exp\left[-\frac{x_i - x}{\rho}\right]}{1 - \exp\left[-\frac{x_i - x_0}{\rho}\right]} = \frac{1 - \exp\left[-\frac{6-2}{5.04}\right]}{1 - \exp\left[-\frac{6-0.5}{5.04}\right]} = 0.83$$

Appendix F. Value Models for all Exponential Value Functions

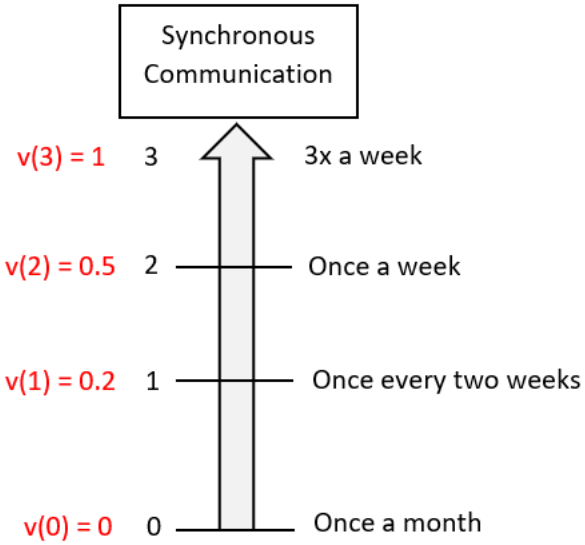

Figure F-1. Synchronous Communication exponential value model

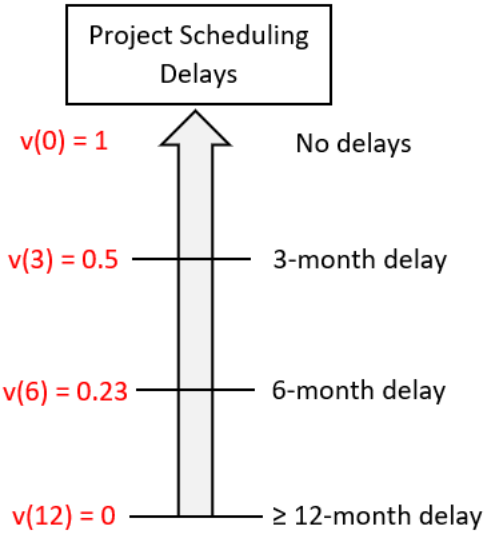

Figure F-2. Project Scheduling Delays exponential value model

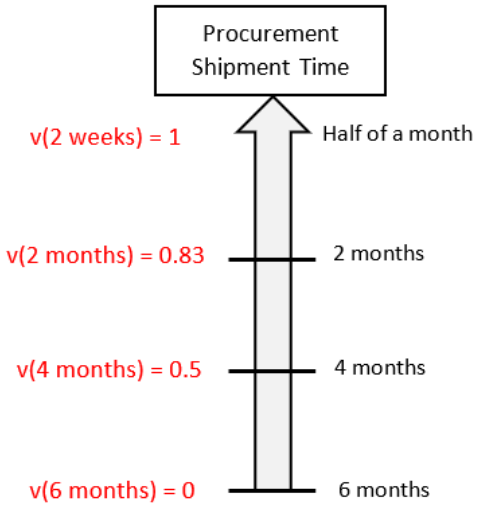

Figure F-3. Procurement Shipment Time exponential value model

Appendix G. Calculations for the Weight Estimation of each Attribute

Synchronous Communication vs. Asynchronous Communication:

$$H_A = w_{sc} * v_{sc}(2) + w_{ac} * v_{ac}(24\ hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\ months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(4\ hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\ months)$$

$$H_A = H_B$$

$$0.5w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc}$$

$$w_{ac} = 0.6w_{sc}$$

Synchronous Communication vs. Staff Engagement:

$$H_A = w_{sc} * v_{sc}(2) + w_{ac} * v_{ac}(24\ hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\ months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\ hrs) + w_{se} * v_{se}(2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\ months)$$

$$H_A = H_B$$

$$0.5w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = .167w_{ac} + w_{se} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc}$$

$$w_{se} = 0.5w_{sc}$$

Synchronous Communication vs. Indirect Communication:

$$H_A = w_{sc} * v_{sc}(1) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_A = H_B$$

$$0.2w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = .167w_{ac} + w_{ic} + 0.67w_{pi} + 0.67w_{fc}$$

$$w_{ic} = 0.267w_{sc}$$

Synchronous Communication vs. Project Scheduling Delays:

$$H_A = w_{sc} * v_{sc}(1) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(No\ delays) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_A = H_B$$

$$0.2w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_{sd} + .167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc}$$

$$w_{sd} = 0.2w_{sc}$$

Synchronous Communication vs. Level of Personal Skills:

$$H_A = w_{sc} * v_{sc}(1) + w_{ac} * v_{ac}(24\ hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\ months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\ hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\ months)$$

$$H_A = H_B$$

$$0.2w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_{ps} + .167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc}$$

$$w_{ps} = 0.2w_{sc}$$

Synchronous Communication vs. Staff Awareness:

$$H_A = w_{sc} * v_{sc}(2) + w_{ac} * v_{ac}(24\ hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\ months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\ hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\ months)$$

$$H_A = H_B$$

$$0.5w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_a + .167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc}$$

$$w_a = 0.5w_{sc}$$

Synchronous Communication vs. Punchlist Items:

$$H_A = w_{sc} * v_{sc}(1) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_A = H_B$$

$$0.2w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_{pi} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{fc}$$

$$w_{pi} = 0.61w_{sc}$$

Synchronous Communication vs. Program Fiscal Close-out:

$$H_A = w_{sc} * v_{sc}(1) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_A = H_B$$

$$0.2w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_{fc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi}$$

$$w_{fc} = 0.61w_{sc}$$

Synchronous Communication vs. Staff Attitude:

$$H_A = w_{sc} * v_{sc}(1) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(2) + w_{pd} * v_{pd}(6\,months)$$

$$H_A = H_B$$

$$0.2w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_{at} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc}$$

$$w_{at} = 0.2w_{sc}$$

Synchronous Communication vs. Procurement Shipment Time:

$$H_A = w_{sc} * v_{sc}(1) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(6\,months)$$

$$H_B = w_{sc} * v_{sc}(0) + w_{ac} * v_{ac}(24\,hrs) + w_{se} * v_{se}(-2) + w_{ic} * v_{ic}(-1) + w_{sd} * v_{sd}(12 - month\ delay) + w_{ps} * v_{ps}(-2) + w_a * v_a(-2) + w_{pi} * v_{pi}(-1) + w_{fc} * v_{fc}(-1) + w_{at} * v_{at}(-2) + w_{pd} * v_{pd}(Half\ of\ a\ month)$$

$$H_A = H_B$$

$$0.2w_{sc} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc} = w_{pd} + 0.167w_{ac} + 0.25w_{ic} + 0.67w_{pi} + 0.67w_{fc}$$

$$w_{pd} = 0.2w_{sc}$$

Weights for all attributes:

$$w_{sc} + w_{ac} + w_{se} + w_{ic} + w_{sd} + w_{ps} + w_a + w_{pi} + w_{fc} + w_{at} + w_{pd} = 1$$

$$w_{sc} + 0.6w_{sc} + 0.5w_{sc} + 0.267w_{sc} + 0.2w_{sc} + 0.2w_{sc} + 0.5w_{sc} + 0.61w_{sc} + 0.61w_{sc} + 0.2w_{sc} + 0.2w_{sc} = 1$$

$$4.887w_{sc} = 1 \therefore$$

$$w_{sc} = 0.205$$
$$w_{ac} = 0.123$$
$$w_{se} = 0.102$$
$$w_{ic} = 0.055$$
$$w_{sd} = 0.041$$
$$w_{ps} = 0.041$$
$$w_a = 0.102$$
$$w_{pi} = 0.125$$
$$w_{fc} = 0.125$$
$$w_{at} = 0.041$$
$$w_{pd} = 0.041$$

Appendix H. Tables of the Hypothetical Values used in each Trade-off Analysis

Table H-1. Synchronous Communication vs. Staff Engagement

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Good (2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	6 months

Table H-2. Synchronous Communication vs. Indirect Communication

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Approachable (1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	6 months

Table H-3. Synchronous Communication vs. Project Scheduling Delays

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	No delays
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	6 months

Table H-4. Synchronous Communication vs. Level of Personal Skills

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Good (2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	6 months

Table H-5. Synchronous Communication vs. Staff Awareness

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Good (2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	6 months

Table H-6. Synchronous Communication vs. Punchlist Items

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	In-scope items (1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	6 months

Table H-7. Synchronous Communication vs. Program Fiscal Close-out

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Meets program budget requirements (1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	6 months

Table H-8. Synchronous Communication vs. Staff Attitude

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Good (2)
Procurement Shipment Time	6 months	6 months

Table H-9. Synchronous Communication vs. Procurement Shipment Time

	Hypothetical Alternative (H_A)	**Hypothetical Alternative (H_B)**
Synchronous Communication	Once a week (2)	Once a month (0)
Asynchronous Communication	≥ 24 hrs	≥ 24 hrs
Staff Engagement	Very Poor (-2)	Very Poor (-2)
Indirect Communication	Unprofessional (-1)	Unprofessional (-1)
Project Scheduling Delays	12 months	12 months
Level of Personal Skills	Very Poor (-2)	Very Poor (-2)
Staff Awareness	Very Poor (-2)	Very Poor (-2)
Punchlist Items	Out-of-scope items (-1)	Out-of-scope items (-1)
Program Fiscal Close-out	Greatly exceeds program requirements (-1)	Greatly exceeds program requirements (-1)
Staff Attitude	Very Poor (-2)	Very Poor (-2)
Procurement Shipment Time	6 months	Half of a month

Appendix I. Comparison Between Attributes during the Trade-off Method

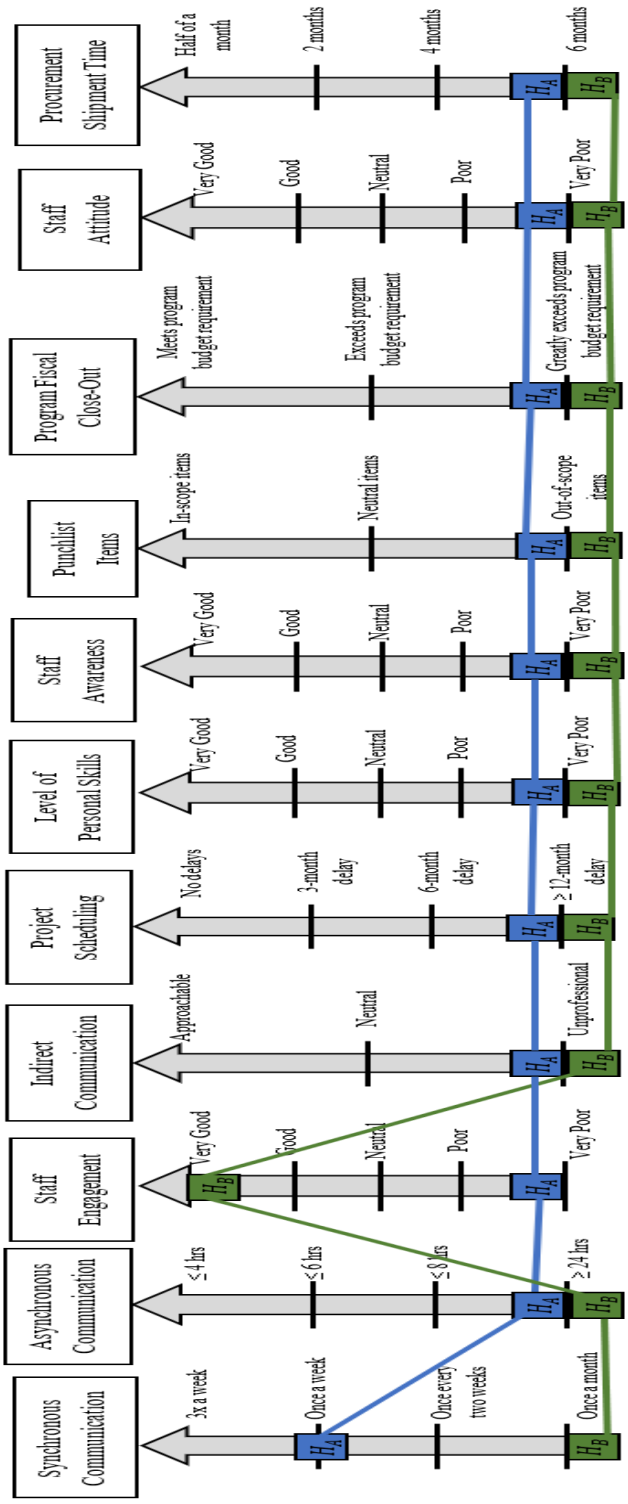

Figure I-1. Trade-off Analysis - Synchronous Communication vs. Staff Engagement

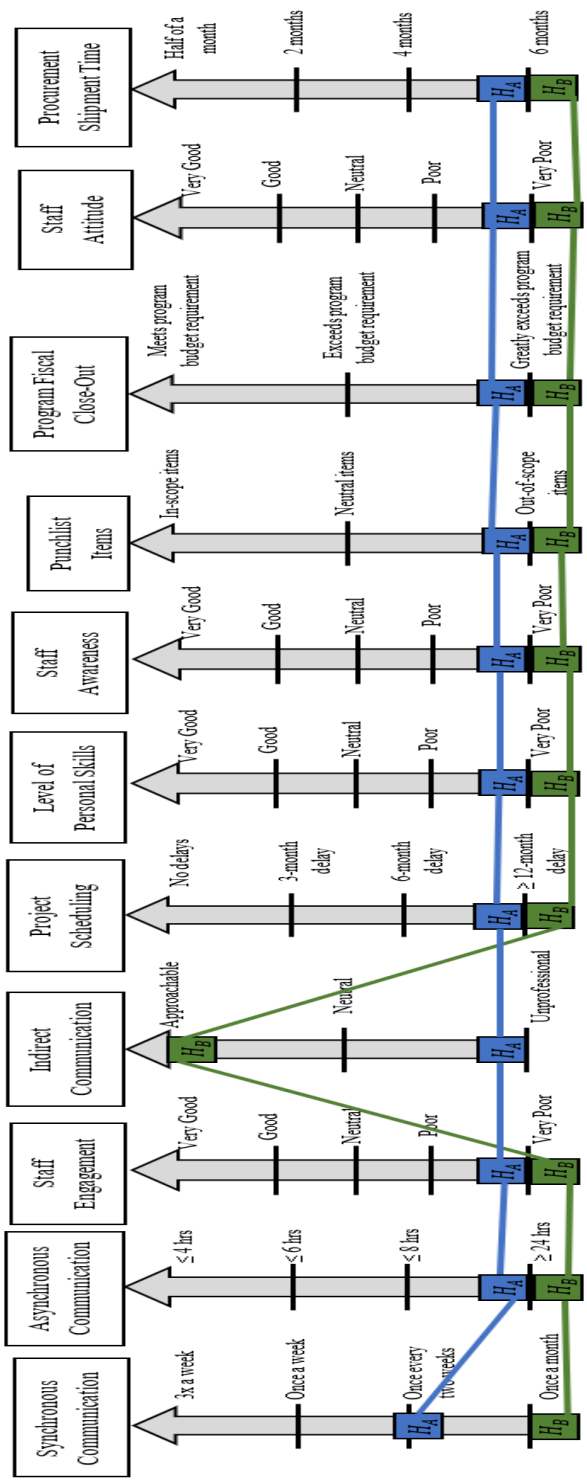

Figure I-2. Trade-off Analysis - Synchronous Communication vs. Indirect Communication

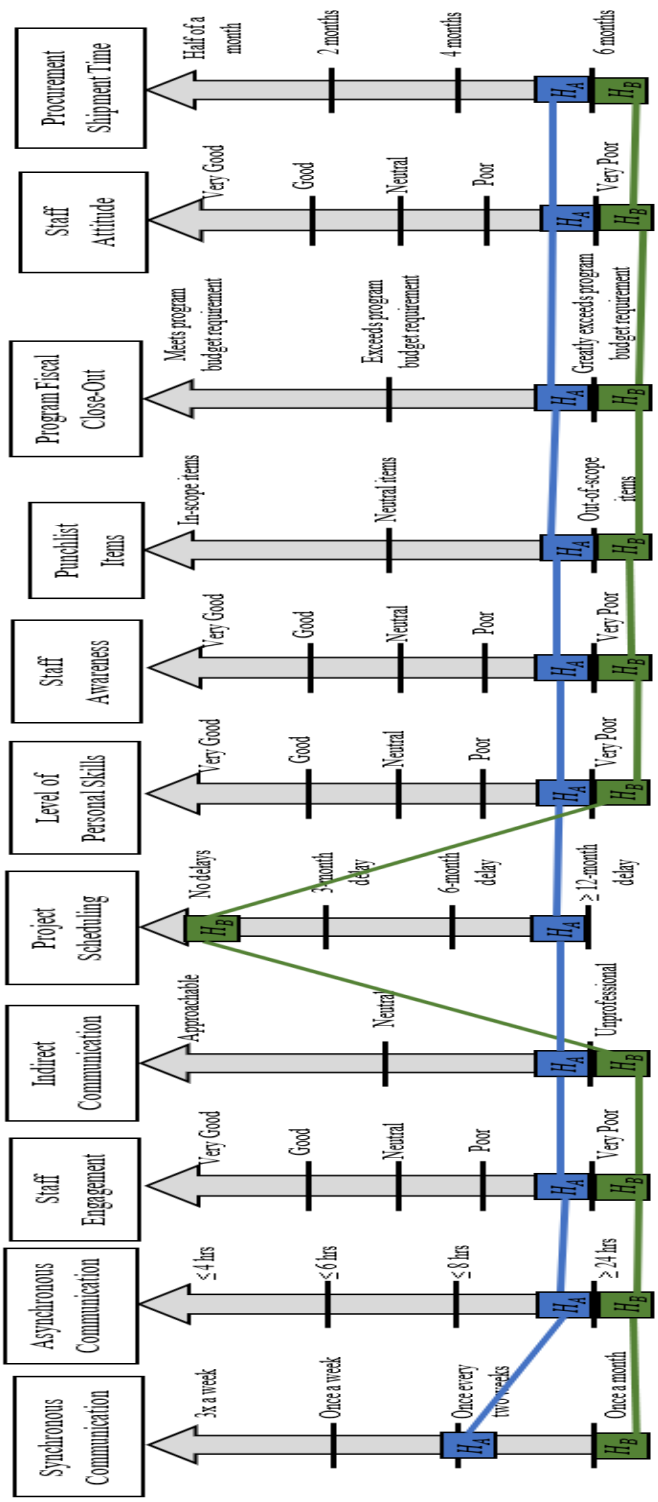

Figure I-3. Trade-off Analysis - Synchronous Communication vs. Project Scheduling Delays

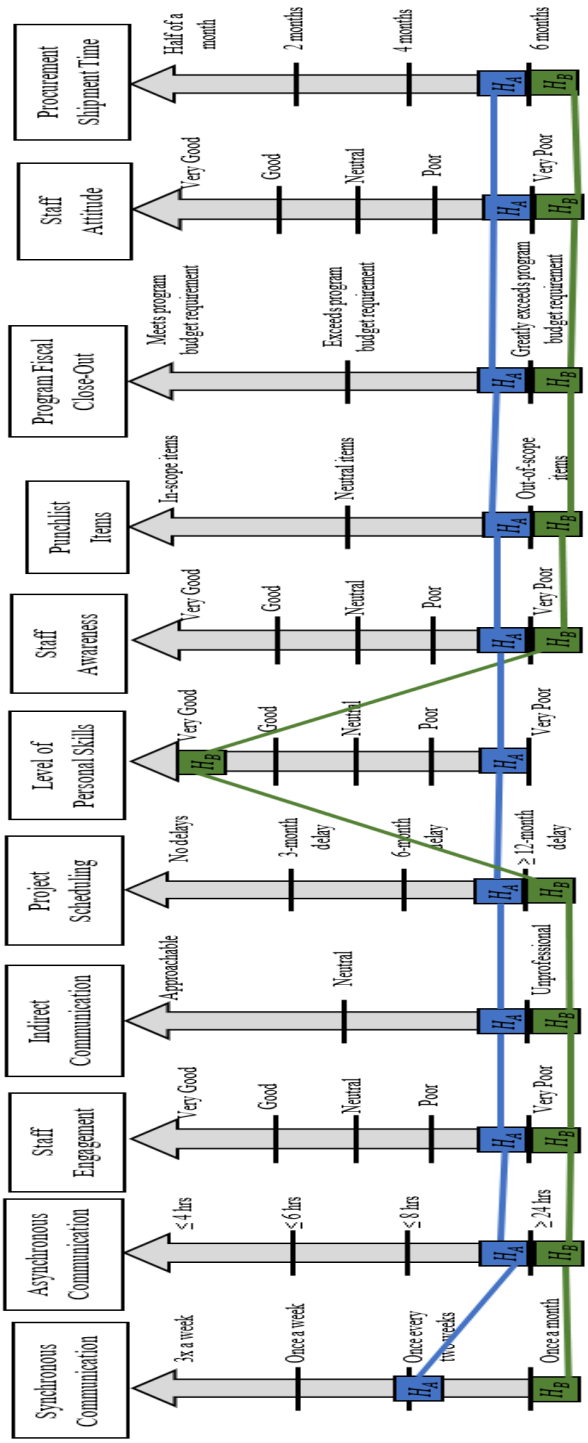

Figure I-4. Trade-off Analysis - Synchronous Communication vs. Level of Personal Skills

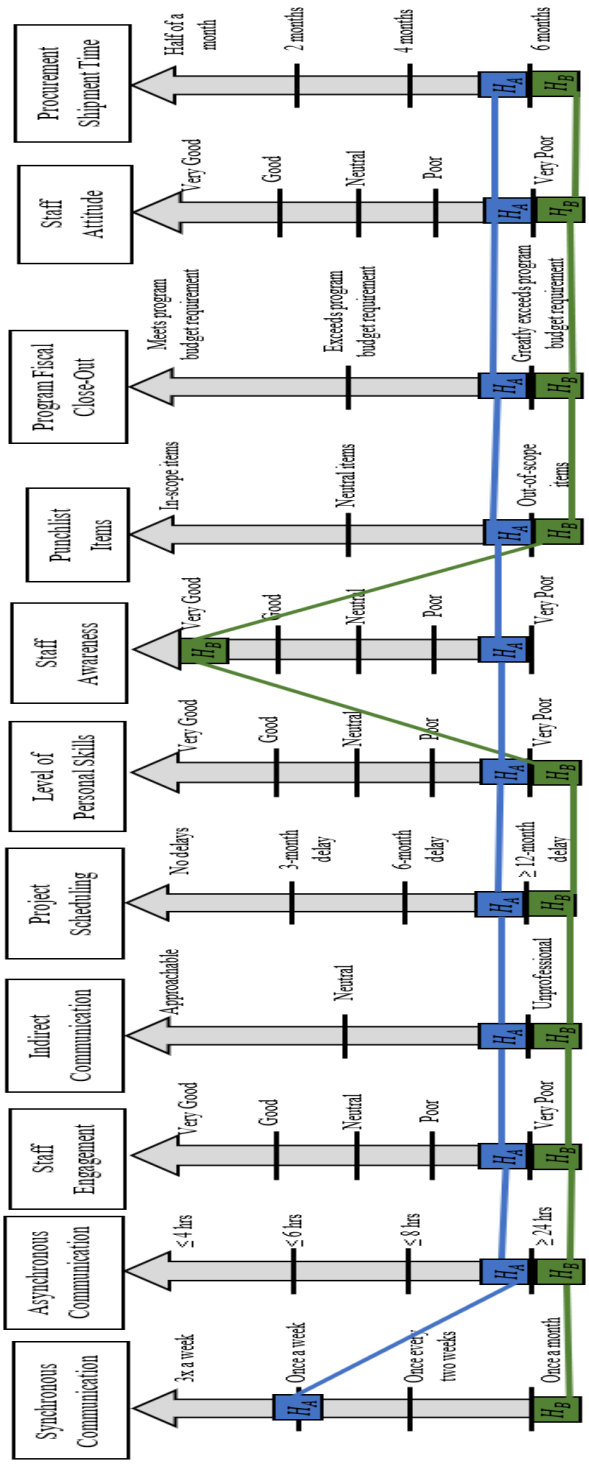

Figure I-5. Trade-off Analysis - Synchronous Communication vs. Staff Awareness

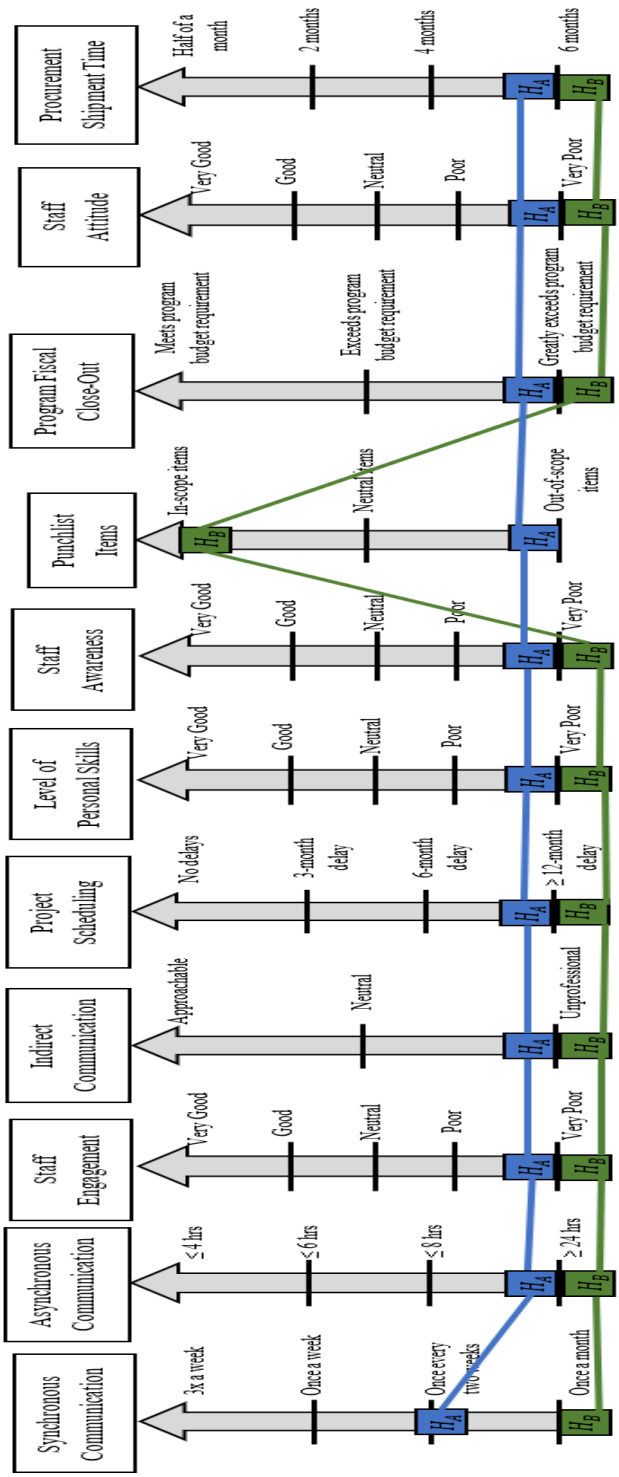

Figure I-6. Trade-off Analysis - Synchronous Communication vs. Punchlist Items

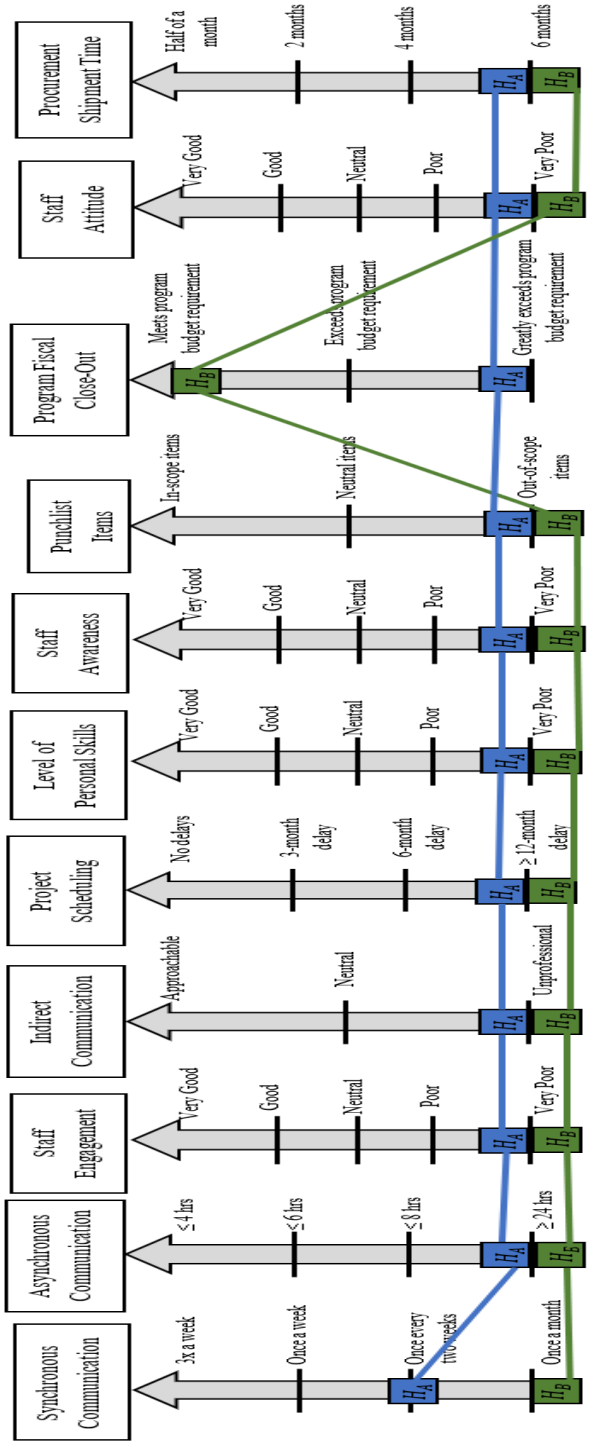

Figure I-7. Trade-off Analysis - Synchronous Communication vs. Program Fiscal Close-out

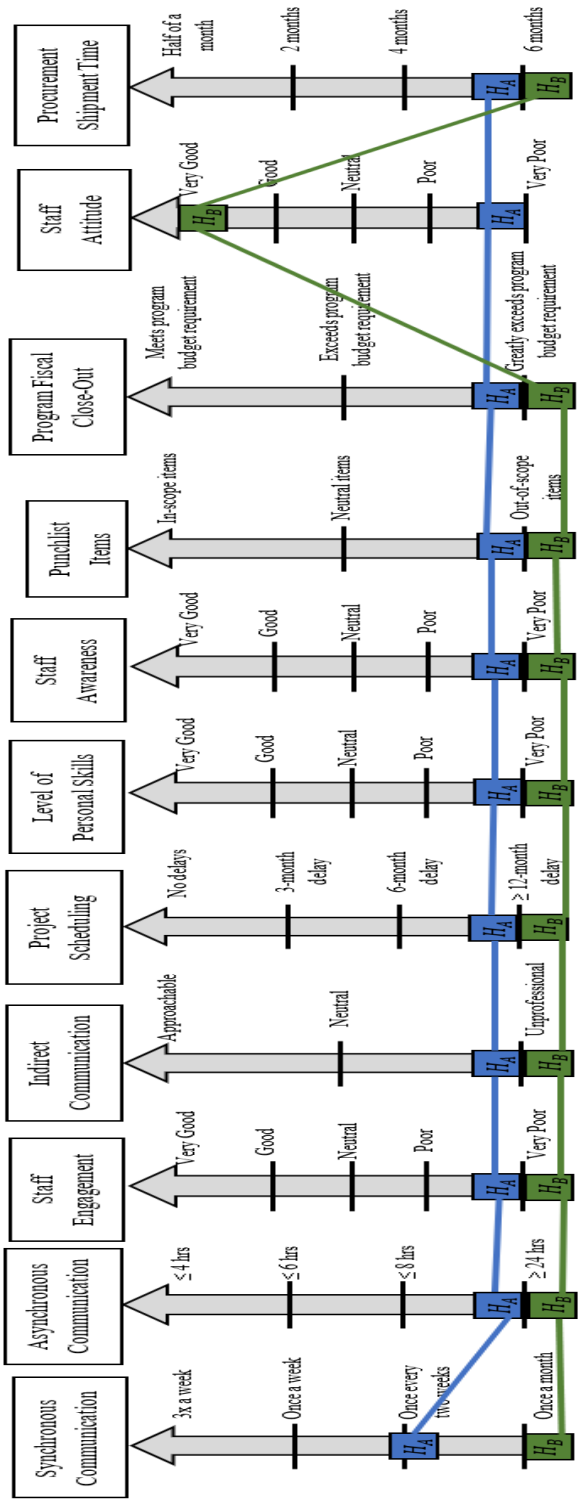

Figure I-8. Trade-off Analysis - Synchronous Communication vs. Staff Attitude

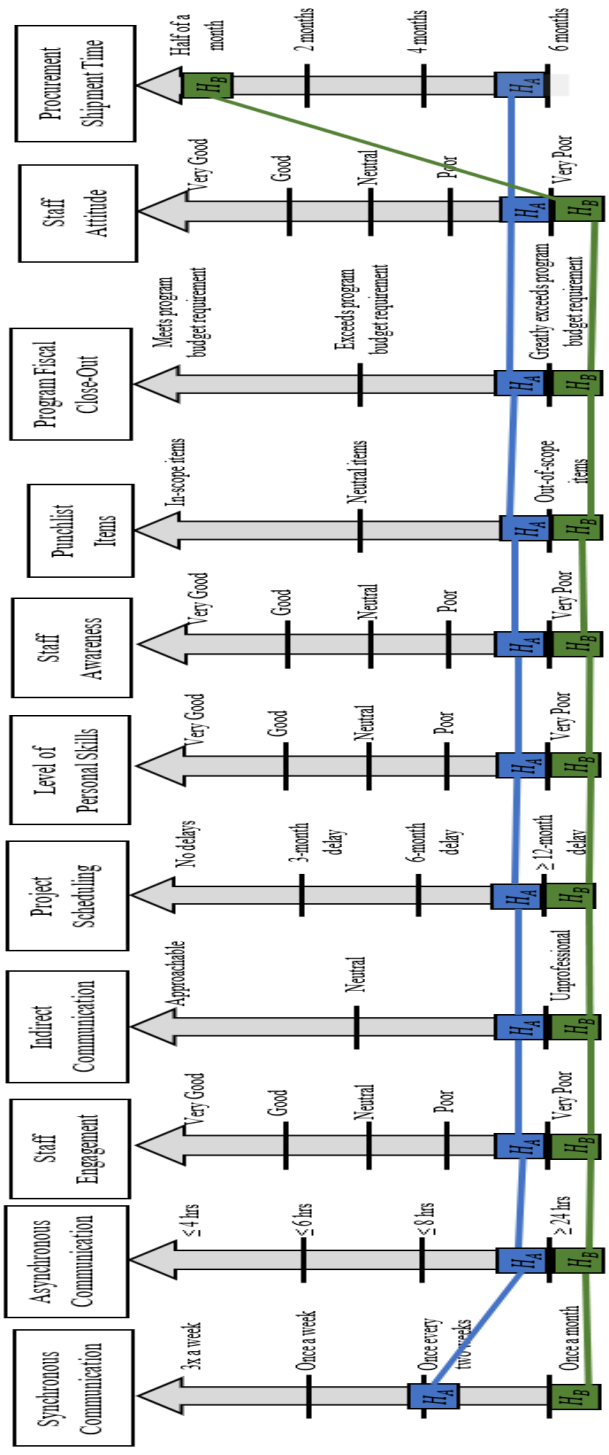

Figure I-9. Trade-off Analysis - Synchronous Communication vs. Procurement Shipment Time

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14. ABSTRACT

The cost, time, and quality pillars of the iron triangle in project management are often considered the most important factors for managers to consider when striving to achieve project success. However, recent literature suggests customer satisfaction and end-user benefit are the most important elements to prioritize during project development. This research analyzes the Air Force Security Assistance Center Construction Division and Foreign Military Sales (FMS) joint construction operations in relation to two Project Management Body of Knowledge (PMBOK) knowledge areas, project stakeholder management and project risk management. Project stakeholder management is addressed by identifying the relationship between cultural competency and customer satisfaction during FMS construction projects. Project risk management is emphasized by using a value-focused thinking (VFT) and multiple objective decision analysis (MODA) approach to identify objectives for mitigating risks that negatively impact the satisfaction of FMS partner stakeholders. The VFT and MODA highlighted four fundamental objectives and eleven critical success factors for improving the satisfaction of partner stakeholders at the conclusion of FMS construction development. Prioritizing the fundamental objectives and their resultant critical success factors can aid FMS managers in increasing the satisfaction of partner stakeholders, furthering the mission of FMS to improve foreign relations and build international security partnerships. These findings offer valuable implications to project management in cross-cultural environments.

15. SUBJECT TERMS

Cross-cultural; Foreign Military Sales; Multiple Objective Decision Analysis; Value-Focused Thinking; Project Management

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