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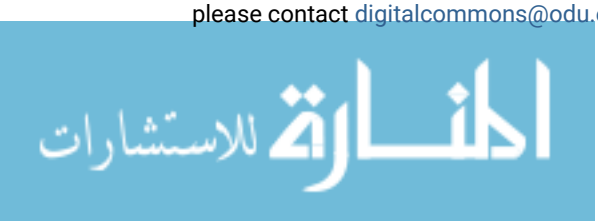

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AN ANALYSIS OF THE RELATIONSHIP BETWEEN MILITARY LEADERS' OPERATIONAL ADAPTABILITY AND KNOWLEDGE TRANSFER

by

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A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

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May 2015

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ABSTRACT

AN ANALYSIS OF THE RELATIONSHIP BETWEEN MILITARY LEADERS' OPERATIONAL ADAPTABILITY AND KNOWLEDGE TRANSFER

Vahap Kavaker
Old Dominion University, 2015
Director: Rafael E. Landaeta

A variety of research underlines the increasing need for adaptable leaders in the military and enhancing operational adaptability is accepted as one of the crucial factors for achieving success in future military operations. In general terms, operational adaptability is the ability to successfully respond to unforeseen changing situations during military operations. However, this study reveals that operational adaptability is not clearly conceptualized and supporting factors are not investigated in detail in the literature. Among possible factors, knowledge transfer is claimed to be an important practice that increases personal performance and effectiveness.

This research conceptualized operational adaptability and investigated the relationship between military leaders' operational adaptability and knowledge transfer. The concept of operational adaptability was developed by using current literature and researcher's experience in military professionalism. The operational adaptability is constructed to include three main dimensions: handling emergency or crisis situations, dealing effectively with unpredictable or changing operational situations and solving problems creatively. The literature review reveals inter-knowledge transfer and intra-knowledge transfer as the main practices whereas lessons learned and best practices as the main forms. The primary research question is "Does knowledge transfer have a positive impact on military leaders' operational adaptability?"

A research conceptual model was developed and five hypotheses were identified and statistically tested. A data collection instrument was developed, improved through peer review, and distributed using the Internet. Seventy one complete responses provided raw data to statistically test the validity of the measures and the hypotheses.

The results do not support the general hypothesis that an increase in knowledge transfer will have a positive impact on military leaders' operational adaptability. However, the results also confirm that the measures developed in the investigation are reliable and possess construct validity. Although no direct cause and effect relationship could be determined between knowledge transfer and operational adaptability, the research enhanced our understanding on both phenomena. This research confirms that knowledge transfer practices are not dominant drivers of operational adaptability; nevertheless, they still have a significant statistical association with operational adaptability. Furthermore, inter- and intra-knowledge transfer practices carry almost an equal weight for their association with operational adaptability. The research also confirms the crucial role of encountering more dangerous, challenging operational situations on operational adaptability especially in the problem solving dimension. This research concludes that knowledge transfer practices have more statistical association with handling crisis and dealing with change dimensions whereas encountering more dangerous, challenging operational situations has more positive impact on problem solving dimension of operational adaptability. The results of this investigation can be used as foundation for further research and development in the area of operational adaptability and knowledge transfer.

This dissertation is dedicated to my wife, Ayse. Your never ending support, encouragement, faith and patience keep me strong in my life.

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I would especially like to thank my lovely wife, Ayse, for her never ending support and patience. She passionately supported and encouraged me in this endeavor. She also gave me a very special gift, my daughter, Nese during my study. Nese, you increased the joy in our family. And of course, my son, Murat, your place in my heart is irreplaceable. I wish I could have spent more time with you during my study.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Research

In the 1990s, U.S. military thinking was mostly shaped by the "Revolution in Military Affairs (RMA)" perception. RMA proponents, who neglected the nature of conflict as well as human role in it and overvalued the part of technology, argued that superiority in communications, information and precision strike technologies would allow U.S. forces to win wars quickly at low cost by providing unprecedented battle space knowledge, eliminating surprise and permitting "full spectrum dominance". However, recent and ongoing combat experiences along with current studies on future operational environment made it clear that military forces will have to operate under complexity and uncertainty (TRADOC Pam 525-3-0, 2009).

Experiences from Iraq, Lebanon, and Afghanistan reveal factors that are likely to influence the conduct and character of future war and provide valuable insights. Uncertainty and complexity will be prevailing factors in the future operational environment and military organizations will have to respond to a broad range of threats and challenges posed by highly adaptive adversaries (TRADOC Pam 525-3-0, 2009).

There is a general consensus about dominant aspects of future security environment in the literature. Headquarters Supreme Allied Commander Transformation (HQ SACT) initiated the Futures Work project in 2012 and published the Strategic Foresight Analysis (SFA)-2013. The report was based on review of many national think tanks, international organizations, and industry future studies. The SFA identifies period of transition, rapid rate of change, uncertainty, globalization and complexity as the main

characteristics of the future. Accelerating the rate of social, economic, scientific, technological and environmental change will fuel and shape future conflicts (Headquarters Supreme Allied Commander Transformation (HQ SACT), 2013).

Future conflict is an unpredictable and uniquely human activity. The 20th century's clear lines among adversaries (state, state-proxies, and non-state) and threats (conventional and unconventional) will blur in future conflicts (Development, Concepts and Doctrine Centre (DCDC), 2012; DCDC, 2013).

One of the most leading proponents of Hybrid Warfare, Frank Hoffman (2007) defines threats that incorporate a full range of different modes of warfare including conventional capabilities, irregular tactics and formations, terrorist acts including indiscriminate violence and coercion, and criminal disorder, conducted by both states and a variety of non-state actors as hybrid threats.

The future nature of conflict could be best described by Hybrid Warfare (Brown, 2011; Hoffman, 2009), however the U.S. Department of Defense (DOD) has not officially defined hybrid warfare and there are different attitudes among services. Nevertheless, Department of Defense officials use the term "hybrid" to describe the increasing complexity of conflict which will require adaptable and resilient military response (U.S. Government Accountability Office, 2010). Furthermore, the recent Ukrainian crisis is also acknowledged as hybrid warfare and it re-energized the conceptual focus towards hybrid warfare in NATO (NATO, 2014).

Since conflict will remain a human endeavor, a contest between two learning and adapting forces, rapid rate of change, uncertainty, and complexity will increase the challenge for military leaders. "Leaders are often late to recognize such changes, and

even when they do, inertia tends to limit their ability to adapt quickly" (United States Joint Forces Command (USJFCOM), 2010, p. 8).

Acknowledging the necessity that military leaders and future forces must develop operational adaptability in order to meet the challenges of future armed conflict, the TRADOC Pam 525-3-0 (2009) changed the conceptual focus of the Army to operational adaptability, the ability to shape conditions and respond effectively to changing threats and situations with appropriate, flexible, and timely actions.

1.2 Problem Statement

There is an increasing need for adaptable leaders in the military (Mueller-Hanson, White, Dorsey & Pulakos, 2005). Furthermore, enhancing operational adaptability both at personal and organizational level is perceived essential in order to achieve success in future military operations (TRADOC Pam 525-3-0, 2009).

Current and future security environment calls for adaptable leaders in the military and development of adaptive leaders has become a priority for the Army, however, there is not enough research and practice related to adaptability (Mueller-Hanson et al., 2005). This study revealed that operational adaptability is not clearly conceptualized and supporting factors are not investigated in detail.

Among possible factors, knowledge transfer is claimed to be an important practice that increases personal and organizational performance and effectiveness (Argote & Ingram, 2000). Regarding knowledge transfer, FM 6-01.1 (2012) notifies that U.S. military has a strong culture and a well-established system. But, the question of how well we understand the correlations between military leaders' operational adaptability and knowledge transfer is not answered in the literature.

1.3 Research Purpose

The purpose of this dissertation is to conceptualize operational adaptability and investigate the relationship between military leaders' operational adaptability and knowledge transfer.

1.4 Research Questions

The literature review uncovers that operational adaptability in the military context has not been conceptualized. The literature review additionally reveals knowledge transfer in forms of lessons learned and best practices. But, the question of how well we understand the correlations between military leaders' operational adaptability and knowledge transfer is not answered in the literature.

The primary research question is: "Does knowledge transfer have a positive impact on military leaders' operational adaptability?"

Furthermore, the following sub-questions will also be investigated.

1. What is operational adaptability?
2. What is the doctrinal framework for knowledge transfer in the U.S. military?
3. What are the current knowledge transfer practices in the U.S. military?
4. How do knowledge transfer practices correlate regarding their effect on military leaders' operational adaptability?

1.5 Research Contribution

The literature review identifies the gap in the body of knowledge regarding the conceptualization of "operational adaptability" and the role of knowledge transfer on military leaders' operational adaptability.

This research is among the first empirical works to conceptualize operational adaptability and investigate the relationship between military leaders' operational adaptability and knowledge transfer.

The findings of this research help to bridge the gap identified in the literature review. First of all, this research conceptualized operational adaptability. This conceptualization both increases our understanding of operational adaptability and provides a framework upon which further research could be based.

Second, this research establishes correlations between military leaders' operational adaptability and knowledge transfer. These correlations increase our understanding of the relationship between operational adaptability and knowledge transfer.

For military organizations, the research findings have practical benefits. By providing a better understanding of the relationship between operational adaptability and knowledge transfer, the findings of this research help senior military leadership to better direct resources on knowledge transfer practices. This consequently enhances leaders' operational adaptability which is essential for success in future military operations.

The findings of this research could also be generalized into industry and provide benefits similar to that for military organizations.

1.6 Definitions of Key Terms

Operational Adaptability: The ability to respond effectively to changing threats and situations with appropriate, flexible, and timely actions (TRADOC Pamphlet 525-3-0, 2009).

Knowledge: "Information that has been analyzed to provide meaning or value or evaluated as to implications for the operation" (FM 6-01.1, 2012, p. Glossary-2).

Tacit Knowledge: The knowledge that exists in an individual's mind (FM 6-01.1, 2012).

Explicit Knowledge: Information that exists in written or otherwise documented formats (FM 6-01.1, 2012).

Knowledge Management: "The process of enabling knowledge flow to enhance shared understanding, learning, and decision-making" (FM 6-01.1, 2012, p. 1-1).

Knowledge Transfer: "The movement of knowledge—including knowledge based on expertise or skilled judgment—from one person to another" (FM 6-01.1, 2012, p. Glossary-2).

Inter-knowledge transfer: The sharing of knowledge from one individual or group to another individual or group between different units (Haltiwanger, 2012). This includes Combined Arms Center-CAC networks, Center for Army Lessons Learned-CALL networks, Army Operational Knowledge Management networks, and Army professional forums: leader forums, functional forums, and warfighter forums (FM 6-01.1, 2012).

Intra-knowledge transfer: The sharing of knowledge from one individual or group to another individual or group within the same unit (Haltiwanger, 2012). This includes after action reviews, the unit forum, internal network managed by knowledge management section (FM 6-01.1, 2012).

Lessons learned: "Validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat

operations that leads to a change in behavior at either the tactical, operational, or strategic level or in one or more of the Army's doctrine, organization, training, materiel, leadership and education, personnel, and facilities domains" (FM 6-01.1, 2012, p. 3-14).

Best Practice: "The most effective and efficient method of achieving any objective or task, into operations and training" (FM 6-01.1, 2012, p. 1-13).

CHAPTER 2

LITERATURE REVIEW

A wide range of literature was reviewed in order to reveal the current state of knowledge about individual adaptability in general and operational adaptability in specific. The literature reviewed was conducted in five phases.

In the first phase, the concept of individual adaptability was investigated. This phase revealed that adaptability is a multidimensional concept and it is discussed under different perspectives. Among these perspectives, this research is conducted based on adaptive performance perspective.

In the second phase, the concept of "operational adaptability" was investigated. Initially, U.S. official military documents were reviewed and a conceptual framework of operational adaptability was explored. This initial step concluded that there was no concrete official framework for operational adaptability in the U.S. Army. Operational adaptability was dealt with through different documents in a consistent way within mostly a leadership focus. The U.S. official military documents provided a large amount of factors affecting operational adaptability with no analysis on relationship among them. Then, in a follow on step, operational adaptability was conceptualized through findings from official perspectives and general adaptability-related findings. This step concluded that operational adaptability mostly covers mental adaptability dimension of Mueller-Hanson's et al. (2005) general adaptability taxonomy. Based on findings, a conceptual model for "operational adaptability" was constructed.

In the third phase, knowledge transfer in U.S. Army was investigated. Historical development and current practices along with current doctrinal framework is explored.

This phase concluded that U.S. Army has a well-established knowledge transfer culture. The U.S. Army both uses inter- and intra-knowledge transfer practices effectively. Furthermore, lessons learned and best practices are identified as two main subjects of knowledge transfer practices.

In the fourth phase, the relation between operational adaptability and knowledge transfer was investigated. This phase concluded that although there is no specific empirical study on this specific subject, the past knowledge transfer experiences in military operations suggest a positive link. This perspective is further supported by the analysis of the role of knowledge transfer in decision making.

In the conclusion phase, a literature gap analysis is done and a conceptual model, research model, hypotheses along with their importance and operational definitions of variables are developed.

2.1 Adaptive Performance

The literature review has revealed that adaptability is a multidimensional concept and it has been discussed under different names and definitions at the individual, team, and organizational levels in relation to many variables such as complicated problems, different cultures, challenging physical conditions (Pulakos, Arad, Donovan, & Plamondon, 2000). For the purpose of this research, individual level adaptability within the work context will be investigated.

Adaptability is not a new concept; however, investigation of adaptability in terms of human performance capabilities with regard to work context has received increased attention for almost last 15-20 years (Burke, Pierce, & Salas, 2006). The advance in technology and its effects on workplace (Hollenbeck & McCall, 1999), the increasing

role and importance of knowledge in the workplace (Hesketh & Neal, 1999; Pearlman & Barney, 2000) along with growing organizational competition (Burke et al., 2006) has led to that increase.

Ployhart and Bliese (2006) reviewed previous research on performance adaptability, training, cognitive adaptation, coping, and reactions to organizational change and they make a classification about in what context or perspective adaptability is studied in the literature. They found a common conceptual framework that shows how the adaptability occurs. In that framework shown in Figure 1, "individual differences (e.g., cognitive ability) influence mediating processes (e.g., goals) which in turn influence how people perceive and respond to some change event (performance)" (Ployhart & Bliese, 2006, p. 6). The process itself is not the focus of this study. This study focuses on identifying the measurable criteria or sub-elements of operational adaptability under the "respond to change" part and investigating the role of knowledge transfer as an external factor in the "mediating process".

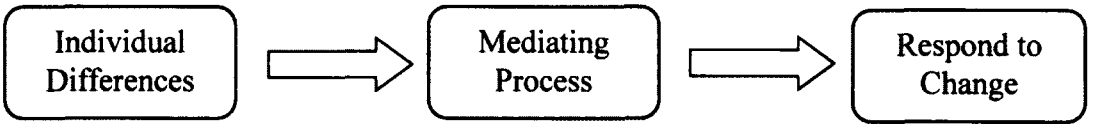

Figure 1. Common Conceptual Framework for Adaptability

Ployhart and Bliese (2006) revealed four main perspectives that dominated the adaptability literature; adaptability as task performance (adaptive performance), adaptability as a change in strategy selection, adaptability as coping and adaptability as

responding to organizational change. These perspectives are briefly described below; however, this research will follow the adaptive performance perspective.

Adaptability as change in strategy selection focuses on individual differences in adaptive strategy selection and use rather than individual differences in knowledge, skill, ability, and other characteristics (KSAOs). Ployhart and Bliese (2006) further defined it in terms of "how well people can identify relevant situational cues, draw from a repertoire of strategies, and choose the best strategy for the situation" (p. 8). Adaptive expertise is the most well-known research in this area. Adaptive experts use "different ways of interpreting tasks and therefore chose different strategies to accomplish tasks" (Ployhart & Bliese, 2006, p. 8). This perspective limits adaptability to strategy selection; however, the process and the rationale are not clearly structured in this perspective (Ployhart & Bliese, 2006).

Regarding adaptability as coping, an abundance of literature examines how individuals cope with stressful events. Coping has not typically fallen within the realm of adaptability research. However, in the adaptability context, coping describes how people handle stressful events (Ployhart & Bliese, 2006). Rather than identifying coping as a separate standpoint, adaptive performance perspective embraces the similarities in its taxonomy (Pulakos et al., 2000).

Adaptability as reacting to organizational change was generally investigated in the context of coping with organizational change and its relation to job satisfaction, organizational commitment, career outcomes and performance (Ployhart & Bliese, 2006).

Adaptive performance perspective dominates the individual adaptability literature. In this perspective, individual adaptability is mainly defined as "an effective change in response to an altered situation" (Mueller-Hanson et al., 2005, p. v).

This approach categorizes individuals' differences in terms of the knowledge, skill, ability, and other characteristics (KSAOs). However, due to defining adaptability in terms of changing task requirements makes it hard to generate a general, inclusive classification of knowledge, skill, ability, and other characteristics (KSAOs) across tasks and contexts (Ployhart & Bliese, 2006).

"Pulakos, Arad, Donovan, and Plamondon (2000) provided the first comprehensive study of adaptive performance" (Ployhart & Bliese, 2006). Pulakos et al. (2000) conducted two influential studies in order to "develop a taxonomy of adaptive job performance and examine the implications of this taxonomy for understanding, predicting, and training adaptive behavior in work settings." (Pulakos et al., 2000, p. 612). They are the first researches that systematically defined and empirically examined specific dimensions of adaptive job performance. They executed a content analysis on over 1,000 critical incidents from 21 different jobs including effective and ineffective instances of adaptability mainly in military settings, and developed and verified an 8-dimension taxonomy of an adaptive performance model. Their model consists of six preliminary dimensions from their literature review and two additional ones that were added by the researchers. These dimensions and definitions are shown in Table 1.

Main of the findings of Pulakos et al. (2000) are summarized below:

- Adaptive performance is a multidimensional construct,
- Different types of jobs requires different types of adaptive performance,

- Solving problems and learning are highly correlated with each other in context of dealing with unpredictable and changing situations, and
- Adaptive performance could be enhanced by experience in adaptive situations.

Table 1. Taxonomy of Adaptive Performance Model (adapted from Pulakos et al., 2000, p. 617)

Dimension	Definition (Pulakos et al., 2000, p. 617)
Handling Emergencies or Crisis Situations (Pulakos et al.,2000)	"Reacting with appropriate and proper urgency in life threatening, dangerous, or emergency situations, quickly analyzing options for dealing with danger or crises and their implications; making split-second decisions based on clear and focused thinking; maintaining emotional control and objectivity while keeping focused on the situation at hand; stepping up to take action and handle danger or emergencies as necessary and appropriate."
Handling Work Stress (Pulakos et al., 2000)	"Remaining composed and cool when faced with difficult circumstances or a highly demanding workload or schedule: not overreacting to unexpected news or situations; managing frustration well by directing effort to constructive solutions rather than blaming others; demonstrating resilience and the highest levels of professionalism in stressful circumstances; acting as a calming and settling influence to whom others look for guidance."
Solving Problems Creatively (Hatano & Inagaki, 1986; Holyoak, 1991; Hoover & Feldhusen, 1990; Owens, 1969)	"Employing unique types of analyses and generating new, innovative ideas in complex areas; turning problems upside down and inside-out to find fresh, new approaches; integrating seemingly unrelated information and developing creative solutions; entertaining wide ranging possibilities others may miss, thinking outside the given parameters to see if there is a more effective approach; developing innovative methods of obtaining or using resources when insufficient resources are available to do the job."
Dealing with Uncertain and Unpredictable Work Situations (Andersen, 1977; Ashford, 1986; Callan, Terry, & Schweitzer, 1994; Dix & Savickas. 1995; Edwards & Morrison. 1994; Goodman, 1994; Hall & Mirvis, 1995; Jones, 1986; Weiss, 1984)	"Taking effective action when necessary without having to know the total picture or have all the facts at hand: readily and easily changing gears in response to unpredictable or unexpected events and circumstances; effectively adjusting plans, goals, actions, or priorities to deal with changing situations; imposing structure for self and others that provide as much focus as possible in dynamic situations: not needing things to be black and white; refusing to be paralyzed by uncertainty or ambiguity."

Table 1 (Continued)

Dimension	Definition (Pulakos et al., 2000, p. 617)
Learning Work Tasks, Technologies, and Procedures (Kinicki & Latack, 1990; Noe & Ford, 1992; Patrickson, 1987; Thach & Woodman, 1994)	"Demonstrating enthusiasm for learning new approaches and technologies for conducting work doing what is necessary to keep knowledge and skills current; quickly and proficiently learning new methods or how to perform previously unlearned tasks; adjusting to new work processes and procedures; anticipating changes in the work demands and searching for and participating in assignments or training that will prepare self for these changes; taking action to improve work performance deficiencies."
Demonstrating Interpersonal Adaptability (Aronoff, Stollak, & Woike, 1994; Bowen & Waldman, 1999; Paulhus & Martin, 1988; Spiro & Weitz, 1990)	"Being flexible and open-minded when dealing with others; listening to and considering others' viewpoints and opinions and altering own opinion when it is appropriate to do so; being open and accepting of negative or developmental feedback regarding work; working well and developing effective relationships with highly diverse personalities; demonstrating keen insight of others' behavior and tailoring own behavior to persuade, influence, or work more effectively with them."
Demonstrating Cultural Adaptability (Black, 1990; Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994)	"Taking action to learn about and understand the climate, orientation, needs, and values of other groups, organizations, or cultures; integrating well into and being comfortable with different values, customs, and cultures; willingly adjusting behavior or appearance as necessary to comply with or show respect for others' values and customs; understanding the implications of one's actions and adjusting approach to maintain positive relationships with other groups, organizations, or cultures."
Demonstrating Physically Oriented Adaptability (Edwards & Morrison, 1994; Fiedler & Fiedler, 1975; Weinstein, 1978)	"Adjusting to challenging environmental states such as extreme heat, humidity, cold, or dirtiness; frequently pushing self physically to complete strenuous or demanding tasks; adjusting weight and muscular strength or becoming proficient in performing physical tasks as necessary for the job."

Mueller-Hanson et al. (2005) grouped the taxonomy of Pulakos et al. (2000) into three overarching types of adaptability: mental, interpersonal, and physical adaptability. Their grouping is summarized in Table 2.

Table 2. Overarching Types of Adaptability (Mueller-Hanson et al., 2005)

Overarching Types	**Sub-dimensions**	**Definition (Mueller-Hanson et al., 2005, pp. 2-3)**
Mental Adaptability	- Handling emergency or crisis situations - Dealing effectively with unpredictable or changing work situations - Handling work stress - Learning new work tasks, technologies, and procedures - Solving problems creatively	"Adjusting one's thinking in new situations to overcome obstacles or improve effectiveness."
Interpersonal Adaptability	- Interpersonal adaptability - Displaying cultural adaptability	"Adjusting what one says and does to make interactions with other people run more smoothly and effectively."
Physical Adaptability		"Adjusting to tough environmental states such as heat, cold, etc., pushing oneself physically to complete strenuous or demanding tasks, and adjusting weight/muscular strength or becoming proficient in performing physical tasks as necessary for the job."

Mueller-Hanson et al. (2005) further investigated the knowledge, skills, abilities, and other characteristics that can be used to predict adaptive performance in context of Pulakos et al.'s (2000) adaptability dimensions. They found that personality traits, cognitive skills, interpersonal skills, the extent of one's domain specific knowledge and experience have an impact on successful adaptive performance. The summary of their findings are summarized in Table 3.

Table 3. Characteristics Related to Adaptability
(Depicted from Mueller-Hanson et al., 2005)

Characteristics Related to Adaptability		**Discussed in Literature by**
Personality Traits	Self-efficacy	(Bandura, 1997; Eden & Kinnar, 1991; Sherer & Adams, 1983; Sherer, Maddux, Mercandante, Prentice-Dunn, Jacobs, & Rogers, 1982)
	Resiliency	(Pulley, Wakefield, & Van Velsor, 2001)
	Openness	(Costa & McCrae, 1992; LePine, Colquitt, & Erez, 2000; Zaccaro, 2001b)
	Achievement motivation	(Dweck, 1986; LePine et al., 2000; Pulakos et al., 2000; Schmeck, 1988)
	Other personality variables - Internal Locus of Control - Tolerance of Ambiguity - Willingness to Learn	(Pulakos & Dorsey, 2000; Zaccaro, 2001b)
Cognitive Skills	General cognitive ability	(LePine et al., 2000; Pulakos, Schmitt, Dorsey, Arad, Hedge, & Borman, 2002; Zaccaro, 2001b)
	Problem-solving and decision-making skills	(Endsley & Robertson, 2000; Klein, 1997)
	Metacognitive skills	(Endsley & Robertson, 2000)
Interpersonal Skills	Communication skills	(Stevens & Campion, 1994)
	Self and other awareness	(Gelfand, Nishii, Holcombe, Dyer, Ohbuchi, & Fukuno, 2001; Gelfand & Christakopulu, 1999; Zaccaro, 2001b;)
Domain Specific Knowledge and Experience	Domain Specific Knowledge	(Cohen, Thompson, Adelman, Bresnick, Shastri, & Riedel, 2000; Endsley & Robertson, 2000; Ross & Lussier, 2000)
	Experience	(Pulakos et al., 2002; Smith, Ford, & Kozlowski, 1997; Zaccaro, 2001b)

Mueller-Hanson et al. (2005) also contributed to the literature by reviewing characteristics of adaptable leaders along a continuum of trainability in the military settings. They focused on training adaptability in terms of institutional, operational, and self-development interventions. They found that exposing to situations requiring adaptability and the iterative process of practice, feedback, and practice have positive

impact on training adaptive performance and acknowledged that "general cognitive ability tends to be stable, trait-like, and therefore largely non- trainable, but other cognitive skills like decision making and problem solving, metacognition, and creativity may be more amenable to training" (Mueller-Hanson et al., 2005, p. 8). Their findings can be seen in Figure 2. For this research, domain specific knowledge and experience in terms of knowledge transfer and their relation to decision making process regarding mental adaptability will be investigated.

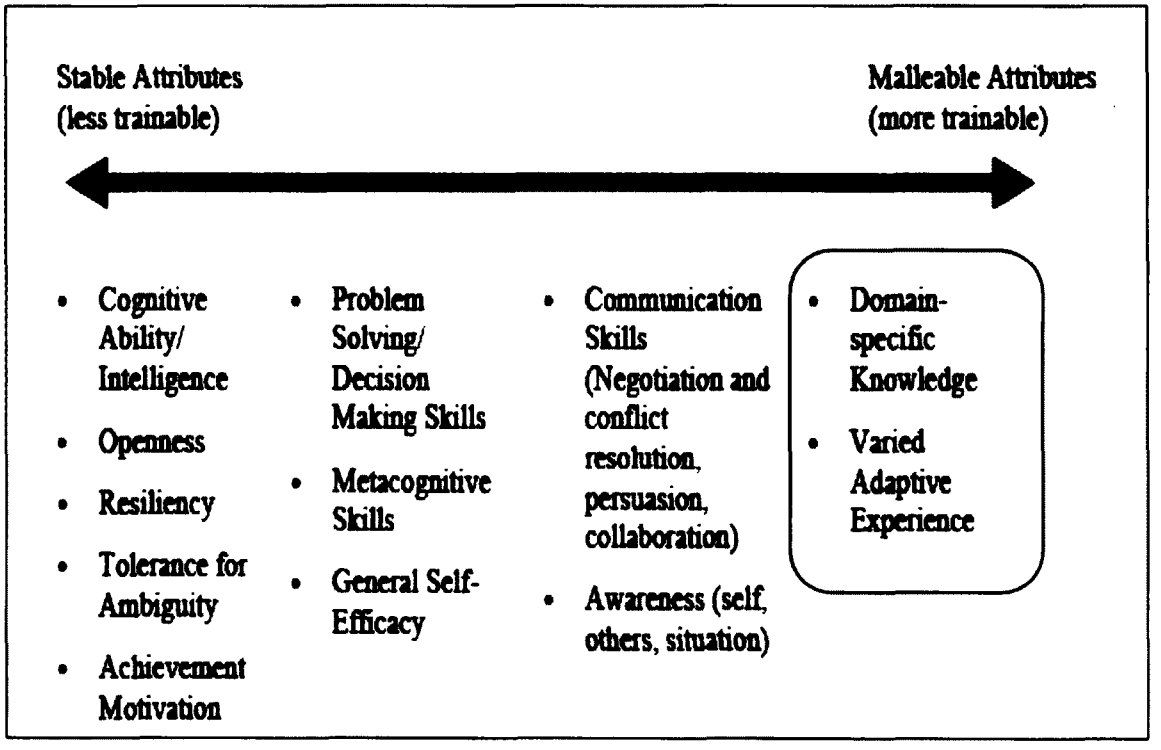

Figure 2. Trainability Continuum for Characteristics Related to Adaptability (Mueller-Hanson et al., 2005)

Adaptive performance is likely the result of three major factors: individual characteristics, leadership training and development programs and organization's rules, norms, climate, and culture (Mueller-Hanson et al., 2005). This research addresses the

third component of this equation by investigating the role of knowledge transfer in leaders' operational adaptability.

2.2 Operational Adaptability

2.2.1 Operational Adaptability in Official U.S. Military Documents

TRADOC Pamphlet 525-3-0, *The Army Capstone Concept, Operational Adaptability: Operating under Conditions of Uncertainty and Complexity in an Era of Persistent Conflict* (2009) is the main document that advanced "operational adaptability" in the U.S. Army. This pamphlet changed the conceptual focus of the Army to operational adaptability and described it as *"the ability to shape conditions and respond effectively to changing threats and situations with appropriate, flexible, and timely actions"* (TRADOC Pamphlet 525-3-0, 2009, p. 51). This definition includes two parts. The first part, "the ability to shape conditions" is much more related to organizational level and thus, it is out of this research's scope. The second part, "respond effectively to changing threats and situations with appropriate, flexible, and timely actions" is both organizational and individual level. For this dissertation, operational adaptability is defined as *the ability to respond effectively to changing threats and situations with appropriate, flexible, and timely actions* and will be studied at the individual level.

TRADOC Pamphlet 525-3-0 (2009) considers operational adaptability both at organizational and individual level. It relates operational adaptability to the factors of "critical thinking, comfort with ambiguity, decentralization, a willingness to accept prudent risk, and an ability to make rapid adjustments" (TRADOC Pamphlet 525-3-0, 2009, p. 16). Although it mentions the importance of designing forces and educating

leaders for operational adaptability, it does not provide enough guidance for leaders' adaptability. This pamphlet focuses mostly on the organizational level and provides six supporting ideas as military solution for operational adaptability at organizational level: "develop the situation through action, conduct combined arms operations, employ a combination of defeat and stability mechanisms, integrate joint capabilities, cooperate with partners, and exert a psychological and technical influence" (TRADOC Pamphlet 525-3-0, 2009, p. 17).

Although the TRADOC Pamphlet 525-3-0 (2009) does not remark knowledge transfer directly, it identifies some knowledge transfer-related aspects which support operational adaptability. In this context, understanding the situation in depth and understanding the dynamics of conflict are mentioned several times with regard to their positive role in enhancing operational adaptability. Furthermore, an analysis of recent and ongoing conflicts is also provided to help in understanding the dynamics of conflict.

CCJO v3.0, Capstone Concept for Joint Operations (2009) uses the term "operational adaptation" rather than "operational adaptability" without giving any specific definition. Like TRADOC Pamphlet 525-3-0 (2009), CCJO v3.0 (2009) also considers adaptability at both the organizational and individual level, however, while it describes a generic process of operational adaptation at organizational level, it does not provide much about individual level. It states "developing innovative and adaptive leaders down to the lowest levels" as one of the institutional implications and suggest leader development and professional military education efforts should provide flexible and creative problem solving skills to the leaders (CCJO v3.0, 2009, p. 28).

CCJO v3.0 (2009) refers to the John Boyd's observation-orientation-decision-action cycle (OODA Loop) seen in the Figure 3 as the best-known model of operational adaptation in the Air Force. However, the "orientation" part of the OODA loop has useful implication for this study and will be further discussed in Section 2.4.2 related to military decision making.

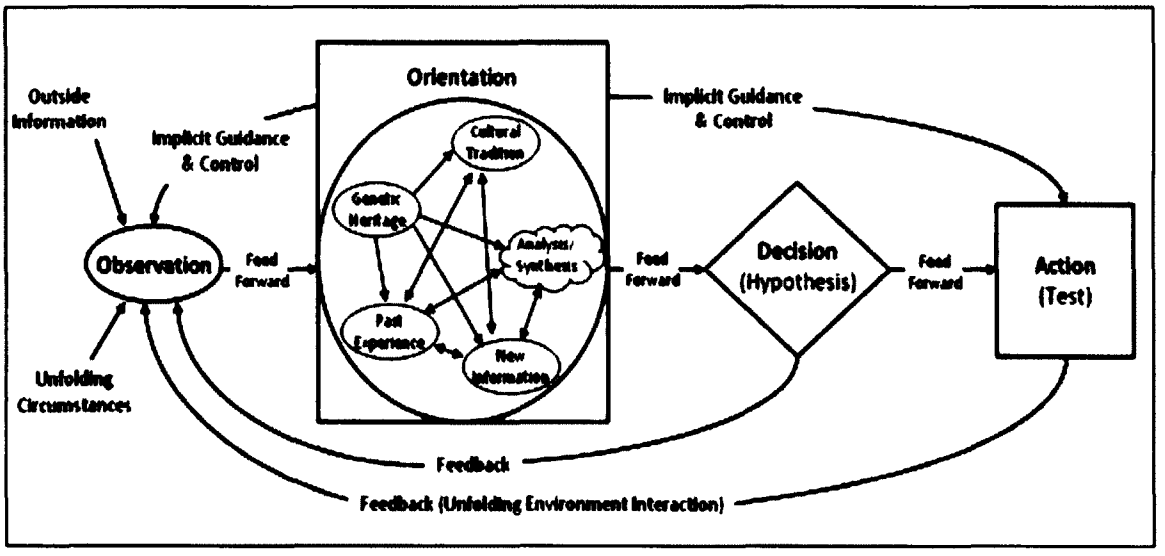

Figure 3. John Boyd's OODA Loop (CCJO v3.0, 2009)

TRADOC Pamphlet 525-3-0, The Army Capstone Concept (2012) keeps the idea of operational adaptability as the Army's fundamental characteristic to deal with challenges and further expands it to the institutional Army and operating force at both the individual and organizational levels. It suggests that flexible organizations and institutions are essential for operational adaptability and then builds a three-dimensioned strategic solution: prevent conflict, shape the operational environment, and win the Nation's war(s). It mostly covers operational adaptability at organizational level. However, regarding individual level, it relates operational adaptability mainly to training and educating leaders, soldiers and civilians without providing any guiding insight.

Furthermore, it also suggests decentralized execution under mission command facilitates leaders' operational adaptability.

The Capstone Concept for Joint Operations: Joint Force 2020 (2012) embraces the concept of "globally integrated operations". This concept does not specifically address to operational adaptability, however, it identifies mission command and tempo as the main factors that provides adaptability.

FM 3-0 (C1), Operations (2008) replaced the command and control warfighting function with "mission command" and acknowledged "operational adaptability" as a new term in its updated version in 2011. FM 3-0 (C1) (2008) considers operational adaptability at both the organizational and individual level. It argues mission command supported by design and tempo enables operational adaptability: "Mission command invokes the greatest possible freedom of action to subordinates. It enables subordinates to develop the situation, adapt, and act decisively through disciplined initiative in dynamic conditions within the commander's intent" (FM 3-0 (C1), 2008, p. 4-5). Regarding individual level operational adaptability, it emphasizes situational understanding, which is shaped by experience, applied judgment, and various analytic tools, as a core requirement for leaders to make timely decisions. In this regard, it argues knowledge management enhances rapid adaptation by increasing leaders' situational understanding and enabling them make informed timely decisions.

ADP 6-0, Mission Command (2012) captures one of the main elements of the future operational environment as the "contents of wills characterized by continuous and mutual adaptation" and provides mission command as part of the solution. Mission command is defined as the "*exercise of authority and direction by the commander using*

mission orders to enable disciplined initiative within the commander's intent to empower agile and adaptive leaders in the conduct of unified land operations" (ADP 6-0, 2012, p. 1). It underlines the role of effective decision making based on applying judgment to available information and knowledge. It identifies "understanding the situation" as the crucial element for decision making and further argues that experience, training, and study are crucial factor for informed decision making. It also identifies knowledge management and information management among the primary staff tasks that supports the commander in the exercise of mission command.

Joint Publication 3-0, Joint Operations (2011) underlines the need for adaptive leaders without covering the term of "operational adaptability" and further identifies experience as a factor that affects innovative and adaptive solutions.

ADP 3-0, Unified Land Operations (2011) identifies adaptability as one of the main characteristics of Army operations without using the term of "operational adaptability". It examines adaptability mainly at the individual level and suggests mission command as a crucial enabler for adaptability. It underlines an "understanding of the operational environment" as a basic requirement for adaptation and further argues that leaders use information networks to share their understanding.

Army Strategic Planning Guidance (2013) aims to develop operational adaptable forces and identifies "Train for Operational Adaptability" as one of the near-term objectives. It acknowledges unit training and leader development guided by the doctrine of mission command as essential factors for developing operational adaptive forces. It highlights regional and cultural expertise development. It also covers integration of lessons learned from recent operations into the force generation as another factor

enhancing operational adaptability. Notably, it gives a special focus on leader development: "Leader development is the best means to ensure that the Total Army can adapt to whatever an uncertain future may bring" (Army Strategic Planning Guidance, 2013, p. 13). It further argues leader's operational adaptability could be best developed through a variety of experiences in joint, interagency, intergovernmental and multinational environment.

TRADOC Pam 525-3-1, The United States Army Operating Concept (2010) defines operational adaptability as *"a quality that Army leaders and forces exhibit based on critical thinking, comfort with ambiguity and decentralization, a willingness to accept prudent risk, and ability to make rapid adjustments based on a continuous assessment of the situation"* (TRADOC Pam 525-3-1, 2010, p. 61). It carries the same ideas from TRADOC Pamphlet 525-3-0 (2009), but, it suggests a new definition. It identifies mission command as a crucial factor supporting operational adaptability. It implicitly creates a link between decision making and adaptability. Notably, it argues a "renewed emphasis on training, education, and leader development" necessary in order to develop agile and adaptive leaders who should be equipped with "a broader set of skills that includes an understanding of politics, economics, and foreign cultures" (TRADOC Pam 525-3-1, 2010, p. 36). It also identifies "application of knowledge" as another important factor which could be assumed as an implicit reference to knowledge transfer.

ADP 7-0, Training Units and Developing Leaders (2012) aims to prepare forces and leaders for operational challenges and it identifies "Train to Develop Adaptability" as a principle for both unit training and leader development. While linking adaptability and decision making, it argues "adaptability comes from training under complex, changing

conditions, with minimal information available to make decisions". It also underlines the importance of critical thinking in leader development. It states that leader development is achieved through training, education, and experience; however, it especially underlines experience and argues that most leader development occurs during operational assignments.

TRADOC Pam 525-8-3, The U.S. Army Training Concept 2012-2020 (2011) embraces the central idea of developing an adaptive training environment in order to achieve operational adaptability. It argues this challenging training environment will enhance leader cognitive, interpersonal and cultural skills and will also "transform individual adaptive skills into adaptive collective skills and unit readiness" (TRADOC Pam 525-8-3, 2011, p. 19).

TRADOC Pam 525-8-2, The U.S. Army Learning Concept for 2015 (2011) embraces adaptability as the central idea and suggests a "Continuous Adaptive Learning Model", "a framework comprised of elements that together create a learner-centric, career-long continuum of learning that is continuously accessible and provides learning at the point of need in the learner's career", to develop adaptive thinking Soldiers and leaders. (TRADOC Pam 525-8-2, 2011, p. 17)

The findings and implications from official documents will be discussed in following part within an individual level focus.

2.2.2 Conceptualizing Operational Adaptability

Operational adaptability will be conceptualized based on findings from review of U.S. official military documents and adaptability literature.

While identifying individual and organizational level aspects of operational adaptability, the official documents do not give equal attention to the individual level.

However, the U.S. official military documents dealt with operational adaptability in a consistent way through different documents.

U.S. military documents generally investigated operational adaptability in the context of mental processes; e.g. like decision making, critical thinking, adaptive thinking, comfort with ambiguity, ability to make rapid adjustments, creative problem solving, and situational understanding. But, they do not provide any empirical analysis on the relationship among the proposed processes.

Furthermore, U.S. military documents argue that operational adaptability at individual level is affected by two major factors: mission command and training. In that context, experience is identified as an enabler of operational adaptability.

Official documents implicitly refer to knowledge transfer as a function in helping to develop a better understanding or sense-making in the context of decision making process.

The review of official documents concluded that currently there is no concrete official framework for operational adaptability in the U.S. Army. However, they provide a shared perspective about operational adaptability. They acknowledge operational adaptability in the context of mental domain.

The review of the adaptive performance literature empirically supports the arguments of official military documents. Tucker and Gunther (2009) applied the nine-dimension adaptability model of White, Mueller-Hanson, Dorsey, Pulakos, Wisecarver, Deagle (2005), which is actually based on taxonomy of Pulakos et al.'s (2000) adaptive performance dimensions, to critical incidents of army leader behaviors. They used two kind of data sets: combat veterans and training facilitators. They found that "the adaptive

behaviours performed most in combat reflected the Deals with Unpredictability and Handles Emergencies dimensions, whereas in training contexts they reflected the Leads Adaptive Teams and Solves Problems Creatively dimensions" (Tucker & Gunther, 2009, p. 315). They concluded that developing mental adaptability skills and adaptive teams will promote adaptability.

Based on a review of official military documents and empirical research on adaptive performance within military context, for the purpose of this research, operational adaptability is conceptualized as it includes three sub-adaptability dimensions from mental adaptability grouping of Mueller-Hanson et al.'s (2005) general adaptability taxonomy. The conceptualized operational adaptability, *the ability to respond effectively to changing threats and situations with appropriate, flexible, and timely actions* (TRADOC Pamphlet 525-3-0, 2009), is shown in Figure 4.

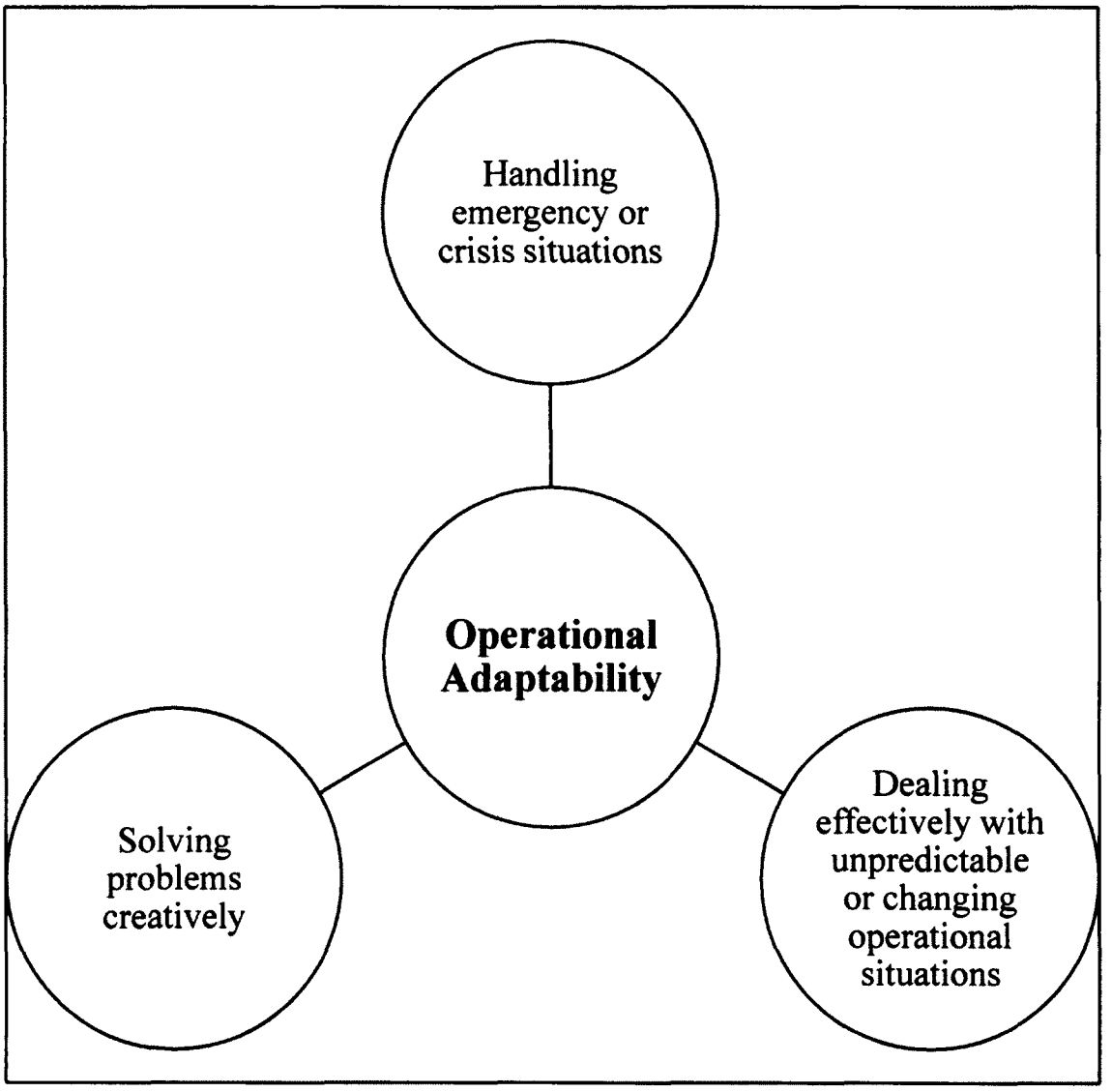

Figure 4. Conceptualized Operational Adaptability

2.3 Knowledge Transfer in the Military

2.3.1 Historical Development and Current Practices

Knowledge transfer is not a new phenomenon for the military. World War II provided many initiatives aimed to collect and distribute operational lessons. Among them, Battle Experiences newsletter, initiated by the U.S. 12th Army Group, was a significant effort which was later centralized at Army level during the war. Battle Experience was a daily, one page newsletter aimed to distribute friend forces' latest

combat experiences to tactical level leaders. The newsletter covered both best practices and negative lessons most of which were easily applicable to save lives. The newsletter also covered lessons from Allies which provided useful insights (Mains & Ariely, 2011).

The U.S. Army was not alone in this effort. The German Army also implemented a similar approach to disperse and integrate knowledge within tactical levels:

> A sort of learning competition is apparent in the newsletters as each army tried to gain the advantage by more quickly adapting to change. The U.S. newsletters often contained a section on new "German tricks" that educated Soldiers on what the enemy was learning and disseminated countermeasures against these adaptations. (Mains & Ariely, 2011, p. 167)

These efforts however did not develop an organization immediately. In the Korean War, units mostly captured their own lessons through after action reviews. However, the mistakes in the invasion of Grenada led to the establishment of the Center for Army Lessons Learned (CALL) in 1985. CALL's initial function was to capture training lessons from the National Training Center (NTC) and distribute them to the units through a quarterly bulletin. After Operations Just Cause and Desert Storm, CALL expanded quickly to capture the lessons, and then again shrank back to its training-focused formation. However, these efforts were reactive and missed the opportunity to impact operations directly (Mains & Ariely, 2011).

9/11 was a decisive moment for the change in knowledge management implementation and culture in U.S. Army. In order to make real-time analysis and share lessons from ongoing operations, CALL expanded across the U.S. Army permanently. CALL created a strong knowledge sharing network among schools, training centers,

organizations and units all across the Army. "The network provides proactive dissemination of lessons to commanders, soldiers, and schools, documenting lessons from actual operations by Active units that are just minutes or hours old and pushing them to the appropriate non-deployed units, schools, and training centers" (Mains & Ariely, 2011, p. 168).

The Army embraced knowledge management as a discipline in 2003 and knowledge management gained more attention in following years (FM 6-01.1, 2012). In 2007, Combined Arms Center–Knowledge (CAC–K) was established in order to create a synergy in organizational knowledge management activities. CAC–K includes five existing Combined Arms Center organizations (Mains & Ariely, 2011).

- The "Center for Army Lessons Learned leads lessons collection and knowledge analysis to integrate the lessons into the field" (Mains & Ariely, 2011, p. 174).
- The Army Operational Knowledge Management fuses communities of practice (Mains & Ariely, 2011, p. 174).
- The "Combined Arms Doctrine Directorate institutionalizes knowledge in the form of doctrine" (Mains & Ariely, 2011, p. 174).
- The "Combat Studies Institute entwines relevant historical knowledge" (Mains & Ariely, 2011, p. 174).
- The "Military Review disseminates and helps test knowledge through the kind of dialogue best stimulated by a professional journal" (Mains & Ariely, 2011, p. 174).

The knowledge sharing culture impressively developed in the U.S Army. The demand for CALL publications is encouraging; 500,000 copies of handbooks each year,

over 3,000 unique users of CALL Website each week, about 1,000 formal requests answered each month and many walk-in requests daily (Mains & Ariely, 2011). However, CALL is not alone in this effort. One of the best examples of the growing knowledge transfer culture was the creation of CompanyCommander.com. This blog site was developed in 2002 by two U.S. Army officers in order to share experiences and lessons learned from Iraq. Due to the rapid acceptance and use, the U.S. Army later officially endorsed and expanded the concept into CompanyCommand.army.mil (United States Strategic Command Knowledge Transfer Office, 2009). Corresponding to increasing knowledge transfer culture, many other efforts exist across the Army (Mains & Ariely, 2011).

> Every unit has its own internal network over which to share lessons. Branch schools and centers have resource sites focused on their areas of responsibility. The Company Command Forum, Platoon Leader, and Army NCO networks grew from private Web sites to meet the needs of junior leaders who wanted to share their experiences and ideas. These networks have become part of the Battle Command Knowledge System, which provides forums on a broad array of topics. U.S. Forces Command units provide "warfighter forums" to focus knowledge exchange on particular types of units. (Mains & Ariely, 2011, p. 169)

Each unit has a "Knowledge Management Section" which is responsible for transferring observations, insights, and lessons learned. This internal knowledge network of combat units connects units horizontally and vertically within a brigade and with adjacent units. This network also provides updates to follow-on units. Furthermore, this

network shares operational knowledge by connecting to the CALL network (FM 6-01.1, 2012).

FM 6-01.1 (2012) further categorized the types of knowledge networks using technical network architecture as tactical Web portals and Army professional forums. Web portals are mainly used to share information such as documents, images, news and announcements, surveys, and discussions. On the other hand, the Army's professional forums contain structured communities of practice which intersect with other knowledge networks, communities of purpose, and knowledge centers. Army professional forums include unit forums, leader forums, functional forums, and warfighter forums. They are summarized in Table 4.

Table 4. Army Professional Forums

Type	Explanation	Examples
Unit Forums	"Unit forums are social networks that support connection and collaboration up and down a unit's chain of command" (FM 6-01.1, 2012, p. 3-7).	25th Infantry Division (Mains & Ariely, 2011)
Leader Forums	"Leader forums are networks that allow Army-wide collaboration among peer leaders" (FM 6-01.1, 2012, p. 3-7).	Company Command Net, NCO Net, Leader Net (FM 6-01.1, 2012)
Functional Forums	Functional forums are "networks that support collaboration among leaders and subordinates who share functional duties and skills" (FM 6-01.1, 2012, p. 3-7).	Sustain Warfighter Forum, Single Link (FM 6-01.1, 2012)
Warfighter Forums	"Warfighter forums are communities that promote teaching, training, and collaboration, generally but not exclusively among brigade combat teams and functional and multifunctional brigades" (FM 6-01.1, 2012, p. 3-7).	Heavy Brigade Combat Team (HBCT) Warfighters Forum, the Infantry Brigade Combat Team (IBCT) Warfighters Forum, the Stryker Brigade Combat Team (SBCT) Warfighters Forum, the Battlefield Surveillance Brigade (BFSB) Warfighters Forum (FM 6-01.1, 2012)

2.3.2 Current Doctrinal Framework

The current knowledge management doctrine is FM 6-01.1: Knowledge Management Operations. It defines knowledge as below:

> Knowledge is information that has been analyzed to provide meaning or value or evaluated as to implications for the operation. It is also comprehension gained through study, experience, practice, and human interaction that provides the basis for expertise and skilled judgment. Knowledge results from analysis of information and data. Individuals gain knowledge when they place information in context based on what they already know, available factual information, and their judgment and experience. This leads to understanding. Knowledge occurs when the proverbial light bulb goes on in a person's mind and he or she says: "I got it" or "now I understand. (FM 6-01.1, 2012, p. 1-2).

The current doctrine identifies two types of knowledge; tacit and explicit. Tacit knowledge defines the knowledge that exists in an individual's mind. It is gained through life experiences, training, and formal and informal networks. Tacit knowledge includes many forms like learned nuances, subtleties, work-arounds, intuition, mental agility, effective responses to crises, and the ability to adapt. Furthermore, military leaders use tacit knowledge to solve complex problems and make decisions. In the military context, 80% of the knowledge resides as tacit knowledge (FM 6-01.1, 2012).

Conversely, explicit knowledge defines information that exists in written or otherwise documented formats. Thus, explicit knowledge can be organized, applied, and transferred easily using digital or non-digital means. In the military, some examples of

explicit knowledge include field manuals, technical manuals, tactics, techniques, and procedure manuals (FM 6-01.1, 2012).

FM 6-01.1 (2012) defines knowledge management as "the process of enabling knowledge flow to enhance shared understanding, learning, and decision-making" (FM 6-01.1, 2012, p. 1-1). The purpose of knowledge management is to create shared understanding which results in better decisions and improved flexibility, adaptability, integration and synchronization (FM 6-01.1, 2012).

Knowledge transfer is one aspect of the larger knowledge management discipline. Knowledge management seeks to achieve its purpose by creating knowledge, organizing knowledge, applying knowledge, and transferring knowledge. Knowledge transfer is defined as "the movement of knowledge—including knowledge based on expertise or skilled judgment—from one person to another" (FM 6-01.1, 2012, p. 1-3). Knowledge transfer practices in U.S. Army include the transfer of knowledge within the same unit and between different units among individuals and groups (FM 6-01.1, 2012).

The doctrinal subject of knowledge transfer is identified as Lessons Learned and Best Practices (FM 6-01.1, 2012). Lessons Learned and Best Practices are both forms of tacit knowledge.

Lessons learned are "validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat operations that leads to a change in behavior at either the tactical, operational, or strategic level or in one or more of the Army's doctrine, organization, training, materiel, leadership and education, personnel, and facilities domains" (FM 6-01.1, 2012, p. 3-14). Each unit may either develops lessons learned by using a Knowledge Section for, or it

may use a collection and analysis team from the Center for Army Lessons Learned (FM 6-01.1, 2012).

Best Practices are the most effective and efficient method of achieving any objective or task, into operations and training (FM 6-01.1, 2012).

FM 6-01.1 (2012) also identifies After Action Review as a crucial mechanism to capture Lessons Learned and Best Practices within a unit. It is a structured review process aimed to discover for "what happened", "why it happened", and "how it can be done better." The Knowledge Management Section supports this effort.

The literature review also reveals the importance of intra- and inter-knowledge transfer practices (Haltiwanger 2012; Kotnour & Landaeta, 2002; Landeata, 2008). The U.S. military has well-established intra- and inter-knowledge transfer practices (FM 6-01.1, 2012; Mains & Ariely, 2011). Intra- and inter-knowledge are defined below.

Inter-knowledge transfer: The sharing of knowledge from one individual or group to another individual or group between different units (Haltiwanger, 2012). This includes Combined Arms Center-CAC networks, Center for Army Lessons Learned-CALL networks, Army Operational Knowledge Management networks, and Army professional forums: leader forums, functional forums, and warfighter forums (FM 6-01.1, 2012).

Intra-knowledge transfer: The sharing of knowledge from one individual or group to another individual or group within the same unit (Haltiwanger, 2012). This includes after action reviews, the unit forum, internal network managed by knowledge management section (FM 6-01.1, 2012).

2.4 Knowledge Transfer and Operational Adaptability

Though, there is no empirical research found specifically conducted on the relationship between "operational adaptability" and "knowledge transfer", FM 6-01.1 (2012) clearly states that "sound knowledge management practices enhance Leader and Soldier agility and adaptability during operations". The literature review also identifies some consideration areas that support a positive correlation between operational adaptability and knowledge transfer. These areas mainly includes the outcome of past knowledge transfer practices in military operations and the role of knowledge transfer in military decision making.

2.4.1 The Outcome of Past Knowledge Transfer Practices in Military Operations

Operational experiences support the research hypothesis of *an increase in knowledge transfer will have a positive impact on military leaders' operational adaptability*. However, the term "operational adaptability" was not used in particular and the proposed relationship was not empirically analyzed in the literature.

The military has always been a learning organization. It has the most incentives of any institution to use knowledge to adapt in order to overcome adversaries and to survive (Mains & Ariely, 2011).

The knowledge transfer practices in World War II played an important function for both U.S. and German Forces. A learning competition of knowledge transfer was noted between two rivals in order to adapt quickly to change. *Battle Experiences*, the daily newsletter including both negative lessons and best practices, played an important role in improving operations and saving lives across U.S. Army in World War II. On the other hand, *German Merkblätter* was less focused on novel lessons and prepared in a

doctrine-oriented manner to ensure common established procedures (Mains & Ariely, 2011).

After 9/11, the U.S. Army impressively developed her knowledge transfer practices and culture. The real time analysis and transfer of lessons improved operations against adaptive enemies. The results of knowledge transfer practices in Afghanistan and Iraq are well documented. "CALL is responsible for many adaptations that were flashed across the Army and adopted within hours or days" (Mains & Ariely, 2011, p. 168).

The U.S. Army also established Combined Arms Center–Knowledge (CAC–K) and linked five existing Combined Arms Center organizations to it. This setup created a synergy in organizational knowledge management activities and leveraged knowledge as a crucial resource for the fighting forces to enhance operational effectiveness (Mains & Ariely, 2011).

2.4.2. The Role of Knowledge Transfer in Decision Making

The literature review reveals a link between problem solving, decision making skills and adaptive performance especially in mental domain. Mueller-Hanson et al. (2005) defines adaptive performance as "effectively responding to changes in the environment" (p. 5) and identifies ancestors of adaptive performance as problem solving and decision making. Mueller-Hanson et al. (2005) further state that naturalistic decision making is related to adaptability.

The U.S. Army identifies two types of Decision Making Models for military leaders: analytic and intuitive. Analytic decision making is a systematic process which aims to find the optimal solution among alternative solutions identified. The Army's analytic approach is named Military Decision Making Process. The second model is very

different from Military Decision Making Process. The second model, intuitive decision making is defined as "the act of reaching a conclusion that emphasizes pattern recognition based on knowledge, judgment, experience, education, intelligence, boldness, perception, and character" (FM 3-0, 2008, p. 5-4).

Intuitive decision making focuses on assessment of the situation whereas MDMP focuses on comparison of multiple options. The success of the intuitive decision making relies on military leaders' experience and intuitive ability to recognize the key elements and implications of a particular problem or situation.

These models do not overrule each other. Military leaders combine analytic and intuitive approaches to the problems. However, circumstances in which decisions should be made define the proper method. MDMP is more suited for planning purposes when the time is not a critical issue. Instead, when circumstances are not suited for the MDMP or troop leading procedures, military leaders rely on intuitive decision making model (FM 3-0, 2008). "Effective decision-making during execution relies heavily on intuitive decision making by commanders and staffs to make rapid adjustments" (ADP 5-0, 2012, p. 13).

The literature also supports the doctrinal framework. Cognitive psychologists challenged the classical (analytic) decision making model in 1970s and studied "how experienced decision makers made decisions in real life situations" which led to the foundation of "naturalistic decision making" models. Naturalistic decision making deals with decision making under naturalistic conditions characterized as below (Schmitt, 1995, p. 3).

- "Ill-structured, situation unique problems,"

- "Uncertain, dynamic environments,"
- "Shifting, ill-defined or competing goals,"
- "Lack of information,"
- "Ongoing action with continuous feedback loops,"
- "High level stress and friction," and
- "Time stress."

In 1989, under the naturalistic decision making perspective, Gary A. Klein, Roberta Calderwood, and Anne Clinton-Cirocco developed the recognition-primed decision model which describes how decision makers can recognize a plausible course of action as the first one to consider (Ross, Klein, Thunholm, Schmitt, & Baxter, 2004). The U.S. Army intuitive decision model is later adapted from recognition-primed decision model (Klein, 2008). The researchers studied 150 experienced decision makers and 450 decisions. They found that decision makers employ intuitive techniques over 90 percent of the time and concluded "proficient decision makers are able to use their experience to recognize a situation as familiar, which gives them a sense of what goals are feasible, what cues are important, what to expect next and what actions are typical in that situation" (Klein, 1989, p. 59). They identified military leaders' knowledge, training and experience as the three major factors that enable assessing a situation correctly and developing and mentally war-gaming a plausible course of action (Ross et.al, 2004). Follow on research concludes that skilled decision makers usually find a good solution on their first try (Klein, Wolf, Militello, & Zsambok, 1995). Furthermore, Johnston, Driskell, & Salas (1997) found that intuitive decision making models supersede analytic ones in producing higher performance and it is further confirmed by the war-game

"Millennium Challenge 2002" in which rival teams employed analytic and intuitive decision models against each other (McCown, 2010).

Among knowledge, training and experience, Schmitt (1995) proposes "experience" as the essential factor in intuitive decision making since experience allows for the "situation assessment" (p. #),which is the hearth of intuitive decision making. He believes the benefit of training military leaders in a way that forces them to take tactical, operational and strategic decisions of all different sorts by extensive use of case studies. His view is supported in literature. Situation assessment, in other words, perception and understanding are mostly accepted as constructive or "sense-making" processes in which people bring existing knowledge and experience to bear to interpret what they observe (Bryant, 2006). His perspective is also later empirically supported by Mueller-Hanson et al. (2005).

> There are two overriding principles for developing adaptable leaders that apply to any type of training method. The first is based on the finding that experience is an important predictor of adaptive behavior. As described in the previous section, domain specific knowledge and experience are individual characteristics important for adaptable behavior and are very amenable to training. By developing a varied "catalog" of experiences, leaders can, when faced with a new situation, review their previous experiences to find one that best matches the new situation to determine what an effective response would be. Therefore, training interventions should incorporate as many opportunities as possible for emerging leaders to be exposed to situations requiring adaptability. Whether simulated or

> real, this exposure will allow the individual to start to build his or her own catalog of experiences from which to draw on in the future thereby speeding up the acquisition of expertise...The second overarching principle is that an iterative process of practice, feedback, and practice is a necessary part of development. Individuals should have the opportunity to practice new skills, obtain feedback on their results, and apply what they learned from this feedback in subsequent practice sessions. In an adaptability context, individuals should have ample opportunities to practice their adaptability related skills in a variety of settings and obtain feedback from a variety of sources. (Mueller-Hanson et al., 2005, p. 9)

Schmitt (1995) also recognizes knowledge transfer's role on experience building. He argues the lessons of how others solve the same tactical problems could be incorporated to one's own experience. This perspective is also embraced by this study. Furthermore, the military literature supports Schmitt (1995). McCown (2010) suggests military leaders accumulate vicarious experience through a critical analysis of historic military events in order to improve their ability to make rapid and effective decisions and further provides an historic example seen below.

> A useful example illustrating the importance of intuitive decision making developed through the study of military history is the leadership of LtGen Harold G. Moore, USA (Ret.). LtGen Moore's flexible and adaptable decision making style, most notably as a LtCol in the Battle of Ia Drang Valley in Vietnam, demonstrated his superior ability to rapidly evaluate and adjust to the conflict despite significant uncertainty and being vastly

> outnumbered. Regarded as one of the most storied battles in American military history, his unit killed over six hundred North Vietnamese Army (NVA) soldiers while suffering only seventy-nine losses. The book (and subsequent movie) We Were Soldiers Once . . . and Young chronicled his unit's heroic action...A critical element in the development of LtGen Moore's leadership was his heavy reliance on the lessons from past military conflicts. At every opportunity in his career in the Army, he carefully studied the art of war through military history, even going so far as to visit the battlefields where especially important events occurred. Through the close examination of the lessons learned from conflicts, he developed a deep understanding of the causes and effects of victories and defeats. His commitment to expanding his knowledge of warfare through the study of military history was so deep that he strongly encouraged his subordinates to do the same. Despite his lack of first-hand knowledge of the NVA prior to the Vietnam conflict, his study of their performance in past battles provided him a clear recognition of their formidable strength. This was an insight lost on many other commanders, but one that proved pivotal in his engagements with the NVA. (McCown, 2010, pp. 14-15)

McIntyre, Gauvin, and Waruszynski (2003) argue that the knowledge management practices enhance situational awareness, sense-making, and decision-making in military settings. Mains and Ariely (2011) elevate knowledge transfer practices achieved by U.S. Army in the last decade and acknowledge knowledge transfer's role in providing context required for sense-making and enhancing operational effectiveness.

The author of this study also shares the very same perspective based on his military service background. Furthermore, this perspective is also reflected in the U.S. Army's doctrinal publications.

Although TRADOC Pamphlet 525-3-0 (2009) does not remark on knowledge transfer directly, it identifies some knowledge transfer-related aspects which support operational adaptability. In this context, understanding the situation in depth and understanding the dynamics of conflict are mentioned several times with regard to their positive role in enhancing operational adaptability. Furthermore, an analysis of recent and ongoing conflicts is also discussed to help in understanding the dynamics of conflict.

Regarding individual level operational adaptability, FM 3-0 (C1) (2008) emphasizes situational understanding, which is shaped by experience, applied judgment, and various analytic tools, as a core requirement for leaders to make timely decisions. In this regard, it argues knowledge management enhances rapid adaptation by increasing leaders' situational understanding and enabling them make informed timely decisions.

TRADOC Pam 525-3-1(2010) implicitly creates a link between decision making and adaptability and identifies "application of knowledge" as another important factor which could be assumed as a reference to knowledge transfer.

FM 6-01.1 (2012) identifies functions of knowledge management and knowledge transfer as below.

- "Effective knowledge management makes that tacit knowledge, as well as explicit knowledge from a wide range of sources, available to those who need it, when they need it, so they can operate more effectively" (FM 6-01.1, 2012, p. 1-8).

- "Sound knowledge management practices enhance Leader and Soldier agility and adaptability during operations" (FM 6-01.1, 2012, p. 1-1).
- "Knowledge transfer enables units and Soldiers to begin operations at a higher knowledge level, raising knowledge and learning levels throughout an operation" (FM 6-01.1, 2012, p. 1-3).
- "Knowledge management helps commanders drive the operations process through enhanced understanding and visualization" (FM 6-01.1, 2012, p. 1-8).
- "Knowledge management seeks to enhance shared understanding and decision-making" (FM 6-01.1, 2012, p. 1-2) as seen Figure 5.

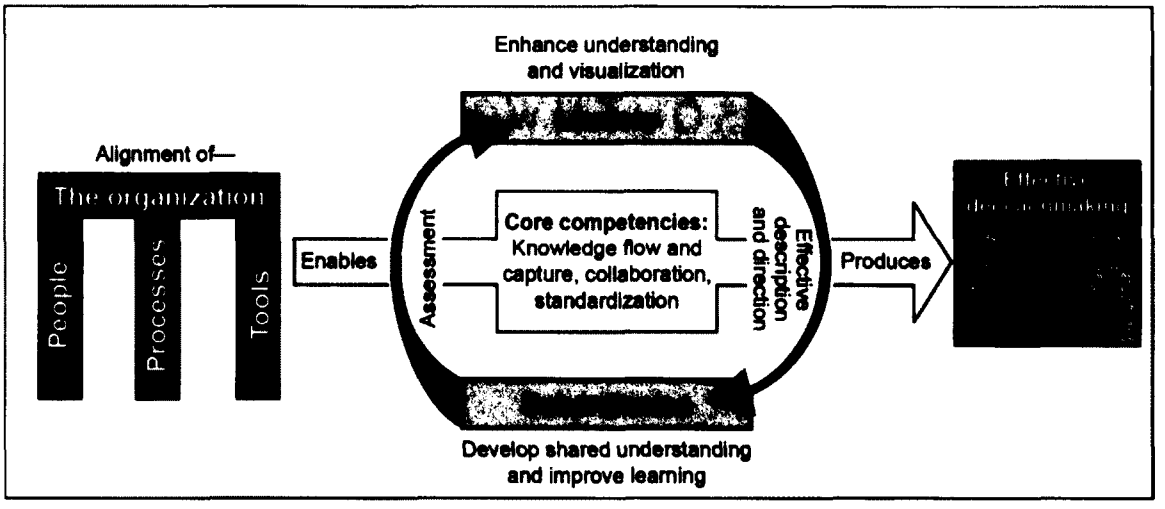

Figure 5. How knowledge management enhances decision-making (FM 6-01.1, 2012, p. 1-9)

2.5 Literature Gap Analysis

The literature review has revealed that adaptability is a multidimensional concept and it has been discussed under different names and definitions at individual, team, and

organizational levels in relation to many variables. Among these perspectives, adaptive performance perspective has dominated the adaptability literature in the last decade.

In the literature, there is a general consensus about how adaptability occurs: individual differences influence mediating processes which in turn influence how people perceive and respond to some change event. "Individual differences" and "respond to change" parts of this process are well structured in the literature; however, the "mediating processes" has not been studied at the same level. Pulakos' (2000) adaptability taxonomy is the main mechanism to analyze and measure the "respond to change" part.

Although, U.S. official military documents dealt with operational adaptability in a consistent way through different documents and some research identifies important aspect of adaptability for military leaders, the literature review uncovers that operational adaptability in military context has not been conceptualized specifically.

The literature review found that lessons learned and best practices are the main subjects of knowledge transfer practices in the U.S. Army. The literature review also identifies intra- and inter-knowledge transfer as two main types and the U.S. Army has well-established intra- and inter-knowledge transfer practices.

However, there is a clear gap in the literature regarding the conceptualization of operational adaptability and the relationship between military leaders' operational adaptability and knowledge transfer, in the forms of lessons learned and best practices through intra- and inter-knowledge transfer practices. This is among the first empirical research studies to address the identified gap. Table 5 provides a summary of the literature gap analysis.

Table 5. Literature Gap Analysis

	Inter-Knowledge Transfer		Intra-Knowledge Transfer		Operational Adaptability		
	Lessons Learned	**Best Practices**	**Lessons Learned**	**Best Practices**	**Handling Crisis**	**Solving Problems**	**Dealing with Change**
Argote & Ingram (2000)		X		X			
Ashford (1986)						X	X
Callan, Terry, & Schweitzer (1994)							X
Dix & Savickas (1995)							X
Edwards & Morrison (1994)							X
FM 3-0 (C1) (2008)	X	X	X	X		X	
FM 6-01.1 (2012)	X	X	X	X		X	
Goodman (1994)							X
Hall & Mirvis (1995)							X
Haltiwanger (2012)	X	X	X	X			
Hatano & Inagaki (1986)						X	
Holyoak (1991)						X	
Hoover & Feldhusen (1990)						X	
Landeata (2008)	X	X					
Mains & Ariely (2011)	X		X			X	
McIntyre, Gauvin, & Waruszynski (2003)	X		X			X	
Mueller-Hanson, White, Dorsey & Pulakos (2005)					X	X	X
Owens (1969)						X	
Pulakos, Arad, Donovan, & Plamondon, 2000					X	X	X
Schmitt (1995)	X		X			X	
TRADOC Pamphlet 525-3-0 (2009)							X
Tucker & Gunther (2009)					X	X	X
Weiss (1984)							X
Vahap (2015)	X	X	X	X	X	X	X

2.6 The Conceptual Model, Research Model and Hypotheses

The conceptual model of this dissertation is shown in Figure 6.

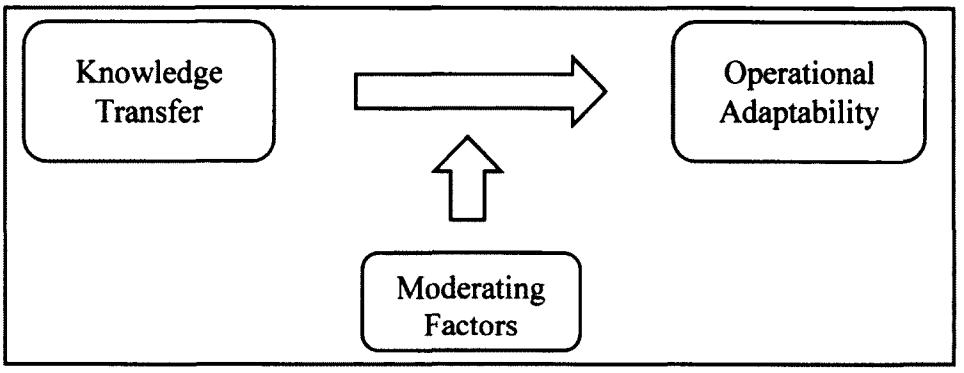

Figure 6. The Conceptual Model

The research model is developed from conceptual model is shown in Figure 7.

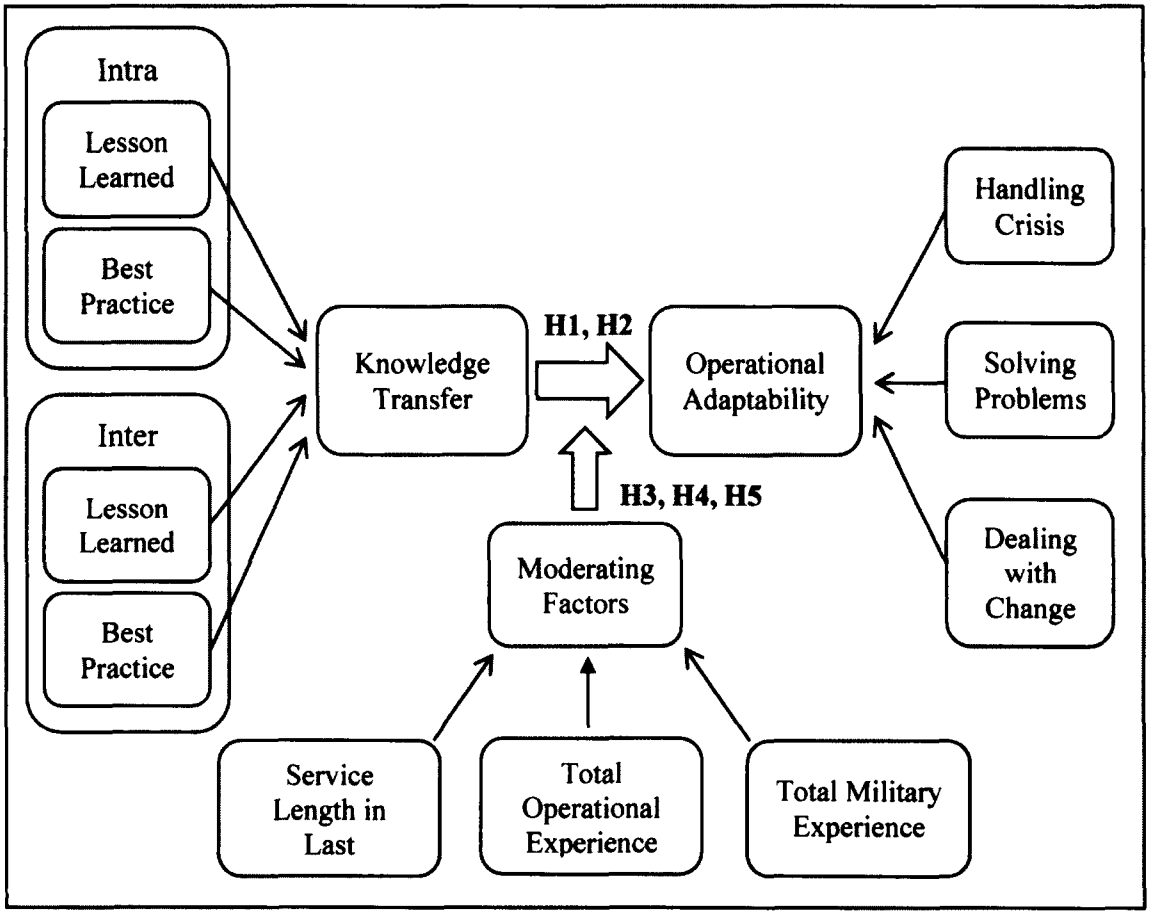

Figure 7. The Research Model

Based on the research questions and literature review findings, the main and moderated hypotheses are identified. The main and moderated hypotheses and their importance for military organizations and engineering managers will be discussed below.

Main Hypotheses:

H1: An increase in knowledge transfer will have a positive impact on military leaders' operational adaptability.

Experiences from Iraq, Lebanon, and Afghanistan reveal factors that are likely to influence the conduct and character of future war and provide valuable insights. Uncertainty and complexity will be prevailing factors in the future operational

environment and military organizations will have to respond to a broad range of threats and challenges posed by highly adaptive adversaries (TRADOC Pam 525-3-0, 2009).

Future conflict will be an unpredictable and uniquely human activity. The 20th century's clear lines among adversaries (state, state-proxies, and non-state) and threats (conventional and unconventional) will blur in future conflicts (DCDC, 2012; DCDC, 2013). Since conflict will remain a human endeavor, a contest between two learning and adapting forces, rapid rate of change, uncertainty, and complexity will increase the challenge for military leaders. "Leaders are often late to recognize such changes, and even when they do, inertia tends to limit their ability to adapt quickly" (USJFCOM, 2010, p. 8).

A variety of research underlined the increasing need for adaptable leaders in the military (Mueller-Hanson, White, Dorsey & Pulakos, 2005). Furthermore, enhancing operational adaptability both at the personal and organizational level is perceived as essential in order to achieve success in future military operations (TRADOC Pam 525-3-0, 2009).

Acknowledging the necessity that military leaders and future forces must develop operational adaptability in order to meet the challenges of future armed conflict, TRADOC Pam 525-3-0 (2009) changed the conceptual focus of the Army to operational adaptability, the ability to shape conditions and respond effectively to changing threats and situations with appropriate, flexible, and timely actions.

Current and future security environment calls for adaptable leaders in the military and development of adaptive leaders has become a priority for the Army, however, there is not enough research and practice related to adaptability (Mueller-Hanson et al., 2005).

Among possible factors, knowledge transfer is claimed to be an important practice that increases personal and organizational performance and effectiveness (Argote & Ingram, 2000). Regarding knowledge transfer, FM 6-01.1 (2012) indicates that the U.S. military has a strong culture and a well-established system. But, the question of how well we understand the correlations between military leaders' operational adaptability and knowledge transfer is not answered in the literature.

The purpose of this dissertation is to conceptualize operational adaptability and investigate the relationship between military leaders' operational adaptability and knowledge transfer.

This research is among the first empirical work to conceptualize operational adaptability and investigate the relationship between military leaders' operational adaptability and knowledge transfer.

The findings of this research help to bridge the gap identified in the literature review. First of all, this research conceptualized operational adaptability. This conceptualization both increases our understanding of operational adaptability and provides a framework upon which further research could be based.

Secondly, this research establishes correlations between military leaders' operational adaptability and knowledge transfer. These correlations increase our understanding of the relationship between operational adaptability and knowledge transfer.

For military organizations, the research findings have practical benefits. By providing a better understanding of the relationship between operational adaptability and knowledge transfer, the findings of this research help military organizations to better

direct resources on knowledge transfer practices in order to enhance leader's operational adaptability which is essential for success in future military operations.

For engineering managers, the importance is similar to that for military organizations. Adaptability in terms of human performance capabilities with regard to work context has received increased attention for almost last 15-20 years (Burke, Pierce, & Salas, 2006). The advance in technology and its effects on workplace (Hollenbeck & McCall, 1999), increasing role and importance of knowledge in the workplace (Hesketh & Neal, 1999; Pearlman & Barney, 2000) along with growing organizational competition (Burke et al., 2006) led to that increase. In this perspective, adaptability is not a crucial skill or performance only for military organizations but also many other business enterprises.

Nonaka (1991) identifies knowledge as the main source for sustainable competitive advantage whereas Ash (1998) similarly recognizes it as the organization's most valuable resource. Furthermore, knowledge transfer is claimed to be an important practice that increases personal and organizational performance and effectiveness (Argote & Ingram, 2000).

The question of how well we understand the correlations between adaptability and knowledge transfer is not answered in the literature.

This hypothesis investigates the relationship adaptability and knowledge transfer. The findings will increase engineering managers' understanding of adaptability and knowledge transfer and help them direct their limited resources managing their knowledge transfer practices.

H2: Inter-knowledge transfer has a more positive impact on military leaders' operational adaptability than intra-knowledge transfer.

The importance of H2 is almost the same as the H1 for the military organizations. Military organizations have strong knowledge transfer cultures and a well-established system enabling them to share experiences in the same unit or between the members of different units (FM 6-01.1, 2012). This hypothesis will investigate and compare the direction and strength of the correlations between operational adaptability and different types of knowledge transfer practices. The findings will increase the understanding of the detailed nature of the relationship and help military organizations direct their resources managing knowledge transfer practices.

For the engineering managers, the importance is similar to that for military organizations. A detailed investigation of the relationship between adaptability and different types of knowledge transfer practices will increase the efficient use of limited resources in managing knowledge transfer practices.

Moderated Hypotheses:

Three moderated hypotheses were developed based on findings of literature review. Experience is identified as a crucial factor in its role in adaptive performance (Pulakos et. al., 2000; Mueller-Hanson et. al., 2005) and in decision making (Schmit, 1995). For this reason, three levels of experience were identified and will be tested by the following hypotheses.

H3: The length of the service in the operation has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.

The findings of this hypothesis may help military organizations optimize their personnel assignment durations which will support enhancing operational adaptability and increased performance.

The benefit is similar for the engineering managers. The findings will help engineering managers improve their personnel and project planning.

H4: Operational experience has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.

This hypothesis will help military organizations understand the mediating role of operational experience on the relationship between operational adaptability and knowledge transfer.

The benefit is similar for the engineering managers. This hypothesis will help engineering managers understand the mediating role of context based specific experience on the relationship between adaptability and knowledge transfer.

H5: Total military service experience has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.

This hypothesis will help military organizations understand the mediating role of total military service experience on the relationship between operational adaptability and knowledge transfer.

The benefit is similar to the one in H4 for the engineering managers. This hypothesis will help engineering managers understand the mediating role of total service/job experience on the relationship between adaptability and knowledge transfer.

2.7 Operational Definitions of Variables

Based on the conceptual research model shown in Figure 6; the identified variables, their closest three definitions in the literature and their operational definitions are provided below.

Inter-knowledge transfer:

1- "The sharing of knowledge from one individual or group to another individual or group between projects" (Haltiwanger, 2012, p. 44).

2- "The transfer of useful know-how or information across company lines" (Appleyard, 1996, p. 138).

3- "Exchanging information about management practices and associated performance outcomes with other firms" (McEvily, Das & McCabe, 2000, p. 299).

Operational Definition: The sharing of knowledge from one individual or group to another individual or group between different units.

Intra-knowledge transfer:

1- "The sharing of knowledge from one individual or group to another individual or group within a project" (Haltiwanger, 2012, p. 44).

2- "The dissemination of knowledge from one division to another division within the same firm" (Lord & Ranft, 2000, p. 574).

3- "A process by which an organization makes available knowledge about routines to its members" (Kalling, 2003, p. 115).

Operational Definition: The sharing of knowledge from one individual or group to another individual or group within the same unit.

Lesson learned:

1- "Validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat operations that leads to a change in behavior at either the tactical, operational, or strategic level or in one or more of the Army's doctrine, organization, training, materiel, leadership and education, personnel, and facilities domains" (FM 6-01.1, 2012, p. 3-14).

2- "An improved capability or increased performance confirmed by validation when necessary resulting from the implementation of one or more remedial actions for a lesson identified" (The NATO Lessons Learned Handbook, 2011, p. 13).

3- Knowledge gained through experience, which if shared, would promote the recurrence of desirable outcomes or preclude the recurrence of undesirable outcomes (Haltiwanger, 2012, p. 44).

Operational Definition: Validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat operations that leads to a change in behavior at either the tactical, operational, or strategic level or in one or more of the Army's doctrine, organization, training, materiel, leadership and education, personnel, and facilities domains.

Best practice:

1- "The most effective and efficient method of achieving any objective or task, into operations and training" (FM 6-01.1, 2012, p. 1-13).

2- "A technique, process or methodology that contributes to the improved performance of an organization and has been identified as a 'best way of operating' in a particular area as compared to other good practice(s)" (The NATO Lessons Learned Handbook, 2011, p. A-1).

3- "A technique or methodology that, has proven successful in particular circumstances" (Haltiwanger, 2012, p. 44).

Operational Definition: The most effective and efficient method of achieving any objective or task, into operations and training.

Operational Adaptability:

1- "The ability to shape conditions and respond effectively to changing threats and situations with appropriate, flexible, and timely actions" (TRADOC Pamphlet 525-3-0, 2009, p.51).

2- "A quality that Army leaders and forces exhibit based on critical thinking, comfort with ambiguity and decentralization, a willingness to accept prudent risk, and ability to make rapid adjustments based on a continuous assessment of the situation" (TRADOC Pam 525-3-1, 2010, p. 61).

3- "An effective change in response to an altered situation" (Mueller-Hanson, White, Dorsey & Pulakos, 2005, p. v).

Operational Definition: The ability to respond effectively to changing threats and situations with appropriate, flexible, and timely actions

Handling emergency or crisis situations:

1- "Reacting with appropriate and proper urgency in life threatening, dangerous, or emergency situations, quickly analyzing options for dealing with danger or crises and their implications; making split-second decisions based on clear and focused thinking; maintaining emotional control and objectivity while keeping focused on the situation at hand; stepping up to take action and handle danger or emergencies as necessary and appropriate" (Pulakos, Arad, Donovan, & Plamondon, 2000, p. 617).

2- "Reacts appropriately and decisively to life-threatening or dangerous situations" (Pulakos, Dorsey & White, 2006, p. 43).

3- "Deals with casualties; makes sound decisions and performs effectively in life-threatening situations; assumes leadership roles as needed during combat" (Tucker & Gunther, 2009, p. 322).

Operational Definition: Reacting with appropriate and proper urgency in life threatening, dangerous, or emergency situations, quickly analyzing options for dealing with danger or crises and their implications; making split-second decisions based on clear and focused thinking; maintaining emotional control and objectivity while keeping focused on the situation at hand; stepping up to take action and handle danger or emergencies as necessary and appropriate.

Dealing effectively with unpredictable or changing operational situations:

1- "Taking effective action when necessary without having to know the total picture or have all the facts at hand: readily and easily changing gears in response to unpredictable or unexpected events and circumstances; effectively adjusting plans, goals, actions, or priorities to deal with changing situations; imposing structure for self and

others that provide as much focus as possible in dynamic situations: not needing things to be black and white; refusing to be paralyzed by uncertainty or ambiguity" (Pulakos et al., 2000, p. 617).

2- "Adjust and deal with unpredictable situations, shift focus, and take reasonable action" (Pulakos, Dorsey & White, 2006, p. 43).

3- "Changes roles, responsibilities, plans, and actions in response to the situation (e.g., from conducting stability and support operations to engaging in combat); plans for contingencies" (Tucker & Gunther, 2009, p. 322).

Operational Definition: Taking effective action when necessary without having to know the total picture or have all the facts at hand: readily and easily changing gears in response to unpredictable or unexpected events and circumstances; effectively adjusting plans, goals, actions, or priorities to deal with changing situations; imposing structure for self and others that provide as much focus as possible in dynamic situations: not needing things to be black and white; refusing to be paralyzed by uncertainty or ambiguity.

Solving problems creatively:

1- "Employing unique types of analyses and generating new, innovative ideas in complex areas; turning problems upside down and inside-out to find fresh, new approaches; integrating seemingly unrelated information and developing creative solutions; entertaining wide ranging possibilities others may miss, thinking outside the given parameters to see if there is a more effective approach; developing innovative methods of obtaining or using resources when insufficient resources are available to do the job" (Pulakos et al., 2000, p. 617).

2- "Solve a typical, ill-defined, and complex problem" (Pulakos, Dorsey & White, 2006, p. 43).

3- "Develops new tactics, techniques, and procedures to accomplish the mission (outside of doctrine); synthesizes multiple sources of information and different perspectives; generates multiple alternatives for accomplishing the mission and considers the consequences of different decisions" (Tucker & Gunther, 2009, p. 322).

Operational Definition: Employing unique types of analyses and generating new, innovative ideas in complex areas; turning problems upside down and inside-out to find fresh, new approaches; integrating seemingly unrelated information and developing creative solutions; entertaining wide ranging possibilities others may miss, thinking outside the given parameters to see if there is a more effective approach; developing innovative methods of obtaining or using resources when insufficient resources are available to do mission.

Length of the service in the operation:

The length of a survey participant's last operational deployment in months.

Operational Experience:

The length of a survey participant's total operational deployment in months.

Total military service experience:

The length of a survey participant's total military service experience in years.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This research is designed to examine the existing literature to conceptualize operational adaptability and then, based on findings of a survey, empirically determine the relationship between knowledge transfer and military leaders' operational adaptability.

Trochim and Donnelly (2008) identified three types of research projects: Descriptive, Relational and Causal. They are defined in Table 6. This research is conducted as a descriptive (conceptualize Operational Adaptability), relational (studying correlations between Operational Adaptability and Knowledge Transfer) and casual study (analyzing moderating relationships).

Table 6. Types of Research Projects

Research Types	Explanation
Descriptive Studies	Designed primarily to describe what is going on or what exists.
Relational studies	Designed to look at the relationships between two or more variables.
Casual Studies	Designed to determine whether one or more variables causes or affects one or more outcome variables.

Deductive and inductive reasoning are two methods of reasoning used in research projects. Deductive reasoning follows a path from the more general to the more specific whereas inductive reasoning works the other way (Trochim & Donnelly, 2008). How

they operate is shown in Figure 8 and Figure 9. For the purpose of this research, deductive reasoning was used since the hypotheses and variables were developed through literature review and will be tested by a survey tool.

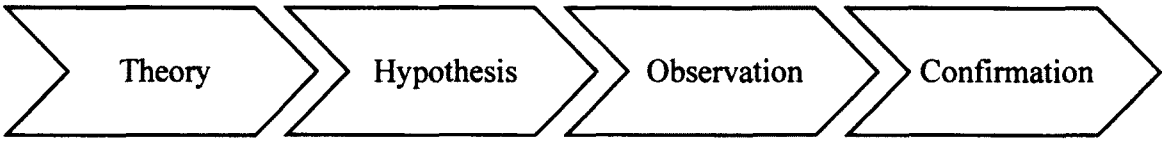

Figure 8. Schematic Representation of Deductive Reasoning

Figure 9. Schematic Representation of Inductive Reasoning

There are three types of research design: Qualitative, Quantitative, and Mixed Methods. Qualitative research uses inductive reasoning whereas quantitative research uses deductive reasoning (Creswell, 2009). Their definition and preferred reasoning is shown in the Table 7. For the purpose of this research, the quantitative design is used it works better at testing theories and determining the relationship among variables (Creswell, 2009).

Table 7. Research Types and Reasoning

Research Type	Explanation	Reasoning
Qualitative Research	"Qualitative Research is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem" (Creswell, 2009, p. 4).	Inductive
Quantitative Research	"Quantitative Research is a means for testing objective theories by examining the relationship among variables" (Creswell, 2009, p. 4).	Deductive
Mixed Methods Research	"Mixed Method Research is an approach to inquiry that combines or associates both qualitative and quantitative forms" (Creswell, 2009, p. 4).	Inductive & Deductive

Bogdan and Biklen (1992) set a main criteria to compare and select the appropriate research design. The comparison of qualitative and quantitative research is summarized in Table 8.

Table 8. Research Design Criteria and Comparison

Criteria	Explanation
Generating a Theory	Qualitative methods work better. (Bogdan & Biklen, 1992)
Testing a Theory	Quantitative methods work better. (Bogdan & Biklen, 1992)
Detail Level	Qualitative methods work better. (Bogdan & Biklen, 1992)
Generalization	Quantitative methods work better. (Bogdan & Biklen, 1992)
Identify Variables	Qualitative methods work better. (Creswell, 2009)
Test the Relationship between Variables	Quantitative methods work better. (Creswell, 2009)

Morse (1991), Creswell (2009) and Leedy and Ormrod (2013) also compare the research designs in the context of research problem. The comparison is summarized in Table 9.

For the purpose of this research, a quantitative design is used since it works better at testing theories and determining the relationship among variables (Creswell, 2009). There are two main inquiry methods that can be used in quantitative research: survey research and experimental research (Creswell, 2009). Survey research designs are "procedures in quantitative research in which investigators administer a survey to a sample or to the entire population of people to describe the attitudes, opinions, behaviors, or characteristics of the population" (Creswell, 2012, p. 376).

Table 9. Research Design and Explanation

Research Design	Explanation
Qualitative Research	❖ Qualitative methods work better to understand a concept or phenomenon on which little research exists. (Creswell, 2009) ❖ Qualitative research is exploratory and helps to determine important variables. (Creswell, 2009) ❖ Qualitative methods work better if the topic is new, it has not been addressed or existing theories do not apply. (Morse, 1991) ❖ "As a general rule, qualitative studies do not allow the researcher to identify cause-and-effect relationships" (Leedy & Ormrod, 2013, p. 140).
Quantitative Research	❖ Quantitative methods work better if the problem is related to; (Creswell, 2009) - "Identification of factors that influence an outcome" - "the utility of an intervention" - "understanding the best predictors of outcomes" (p. 18) ❖ "It is the best approach to test a theory or explanation." (Creswell, 2009, p. 18) ❖ Quantitative studies are used to identify cause-and-effect relationships. (Leedy & Ormrod, 2013)
Mixed Methods Research	❖ Mixed Methods is useful when either qualitative or quantitative approach by itself is inadequate. (Creswell, 2009) ❖ Mixed Methods works better when both generalizing the findings and developing a detailed understanding of a phenomenon or concept. (Creswell, 2009)

Survey researches collect quantitative, numbered data and statistically analyze these data to describe trends about responses to questions and to test research questions or hypotheses (Creswell, 2012).

Experimental design is the traditional approach to conducting quantitative research. Experimental research tests an idea (or practice or procedure) to determine whether it influences an outcome or dependent variable. It is mainly used to establish possible cause and effect between independent and dependent variables. In experimental research, researchers attempt to control all variables that influence the outcome except for the independent variable (Creswell, 2012).

Survey research differs from experimental research in that survey researchers do not experimentally manipulate the conditions. Survey research cannot explain cause and effect as well as experimental research can. However, survey research describes trends in the data rather than offering rigorous explanations. Survey research often correlates variables (Creswell, 2012). The difference between survey research and experimental research is summarized in Table 10 (Kothari, 2004).

Table 10. The Difference between Survey Research and Experimental Research

Survey Research	Experimental Research
The survey method gathers data from a relatively large number of cases at a particular time; it is essentially cross-sectional.	Experimental studies generally need small samples.
Surveys are concerned with describing, recording, analyzing and interpreting conditions that either exist or existed. The researcher does not manipulate the variable or arrange for events to happen.	Deliberate manipulation is a part of the experimental method. In an experiment, the researcher measures the effects of an experiment which s/he conducts intentionally.
Surveys are usually appropriate in case of social and behavioral sciences.	Experiments are mostly an essential feature of physical and natural sciences
An example of field research	An example of laboratory research.
Data are collected from observation, or interview or questionnaire/opinionnaire or some projective technique(s).	Data are collected from several readings of experiments.
Correlation analysis is relatively more important in surveys.	Causal analysis is considered relatively more important in experiments.

3.2 The Research Design

This research follows a modified version of Creswell's (2012) research process steps shown in Figure 10. As each step in the process progressed, new information, findings or knowledge often required updating of previous steps.

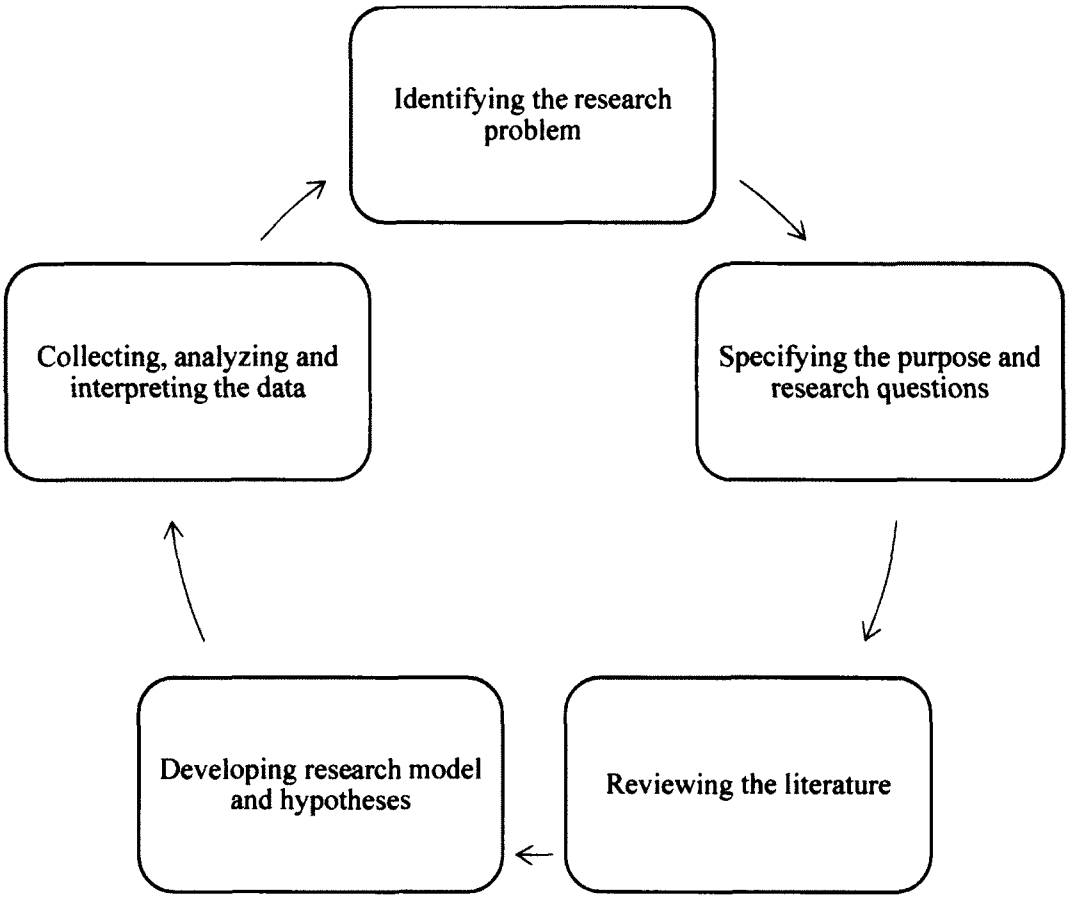

Figure 10. The Research Process

Step-1: Identifying the Research Problem

The heart of every research project is the problem. "The first step in the research process is to identify the problem with unwavering clarity and to state it in precise and unmistakable terms" (Leedy & Ormrod, 2013, p. 27). Researchers begin a study by identifying a research problem (Creswell, 2012). Creswell (2012) defines research problem as the controversies or concerns that guide the need for conducting a study.

A variety of research underlined the increasing need for adaptable leaders in the military (Mueller-Hanson, White, Dorsey & Pulakos, 2005). Furthermore, enhancing

operational adaptability both at personal and organizational level is perceived essential in order to achieve success in future military operations (TRADOC Pam 525-3-0, 2009).

Current and future security environment calls for adaptable leaders in the military and development of adaptive leaders has become a priority for the Army; however, there is not enough research and practice related to adaptability (Mueller-Hanson et al., 2005). This study revealed that operational adaptability is not clearly conceptualized and supporting factors are not investigated in detail.

Among possible factors, knowledge transfer is claimed to be an important practice that increases personal and organizational performance and effectiveness (Argote & Ingram, 2000). Regarding knowledge transfer, FM 6-01.1 (2012) indicates that the U.S. military has a strong culture and a well-established system. But, the question of how well we understand the correlations between military leaders' operational adaptability and knowledge transfer is not answered in the literature.

Step-2: Specifying the Purpose and Research Questions

"The purpose for research consists of identifying the major intent or objective for a study and narrowing it into specific research questions or hypotheses" (Creswell, 2012, p. 9). The purpose statement acknowledges why the study is being done and what outcome is expected (Creswell, 2009).

Purpose statements and research questions provide critical information about the direction of the study. Specifically, research questions shape the literature review and data collection process (Creswell, 2012).

The purpose of this dissertation is to conceptualize operational adaptability and investigate the relationship between military leaders' operational adaptability and knowledge transfer.

The primary research question is: "Does knowledge transfer have a positive impact on military leaders' operational adaptability?"

Furthermore, the following sub-questions will also be investigated.

1. What is operational adaptability?
2. What is the doctrinal framework for knowledge transfer in the U.S. Army?
3. What are the current knowledge transfer practices in the U.S. Army?
4. How do knowledge transfer practices correlate regarding their effect on military leaders' operational adaptability?

Step-3: Reviewing the Literature

Leedy and Ormrod (2013) identifies the role of literature review and its benefits as below:

- It helps whether other researchers have already addressed and answered the research problem.
- It can offer new ideas, perspectives, and approaches.
- It informs about other individuals who conduct work in this area.
- It can show how others have handled methodological and design issues in similar studies.
- It can reveal sources of data.
- It can introduce the measurement tools that other researchers have developed and used effectively.

- It can reveal methods of dealing with similar difficulties for the research problem.
- It can help interpreting and making sense of findings.

The literature review has revealed that adaptability is a multidimensional concept and it has been discussed under different names and definitions at individual, team, and organizational levels in relation to many variables. Among these perspectives, adaptive performance perspective has dominated the adaptability literature in the last decade.

In the literature, there is a general consensus about how the adaptability occurs; individual differences influence mediating processes which in turn influence how people perceive and respond to some change event. "Individual differences" and "respond to change" parts of this process are well structured in the literature; however, the "mediating processes" has not been studied at the same level. Adaptability taxonomy of Pulakos (2000) is the main mechanism to analyze and measure the "respond to change" part.

Although, official U.S. military documents have dealt with operational adaptability in a consistent way through different documents and some research identifies important aspect of adaptability for military leaders, the literature review uncovers that operational adaptability in military context has not been conceptualized specifically.

The literature review found that lessons learned and best practices are the main subjects of knowledge transfer practices in the U.S. Army. The literature review also identifies intra- and inter-knowledge transfer as two main types and the U.S. Army has well-established intra- and inter-knowledge transfer practices.

However, there is a clear gap in the literature regarding the conceptualization of operational adaptability and the relationship between military leaders' operational

adaptability and knowledge transfer, in the forms of lessons learned and best practices through intra- and inter-knowledge transfer practices. This study is among the first empirical research studies addressing the identified gap.

Step-4: Developing a research model and hypotheses

The aim of this phase is to build a research model based on the literature review's findings and then complete the research hypotheses accordingly.

Hypotheses are statements in quantitative research in which the investigator makes a prediction or a conjecture about the outcome of a relationship among attributes or characteristics. (Creswell, 2012). Leedy and Ormrod (2013) defines hypotheses as "intelligent, tentative guesses about how the research problem might be resolved" (p. 39).

The literature review concluded that "operational adaptability" is not conceptualized in the literature. For the purpose of this research, official U.S. military documents and literature related to adaptability is analyzed and then based on findings, operational adaptability is conceptualized by the researcher. The conceptualized operational adaptability is shown in Figure 11.

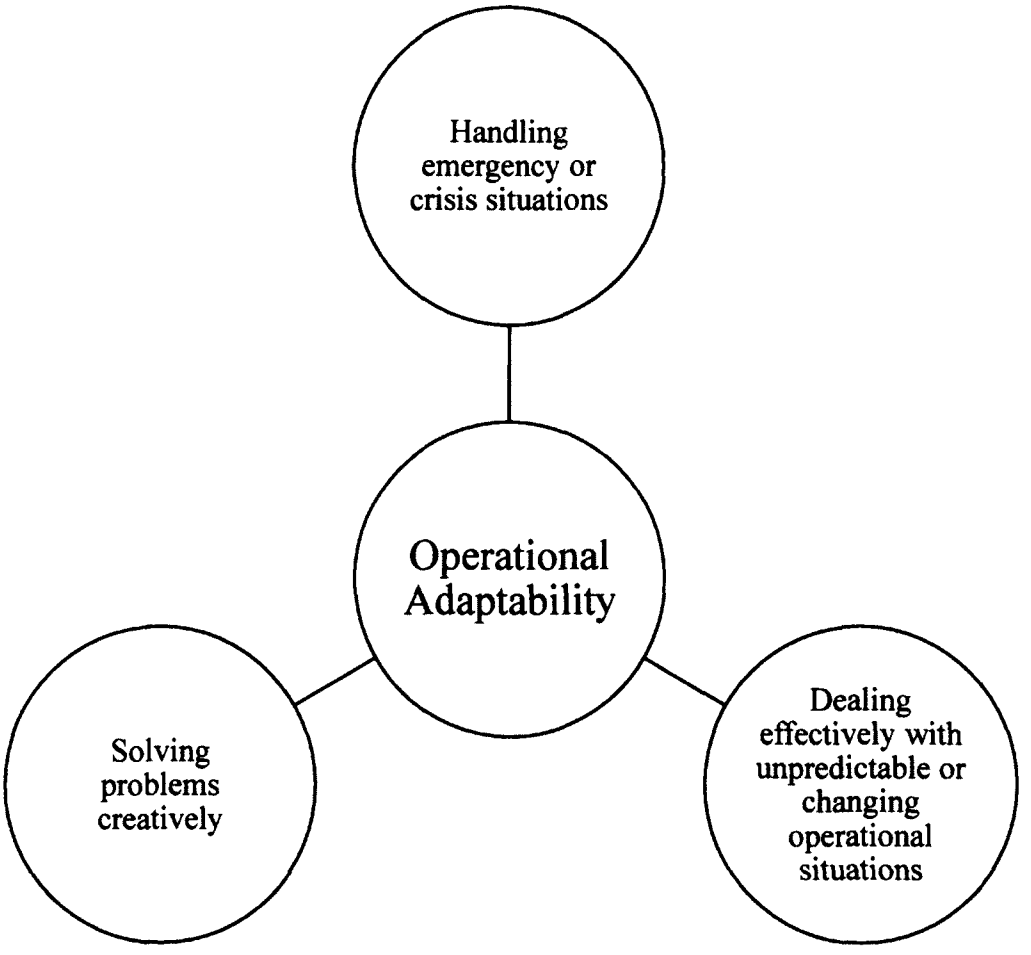

Figure 11. Conceptualized Operational Adaptability

Based on the literature review, there is no specific research found conducted on the relationship between knowledge transfer and operational adaptability. The related research areas are identified as: training for operational adaptability, experience's impact on operational adaptability, and knowledge transfer's impact on decision making. Although analyzing these research areas suggests a link, there is a quite gap in the literature in the specific area of knowledge transfer and operational adaptability and the research question was posed: "Does knowledge transfer have a positive impact on military leaders' operational adaptability?" From this question, the research model shown in Figure 12 and the research hypotheses were established.

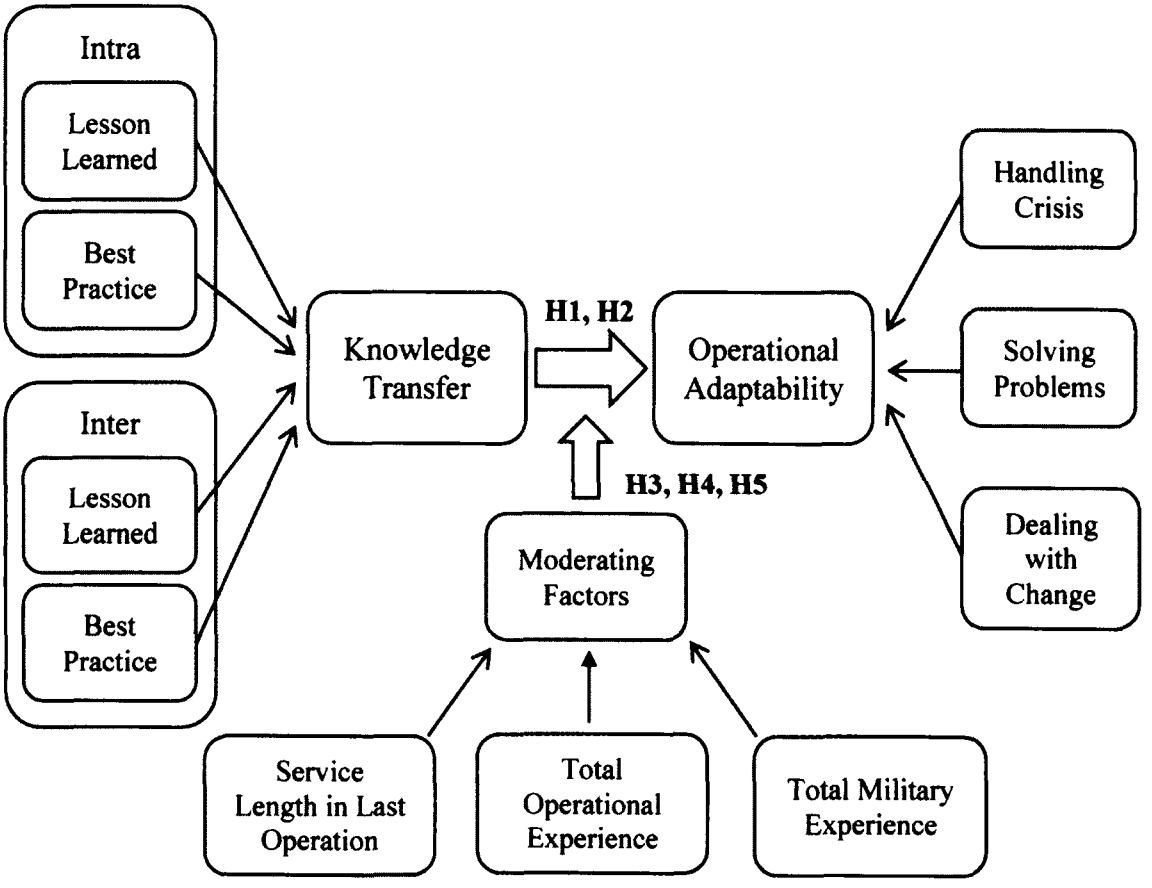

Figure 12. Research Model

Main research hypotheses:

- H1: An increase in knowledge transfer will have a positive impact on military leaders' operational adaptability.
- H2: Inter-knowledge transfer has a more positive impact on military leaders' operational adaptability than intra-knowledge transfer.

Moderated Research Hypotheses:

- H3: The length of the service in the operation has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.
- H4: Operational experience has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.
- H5: Total military service experience has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.

The variables and their operational definition are shown in Table 11.

Table 11. Research Variables and Operational Definitions

Variable	Operational Definition
Independent Variables	
Inter-knowledge transfer	The sharing of knowledge from one individual or group to another individual or group between different units.
Intra-knowledge transfer	The sharing of knowledge from one individual or group to another individual or group within the same unit.
Lesson learned	Validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat operations that leads to a change in behavior at either the tactical, operational, or strategic level or in one or more of the Army's doctrine, organization, training, materiel, leadership and education, personnel, and facilities domains
Best practice	The most effective and efficient method of achieving any objective or task, into operations and training.
Dependent Variables	
Operational Adaptability	The ability to respond effectively to changing threats and situations with appropriate, flexible, and timely actions
Handling emergency or crisis situations	Reacting with appropriate and proper urgency in life threatening, dangerous, or emergency situations, quickly analyzing options for dealing with danger or crises and their implications; making split-second decisions based on clear and focused thinking; maintaining emotional control and objectivity while keeping focused on the situation at hand; stepping up to take action and handle danger or emergencies as necessary and appropriate.
Dealing effectively with unpredictable or changing operational situations	Taking effective action when necessary without having to know the total picture or have all the facts at hand: readily and easily changing gears in response to unpredictable or unexpected events and circumstances; effectively adjusting plans, goals, actions, or priorities to deal with changing situations; imposing structure for self and others that provide as much focus as possible in dynamic situations: not needing things to be black and white; refusing to be paralyzed by uncertainty or ambiguity.
Solving problems creatively	Employing unique types of analyses and generating new, innovative ideas in complex areas; turning problems upside down and inside-out to find fresh, new approaches; integrating seemingly unrelated information and developing creative solutions; entertaining wide ranging possibilities others may miss, thinking outside the given parameters to see if there is a more effective approach; developing innovative methods of obtaining or using resources when insufficient resources are available to do mission.

Step-5: Collecting, Analyzing and Interpreting the Data

Quantitative research collects data through surveys or experiments (Creswell, 2009). This research will collect data by a survey. A survey "provides a quantitative or

numeric description of trends, attitudes, or opinions of a population by studying a sample of that population" (Creswell, 2009, p. 12).

Fink (2003) identifies components of a survey as the identifying objectives, survey design, instrumentation, administering, data analysis and reporting. The objectives for this survey are developed from the hypotheses. The main purpose of the survey is to collect meaningful data to test the hypotheses. Regarding survey design, Fink (2003) identifies four types of survey: self-administrative questionnaire, interview, structured record review, and structured observation. For the purpose of this research, a web-based, self-administrative questionnaire is conducted.

Surveys use open-ended and closed-ended questions. The respondents answer in their own words to open-ended questions, whereas they select pre-determined answers to closed-ended questions. Hence, closed-ended questions work better for statistical analysis and interpretation (Fink, 2003). This survey will use closed-ended questions. Nominal, ordinal, and numerical answers are used in closed questions. Nominal answers require classification, ordinal answers require ranking and numerical answers require exact numbers. This survey will use ordinal answers for dependent and moderating variables and numerical questions for independent variables.

Survey design also covers the issue of population and sample. There are two methods for sampling: probability and nonprobability sampling. Probability sampling covers all members of target population and uses random sampling whereas nonprobability sampling does not cover whole target population and choosing participants is made through judgment (Fink, 2003). This survey embraced the nonprobability sampling method. Different views exist for the sampling size; however,

this survey meets Hair, Anderson, Tatham, and Black's (1995) 15-20 observations per independent variable for generalizability and 50 total observations for factor analysis criteria. The target population for this survey is U.S. military officers who have served in military operations.

Cresswell (2012) identifies getting necessary permissions as an important step in collecting data. In this regard, permission to conduct the pilot study and follow-on study was obtained through ODU Engineering Human Subjects Review Committee Approval process (Appendix A) in order to meet ethical conditions of the study. The proposed survey development steps are summarized in Figure 13.

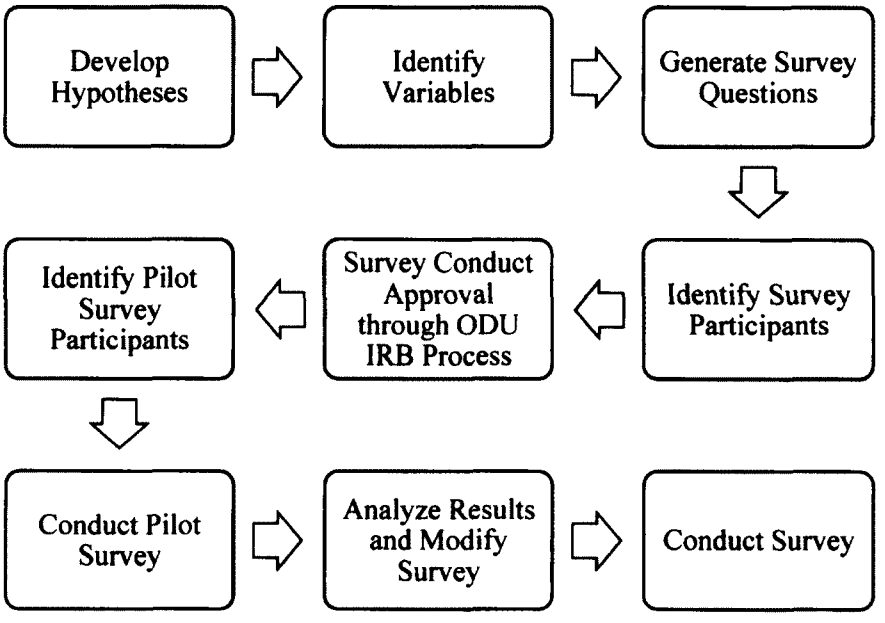

Figure 13. Survey Development Process

The initial survey developed is shown in Appendix B. The survey was constructed based on hypotheses. In order to increase the content validity, the survey was developed

using adapted questions from previous research. There are two main sets of questions trying to identify respondents' use of knowledge transfer and their operational adaptability performance. The questions related to knowledge transfer were adapted from previous research of Haltiwanger (2012) and Landaeta (2008) the questions related to operational adaptability were adapted from previous research of Pulakos, Arad, Donovan and Plamondon (2000), Ployhart and Bliese (2006), Tucker and Gunther (2009) and Bartone, Kelly and Matthews (2013). Table 12 provides the questions and from which sources they were adapted.

Table 12. Survey Questions and Origins

Questions	Adapted from
1, 2, 3, 4, 5, 6, 7, 8	Haltiwanger (2012)
9, 10	Pulakos, Arad, Donovan & Plamondon (2000)
11, 14, 19, 22	Bartone, Kelly & Matthews (2013)
12, 17, 21	Ployhart & Bliese (2006)
13, 15, 16, 20	Tucker & Gunther (2009)

In order to determine face validity, a pilot survey (Appendix C) was given to a group of ten experienced military personnel. Participants were asked to review the questions, validate the clarity, and determine the success of reflecting the intended purpose. Based on reviews and suggestions, the initial survey was modified and finalized. The final survey is shown in Appendix D. The survey is constructed based on data

collection model shown in Figure 14, and questions related to each construct shown in Table 13.

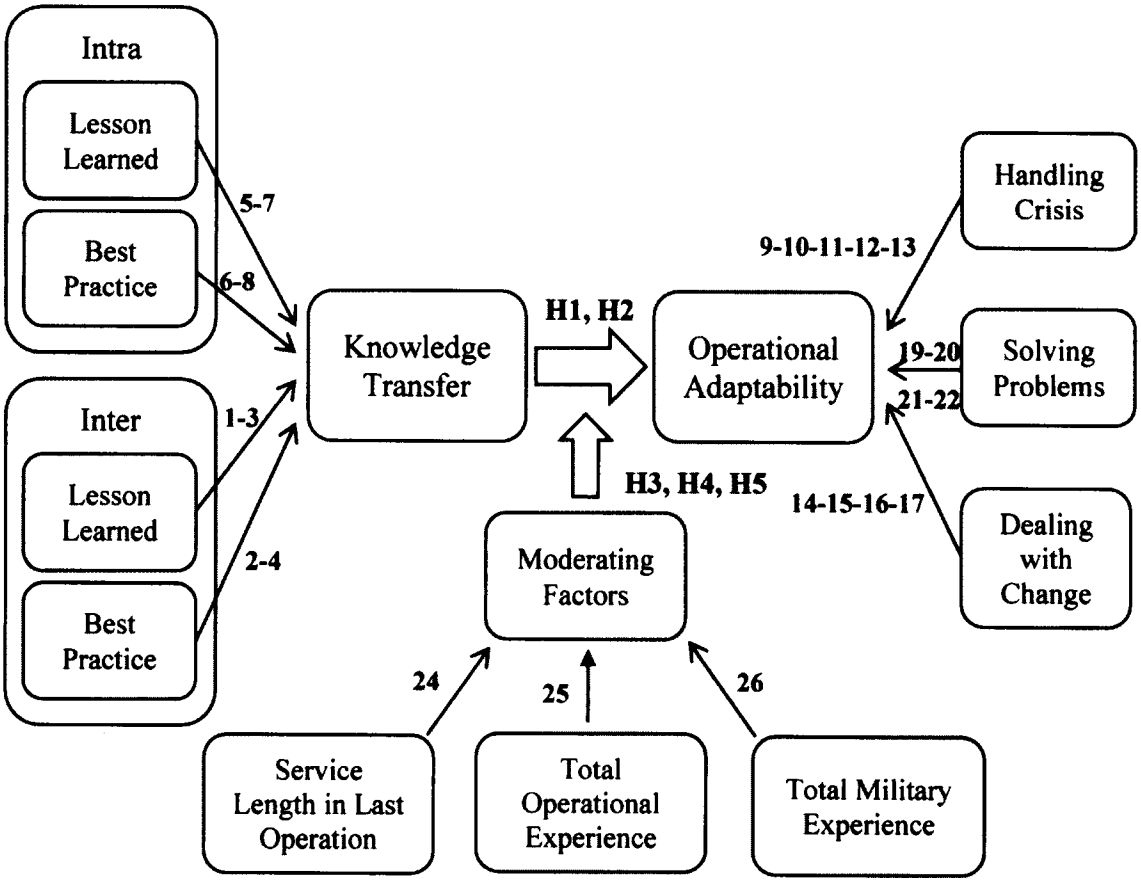

Figure 14. Data Collection Model with Survey Question Numbers

Table 13. Research Constructs, Labels and Survey Questions

Constructs		Variable Label	Survey Question (Definition)
KNOWLEDGE TRANSFER	INTER-K/T	INTER_LL_S	Q1. When looking back at your last deployment, approximately how many times did you study lessons learned through inter-knowledge transfer practices?
		INTER_BP_S	Q2. When looking back at your last deployment, approximately how many times did you study best practices through inter-knowledge transfer practices?
		INTER_LL_D	Q3. When looking back at your last deployment, approximately how many times did you discuss lessons learned through inter-knowledge transfer practices?
		INTER_BP_D	Q4. When looking back at your last deployment, approximately how many times did you discuss best practices through inter-knowledge transfer practices?
	INTRA-K/T	INTRA_LL_S	Q5. When looking back at your last deployment, approximately how many times did you study lessons learned through intra-knowledge transfer practices?
		INTRA_BP_S	Q6. When looking back at your last deployment, approximately how many times did you study best practices through intra-knowledge transfer practices?
		INTRA_LL_D	Q7. When looking back at your last deployment, approximately how many times did you discuss lessons learned through intra-knowledge transfer practices?
		INTRA_BP_D	Q8. When looking back at your last deployment, approximately how many times did you discuss best practices through intra-knowledge transfer practices?
OPERATIONAL ADAPTABILITY	HANDLING CRISIS	HANDLING CRISIS_1	Q9. When looking back at my last deployment, in a time constraint environment, I made effective decisions. Approximately, what percentage of time?
		HANDLING CRISIS_2	Q10. When looking back at my last deployment, I performed effectively in dangerous situations. Approximately, what percentage of time?
		HANDLING CRISIS_3	Q11. When looking back at my last deployment, I acted decisively under pressure. Approximately, what percentage of time?
		HANDLING CRISIS_4	Q12. When looking back at my last deployment, I was able to maintain focus during emergencies. Approximately, what percentage of time?
		HANDLING CRISIS_5	Q13. When looking back at my last deployment, I made autonomous decisions effectively in dangerous situations. Approximately, what percentage of time?

Table 13. (Continued)

Constructs		Variable Label	Survey Question (Definition)
OPERATIONAL PTADAABILITY	DEALING WITH CHANGE	DEALING CHANGE_1	Q14. When looking back at my last deployment, I accomplished the mission without specific guidance. Approximately, what percentage of time?
		DEALING CHANGE_2	Q15. When looking back at my last deployment, I performed effectively when the goals of the mission, environment, roles and responsibilities changed during the mission execution. Approximately, what percentage of time?
		DEALING CHANGE_3	Q16. When looking back at my last deployment, I identified the key aspect of ambiguous situations and created new plans or modified existing ones as the situation changed. Approximately, what percentage of time?
		DEALING CHANGE_4	Q17. When looking back at my last deployment, I was able make effective decisions without all relevant information in unpredictable or changing operational situations. Approximately, what percentage of time?
	PROBLEM SOLVING	PROBLEM SOLVING_1	Q19. When looking back at my last deployment, I devised creative solutions to complex problems. Approximately, what percentage of time?
		PROBLEM SOLVING_2	Q20. When looking back at my last deployment, I considered different perspectives and outcomes prior to making decisions. Approximately, what percentage of time?
		PROBLEM SOLVING_3	Q21. When looking back at my last deployment, I saw connections among seemingly unrelated information when solving problems. Approximately, what percentage of time?
		PROBLEM SOLVING_4	Q22. When looking back at my last deployment, I was able think out of the box when solving problems. Approximately, what percentage of time?
DEMOGRAPHICS		HOW OFTEN	Q23. When looking back at your last deployment, approximately how often did you encounter dangerous, unpredictable and challenging operational situations?
		LAST DEPLOYMENT MONTH	Q24. What was the length of your last operational deployment in months?
		TOTAL DEPLOYMENT MONTH	Q25. During your military career, what is the approximate number of your total months deployed?
		TOTAL SERVICE YEAR	Q26. What is the length of your total military service experience in years?

Ensuring data quality is essential for any kind of research. Hence, the survey tool and findings should undergo reliability and validity tests. Reliability shows the stability and consistency of the scores and validity demonstrates that the survey interpretation matches its proposed use (Creswell, 2012). The survey tool was already confirmed for content and face validity, and further quality process were employed in the data analysis period. The data quality process is shown in Table 14.

Table 14. Data Quality Process

Data Quality Test Methods	Explanation	Tool
Content Validity	The degree that instrument covers the domain of concept. (Ahire & Devaraj, 2001)	Literature review, Adapted survey questions from previous research
Face Validity	The degree that instrument looks like to measure what it is intended to do. (Ahire & Devaraj, 2001)	Pilot survey
Internal Validity	The degree of achieving an unbiased answer for the research question/hypotheses. (R. Landaeta, personal communication, April 12, 2015).	- Data analysis methods, - Conclusion
Unidimensionality (Construct Validity)	The degree that indicators associate with each other and represent a single concept. (Ahire & Devaraj, 2001)	Confirmatory Factor Analysis [Acceptance Criteria > 0.4 (Girden, 2001)]
Reliability	The degree of consistency between the measures of a construct. (Ahire & Devaraj, 2001)	Cronbach's Alpha [Acceptance Criteria: Alpha > 0.6 (Ahire & Devaraj, 2001)]
Normality	The distribution of data with a bell-shaped curve. (Elliot & Woodward, 2007)	-Kolmogorov-Smirnov test - Shapiro-Wilk tests - Normal Q-Q plots - Skewness Analysis)
Nomological Validity	The degree that constructs relate to each other in a manner consistent with theory. (Ahire & Devaraj, 2001)	Correlation Analysis, Regression Analysis
External Validity	The degree that the findings could be generalized. (Ahire & Devaraj, 2001)	- Share results with experts and organizations

The data quality analysis confirmed applicability, consistency and neutrality.

Figure 15 shows the data analysis steps.

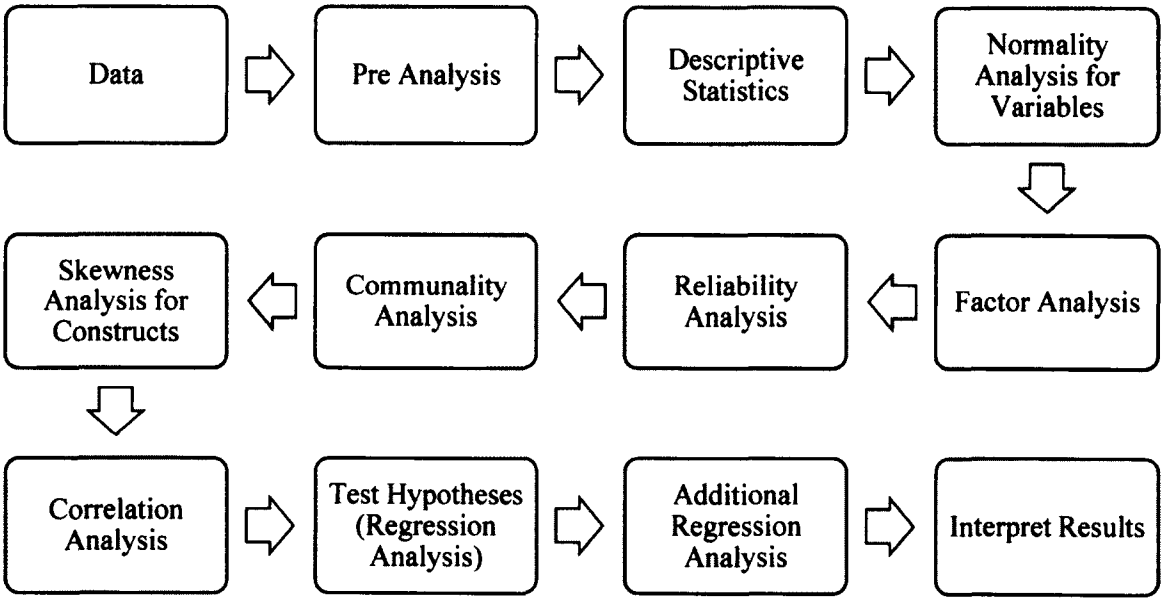

Figure 15. Data Analysis Steps

CHAPTER 4

RESULTS

This chapter explains a detailed analysis of data collected during three-week long survey period.

4.1 Data Collection and Pre-Analysis

The survey collected 86 responses. All responses were complete. Figure 16 illustrates the subtotals by each week.

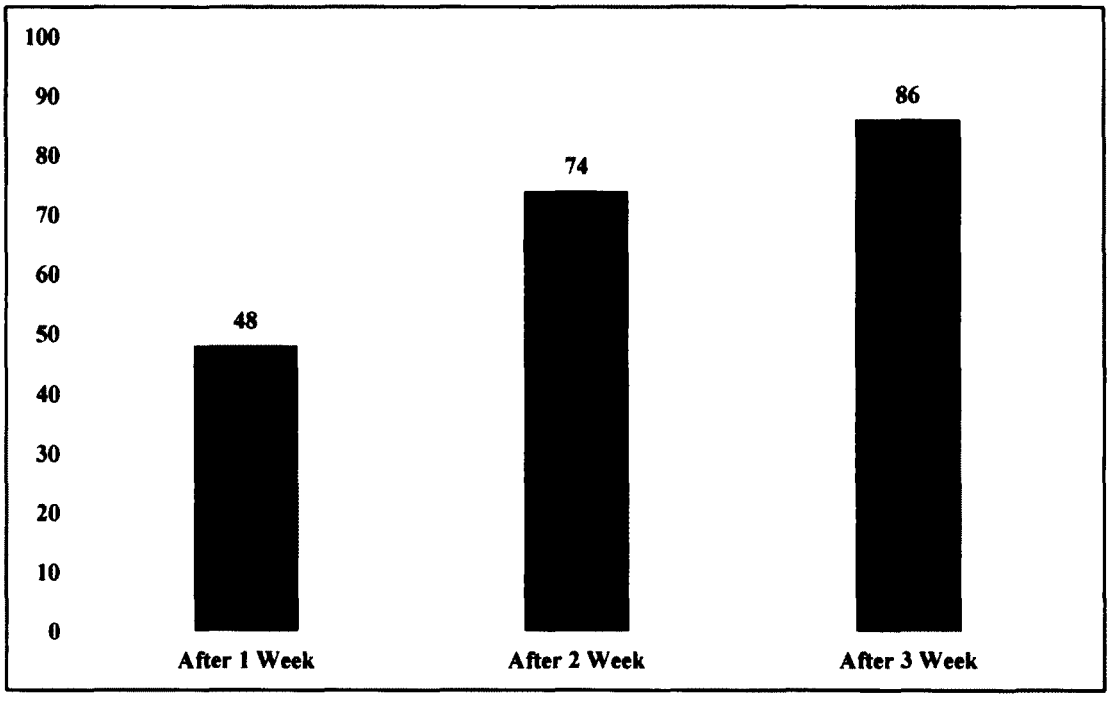

Figure 16. Data Collection (Weekly Survey Responses)

The survey was distributed by email to many military commands using the researcher's own personal network. Out of 195 U.S. military personnel who received the survey request, 86 U.S. military personnel participated in the survey. A general response rate of 44% was reached. Since the survey tool (Qualtrics) was set not to collect IP

addresses, the response rate could not be categorized by command. Table 15 summarizes the survey responses.

Table 15. Summary of Survey Response Rate

Organization	Distributed Survey	Responses	Response Rate
Allied Command Transformation/Norfolk/US	65	86	44%
Allied Command Operations/Mons/Belgium	17		
Joint Warfare Centre/Stavanger/Norway	5		
Joint Analysis and Lessons Learned Centre/Lisbon/ Portugal	3		
Joint Force Training Centre/Bydgoszcz/Poland	4		
Allied Air Command/Ramstein/Germany	6		
Allied Land Command/Izmir/Turkey	7		
Allied Joint Force Command/Brunssum/ Netherlands	11		
Rapid Deployable Spanish Corps/Valencia/Spain	5		
Rapid Deployable Turkish Corps/Istanbul/Turkey	8		
Rapid Deployable Italian Corps/Milan/Italy	5		
Rapid Deployable French Corps/Lille/France	7		
US Army Training and Doctrine Command/Virginia/US	8		
NATO School/Oberammergau/Germany	9		
Naval Postgraduate School/California/US	12		
Command and General Staff College/Kansas/US	11		
US Central Command/Florida/US	8		
Joint Air Power Competence Centre/Kalkar/Germany	4		
TOTAL	**195**		

In order to guarantee the quality of data, a pre-analysis was conducted. A test question was asked to identify inattentive responses. The survey records were examined and inattentive responses were removed. Furthermore, the responses which were completed in less than three minutes were removed from raw data. The responses from participants who have never deployed and/or who have never encountered dangerous, unpredictable and challenging operational situations in his/her last deployment were also removed from the raw data. Table 16 summarizes the pre-analysis process. Upon pre-analysis, a total of 15 responses were removed from the raw data and 71 responses were exported to SPPS file for data analysis. This number exceeds the minimum requirement and is sufficient to conduct further analysis.

Table 16. Summary of the Pre-Analysis

Category	Number of Removed Responses
Participants who have never been deployed	2
Participants who have never encountered dangerous, unpredictable and challenging operational situations	4
Participants who completed the survey under 3 minutes	3
Participants who responded inattentively (identified by test question)	2
Participants who responded inattentively (identified by the response pattern)	4
TOTAL	**15**

4.2 Descriptive Statistics

The frequency distributions, minimum and maximum values, mean, standard deviation and variance for each question provided in Sub-Sections 4.2.1 to 4.2.3 (see Table 17 through Table 72).

4.2.1. Independent Variables

Survey Question #1 (INTER_LL_S): When looking back at your last deployment, approximately how many times did you study lessons learned through inter-knowledge transfer practices?

Table 17. Frequency Distribution – INTER_LL_S

Answer		Frequency	%
0		10	14%
1		5	7%
2		8	11%
3		6	8%
4		1	1%
5		7	10%
6		2	3%
10		7	10%
11		1	1%
12		4	6%
13		1	1%
15		2	3%
18		1	1%
20		3	4%
24		1	1%
30		3	4%
50		2	3%
52		1	1%
65		1	1%
90		1	1%
100		1	1%
104		1	1%
200+		2	3%
Total		71	100%

Table 18. Descriptive Statistics – INTER_LL_S

Statistic	**Value**
Min Value	1
Max Value	201
Mean	20.23
Variance	1,453.89
Standard Deviation	38.13
Total Responses	71

Survey Question #2 (INTER_BP_S): When looking back at your last deployment, approximately how many times did you study best practices through inter-knowledge transfer practices?

Table 19. Frequency Distribution – INTER_BP_S

Answer		Frequency	%
0		6	8%
1		6	8%
2		8	11%
3		4	6%
4		5	7%
5		7	10%
6		2	3%
8		4	6%
10		5	7%
12		4	6%
14		1	1%
15		2	3%
20		1	1%
23		1	1%
24		1	1%
25		2	3%
30		2	3%
36		1	1%
45		1	1%
50		3	4%
78		1	1%
100		1	1%
104		1	1%
200+		2	3%
Total		71	100%

Table 20. Descriptive Statistics – INTER_BP_S

Statistic	Value
Min Value	1
Max Value	201
Mean	20.23
Variance	1,405.89
Standard Deviation	37.50
Total Responses	71

Survey Question #3 (INTER_LL_D): When looking back at your last deployment, approximately how many times did you discuss lessons learned through inter-knowledge transfer practices?

Table 21. Frequency Distribution – INTER_LL_D

Answer		Frequency	%
0		9	13%
1		2	3%
2		7	10%
3		1	1%
4		5	7%
5		11	15%
6		3	4%
7		1	1%
8		1	1%
10		4	6%
12		1	1%
15		1	1%
18		1	1%
20		4	6%
22		1	1%
24		3	4%
25		3	4%
30		2	3%
37		1	1%
50		1	1%
55		1	1%
60		1	1%
70		1	1%
87		1	1%
100		2	3%
104		1	1%
200+		2	3%
Total		71	100%

Table 22. Descriptive Statistics – INTER_LL_D

Statistic	Value
Min Value	1
Max Value	201
Mean	23.31
Variance	1,537.65
Standard Deviation	39.21
Total Responses	71

Survey Question #4 (INTER_BP_D): When looking back at your last deployment, approximately how many times did you discuss best practices through inter-knowledge transfer practices?

Table 23. Frequency Distribution – INTER_BP_D

Answer		Frequency	%
0		6	8%
1		3	4%
2		10	14%
3		2	3%
4		5	7%
5		7	10%
6		2	3%
7		3	4%
8		1	1%
10		7	10%
12		2	3%
15		1	1%
20		4	6%
24		2	3%
28		1	1%
30		3	4%
45		1	1%
50		1	1%
56		1	1%
60		1	1%
90		1	1%
100		2	3%
104		1	1%
110		1	1%
124		1	1%
200+		2	3%
Total		71	100%

Table 24. Descriptive Statistics – INTER_BP_D

Statistic	**Value**
Min Value	1
Max Value	201
Mean	25.21
Variance	1,772.60
Standard Deviation	42.10
Total Responses	71

Survey Question #5 (INTRA_LL_S): When looking back at your last deployment, approximately how many times did you study lessons learned through intra-knowledge transfer practices?

Table 25. Frequency Distribution – INTRA_LL_S

Answer		Frequency	%
0		7	10%
1		7	10%
2		5	7%
3		5	7%
4		3	4%
5		3	4%
6		2	3%
7		2	3%
8		1	1%
10		6	8%
11		1	1%
13		1	1%
14		1	1%
15		1	1%
16		2	3%
18		1	1%
20		2	3%
24		1	1%
25		2	3%
26		1	1%
30		5	7%
40		1	1%
45		1	1%
50		1	1%
52		1	1%
54		1	1%
60		2	3%
66		1	1%
100		2	3%
200+		2	3%
Total		71	100%

Table 26. Descriptive Statistics – INTRA_LL_S

Statistic	Value
Min Value	1
Max Value	201
Mean	23.15
Variance	1,411.85
Standard Deviation	37.57
Total Responses	71

Survey Question #6 (INTRA_BP_S): When looking back at your last deployment, approximately how many times did you study best practices through intra-knowledge transfer practices?

Table 27. Frequency Distribution – INTRA_BP_S

Answer		Frequency	%
0		6	8%
1		10	14%
2		3	4%
3		6	8%
4		3	4%
5		1	1%
6		2	3%
8		1	1%
10		9	13%
12		1	1%
13		1	1%
14		2	3%
20		5	7%
24		1	1%
25		3	4%
26		1	1%
28		1	1%
30		3	4%
35		2	3%
40		1	1%
50		1	1%
52		1	1%
60		1	1%
78		1	1%
84		1	1%
100		1	1%
200+		3	4%
Total		71	100%

Table 28. Descriptive Statistics – INTRA_BP_S

Statistic	Value
Min Value	1
Max Value	201
Mean	24.82
Variance	1,803.15
Standard Deviation	42.46
Total Responses	71

Survey Question #7 (INTRA_LL_D): When looking back at your last deployment, approximately how many times did you discuss lessons learned through intra-knowledge transfer practices?

Table 29. Frequency Distribution – INTRA_LL_D

Answer		Frequency	%
0		3	4%
1		4	6%
2		12	17%
3		2	3%
4		3	4%
5		5	7%
7		2	3%
8		1	1%
10		1	1%
12		2	3%
14		1	1%
15		2	3%
16		1	1%
18		1	1%
20		4	6%
24		1	1%
25		1	1%
30		4	6%
35		1	1%
40		2	3%
50		2	3%
52		2	3%
60		1	1%
66		1	1%
70		1	1%
77		1	1%
80		1	1%
92		1	1%
99		1	1%
100		2	3%
120		1	1%
130		1	1%
200+		3	4%
Total		71	100%

Table 30. Descriptive Statistics – INTRA_LL_D

Statistic	**Value**
Min Value	1
Max Value	201
Mean	34.34
Variance	2,272.74
Standard Deviation	47.67
Total Responses	71

Survey Question #8 (INTRA_BP_D): When looking back at your last deployment, approximately how many times did you discuss best practices through intra-knowledge transfer practices?

Table 31. Frequency Distribution – INTRA_BP_D

Answer		Frequency	%
0		3	4%
1		4	6%
2		5	7%
3		6	8%
4		3	4%
5		5	7%
8		1	1%
9		1	1%
10		6	8%
12		3	4%
14		2	3%
18		1	1%
20		4	6%
24		1	1%
25		1	1%
26		1	1%
28		1	1%
30		5	7%
40		2	3%
45		1	1%
50		2	3%
52		3	4%
60		1	1%
79		1	1%
90		2	3%
99		1	1%
100		1	1%
102		1	1%
150		1	1%
200+		2	3%
Total		71	100%

Table 32. Descriptive Statistics – INTRA_BP_D

Statistic	Value
Min Value	1
Max Value	201
Mean	30.75
Variance	1,788.05
Standard Deviation	42.29
Total Responses	71

Table 33. Descriptive Statistics – INDEPENDENT VARIABLES

Question	N	Minimum	Maximum	Mean	Std. Deviation	Variance
INTER_LL_S	71	1	201	20.23	38.130	1453.891
INTER_BP_S	71	1	201	20.23	37.495	1405.891
INTER_LL_D	71	1	201	23.31	39.213	1537.645
INTER_BP_D	71	1	201	25.21	42.102	1772.598
INTRA_LL_S	71	1	201	23.15	37.575	1411.847
INTRA_BP_S	71	1	201	24.82	42.464	1803.152
INTRA_LL_D	71	1	201	34.34	47.673	2272.741
INTRA_BP_D	71	1	201	30.75	42.285	1788.049

4.2.2 Dependent Variables

Survey Question #9 (HANDLING CRISIS_1): When looking back at my last deployment, in a time constraint environment, I made effective decisions. Approximately, what percentage of time?

Table 34. Frequency Distribution – HANDLING CRISIS_1

Answer		Frequency	%
30%		1	1%
60%		2	3%
70%		11	15%
80%		27	38%
90%		27	38%
100% of times (always)		3	4%
Total		71	100%

Table 35. Descriptive Statistics – HANDLING CRISIS_1

Statistic	Value
Min Value	4
Max Value	11
Mean	9.18
Variance	1.15
Standard Deviation	1.07
Total Responses	71

Survey Question #10 (HANDLING CRISIS_2): When looking back at my last deployment, I performed effectively in dangerous situations. Approximately, what percentage of time?

Table 36. Frequency Distribution – HANDLING CRISIS_2

Answer		Frequency	%
20%		1	1%
40%		2	3%
50%		1	1%
60%		1	1%
70%		3	4%
80%		16	23%
90%		21	30%
100% of times (always)		26	37%
Total		71	100%

Table 37. Descriptive Statistics – HANDLING CRISIS_2

Statistic	Value
Min Value	3
Max Value	11
Mean	9.72
Variance	2.46
Standard Deviation	1.57
Total Responses	71

Survey Question #11 (HANDLING CRISIS_3): When looking back at my last deployment, I acted decisively under pressure. Approximately, what percentage of time?

Table 38. Frequency Distribution – HANDLING CRISIS_3

Answer		Frequency	%
10%		1	1%
20%		1	1%
30%		1	1%
70%		2	3%
80%		16	23%
90%		32	45%
100% of times (always)		18	25%
Total		71	100%

Table 39. Descriptive Statistics – HANDLING CRISIS_3

Statistic	Value
Min Value	2
Max Value	11
Mean	9.68
Variance	2.62
Standard Deviation	1.62
Total Responses	71

Survey Question #12 (HANDLING CRISIS_4): When looking back at my last deployment, I was able to maintain focus during emergencies. Approximately, what percentage of time?

Table 40. Frequency Distribution – HANDLING CRISIS_4

Answer		Frequency	%
50%		1	1%
60%		1	1%
70%		2	3%
80%		10	14%
90%		31	44%
100% of times (always)		26	37%
Total		71	100%

Table 41. Descriptive Statistics – HANDLING CRISIS_4

Statistic	Value
Min Value	6
Max Value	11
Mean	10.07
Variance	0.98
Standard Deviation	0.99
Total Responses	71

Survey Question #13 (HANDLING CRISIS_5): When looking back at my last deployment, I made autonomous decisions effectively in dangerous situations. Approximately, what percentage of time?

Table 42. Frequency Distribution – HANDLING CRISIS_5

Answer		Frequency	%
0% (never)		1	1%
20%		1	1%
30%		1	1%
50%		2	3%
60%		2	3%
70%		10	14%
80%		14	20%
90%		24	34%
100% of times (always)		16	23%
Total		71	100%

Table 43. Descriptive Statistics – HANDLING CRISIS_5

Statistic	Value
Min Value	1
Max Value	11
Mean	9.24
Variance	3.50
Standard Deviation	1.87
Total Responses	71

Survey Question #14 (DEALING CHANGE_1): When looking back at my last deployment, I accomplished the mission without specific guidance. Approximately, what percentage of time?

Table 44. Frequency Distribution – DEALING CHANGE_1

Answer		Frequency	%
0% (never)		1	1%
30%		1	1%
40%		2	3%
50%		1	1%
60%		3	4%
70%		7	10%
80%		18	25%
90%		20	28%
100% of times (always)		18	25%
Total		71	100%

Table 45. Descriptive Statistics – DEALING CHANGE_1

Statistic	Value
Min Value	1
Max Value	11
Mean	9.27
Variance	3.37
Standard Deviation	1.84
Total Responses	71

Survey Question #15 (DEALING CHANGE_2): When looking back at my last deployment, I performed effectively when the goals of the mission, environment, roles and responsibilities changed during the mission execution. Approximately, what percentage of time?

Table 46. Frequency Distribution – DEALING CHANGE_2

Answer		Frequency	%
30%		2	3%
50%		2	3%
60%		3	4%
70%		8	11%
80%		14	20%
90%		23	32%
100% of times (always)		19	27%
Total		71	100%

Table 47. Descriptive Statistics – DEALING CHANGE_2

Statistic	Value
Min Value	4
Max Value	11
Mean	9.44
Variance	2.48
Standard Deviation	1.57
Total Responses	71

Survey Question #16 (DEALING CHANGE_3): When looking back at my last deployment, I identified the key aspect of ambiguous situations and created new plans or modified existing ones as the situation changed. Approximately, what percentage of time?

Table 48. Frequency Distribution – DEALING CHANGE_3

Answer		Frequency	%
0% (never)		1	1%
20%		1	1%
40%		1	1%
50%		3	4%
60%		5	7%
70%		9	13%
80%		14	20%
90%		23	32%
100% of times (always)		14	20%
Total		71	100%

Table 49. Descriptive Statistics – DEALING CHANGE_3

Statistic	Value
Min Value	1
Max Value	11
Mean	9.07
Variance	3.58
Standard Deviation	1.89
Total Responses	71

Survey Question #17 (DEALING CHANGE_4): When looking back at my last deployment, I was able make effective decisions without all relevant information in unpredictable or changing operational situations. Approximately, what percentage of time?

Table 50. Frequency Distribution – DEALING CHANGE_4

Answer		Frequency	%
0% (never)		1	1%
30%		2	3%
40%		1	1%
50%		2	3%
60%		4	6%
70%		14	20%
80%		11	15%
90%		25	35%
100% of times (always)		11	15%
Total		71	100%

Table 51. Descriptive Statistics – DEALING CHANGE_4

Statistic	Value
Min Value	1
Max Value	11
Mean	8.96
Variance	3.53
Standard Deviation	1.88
Total Responses	71

Survey Question #19 (PROBLEM SOLVING_1): When looking back at my last deployment, I devised creative solutions to complex problems. Approximately, what percentage of time?

Table 52. Frequency Distribution – PROBLEM SOLVING_1

Answer		Frequency	%
20%		1	1%
40%		2	3%
50%		2	3%
60%		7	10%
70%		9	13%
80%		20	28%
90%		22	31%
100% of times (always)		8	11%
Total		71	100%

Table 53. Descriptive Statistics – PROBLEM SOLVING_1

Statistic	Value
Min Value	3
Max Value	11
Mean	8.93
Variance	2.52
Standard Deviation	1.59
Total Responses	71

Survey Question #20 (PROBLEM SOLVING_2): When looking back at my last deployment, I considered different perspectives and outcomes prior to making decisions. Approximately, what percentage of time?

Table 54. Frequency Distribution – PROBLEM SOLVING_2

Answer		Frequency	%
10%		1	1%
50%		3	4%
60%		1	1%
70%		9	13%
80%		10	14%
90%		28	39%
100% of times (always)		19	27%
Total		71	100%

Table 55. Descriptive Statistics – PROBLEM SOLVING_2

Statistic	Value
Min Value	2
Max Value	11
Mean	9.55
Variance	2.45
Standard Deviation	1.57
Total Responses	71

Survey Question #21 (PROBLEM SOLVING_3): When looking back at my last deployment, I saw connections among seemingly unrelated information when solving problems. Approximately, what percentage of time?

Table 56. Frequency Distribution – PROBLEM SOLVING_3

Answer		Frequency	%
20%		1	1%
30%		2	3%
40%		2	3%
50%		8	11%
60%		7	10%
70%		16	23%
80%		17	24%
90%		16	23%
100% of times (always)		2	3%
Total		71	100%

Table 57. Descriptive Statistics – PROBLEM SOLVING_3

Statistic	Value
Min Value	3
Max Value	11
Mean	8.18
Variance	3.01
Standard Deviation	1.73
Total Responses	71

Survey Question #22 (PROBLEM SOLVING_4): When looking back at my last deployment, I was able think out of the box when solving problems. Approximately, what percentage of time?

Table 58. Frequency Distribution – PROBLEM SOLVING_4

Answer		Frequency	%
20%		1	1%
40%		4	6%
50%		5	7%
60%		7	10%
70%		11	15%
80%		16	23%
90%		18	25%
100% of times (always)		9	13%
Total		71	100%

Table 59. Descriptive Statistics – PROBLEM SOLVING_4

Statistic	Value
Min Value	3
Max Value	11
Mean	8.63
Variance	3.26
Standard Deviation	1.81
Total Responses	71

Table 60. Descriptive Statistics – DEPENDENT VARIABLES

Questions	N	Minimum	Maximum	Mean	Std. Deviation	Variance
HANDLING CRISIS_1	71	4	11	9.18	1.073	1.152
HANDLING CRISIS_2	71	3	11	9.72	1.569	2.462
HANDLING CRISIS_3	71	2	11	9.68	1.619	2.622
HANDLING CRISIS_4	71	6	11	10.07	.990	.981
HANDLING CRISIS_5	71	1	11	9.24	1.871	3.499
DEALING CHANGE_1	71	1	11	9.27	1.836	3.370
DEALING CHANGE_2	71	4	11	9.44	1.574	2.478
DEALING CHANGE_3	71	1	11	9.07	1.892	3.581
DEALING CHANGE_4	71	1	11	8.96	1.878	3.527
PROBLEM SOLVING_1	71	3	11	8.93	1.589	2.524
PROBLEM SOLVING_2	71	2	11	9.55	1.566	2.451
PROBLEM SOLVING_3	71	3	11	8.18	1.735	3.009
PROBLEM SOLVING_4	71	3	11	8.63	1.807	3.264

4.2.3 Demographics

Survey Question #23 (HOW OFTEN): When looking back at your last deployment, approximately how often did you encounter dangerous, unpredictable and challenging operational situations?

Table 61. Frequency Distribution – HOW OFTEN

Answer		Frequency	%
Less than Once a Month		13	18%
Once a Month		3	4%
2-3 Times a Month		12	17%
Once a Week		7	10%
2-3 Times a Week		18	25%
Daily		18	25%
Total		71	100%

Table 62. Descriptive Statistics – HOW OFTEN

Statistic	Value
Min Value	2
Max Value	7
Mean	4.96
Variance	3.30
Standard Deviation	1.82
Total Responses	71

Survey Question #24 (LAST DEPLOYMENT MONTH): What was the length of your last operational deployment in months?

Table 63. Frequency Distribution – LAST DEPLOYMENT MONTH

Answer		Frequency	%
3		1	1%
4		1	1%
6		19	27%
7		11	15%
8		6	8%
9		9	13%
10		2	3%
11		1	1%
12		12	17%
13		2	3%
14		2	3%
15		1	1%
20		1	1%
24		2	3%
36		1	1%
Total		71	100%

Table 64. Descriptive Statistics – LAST DEPLOYMENT MONTH

Statistic	**Value**
Min Value	4
Max Value	37
Mean	10.51
Variance	25.65
Standard Deviation	5.06
Total Responses	71

Survey Question #25 (TOTAL DEPLOYMENT MONTH): During your military career, what is the approximate number of your total months deployed?

Table 65. Frequency Distribution – TOTAL DEPLOYMENT MONTH

Answer		Frequency	%
3		1	1%
4		1	1%
10		1	1%
11		1	1%
12		4	6%
14		2	3%
15		1	1%
16		1	1%
18		1	1%
20		3	4%
22		2	3%
24		4	6%
25		1	1%
26		2	3%
27		3	4%
28		1	1%
30		6	8%
32		2	3%
34		2	3%
35		1	1%
36		8	11%
37		2	3%
38		1	1%
39		1	1%
40		2	3%
45		1	1%
46		1	1%
48		3	4%
52		2	3%
53		1	1%
54		2	3%
60		1	1%
64		1	1%
66		1	1%
72		1	1%
93		1	1%
120		2	3%
Total		71	100%

Table 66. Descriptive Statistics – TOTAL DEPLOYMENT MONTH

Statistic	Value
Min Value	1
Max Value	121
Mean	35.30
Variance	511.10
Standard Deviation	22.61
Total Responses	71

Survey Question #26 (TOTAL SERVICE YEAR): What is the length of your total military service experience in years?

Table 67. Frequency Distribution – TOTAL SERVICE YEAR

Answer		Frequency	%
6		1	1%
7		1	1%
8		1	1%
9		1	1%
10		2	3%
11		1	1%
12		7	10%
13		2	3%
14		1	1%
15		5	7%
16		3	4%
17		3	4%
18		2	3%
19		1	1%
20		8	11%
21		3	4%
22		7	10%
23		4	6%
24		1	1%
25		4	6%
26		2	3%
27		3	4%
28		4	6%
29		1	1%
30		1	1%
32		2	3%
Total		71	100%

Table 68. Descriptive Statistics – TOTAL SERVICE YEAR

Statistic	Value
Min Value	7
Max Value	33
Mean	20.37
Variance	40.01
Standard Deviation	6.33
Total Responses	71

Survey Question #27 (MILITARY STATUS): Select all that will apply to your military service.

Table 69. Frequency Distribution – MILITARY STATUS

Answer		**Frequency**	**%**
Officer		68	96%
Non Commissioned Officer		10	14%
Warrant Officer		3	4%
Active		32	45%
Reserved/Guards		5	7%
Prior Service		8	11%
Retired		1	1%

Survey Question #28 (MILITARY SERVICE TYPE): Select your military service.

Table 70. Frequency Distribution – MILITARY SERVICE TYPE

Answer		Frequency	%
Army		38	54%
Navy		24	34%
Marine Corps		5	7%
Air Force		4	6%
Total		71	100%

Table 71. Descriptive Statistics – MILITARY SERVICE TYPE

Statistic	**Value**
Min Value	1
Max Value	4
Mean	1.65
Variance	0.72
Standard Deviation	0.85
Total Responses	71

Table 72. Descriptive Statistics – DEMOGRAPHICS

Questions	N	Minimum	Maximum	Mean	Std. Deviation	Variance
HOW OFTEN	71	2	7	4.96	1.816	3.298
LAST DEPLOYMENT MONTH	71	4	37	10.51	5.065	25.654
TOTAL DEPLOYMENT MONTH	71	1	121	35.30	22.607	511.097
TOTAL SERVICE YEAR	71	7	33	20.37	6.325	40.007
OFFICER	68	1	1	1.00	.000	.000
NCO	10	1	1	1.00	.000	.000
WARRANT OFFICER	3	1	1	1.00	.000	.000
ACTIVE	32	1	1	1.00	.000	.000
RESERVED/GUARDS	5	1	1	1.00	.000	.000
PRIOR SERVICE	8	1	1	1.00	.000	.000
RETIRED	1	1	1	1.00	.	.
MILITARY SERVICE TYPE	71	1	4	1.65	.847	.717

4.3 Normality and Skewness Analysis

Independent and dependent variables and demographics were analyzed for normality by employing Kolmogorov-Smirnov and Shapiro-Wilk tests. The *p*-value (or significance value) greater than 0.05 validates a normal distribution. Normal Q-Q plots were reviewed. Normal Q-Q plots are provided in Appendix E. The skewness analysis were also conducted. Values ranging between 0 and 1 suggest a normal distribution. The results will result either a parametric test (Pearson's correlation coefficient) or nonparametric test (Spearman's rho) for further analysis.

4.3.1 Independent Variables

Based on the normality test in Table 73 and skewness analysis in Table 74, it was concluded all independent variables were non-normally distributed.

Table 73. Tests of Normality for Independent Variables

Independent Variables	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
INTER_LL_S	.309	71	.000	.514	71	.000
INTER_BP_S	.305	71	.000	.510	71	.000
INTER_LL_D	.290	71	.000	.573	71	.000
INTER_BP_D	.290	71	.000	.591	71	.000
INTRA_LL_S	.278	71	.000	.581	71	.000
INTRA_BP_S	.287	71	.000	.549	71	.000
INTRA_LL_D	.242	71	.000	.699	71	.000
INTRA_BP_D	.244	71	.000	.682	71	.000

Table 74. Skewness Analysis for Independent Variables

Independent Variables	N	Skewness	
	Statistic	Statistic	Std. Error
INTER_LL_S	71	3.525	.285
INTER_BP_S	71	3.646	.285
INTER_LL_D	71	3.144	.285
INTER_BP_D	71	2.730	.285
INTRA_LL_S	71	3.381	.285
INTRA_BP_S	71	3.256	.285
INTRA_LL_D	71	2.150	.285
INTRA_BP_D	71	2.467	.285

4.3.2 Dependent Variables

Based on the normality test in Table 75 and skewness analysis in Table 76, it was concluded all dependent variables were non-normally distributed.

Table 75. Tests of Normality for Dependent Variables

Dependent Variables	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
HANDLING CRISIS_1	.235	71	.000	.812	71	.000
HANDLING CRISIS_2	.233	71	.000	.747	71	.000
HANDLING CRISIS_3	.284	71	.000	.619	71	.000
HANDLING CRISIS_4	.274	71	.000	.782	71	.000
HANDLING CRISIS_5	.221	71	.000	.774	71	.000
DEALING CHANGE_1	.231	71	.000	.792	71	.000
DEALING CHANGE_2	.231	71	.000	.831	71	.000
DEALING CHANGE_3	.210	71	.000	.820	71	.000
DEALING CHANGE_4	.218	71	.000	.827	71	.000
PROBLEM SOLVING_1	.222	71	.000	.880	71	.000
PROBLEM SOLVING_2	.275	71	.000	.775	71	.000
PROBLEM SOLVING_3	.176	71	.000	.917	71	.000
PROBLEM SOLVING_4	.186	71	.000	.915	71	.000

Table 76. Skewness Analysis for Dependent Variables

Dependent Variables	N	Skewness	
	Statistic	Statistic	Std. Error
HANDLING CRISIS_1	71	-1.733	.285
HANDLING CRISIS_2	71	-2.095	.285
HANDLING CRISIS_3	71	-3.130	.285
HANDLING CRISIS_4	71	-1.597	.285
HANDLING CRISIS_5	71	-2.151	.285
DEALING CHANGE_1	71	-2.019	.285
DEALING CHANGE_2	71	-1.485	.285
DEALING CHANGE_3	71	-1.822	.285
DEALING CHANGE_4	71	-1.735	.285
PROBLEM SOLVING_1	71	-1.245	.285
PROBLEM SOLVING_2	71	-2.128	.285
PROBLEM SOLVING_3	71	-.831	.285
PROBLEM SOLVING_4	71	-.821	.285

4.3.3 Demographics

Based on the normality test in Table 77 and skewness analysis in Table 78, it was concluded all demographics except total service year were non-normally distributed.

Table 77. Tests of Normality for Demographics

Demographics	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
HOW OFTEN	.224	71	.000	.857	71	.000
LAST DEPLOYMENT MONTH	.216	71	.000	.717	71	.000
TOTAL DEPLOYMENT MONTH	.174	71	.000	.841	71	.000
TOTAL SERVICE YEAR	.103	71	.058	.979	71	.293
MILITARY SERVICE TYPE	.313	71	.000	.731	71	.000

Table 78. Skewness Analysis for Demographics

Demographics	N	Skewness	
	Statistic	Statistic	Std. Error
HOW OFTEN	71	-.480	.285
LAST DEPLOYMENT MONTH	71	2.829	.285
TOTAL DEPLOYMENT MONTH	71	1.910	.285
TOTAL SERVICE YEAR	71	-.079	.285
OFFICER	68	.	.
NCO	10	.	.
WARRANT OFFICER	3	.	.
ACTIVE	32	.	.
RESERVED/GUARDS	5	.	.
PRIOR SERVICE	8	.	.
RETIRED	1	.	.
MILITARY SERVICE TYPE	71	1.334	.285

4.4 Construct Testing: Factor Analysis, Reliability, Communality and Skewness Test

A construct is defined as a "hypothetical concept that cannot be measured directly" (Gliner & Morgan, 2000, p. 322). Based on the research model, the constructs at Table 79 will be analyzed.

Table 79. Research Constructs

Variable Type	Variable Label	Construct	
Independent Variable	INTER_LL_S	INTER-K/T	KNOWLEDGE TRANSFER
	INTER_BP_S		
	INTER_LL_D		
	INTER_BP_D		
	INTRA_LL_S	INTRA-K/T	
	INTRA_BP_S		
	INTRA_LL_D		
	INTRA_BP_D		
Dependent Variable	HANDLING CRISIS_1	HANDLING CRISIS	OPERATIONAL ADAPTABILITY
	HANDLING CRISIS_2		
	HANDLING CRISIS_3		
	HANDLING CRISIS_4		
	HANDLING CRISIS_5		
	DEALING CHANGE_1	DEALING CHANGE	
	DEALING CHANGE_2		
	DEALING CHANGE_3		
	DEALING CHANGE_4		
	PROBLEM SOLVING_1	PROBLEM SOLVING	
	PROBLEM SOLVING_2		
	PROBLEM SOLVING_3		
	PROBLEM SOLVING_4		

4.4.1 Factor Analysis

A factor analysis was performed to determine construct validity and if the variables were part of a proposed construct. Independent and dependent variables were explored in their relation to Table 79. Variables with factors greater than 0.4 were concluded to be part of the construct. The overall Kaiser-Meyer-Olkin (KMO) measure was also examined for sampling adequacy and Bartlett's Test of Sphericity was used to identify the strength of correlation. A KMO greater than 0.6 and a significant Bartlett Test determined a large correlation between variables (Garson, 2013). These tests were used to check unidimensionalty.

The construct for Knowledge Transfer had 8 variables that loaded onto one factor. The results are shown in Table 80. KMO and Bartlett's Test is shown in Table 81. All loading was greater than 0.4, KMO was 0.805, and Bartlett's Test was significant.

Table 80. Knowledge Transfer Factor Summary

Component Matrix[a]	
KNOWLEDGE TRANSFER	Component
	1
INTER_LL_S	.950
INTER_BP_S	.946
INTER_LL_D	.963
INTER_BP_D	.931
INTRA_LL_S	.952
INTRA_BP_S	.889
INTRA_LL_D	.886
INTRA_BP_D	.932

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

Table 81. KMO and Bartlett's Test for Knowledge Transfer

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.805
Bartlett's Test of Sphericity	Approx. Chi-Square	1177.443
	df	28
	Sig.	.000

The construct for Inter-K/T had 4 variables that loaded onto one factor. The results are shown in Table 82. KMO and Bartlett's Test is shown in Table 83. All loading was greater than 0.4, KMO was 0.771, and Bartlett's Test was significant.

Table 82. Inter-K/T Factor Summary

Component Matrix[a]	
INTER-K/T	Component
	1
INTER_LL_S	.980
INTER_BP_S	.979
INTER_LL_D	.990
INTER_BP_D	.964

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

Table 83. KMO and Bartlett's Test for Inter-K/T

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.771
Bartlett's Test of Sphericity	Approx. Chi-Square	597.227
	df	6
	Sig.	.000

The construct for Intra-K/T had 4 variables that loaded onto one factor. The results are shown in Table 84. KMO and Bartlett's Test is shown in Table 85. All loading was greater than 0.4, KMO was 0.637, and Bartlett's Test was significant.

Table 84. Intra-K/T Factor Summary

Component Matrix[a]	
INTRA-K/T	Component
	1
INTRA_LL_S	.962
INTRA_BP_S	.953
INTRA_LL_D	.961
INTRA_BP_D	.924

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

Table 85. KMO and Bartlett's Test for Intra-K/T

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.637
Bartlett's Test of Sphericity	Approx. Chi-Square	410.787
	df	6
	Sig.	.000

The construct for Operational Adaptability had 13 variables that loaded onto one factor. The results are shown in Table 86. KMO and Bartlett's Test is shown in Table 87. All loading was greater than 0.4 except **Problem Solving_2**, KMO was 0.798, and Bartlett's Test was significant.

Table 86. Operational Adaptability Factor Summary

Component Matrix[a]	
OPERATIONAL ADAPTABILITY	Component
	1
HANDLING CRISIS_1	.661
HANDLING CRISIS_2	.692
HANDLING CRISIS_3	.588
HANDLING CRISIS_4	.645
HANDLING CRISIS_5	.703
DEALING CHANGE_1	.470
DEALING CHANGE_2	.545
DEALING CHANGE_3	.679
DEALING CHANGE_4	.721
PROBLEM SOLVING_1	.586
PROBLEM SOLVING_2	.394
PROBLEM SOLVING_3	.538
PROBLEM SOLVING_4	.776

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

Table 87. KMO and Bartlett's Test for Operational Adaptability

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.798
Bartlett's Test of Sphericity	Approx. Chi-Square	408.474
	df	78
	Sig.	.000

Problem Solving_2 was removed from the construct for Operational Adaptability and 12 variables loaded onto one factor. The results are shown in Table 88. KMO and Bartlett's Test is shown in Table 89. All loading was greater than 0.4, KMO was 0.793, and Bartlett's Test was significant.

Table 88. Operational Adaptability (Problem Solving_2 Removed) Factor Summary

Component Matrix[a]	
OPERATIONAL ADAPTABILITY (Problem Solving_2 Removed)	Component
	1
HANDLING CRISIS_1	.661
HANDLING CRISIS_2	.696
HANDLING CRISIS_3	.594
HANDLING CRISIS_4	.652
HANDLING CRISIS_5	.703
DEALING CHANGE_1	.479
DEALING CHANGE_2	.555
DEALING CHANGE_3	.695
DEALING CHANGE_4	.739
PROBLEM SOLVING_1	.582
PROBLEM SOLVING_3	.514
PROBLEM SOLVING_4	.756

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

Table 89. KMO and Bartlett's Test for Operational Adaptability (Problem Solving_2 Removed)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.793
Bartlett's Test of Sphericity	Approx. Chi-Square	382.555
	df	66
	Sig.	.000

The construct for Handling Crisis had five variables that loaded onto one factor. The results are shown in Table 90. KMO and Bartlett's Test is shown in Table 91. All loading was greater than 0.4, KMO was 0.829, and Bartlett's Test was significant.

Table 90. Handling Crisis Factor Summary

Component Matrix[a]	
HANDLING CRISIS	Component
	1
HANDLING CRISIS_1	.789
HANDLING CRISIS_2	.846
HANDLING CRISIS_3	.788
HANDLING CRISIS_4	.785
HANDLING CRISIS_5	.699

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

Table 91. KMO and Bartlett's Test for Handling Crisis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.829
Bartlett's Test of Sphericity	Approx. Chi-Square	129.015
	df	10
	Sig.	.000

The construct for Dealing with Change had 4 variables that loaded onto one factor. The results are shown in Table 92. KMO and Bartlett's Test is shown in Table 93. All loading was greater than 0.4, KMO was 0.624, and Bartlett's Test was significant.

Table 92. Dealing with Change Factor Summary

Component Matrix[a]	
DEALING CHANGE	Component
	1
DEALING CHANGE_1	.584
DEALING CHANGE_2	.662
DEALING CHANGE_3	.807
DEALING CHANGE_4	.911

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

Table 93. KMO and Bartlett's Test for Dealing with Change

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.624
Bartlett's Test of Sphericity	Approx. Chi-Square	82.054
	df	6
	Sig.	.000

The construct for Problem Solving had four variables that loaded onto one factor. The results are shown in Table 94. KMO and Bartlett's Test is shown in Table 95. All loading was greater than 0.4, KMO was 0.727, and Bartlett's Test was significant.

Table 94. Problem Solving Factor Summary

Component Matrix[a]	
PROBLEM SOLVING	Component
	1
PROBLEM SOLVING_1	.768
PROBLEM SOLVING_2	.626
PROBLEM SOLVING_3	.848
PROBLEM SOLVING_4	.902

Extraction Method: Principal Component Analysis.[a]

a. 1 components extracted.

Table 95. KMO and Bartlett's Test for Problem Solving

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.727
Bartlett's Test of Sphericity	Approx. Chi-Square	100.569
	df	6
	Sig.	.000

4.4.2 Reliability Analysis

Cronbach's Alpha was used to measure internal consistency of the measurement instrument. A derived Cronbach's Alpha value of greater than 0.6 when investigating constructs exceeds the general acceptance criteria (Ahire & Devaraj, 2001). The alpha

measure for all factors was above the acceptance criteria. Table 96 shows Cronbach's Alpha summary for the constructs.

Table 96. Cronbach's Alpha Summary

Construct	Cronbach's Alpha	Number of Items
KNOWLEDGE TRANSFER	.976	8
INTER-K/T	.984	4
INTRA-K/T	.962	4
OPERATIONAL ADAPTABILITY (Problems Solving_2 Removed)	.861	12
HANDLING CRISIS	.819	5
DEALING WITH CHANGE	.734	4
PROBLEM SOLVING	.801	4

4.4.3 Communality Analysis

The communality of a variable is described as "the portion of the variance of that variable that is accounted for by the common factors" (MacCallum, Widaman, Zhang, & Hong, 1999, p. 85). Along with reliability analysis, communality analysis is used to determine whether the factors were well determined. The mean of communalities of a construct greater than 0.7 exceeds the general acceptance criteria (MacCallum et.al., 1999). However, the results should be considered with reliability analysis. The mean of communalities for Operational Adaptability (Problem Solving_2 Removed), Handling Crisis, Dealing with Change and Problem Solving were below the acceptance criteria. Nevertheless, since they have strong Cronbach's Alpha levels, all constructs were accepted. Table 97 shows Communality summary for the constructs.

Table 97. Communality Summary

Construct	Mean Communality Value
KNOWLEDGE TRANSFER	.868
INTER-K/T	.957
INTRA-K/T	.903
OPERATIONAL ADAPTABILITY (Problems Solving_2 Removed)	.411
HANDLING CRISIS	.612
DEALING WITH CHANGE	.565
PROBLEM SOLVING	.629

4.4.4 Skewness Analysis

The constructs were analyzed for normality by employing skewness analysis. Values ranging between 0 and 1 suggest a normal distribution. The results determined a nonparametric test (Spearman's rho) for further analysis. Table 98 shows Skewness summary for the constructs.

Table 98. Skewness Summary

CONSTRUCTS	N	Skewness	
	Statistic	Statistic	Std. Error
KNOWLEDGE TRANSFER	71	3.206	.285
INTER-K/T	71	3.340	.285
INTRA-K/T	71	2.778	.285
OPERATIONAL ADAPTABILITY (Problems Solving_2 Removed)	71	-1.108	.285
HANDLING CRISIS	71	-1.878	.285
DEALING WITH CHANGE	71	-1.358	.285
PROBLEM SOLVING	71	-.633	.285

4.5 Correlation Analysis

Since all variables and constructs were not normally distributed, a Spearman correlation for a two-tailed response was run to determine if a relationship between the variables and constructs existed. Table 99 shows the number of significant correlations between knowledge transfer variables and operational adaptability variables. Table 100 provides a summary of significant correlations for knowledge transfer practices based on Table 99. Appendix F shows the correlations for variables and demographics. Table 101 shows correlations among constructs. No significant correlations were found among constructs.

Table 99. Correlation Summary for Independent and Dependent Variables

SPEARMAN'S RHO	Number of Sig. Correlations at 0.01			
Knowledge Transfer Variables	**Operational Adaptability Variables**			
	Handling Crisis	**Dealing with Change**	**Problem Solving**	**TOTAL**
INTER_LL_S	3	2	2	7
INTER_BP_S	1	3	2	6
INTER_LL_D	4	3	2	9
INTER_BP_D	4	3	1	8
INTRA_LL_S	2	3	1	6
INTRA_BP_S	3	2	3	8
INTRA_LL_D	3	2	2	7
INTRA_BP_D	4	3	3	10
TOTAL	24	21	16	61

Table 100. Correlation Summary for Knowledge Transfer Practices

SPEARMAN'S RHO	Number of Sig. Correlations at 0.01			
Knowledge Transfer Practices	Operational Adaptability Variables			
	Handling Crisis	Dealing with Change	Problem Solving	TOTAL
INTER-K/T	12	11	7	30
INTRA-K/T	12	10	9	31
LESSONS LEARNED	12	10	7	29
BEST PRACTICES	12	11	9	32

Table 101. Correlation Analysis for Constructs

SPEARMAN'S RHO		OPERATIONAL ADAPTABILITY (Problems Solving_2 Removed)	HANDLING CRISIS	DEALING WITH CHANGE	PROBLEM SOLVING
KNOWLEDGE TRANSFER	Correlation Coefficient	.131	.135	.034	.084
	Sig. (2-tailed)	.275	.262	.777	.488
	N	71	71	71	71
INTER-K/T	Correlation Coefficient	.115	.102	.047	.035
	Sig. (2-tailed)	.340	.396	.697	.774
	N	71	71	71	71
INTRA-K/T	Correlation Coefficient	.146	.131	.055	.129
	Sig. (2-tailed)	.224	.276	.646	.283
	N	71	71	71	71

An additional correlation analysis was also conducted to determine the relationship among demographics and other variables and constructs. Since all variables and constructs were not normally distributed, a Spearman correlation for a two-tailed

response was employed. Table 102 shows the number of significant correlations between demographics and independent and dependent variables. Table 103 shows correlations among demographics and constructs. Only "HOW OFTEN" has correlations with both independent and dependent variables and constructs.

Table 102. Correlation Summary for Demographics and Variables

Spearman's rho	**Inter-K/T**	**Intra-K/T**	**Handling Crisis**	**Dealing with Change**	**Problem Solving**
HOW OFTEN	2	4	1	-	3
LAST DEPLOYMENT MONTH	-	-	-	-	-
TOTAL DEPLOYMENT MONTH	-	-	-	-	-
TOTAL SERVICE YEAR	-	-	-	-	-

Table 103. Correlation Analysis among Demographics and Constructs

Spearman's rho		K/T	INTER - K/T	INTRA-K/T	OPERATIONAL ADAPTABILITY-PS2 REMOVED	HANDLING CRISIS	DEALING WITH CHANGE	PROBLEM SOLVING
HOW OFTEN	Correlation Coefficient	.316**	.220	.349**	.238*	.137	.051	.370**
	Sig. (2-tailed)	.007	.065	.003	.046	.255	.672	.002
	N	71	71	71	71	71	71	71
LAST DEPLOYMENT MONTH	Correlation Coefficient	.116	.175	.096	.018	-.012	.067	-.015
	Sig. (2-tailed)	.335	.144	.428	.884	.921	.580	.899
	N	71	71	71	71	71	71	71
TOTAL DEPLOYMENT MONTH	Correlation Coefficient	.168	.192	.112	.059	.044	.000	.129
	Sig. (2-tailed)	.163	.108	.352	.626	.713	.998	.285
	N	71	71	71	71	71	71	71
TOTAL SERVICE YEAR	Correlation Coefficient	-.141	-.160	-.134	.079	-.089	.174	.161
	Sig. (2-tailed)	.241	.184	.264	.512	.458	.147	.179
	N	71	71	71	71	71	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.6 Hypothesis Testing

Linear regression with an R Square model was used to test the hypotheses in SPSS. R Square represents the ratio of change in the dependent variable explained by independent variable (Haltiwanger, 2012). The acceptance criterion for a hypothesis is the significance level of 0.05 or below.

Main Research Hypotheses:

- H1: An increase in knowledge transfer will have a positive impact on military leaders' operational adaptability.

The independent variable was knowledge transfer. This was a single factor that represented by questions 1 through 8. The dependent variable was operational adaptability and was represented by questions 9-17 and 19-22. Table 104 shows the model summary for Hypothesis 1. The regression analysis of this hypothesis was not significant (p=0.173) and Hypothesis 1 was not supported by the data.

Table 104. Hypothesis 1 Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.163[a]	.027	.013	.99367824	.027	1.894	1	69	.173
a. Predictors: (Constant), KNOWLEDGE TRANSFER									

- H2: Inter-knowledge transfer has a more positive impact on military leaders' operational adaptability than intra-knowledge transfer.

The independent variables were inter-knowledge transfer and intra-knowledge transfer. The factor for inter-knowledge transfer represented questions 1-4. The factor for intra-knowledge transfer was represented by questions 5-8. The dependent variable was operational adaptability and was represented by questions 9-17 and 19-22. Table 105 shows the model summary for inter-knowledge transfer and operational adaptability analysis. The analysis for inter-knowledge transfer was not significant (p=0.171). Table 106 shows the model summary for intra-knowledge transfer and operational adaptability analysis. The analysis for intra-knowledge transfer was not significant (p=0.209). The data did not support this hypothesis.

Table 105. Inter-Knowledge Transfer - Operational Adaptability Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.164[a]	.027	.013	.99354955	.027	1.912	1	69	.171
a. Predictors: (Constant), INTER-K/T									

Table 106. Intra-Knowledge Transfer - Operational Adaptability Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.151[a]	.023	.009	.99568215	.023	1.608	1	69	.209
a. Predictors: (Constant), INTRA-K/T									

Moderated Research Hypotheses:

- H3: The length of the service in the operation has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.
- H4: Operational experience has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.
- H5: Total military service experience has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.

All moderated hypotheses (H3, H4, and H5) were rejected since the data did not support main hypothesis of H1.

4.7 Additional Regression Analysis

An additional regression analysis was conducted to determine any relationship among constructs as well as between demographics and dependent constructs. No significant relationship was found among independent and dependent constructs. For the demographics and dependent constructs, only one significant relationship found between How Often and Problem Solving construct shown in Table 107. Appendix G shows the additional regression analysis findings.

Table 107. Regression Analysis for How Often and Problem Solving Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.368[a]	.135	.123	.93651373	.135	10.812	1	69	.002
a. Predictors: (Constant), HOW OFTEN									

4.8 External Validation

The research findings were shared with a group of survey participants and their comments and review were requested. Their inputs validate a significant statistical association between knowledge transfer and operational adaptability.

The respondents believe in the benefit of knowledge transfer on their operational performance and adaptability. However, they also stress the difficulty of evaluating the

role of individual level knowledge transfer practices' impact on operational adaptability. They argue that causation cannot be substantiated since many of the traits of operational adaptability are seen part of military training, which in itself is a form of knowledge transfer and refinement of best practices. For example, the Army conducts pre-deployment training, a combination of inter- and intra-knowledge transfer results in terms of lessons learned and best practices. Almost all pre-deployment training is based on recent lessons learned from the theater to which the unit will be deployed.

CHAPTER 5

CONCLUSION

A variety of research underlined the increasing need for adaptable leaders in the military (Mueller-Hanson, White, Dorsey & Pulakos, 2005). Furthermore, enhancing operational adaptability both at the personal and organizational level is perceived as essential in order to achieve success in future military operations (TRADOC Pam 525-3-0, 2009).

This study revealed that operational adaptability is not clearly conceptualized and supporting factors are not investigated in detail. Among possible factors, knowledge transfer is claimed to be an important practice that increases personal and organizational performance and effectiveness (Argote & Ingram, 2000). However, the question of how well we understand the correlations between military leaders' operational adaptability and knowledge transfer is not answered in the literature. This research conceptualized operational adaptability and investigated the relationship between military leaders' operational adaptability and knowledge transfer.

This section provides the summary of findings, limitations and recommendations for future research.

5.1 Descriptive Statistics

An analysis of descriptive statistics shows us that intra-knowledge transfer practices are employed more than inter-knowledge transfer practices. Furthermore, comparing the methods used, discussion is preferred more than study in knowledge transfer practices. These findings are concluded to be determined by military's strong

after action review culture. Concerning lessons learned and best practices, there is no significant difference between their frequencies of employment in knowledge transfer practices.

For operational adaptability dimensions, although, overall, the respondents expressed a success rate through all questions as very high and close to each other, handling a crisis got the highest average whereas problem solving got the lowest one. Comparing individual questions, "maintain focus during the emergencies" got the highest scores while "seeing connections among seemingly unrelated information" got the lowest scores in comparison. These results could be a function of military training and professionalism which heavily focuses to increase military leaders' decision making and executing skills under pressure.

A majority of the participants (60%) encountered dangerous, unpredictable, and challenging operational situations once a week and/or more during their last deployment. Of the participants, 75% encountered these once a month or more. Furthermore, the choices of "Less than Once a Month", "Once a Month", "2-3 Times a Month", "Once a Week", "2-3 Times a Week" and "Daily" were all well represented among respondents. This increases the reliability of the survey findings.

The respondents (85%) stayed 6-12 months in their last deployment. The period is long enough to provide reliable data for empirical research. Furthermore, both total deployment and coverage of total service experience suggest that respondents represent well the general population. Especially, respondents were reasonably distributed by years of service experience. This actually prevents the possible bias with sampling.

5.2 Constructs

This research was conducted to determine the relationship between two main constructs: knowledge transfer and operational adaptability. Knowledge transfer was constructed on two components; inter-knowledge transfer and intra-knowledge transfer. Lessons learned and best practices were identified as the main subjects for knowledge transfer practices. The validity of knowledge transfer, inter-knowledge transfer and intra-knowledge constructs has already been confirmed by Landaeta (2008) and Haltiwanger (2012). This research also confirmed a very strong unidimensionalty for knowledge transfer; inter-knowledge transfer and intra-knowledge transfer constructs.

The concept of operational adaptability was developed by using current literature and the experience of the researcher. Operational adaptability was constructed on three components: handling crisis, dealing with change, and problem solving. The construct for operational adaptability had 13 questions that loaded onto one factor. In factor analysis, all loading succeeded acceptance criterion except for one question. After removing that particular question, the operational adaptability construct proved to be valid. Handling crisis, dealing with change, and problem solving constructs were also determined to be strong constructs.

Cronbach's Alpha was used to measure internal consistency of the measurement instrument. All constructs demonstrated high internal reliability.

5.3 Correlation Analysis

The research found no significant correlations between Knowledge Transfer (including Inter-K/T and Intra-K/T) and Operational Adaptability (including Handling Crisis, Dealing with Change, and Problem Solving) constructs.

However, the results of correlation analysis between Knowledge Transfer and Operational Adaptability questions demonstrated a moderate level correlation. From Operational Adaptability perspective, handling crisis has the most strong correlation level with knowledge transfer practices. Dealing with Change came second, and problem solving has the smallest correlation level. From the knowledge transfer perspective, inter-knowledge transfer and intra-knowledge transfer had almost same number of correlation with regard to operational adaptability questions.

Considering that participants use less inter-knowledge transfer, it could be assumed that inter-knowledge transfer has a stronger impact. From a lessons learned and best practice perspective, they also have very close number of correlations with operational adaptability questions.

From the experience perspective, participants' encountering challenging operational situations, their last deployment, total deployment, and total length of service were investigated for any correlation with knowledge transfer and operational adaptability constructs and question sets. For the correlation analysis with constructs, only the frequency of participants' encountering challenging operational situations had strong correlations with knowledge transfer, intra-knowledge transfer, operational adaptability, and problem solving constructs. For the correlation analysis with the question sets, it was again the frequency of participants' encountering challenging operational situations that had correlations with all sets of questions except for dealing with change. This clearly shows us the crucial role of encountering more dangerous, challenging operational situations in the experience dimension.

5.4 Hypothesis Testing

5.4.1 Main Research Hypotheses:

- H1: An increase in knowledge transfer will have a positive impact on military leaders' operational adaptability.

Although there a good number of significant correlations between knowledge transfer and operational adaptability question sets, the regression analysis of this hypothesis was not significant and Hypothesis 1 was not supported by the data. This shows the existence of a correlation however there is no cause and effect relationship between constructs. Knowledge transfer has a secondary, supporting role for operational adaptability.

- H2: Inter-knowledge transfer has a more positive impact on military leaders' operational adaptability than intra-knowledge transfer.

The regression analysis for inter-knowledge transfer and intra-knowledge transfer for their impact on operational adaptability were not significant. The data did not support this hypothesis. Furthermore, they produced almost same number of significant correlations with operational adaptability question sets. They are concluded to be equally important in their role on operational adaptability.

5.4.2 Moderated Research Hypotheses:

- H3: The length of the service in the operation has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.

- H4: Operational experience has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.

- H5: Total military service experience has a significant effect on the relationship between knowledge transfer and military leaders' operational adaptability.

All moderated hypotheses (H3, H4, and H5) were rejected since the data did not support main hypothesis of H1.

5.5 Additional Regression Analysis

Additional regression analysis was conducted to determine any relationship among constructs as well as between demographics and dependent constructs. No significant relationship was found among independent and dependent constructs. For the demographics and dependent constructs, only one significant relationship found between How Often and Problem Solving constructs.

5.6 External Validation

The research findings were shared with a group of survey participants and their comments and review were requested. Their inputs validate a significant statistical association between knowledge transfer and operational adaptability.

5.7 Summary of Findings

Although no direct cause and effect relationship could be determined between knowledge transfer and operational adaptability, the research enhanced our understanding on both phenomena. First of all, this research conceptualized operational adaptability based on three main dimensions; handling crisis, dealing with change and problem solving. Data analysis determined a high construct validity for the proposed conceptualization.

The number of significant correlations between Knowledge Transfer and Operational Adaptability questions is important. This research concludes that knowledge transfer practices are not dominant drivers of operational adaptability; however, they still have a significant statistical association with operational adaptability. Furthermore, inter- and intra-knowledge transfer practices carry almost an equal weight for their association with operational adaptability. However, the results show that inter-knowledge transfer practices are not used as the same level as intra-knowledge transfer practices. The use of inter-knowledge transfer practices should be encouraged and supported.

This research supports Mueller-Hanson et al. (2005) research since the findings clearly determines the crucial role of encountering more dangerous, challenging operational situations on operational adaptability especially in the problem solving dimension. Furthermore, among the operational adaptability dimensions, problem solving is found to be the least successful one for the participants.

Based on findings, this research concludes that knowledge transfer practices have more significant statistical association with handling crisis and dealing with change dimensions whereas encountering more dangerous, challenging operational situations has more positive impact on problem solving dimension of operational adaptability.

5.8 Limitations and Recommendations

The sample size, while technically acceptable, was low. 86 respondents answered the survey. However, based on pre-analysis, 15 responses were removed from data and only 71 responses were analyzed in the data analysis process. A larger sample size would make the results more generalizable.

Second main limitation could be a possible bias for performance related questions under operational adaptability dimensions. Since this research was an individual dissertation study, data were collected from participants through a self-administered survey. This actually increases subjectivity in performance related questions. An institutional research, which captures performance dimensions more objectively, could provide more insight about relationship between knowledge transfer and operational adaptability.

5.9 Implications

The literature review identifies the gap in the body of knowledge regarding the conceptualization of "operational adaptability" and the role of knowledge transfer on military leaders' operational adaptability.

The implications to academia are to expand the current body of knowledge in the area of knowledge transfer and adaptability in military settings. This research is among the first empirical work to conceptualize operational adaptability and investigate the relationship between military leaders' operational adaptability and knowledge transfer.

The findings of this research help to bridge the gap identified in the literature review. First of all, this research conceptualized operational adaptability. This conceptualization both increases our understanding of operational adaptability and provides a framework upon which further research could be based.

Secondly, this research establishes correlations between military leaders' operational adaptability and knowledge transfer. These correlations increase our understanding of the relationship between operational adaptability and knowledge transfer.

For military organizations, the research findings have practical benefits. By providing a solid conceptual framework for operational adaptability, the findings of research could help military organizations better design their officer's leadership development efforts. Furthermore, a better understanding of the relationship between operational adaptability and knowledge transfer, the findings of this research help military organizations to better direct resources on knowledge transfer practices. This consequently could help to enhance leader's operational adaptability which is essential for success in future military operations.

The findings of this research could also be generalized for other organizations striving to develop adaptability in her members and they provide them benefits similar to that for military organizations. This research provides a solid construct for operational adaptability for the military context; however the three main dimensions of the proposed construct could be helpful for the other organizations' leadership development against emergencies, crisis and challenging situations in context of their own operational business settings. Furthermore, the findings related to knowledge transfer practices and their association to adaptability dimensions could help organizations to better direct their resources to enhance adaptability dimensions where necessary.

5.10 Future Research

Possible future research areas are listed below.

- This research provides a solid construct of operational adaptability. Operational adaptability consists of three main dimensions: handling crisis, dealing with change and problem solving. However, this research did not investigate the individual dimensions' specific weighted role on operational adaptability. Future research could

investigate which dimension has a more crucial role for operational adaptability and enhance our understanding of the relationship among these three dimensions.

- This research provides a good number of correlations between knowledge transfer practices and operational adaptability dimensions. Future research could investigate these correlations more deeply.

- This study did not investigate the differences between tacit and explicit knowledge in their role for operational adaptability. Future research could investigate the role of tacit and explicit knowledge transfers on operational adaptability.

- This research found that the frequency of encountering challenging operational situations has a greater impact than lengths of operational deployment or military service on operational adaptability especially in the problem solving dimension. Future research could investigate the association between experience and problem solving dimension more deeply.

- This research did not triangulate data collection. An institutional future research could achieve data triangulation by collecting data both from individuals through survey or interviews and from official records when investigating the relationship between operational adaptability and knowledge transfer.

- Future research could investigate the role organizational culture on military leaders' operational adaptability.

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APPENDICES

APPENDIX A: ODU ENGINEERING HUMAN SUBJECTS REVIEW COMMITTEE APPROVAL

OFFICE OF THE VICE PRESIDENT FOR RESEARCH
Physical Address
4111 Monarch Way, Suite 203
Norfolk, Virginia 23508
Mailing Address
Office of Research
1 Old Dominion University
Norfolk, Virginia 23529
Phone(757) 683-3460
Fax(757) 683-5902

DATE:	February 23, 2015
TO:	RAFAEL LANDAETA
FROM:	Old Dominion University Engineering Human Subjects Review Committee
PROJECT TITLE:	[702918-4] AN ANALYSIS OF RELATIONSHIP BETWEEN MILITARY LEADERS? OPERATIONAL ADAPTABILITY AND KNOWLEDGE TRANSFER
REFERENCE #:	ENGN-15-1
SUBMISSION TYPE:	Revision
ACTION:	DETERMINATION OF EXEMPT STATUS
DECISION DATE:	February 23, 2015
REVIEW CATEGORY:	Exemption category # 6.2

Thank you for your submission of Revision materials for this project. The Old Dominion University Engineering Human Subjects Review Committee has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact Stacie Ringleb at 757-683-6363 or sringleb@odu.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Old Dominion University Engineering Human Subjects Review Committee's records.

APPENDIX B: INITIAL SURVEY

This survey only requires about 10-15 minutes of your time. You are not asked to identify yourself. Analysis of the results will be based on a combination of survey participants and cannot be traced back to any one individual. Individual responses will remain anonymous and will not be reported to any person or entity. Participation in this survey is voluntary. Please read through the background information and definitions prior to starting the survey and refer back to the definitions as needed.

Background information

Adaptability is one of the issues that have gained increasing attention. The U.S. Army Capstone Concept (TRADOC Pamphlet 525-3-0 (2009) embraced the idea of "operational adaptability". Additionally, the U.S. Army has a deep knowledge transfer culture. This survey will provide data for the Ph.D. dissertation which will analyze the relationship between military leaders' operational adaptability and knowledge transfer.

Definitions

Study: Refers to reading, watching videos, or other activities which do not directly involve conversations with others.
Discuss: Refers to meetings, phone talking, chatting, e-mailing or other activities in which conversations and interactions with others occurred.
Operational Adaptability: The ability to respond effectively to changing threats and situations with appropriate, flexible, and timely actions.
Knowledge Transfer: The movement of knowledge—including knowledge based on expertise or skilled judgment—from one person to another.
Lessons learned: Validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat operations that leads to a change in behavior at either the tactical, operational, or strategic level or in one or more of the Army's doctrine, organization, training, materiel, leadership and education, personnel, and facilities domains.
Best Practice: The most effective and efficient method of achieving any objective or task, into operations and training.
Inter-knowledge transfer: The sharing of knowledge from one individual or group to another individual or group between different units. This includes Combined Arms Center-CAC networks, Center for Army Lessons Learned-CALL networks, Army Operational Knowledge Management networks, and Army professional forums: leader forums, functional forums, and warfighter forums.
Intra-knowledge transfer: The sharing of knowledge from one individual or group to another individual or group within the same unit. This includes after action reviews, the unit forum, internal network managed by knowledge management section.

Thank you for participating in our study!

MAJ Vahap Kavaker is a Ph.D. Candidate under the supervision of Dr. Rafael E. Landaeta at the Old Dominion University, Norfolk, VA USA. Tel: +1 757 652 6586. e-mail: vahap.kavaker@act.nato.int

Please respond all questions pertaining to your last operational deployment

Inter-Knowledge Transfer

1. Approximately how many times did you study lessons learned through inter-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

2. Approximately how many times did you study best practices through inter-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99, 100+					

3. Approximately how many times did you discuss lessons learned through inter-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

4. Approximately how many times did you discuss best practices through inter-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

Intra-Knowledge Transfer

5. Approximately how many times did you study lessons learned through intra-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

6. Approximately how many times did you study best practices through intra-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

7. Approximately how many times did you discuss lessons learned through intra-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

8. Approximately how many times did you discuss best practices through intra-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

Handling emergency or crisis situations

9. I made right decisions punctually and performed effectively in life threating situations.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

10. I acted decisively under pressure.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

11. I was able to maintain focus during emergencies.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

12. I made autonomous decisions effectively in life threating situations.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

Dealing effectively with unpredictable or changing operational situations

13. I accomplished the mission without specific guidance.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

14. I performed effectively when the goals of the mission, environment, roles and responsibilities change.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

15. I identified the key aspect of ambiguous situations and created new plans or modified existing ones as the situation changed.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

16. I was able make effective decisions without all relevant information in unpredictable or changing operational situations.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

Solving problems creatively

17. I devised creative solutions to complex problems.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

18. I considered different perspectives and outcomes of decisions.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

19. I saw connections among seemingly unrelated information.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

20. I was able think out the box when solving problems.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

Demographics

21. The length of your last operational deployment (in months)

	Drop down menu with: 0,1,2,3…..34,35,36+					

22. The approximate length of your total operational experience (in months)

	Drop down menu with: 0,1,2,3…..98,99,100+					

23. The length of your total military service experience (in years)

	Drop down menu with: 0,1,2,3…..34,35,36+					

24. What kind of job have you completed in your last operational deployment?

Staff	Field

25. What is your gender?

Female	Male

26. What is your current pay grade/rank?

OR-4	OR-5	OR-6	OR-7	OR-8	OR-9	OF-1	OF-2	OF-3	OF-4	OF-5

27. What is your highest level of education?

Associated Degree	Bachelor's Degree	Master's Degree	Doctoral Degree

APPENDIX C: PILOT SURVEY

The pilot survey is executed to validate initial survey questions. The full survey is attached. It is not required to answer the actual survey questions. Please read through the question and answer the review section for that particular question. The review section consists of 5 columns. For the first 4 columns, place an "X" in the box(s) that are most appropriate. Each question has also a place for comments. Additionally, at the end of the survey there is a general comments section. This section can be used to address the survey in general or specific survey questions. If commenting on a specific survey question please refer to the survey question number. The survey will be revised based on the inputs from the pilot survey responses. Thank you for your time and expertise.

SURVEY

This survey only requires about 10-15 minutes of your time. You are not asked to identify yourself. Analysis of the results will be based on a combination of survey participants and cannot be traced back to any one individual. Individual responses will remain anonymous and will not be reported to any person or entity. Participation in this survey is voluntary. Please read through the background information and definitions prior to starting the survey and refer back to the definitions as needed.

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Adaptability is one of the issues that have gained increasing attention. The U.S. Army Capstone Concept (TRADOC Pamphlet 525-3-0 (2009) embraced the idea of "operational adaptability". Additionally, the U.S. Army has a deep knowledge transfer culture. This survey will provide data for the Ph.D. dissertation which will analyze the relationship between military leaders' operational adaptability and knowledge transfer.

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Lessons learned: Validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat operations that leads to a change in behavior at either the tactical, operational, or strategic level or in one or more of the Army's doctrine, organization, training, materiel, leadership and education, personnel, and facilities domains.
Best Practice: The most effective and efficient method of achieving any objective or task, into operations and training.
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Please respond all questions pertaining to your last operational deployment

Inter-Knowledge Transfer

1. Approximately how many times did you study lessons learned through inter-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

REVIEW OF QUESTION 1

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to knowledge transfer	Question **DOES NOT** relate to knowledge transfer	Recommendations/ Assessment

2. Approximately how many times did you study best practices through inter-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99, 100+					

REVIEW OF QUESTION 2

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to knowledge transfer	Question **DOES NOT** relate to knowledge transfer	Recommendations/ Assessment

3. Approximately how many times did you discuss lessons learned through inter-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

REVIEW OF QUESTION 3

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to knowledge transfer	Question **DOES NOT** relate to knowledge transfer	Recommendations/ Assessment

4. Approximately how many times did you discuss best practices through inter-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

REVIEW OF QUESTION 4

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to knowledge transfer	Question **DOES NOT** relate to knowledge transfer	Recommendations/ Assessment

Intra-Knowledge Transfer

5. Approximately how many times did you study lessons learned through intra-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

REVIEW OF QUESTION 5

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to knowledge transfer	Question **DOES NOT** relate to knowledge transfer	Recommendations/ Assessment

6. Approximately how many times did you study best practices through intra-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

REVIEW OF QUESTION 6

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to knowledge transfer	Question **DOES NOT** relate to knowledge transfer	Recommendations/ Assessment

7. Approximately how many times did you discuss lessons learned through intra-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

REVIEW OF QUESTION 7

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to knowledge transfer	Question **DOES NOT** relate to knowledge transfer	Recommendations/ Assessment

8. Approximately how many times did you discuss best practices through intra-knowledge transfer practices?

	Drop down menu with: 0,1,2,3.....98,99,100+					

REVIEW OF QUESTION 8

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to knowledge transfer	Question **DOES NOT** relate to knowledge transfer	Recommendations/ Assessment

Handling emergency or crisis situations

9. I made right decisions punctually and performed effectively in life threating situations.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 9

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

10. I acted decisively under pressure.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 10

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

11. I was able to maintain focus during emergencies.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 11

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

12. I made autonomous decisions effectively in life threating situations.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 12

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

Dealing effectively with unpredictable or changing operational situations

13. I accomplished the mission without specific guidance.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 13

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

14. I performed effectively when the goals of the mission, environment, roles and responsibilities change.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 14

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

15. I identified the key aspect of ambiguous situations and created new plans or modified existing ones as the situation changed.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 15

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

16. I was able make effective decisions without all relevant information in unpredictable or changing operational situations.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 16

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

Solving problems creatively

17. I devised creative solutions to complex problems.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 17

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

18. I considered different perspectives and outcomes of decisions.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 18

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

19. I saw connections among seemingly unrelated information.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 19

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

20. I was able think out the box when solving problems.

1-with no accuracy/not effectively	2	3	4-with some accuracy/ effectiveness	5	6	7- accurately/ effectively

REVIEW OF QUESTION 20

Question is clear/under standable	Question is **NOT** clear/under standable	Question relates to operational adaptability	Question **DOES NOT** relate to operational adaptability	Recommendations/ Assessment

Demographics

21. The length of your last operational deployment (in months)

	Drop down menu with: 0,1,2,3…..34,35,36+					

REVIEW OF QUESTION 21

Question is clear/under standable	Question is **NOT** clear/under standable	Question adds value to data collection	Question **DOES NOT** add value to data collection	Recommendations/ Assessment

22. The approximate length of your total operational experience (in months)

	Drop down menu with: 0,1,2,3…..98,99,100+					

REVIEW OF QUESTION 22

Question is clear/under standable	Question is **NOT** clear/under standable	Question adds value to data collection	Question **DOES NOT** add value to data collection	Recommendations/ Assessment

23. The length of your total military service experience (in years)

	Drop down menu with: 0,1,2,3…..34,35,36+					

REVIEW OF QUESTION 23

Question is clear/under standable	Question is **NOT** clear/under standable	Question adds value to data collection	Question **DOES NOT** add value to data collection	Recommendations/ Assessment

24. What kind of job have you completed in your last operational deployment?

Staff	Field

REVIEW OF QUESTION 24

Question is clear/under standable	Question is **NOT** clear/under standable	Question adds value to data collection	Question **DOES NOT** add value to data collection	Recommendations/ Assessment

25. What is your gender?

Female	Male

REVIEW OF QUESTION 25

Question is clear/under standable	Question is **NOT** clear/under standable	Question adds value to data collection	Question **DOES NOT** add value to data collection	Recommendations/ Assessment

26. What is your current pay grade/rank?

OR-4	OR-5	OR-6	OR-7	OR-8	OR-9	OF-1	OF-2	OF-3	OF-4	OF-5

REVIEW OF QUESTION 26

Question is clear/under standable	Question is **NOT** clear/under standable	Question adds value to data collection	Question **DOES NOT** add value to data collection	Recommendations/ Assessment

27. What is your highest level of education?

Associated Degree	Bachelor's Degree	Master's Degree	Doctoral Degree

REVIEW OF QUESTION 27

Question is clear/under standable	Question is **NOT** clear/under standable	Question adds value to data collection	Question **DOES NOT** add value to data collection	Recommendations/ Assessment

GENERAL COMMENTS ON THE SURVEY:

APPENDIX D: FINAL SURVEY

PLEASE READ THE DEFINITIONS PRIOR TO STARTING THE SURVEY AND REFER BACK TO THE DEFINITIONS AS NEEDED

DEFINITIONS

(α) Inter-knowledge transfer practices: The sharing of knowledge from one individual or group to another individual or group **between different units**. For example; Combined Arms Center-CAC networks, Lessons Learned Center networks, Knowledge Management networks/portals, and military professional forums: leader forums, functional forums, and warfighter forums.

(β) Intra-knowledge transfer practices: The sharing of knowledge from one individual or group to another individual or group **within the same unit**. For example; after action reviews, the unit forum, internal network managed by units' knowledge management sections.

(χ) Lessons learned: Validated knowledge and experience derived from observations and the historical study of military training, exercises, and combat operations that leads to a change in behavior at either the tactical, operational, or strategic level or in one or more of the Army's doctrine, organization, training, materiel, leadership and education, personnel, and facilities domains. Lessons learned are collected after something negative happened and also called hard-lessons learned with the intention to avoid the same negative situation in the future.

(δ) Best Practice: The most effective and efficient method of achieving any objective or task, into operations and training. A best practice is the recollection of experiences that

achieved a positive result. A best practice is collected after something positive happened to replicate as much as possible a success in the future.

(ε) Study: Refers to reading, watching videos, or other activities which do not directly involve conversations with others in order to analyze and learn.

(ϕ) Discuss: Refers to meetings, phone talking, chatting, e-mailing or other activities in which conversations and interactions with others occurred. Discussions seek to further the understanding on a given topic and situation.

Part-1: Inter-Knowledge Transfer

1. When looking back at your last deployment, approximately how many times did you **study lessons learned**$^{\varepsilon\chi}$ through **inter-knowledge transfer**$^{\alpha}$ practices?

	Drop down menu with: 0,1,2,3.....198,199,200+					

2. When looking back at your last deployment, approximately how many times did you **study best practices**$^{\varepsilon\delta}$ through **inter-knowledge transfer**$^{\alpha}$ practices?

	Drop down menu with: 0,1,2,3.....198,199, 200+					

3. When looking back at your last deployment, approximately how many times did you **discuss lessons learned**$^{\phi\chi}$ through **inter-knowledge transfer**$^{\alpha}$ practices?

	Drop down menu with: 0,1,2,3.....198,199,200+					

4. When looking back at your last deployment, approximately how many times did you **discuss best practices**$^{\phi\delta}$ through **inter-knowledge transfer**$^{\alpha}$ practices?

	Drop down menu with: 0,1,2,3.....198,199,200+					

Part-2: Intra-Knowledge Transfer

5. When looking back at your last deployment, approximately how many times did you **study lessons learned**$^{\varepsilon\chi}$ through **intra-knowledge transfer**$^{\beta}$ practices?

	Drop down menu with: 0,1,2,3.....198,199,200+					

6. When looking back at your last deployment, approximately how many times did you **study best practices**$^{\varepsilon\delta}$ through **intra-knowledge transfer**$^{\beta}$ practices?

	Drop down menu with: 0,1,2,3.....198,199,200+					

7. When looking back at your last deployment, approximately how many times did you **discuss lessons learned**$^{\phi\chi}$ through **intra-knowledge transfer**$^{\beta}$ practices?

	Drop down menu with: 0,1,2,3.....198,199,200+					

8. When looking back at your last deployment, approximately how many times did you **discuss best practices**$^{\phi\delta}$ through **intra-knowledge transfer**$^{\beta}$ practices?

	Drop down menu with: 0,1,2,3.....198,199,200+					

Part-3: Handling emergency or crisis situations

9. When looking back at my last deployment, in a time constraint environment, I made effective decisions. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

10. When looking back at my last deployment, I performed effectively in dangerous situations. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

11. When looking back at my last deployment, I acted decisively under pressure. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

12. When looking back at my last deployment, I was able to maintain focus during emergencies. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

13. When looking back at my last deployment, I made autonomous decisions effectively in dangerous situations. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

Part-4: Dealing effectively with unpredictable or changing operational situations

14. When looking back at my last deployment, I accomplished the mission without specific guidance. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

15. When looking back at my last deployment, I performed effectively when the goals of the mission, environment, roles and responsibilities changed during the mission execution. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

16. When looking back at my last deployment, I identified the key aspect of ambiguous situations and created new plans or modified existing ones as the situation changed. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

17. When looking back at my last deployment, I was able make effective decisions without all relevant information in unpredictable or changing operational situations. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

18. **(Reliability/Test Question)** When looking back at my last deployment, I hesitated to act and preferred to get orders in dangerous situations. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

Part-5: Solving problems creatively

19. When looking back at my last deployment, I devised creative solutions to complex problems. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

20. When looking back at my last deployment, I considered different perspectives and outcomes prior to making decisions. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

21. When looking back at my last deployment, I saw connections among seemingly unrelated information when solving problems. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

22. When looking back at my last deployment, I was able think out of the box when solving problems. Approximately, what percentage of time?

0% (never)	10%	20%	30%	40%	50%	60%	70%	80%	90%	100% of times (always)

Part-6: Demographics

23. When looking back **at your last deployment**, approximately how often did you encounter dangerous, unpredictable and challenging operational situations?

Never	Less than Once a Month	Once a Month	2-3 Times a Month	Once a Week	2-3 Times a Week	Daily

24. What was the length of your **last operational deployment in months**?

	Drop down menu with: 0,1,2,3…..48,49,50+					

25. During your military career, what is the approximate number of your **total months deployed**?

	Drop down menu with: 0,1,2,3…..148,149,150+					

26. What is the length of your **total military service experience in years**?

	Drop down menu with: 0,1,2,3…..48,49,50+					

27. Select all that will apply to your military service.

Officer	Non Commissioned Officer	Warrant Officer	Active	Reserved/Guards	Prior Service	Retired

28. Select your military service.

Army	Navy	Marine Corps	Air force	Coast Guard

APPENDIX E: SURVEY DATA (NORMALITY PLOTS)

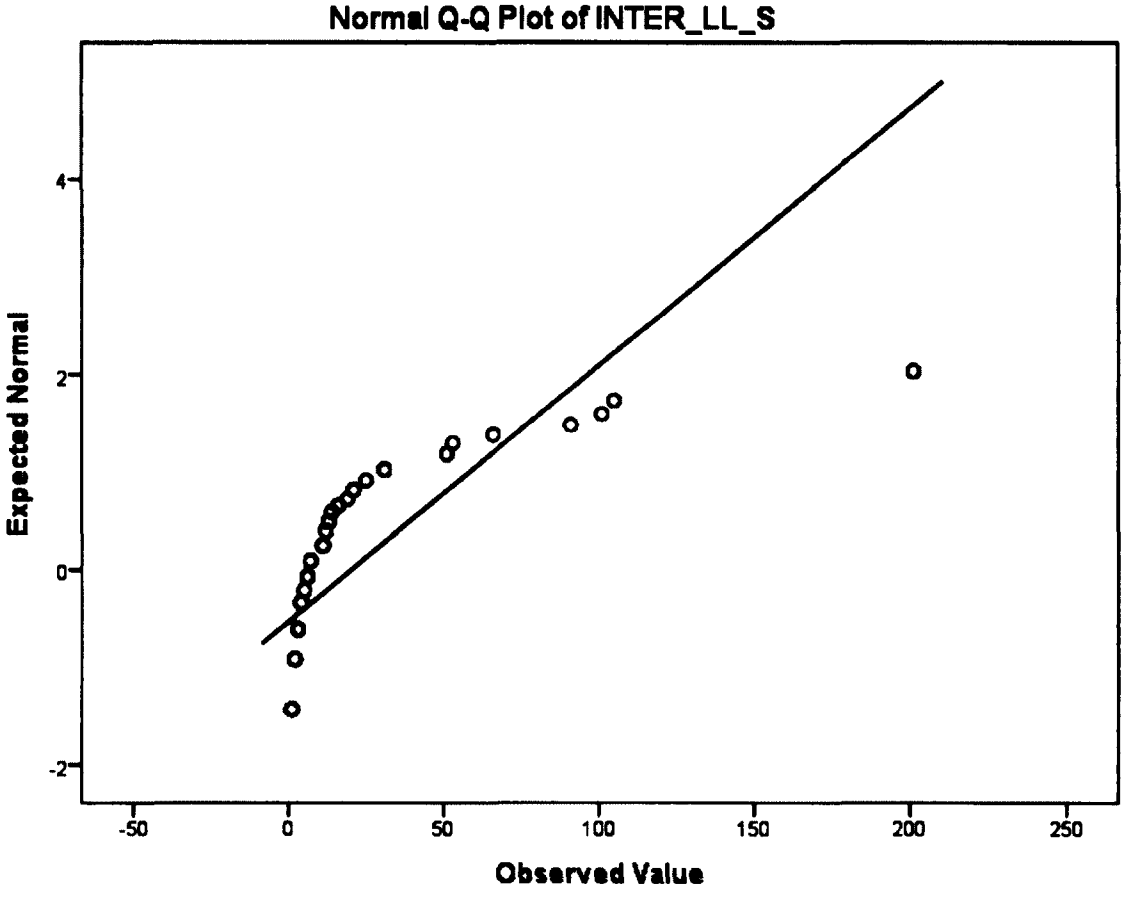

Figure 17. Normality Plot – INTER_LL_S

(When looking back at your last deployment, approximately how many times did you study lessons learned through inter-knowledge transfer practices?)

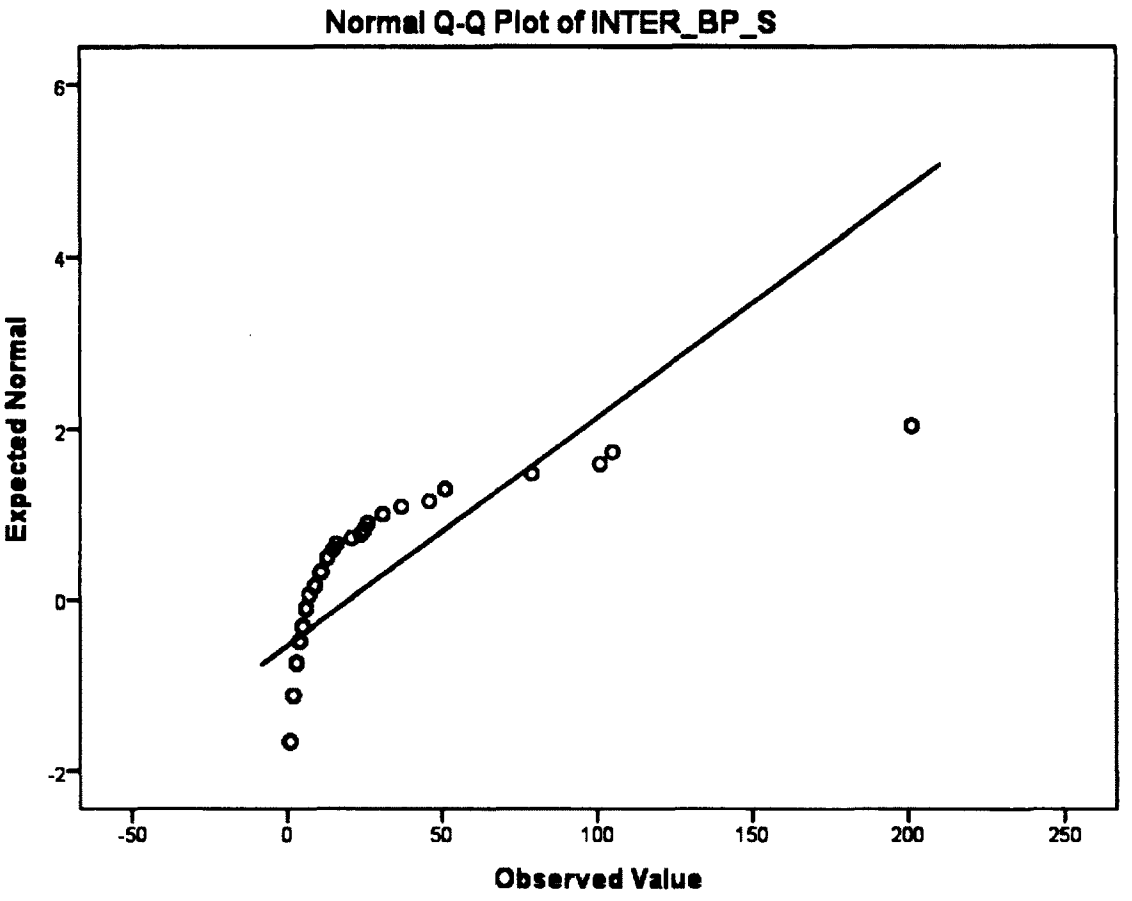

Figure 18. Normality Plot – INTER_BP_S

(When looking back at your last deployment, approximately how many times did you study best practices through inter-knowledge transfer practices?)

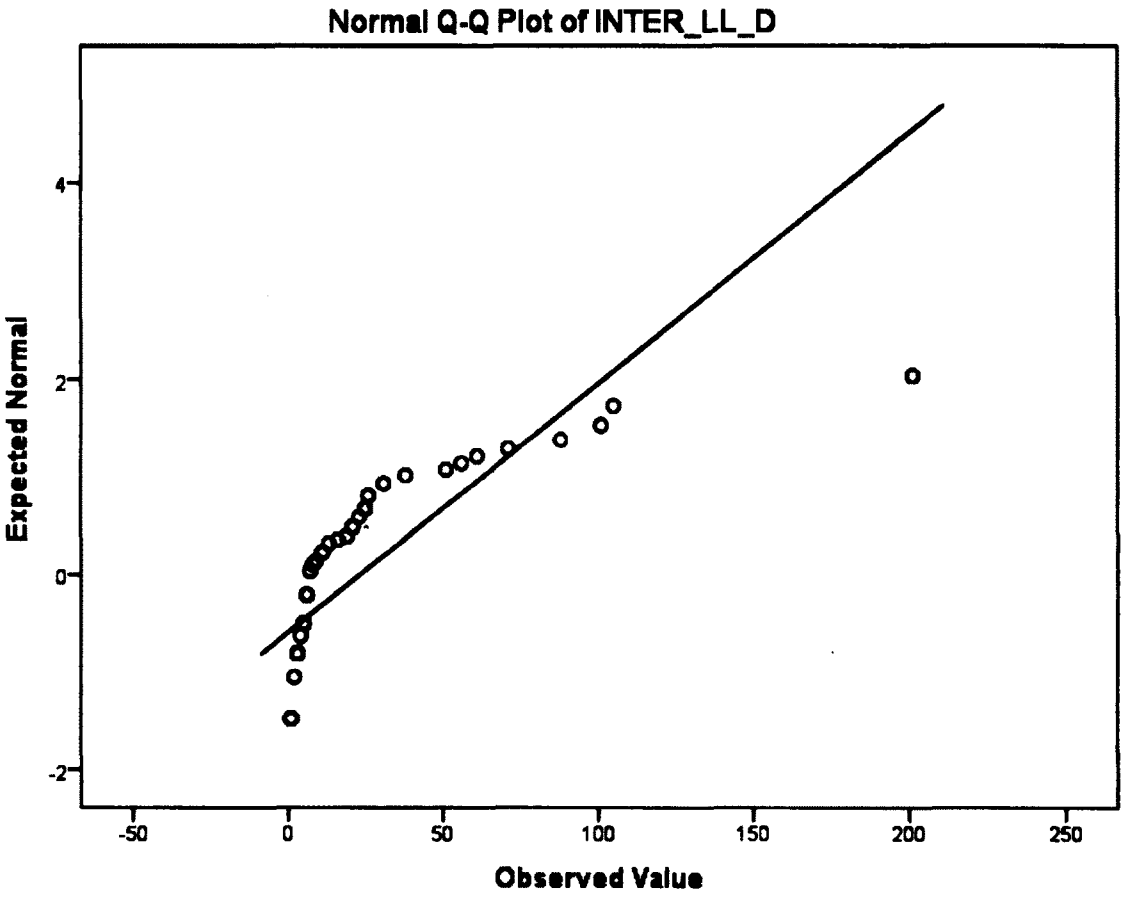

Figure 19. Normality Plot – INTER_LL_D

(When looking back at your last deployment, approximately how many times did you discuss lessons learned through inter-knowledge transfer practices?)

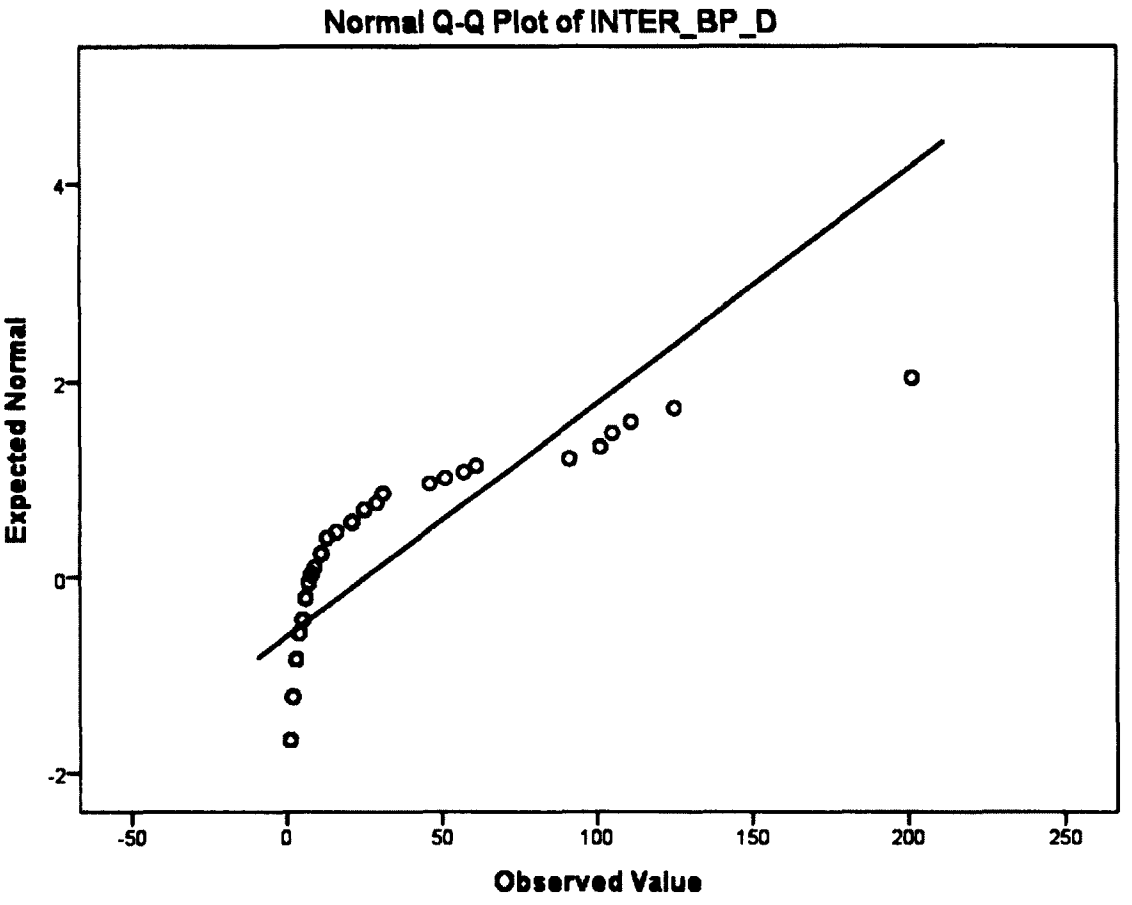

Figure 20. Normality Plot – INTER_BP_D

(When looking back at your last deployment, approximately how many times did you discuss best practices through inter-knowledge transfer practices?)

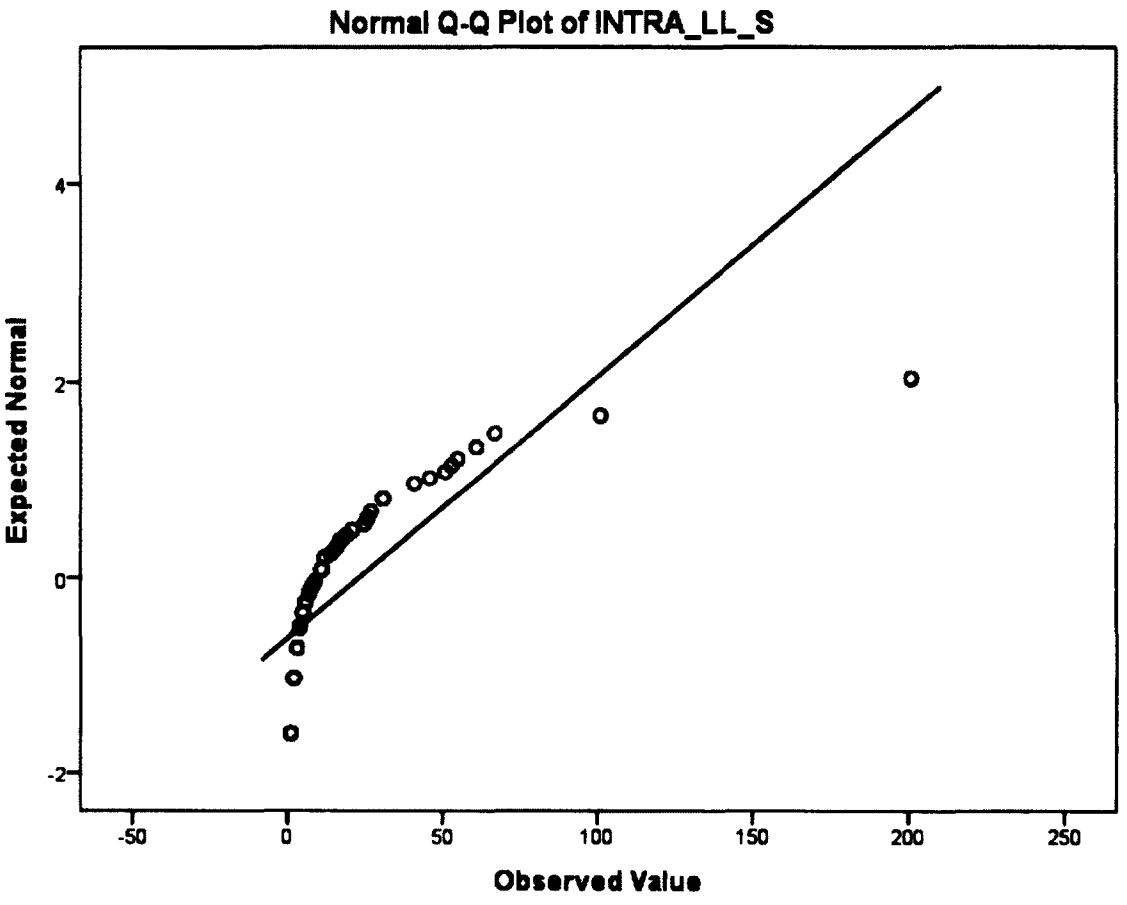

Figure 21. Normality Plot – INTRA_LL_S

(When looking back at your last deployment, approximately how many times did you study lessons learned through intra-knowledge transfer practices?)

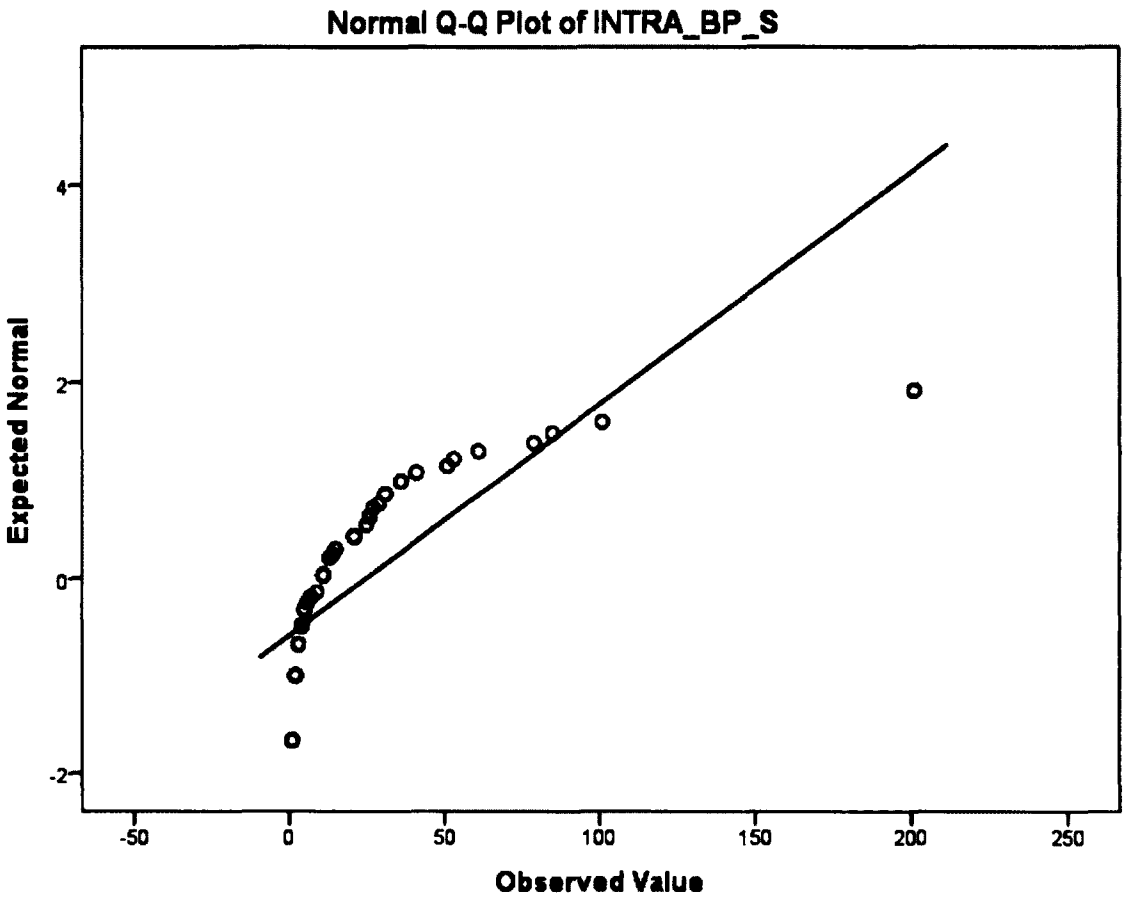

Figure 22. Normality Plot – INTRA_BP_S

(When looking back at your last deployment, approximately how many times did you study best practices through intra-knowledge transfer practices?)

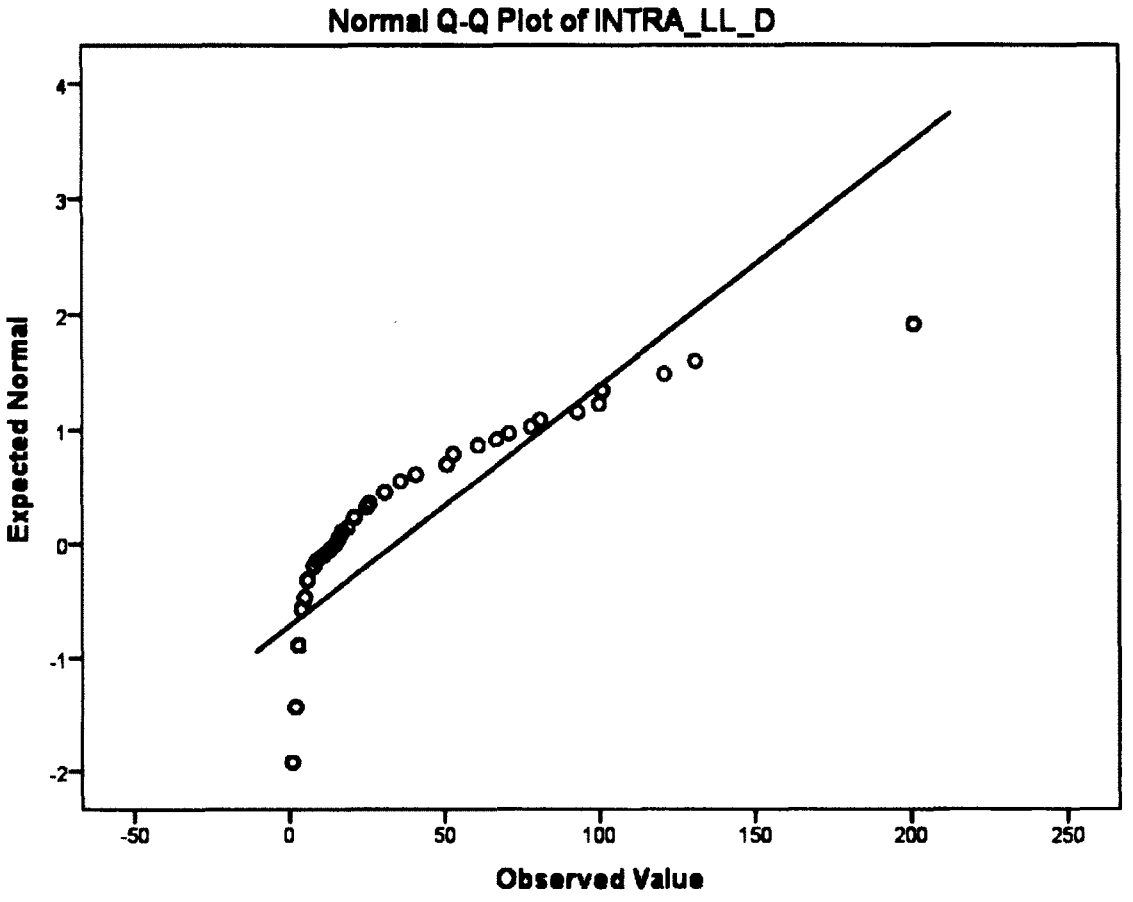

Figure 23. Normality Plot – INTRA_LL_D

(When looking back at your last deployment, approximately how many times did you discuss lessons learned through intra-knowledge transfer practices?)

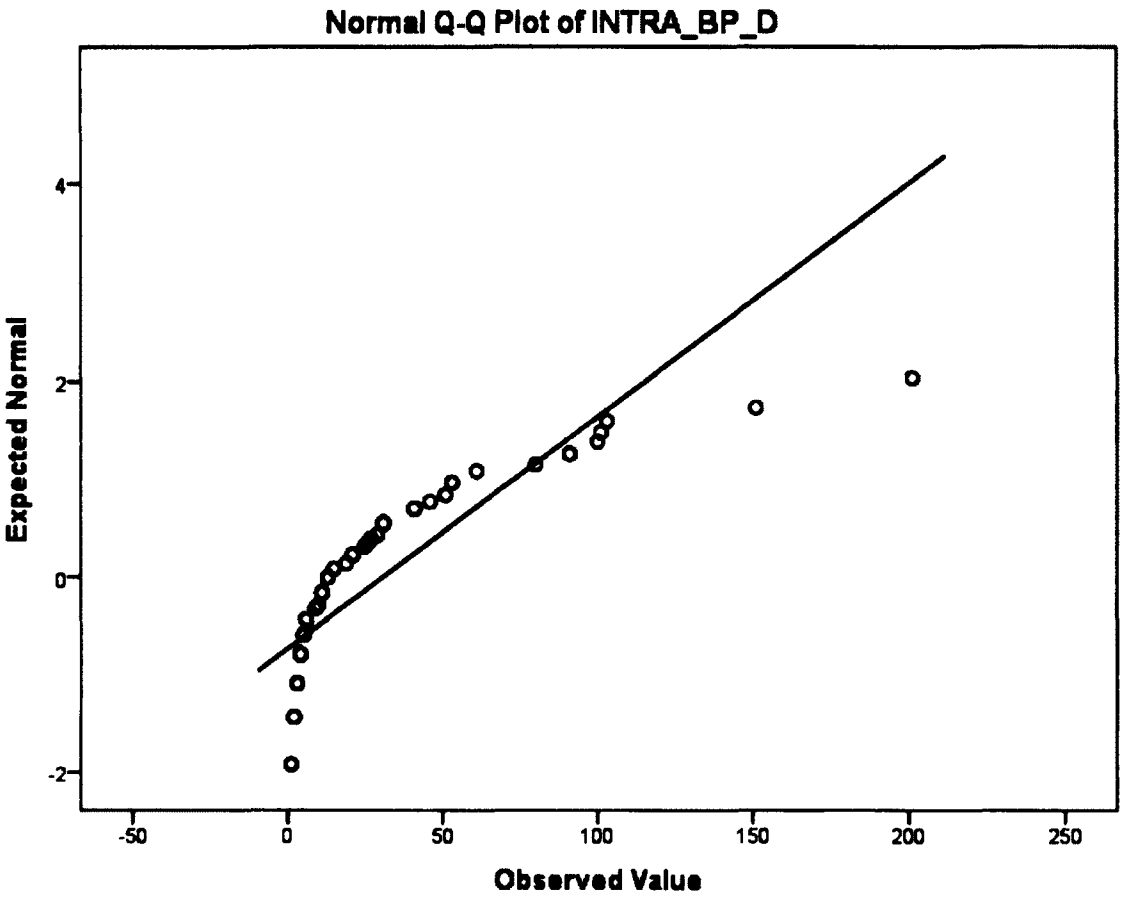

Figure 24. Normality Plot – INTRA_BP_D

(When looking back at your last deployment, approximately how many times did you discuss best practices through intra-knowledge transfer practices?)

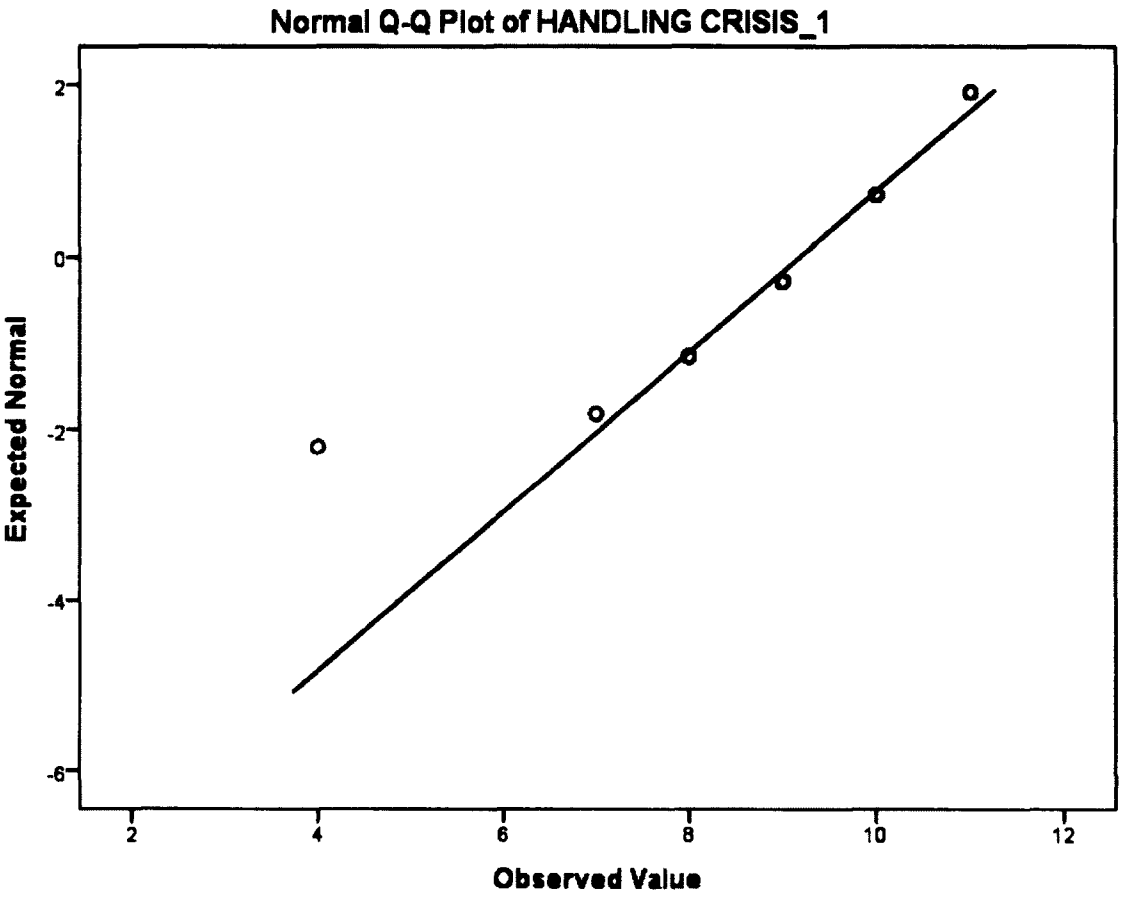

Figure 25. Normality Plot – HANDLING CRISIS_1

(When looking back at my last deployment, in a time constraint environment, I made effective decisions. Approximately, what percentage of time?)

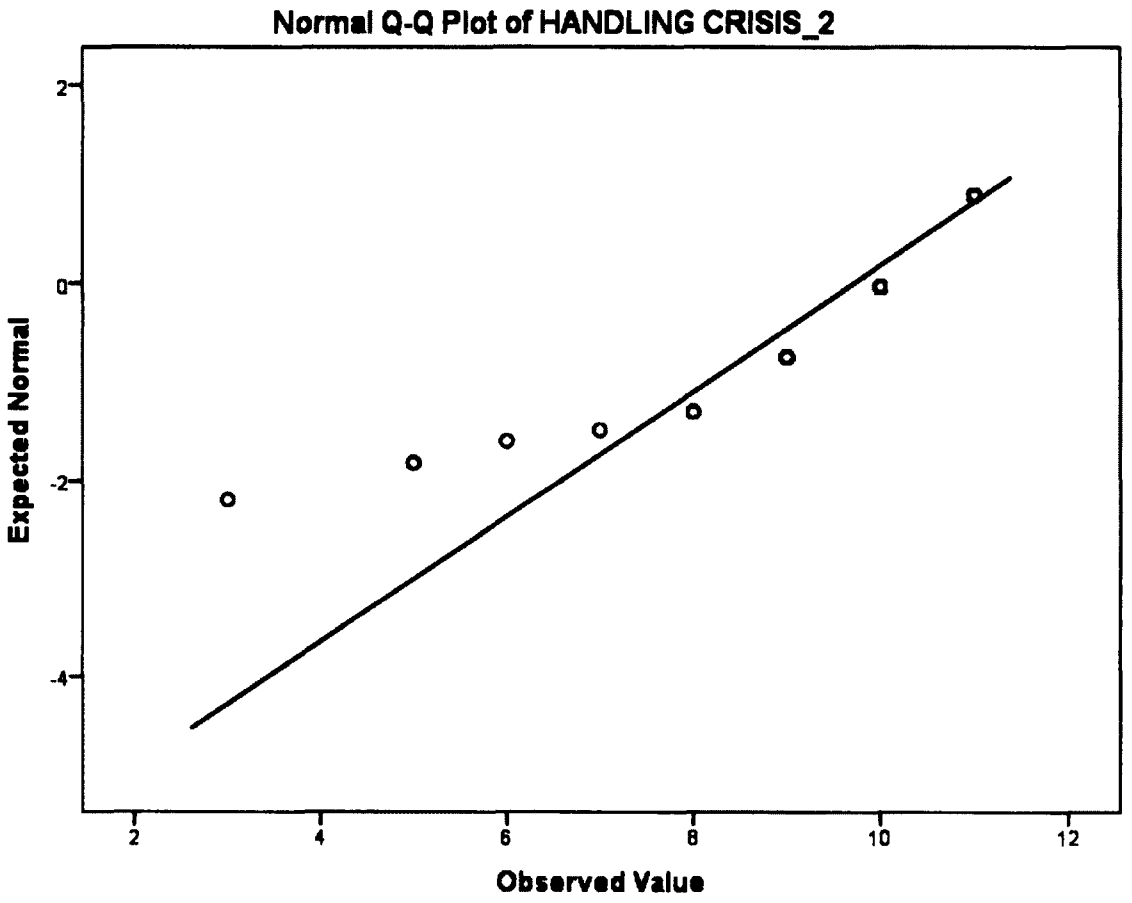

Figure 26. Normality Plot – HANDLING CRISIS_2

(When looking back at my last deployment, I performed effectively in dangerous situations. Approximately, what percentage of time?)

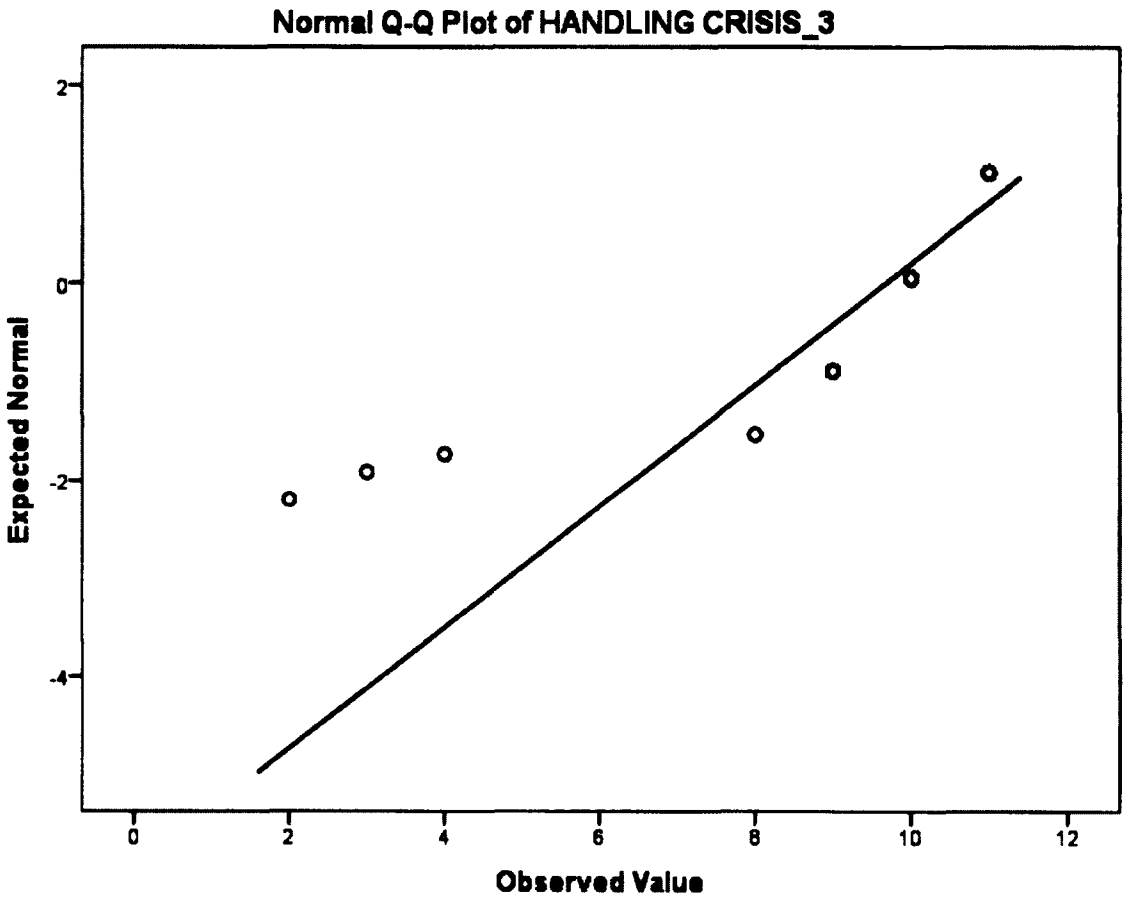

Figure 27. Normality Plot – HANDLING CRISIS_3

(When looking back at my last deployment, I acted decisively under pressure.

Approximately, what percentage of time?)

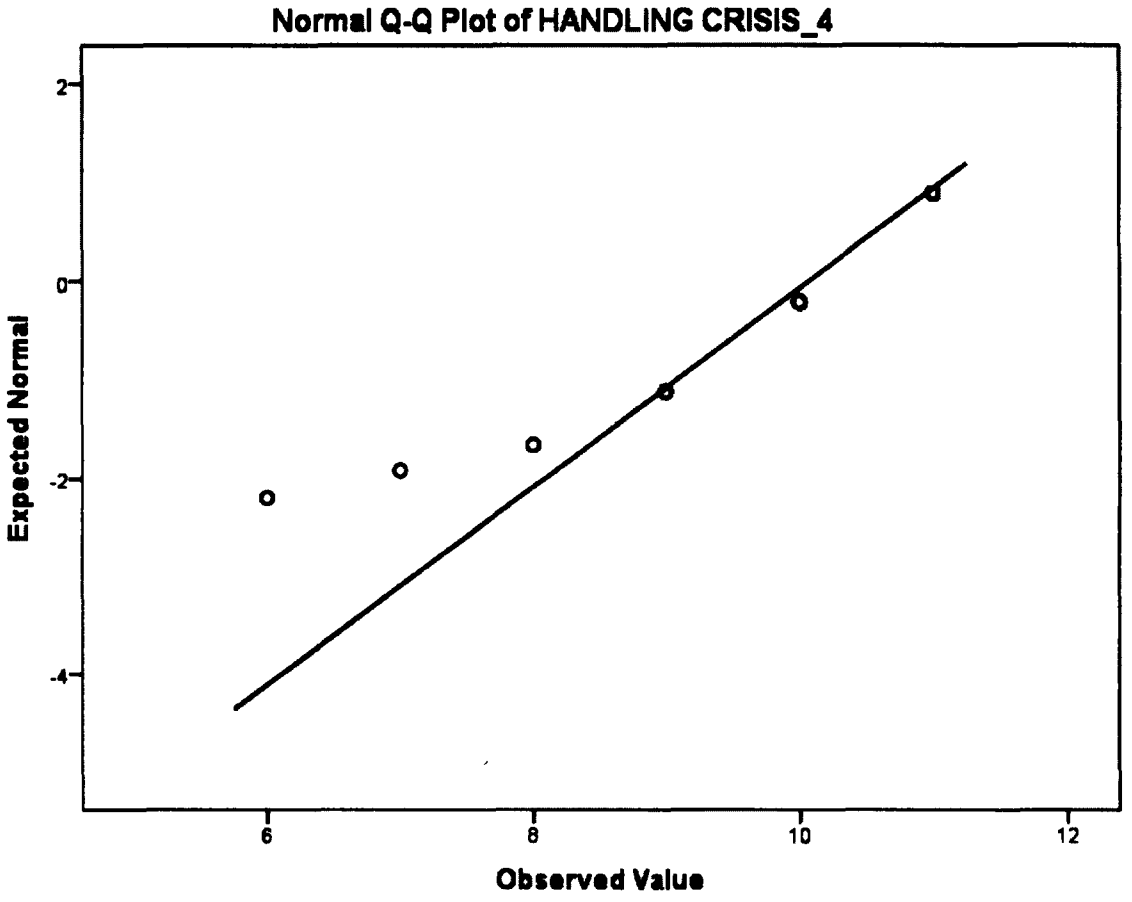

Figure 28. Normality Plot – HANDLING CRISIS_4

(When looking back at my last deployment, I was able to maintain focus during emergencies. Approximately, what percentage of time?)

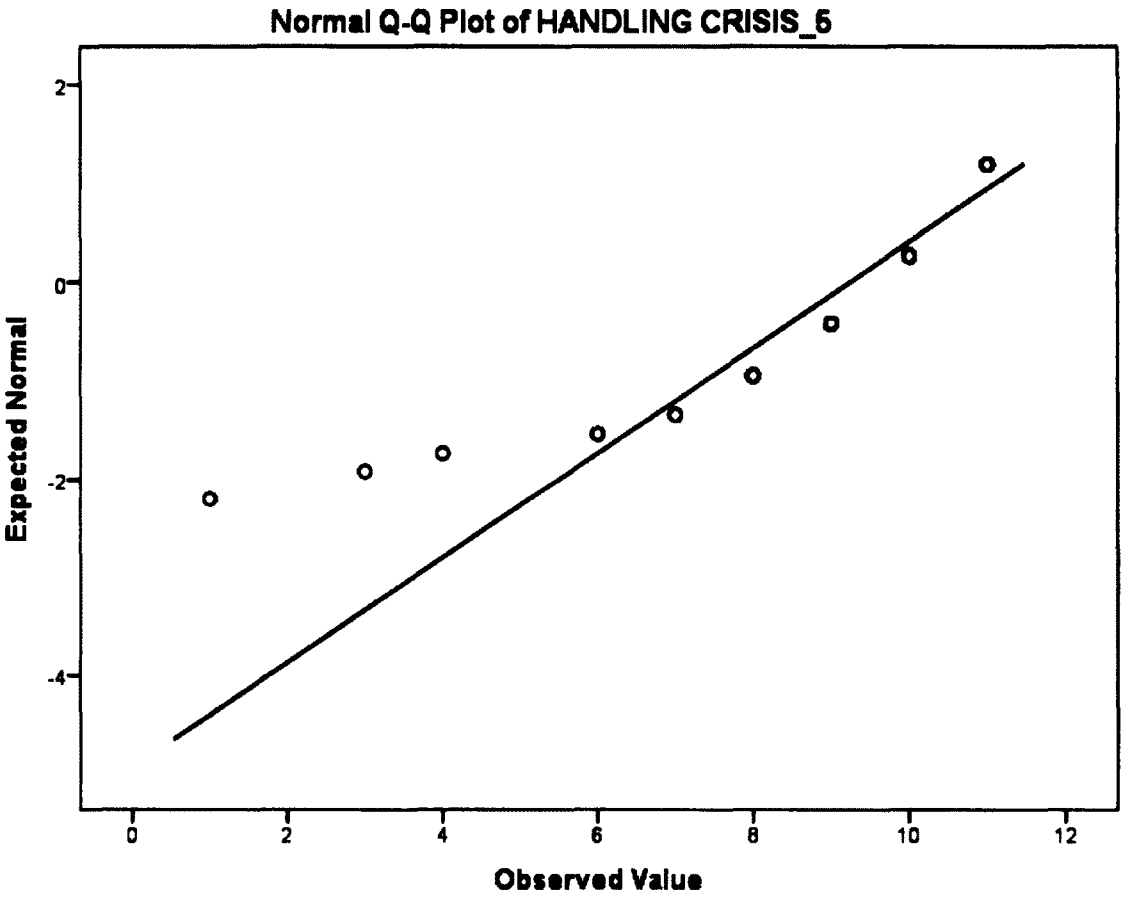

Figure 29. Normality Plot – HANDLING CRISIS_5

(When looking back at my last deployment, I made autonomous decisions effectively in dangerous situations. Approximately, what percentage of time?)

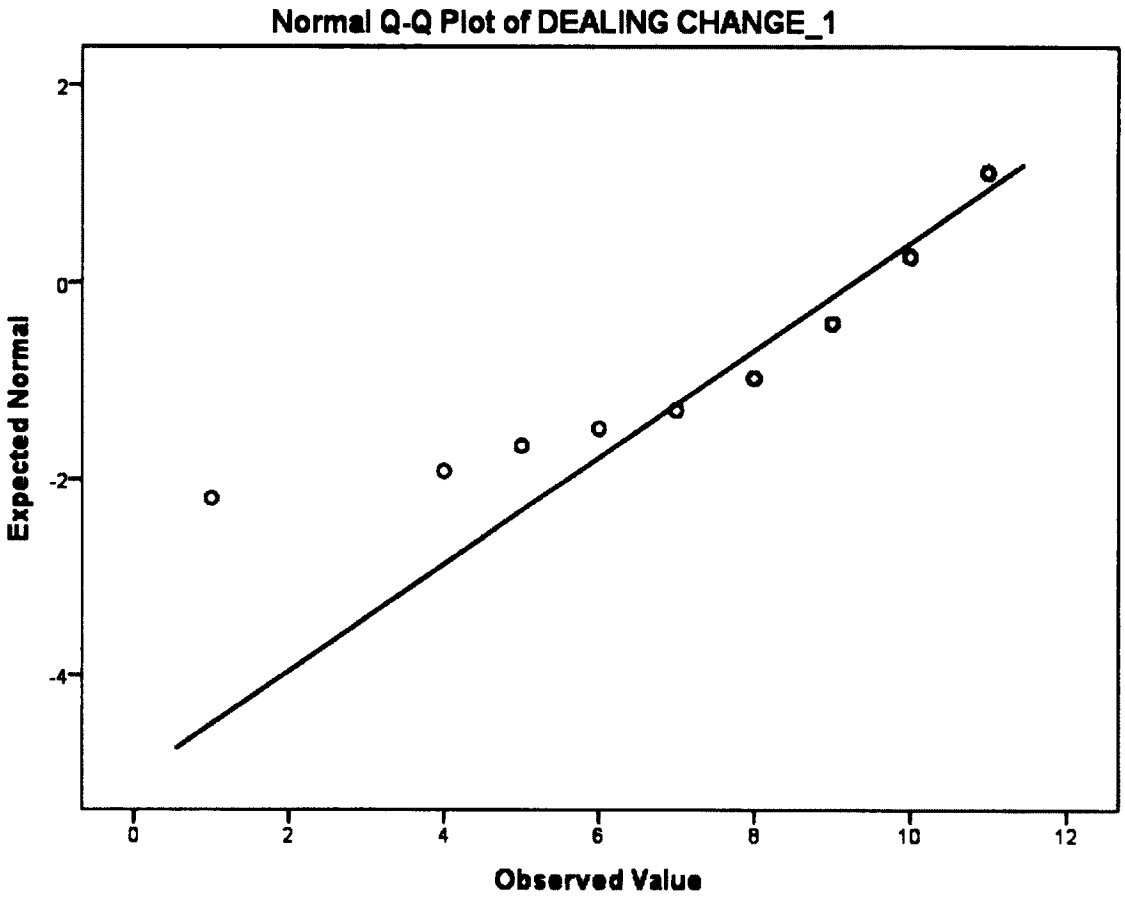

Figure 30. Normality Plot – DEALING CHANGE_1

(When looking back at my last deployment, I accomplished the mission without specific guidance. Approximately, what percentage of time?)

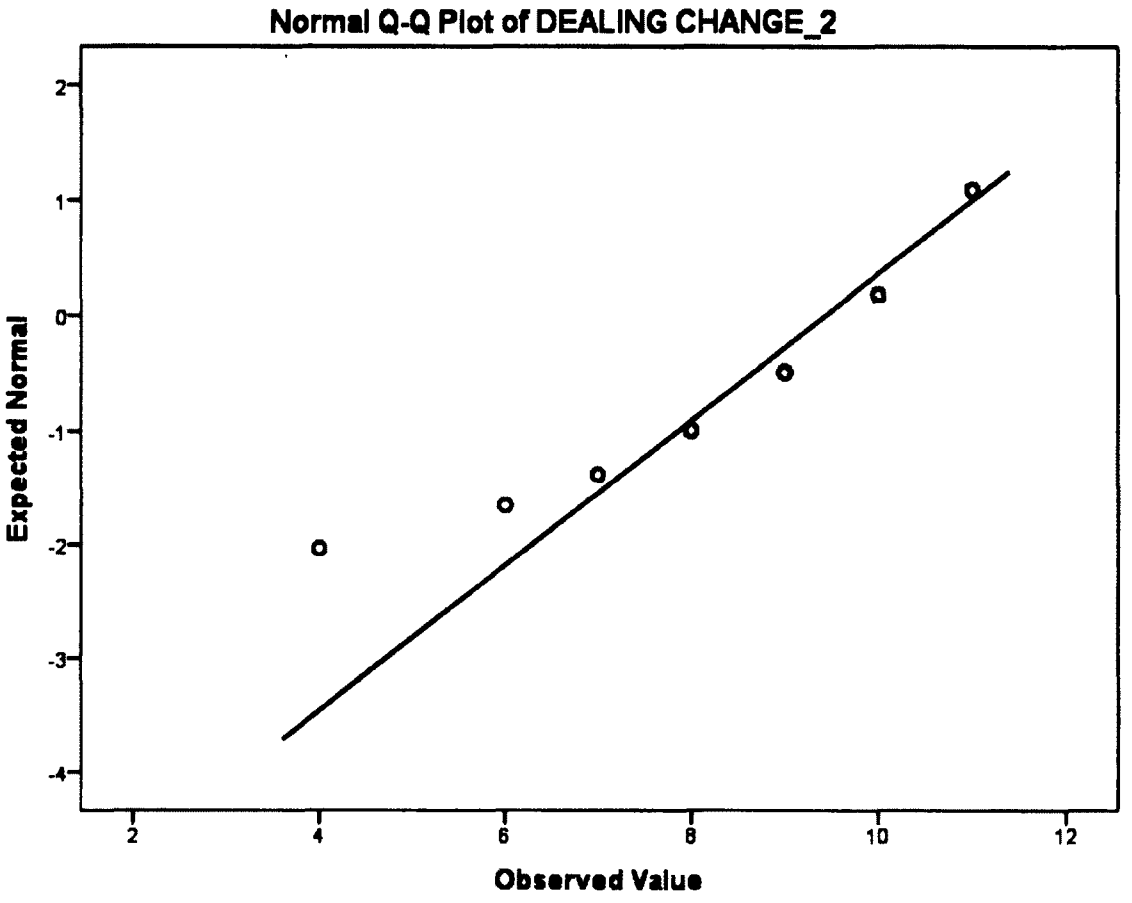

Figure 31. Normality Plot – DEALING CHANGE_2

(When looking back at my last deployment, I performed effectively when the goals of the mission, environment, roles and responsibilities changed during the mission execution. Approximately, what percentage of time?)

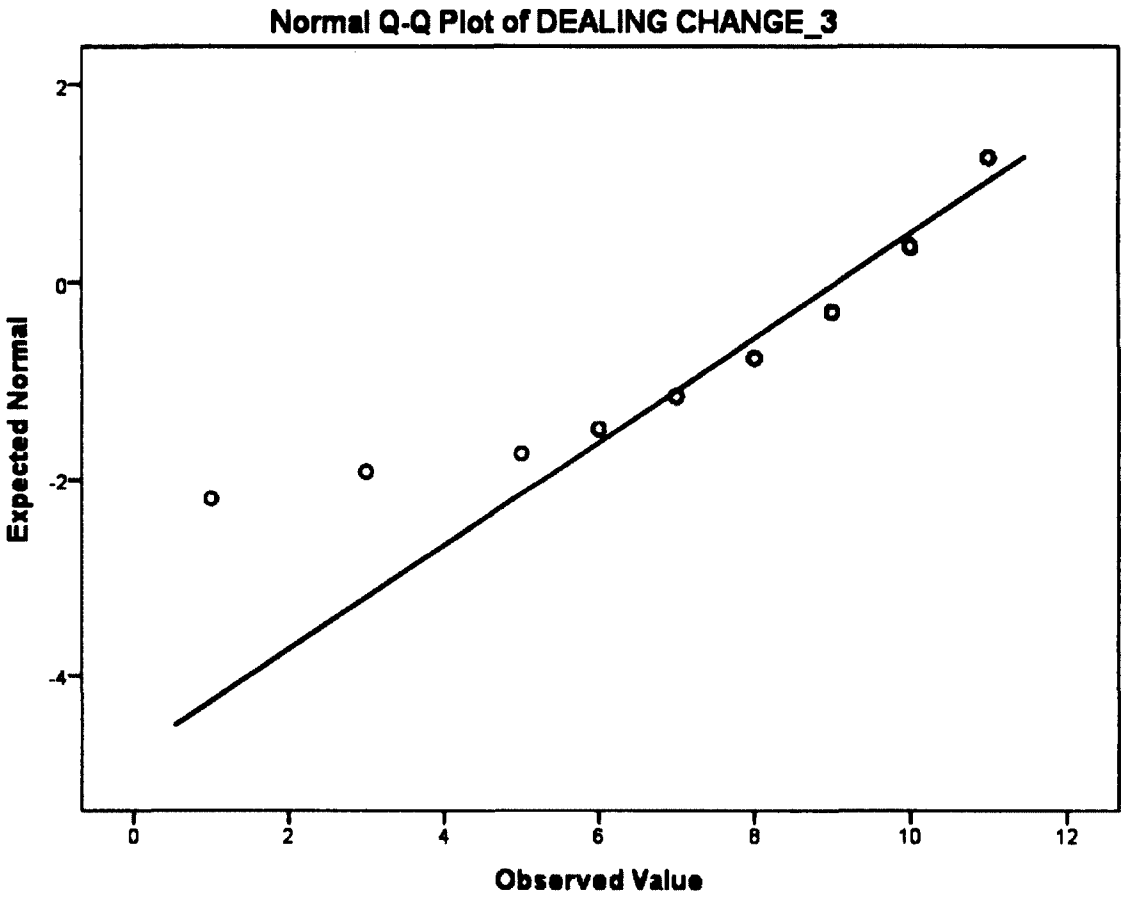

Figure 32. Normality Plot – DEALING CHANGE_3

(When looking back at my last deployment, I identified the key aspect of ambiguous situations and created new plans or modified existing ones as the situation changed. Approximately, what percentage of time?)

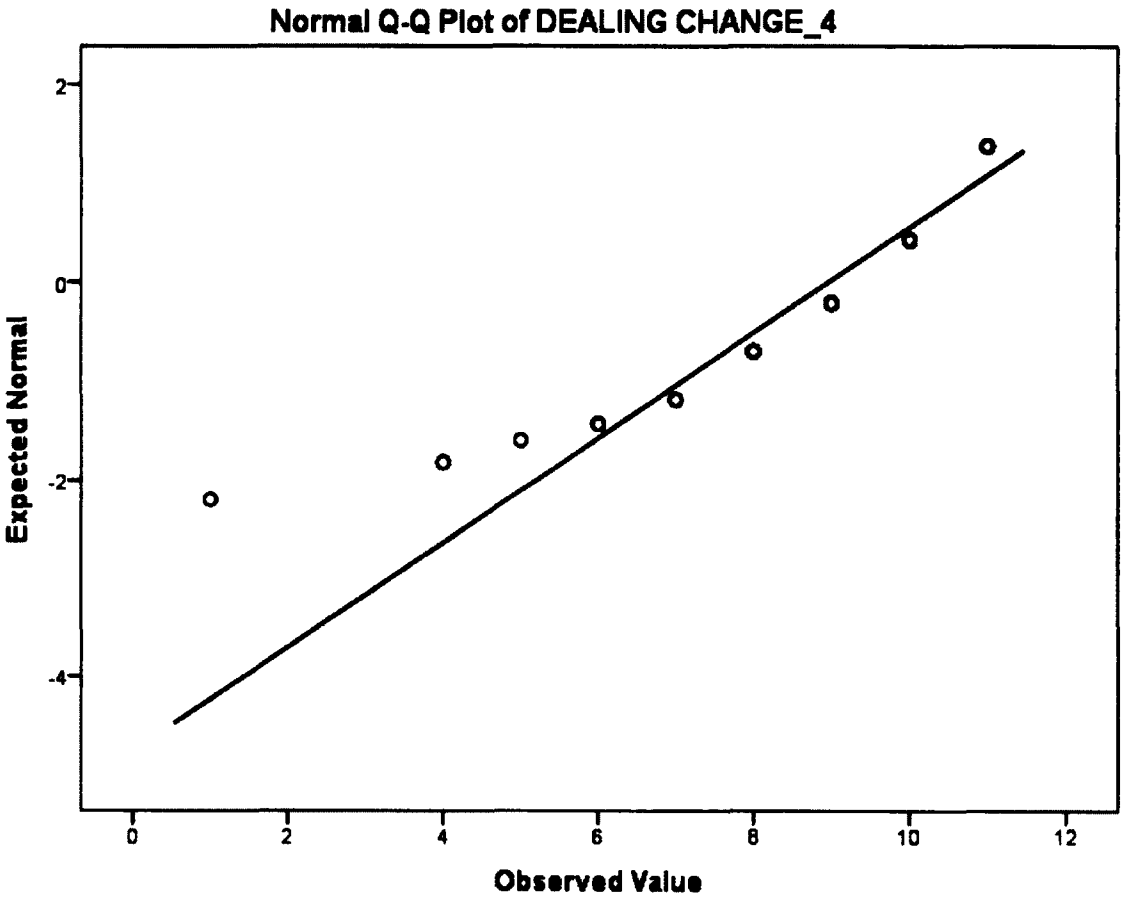

Figure 33. Normality Plot – DEALING CHANGE_4

(When looking back at my last deployment, I was able make effective decisions without all relevant information in unpredictable or changing operational situations. Approximately, what percentage of time?)

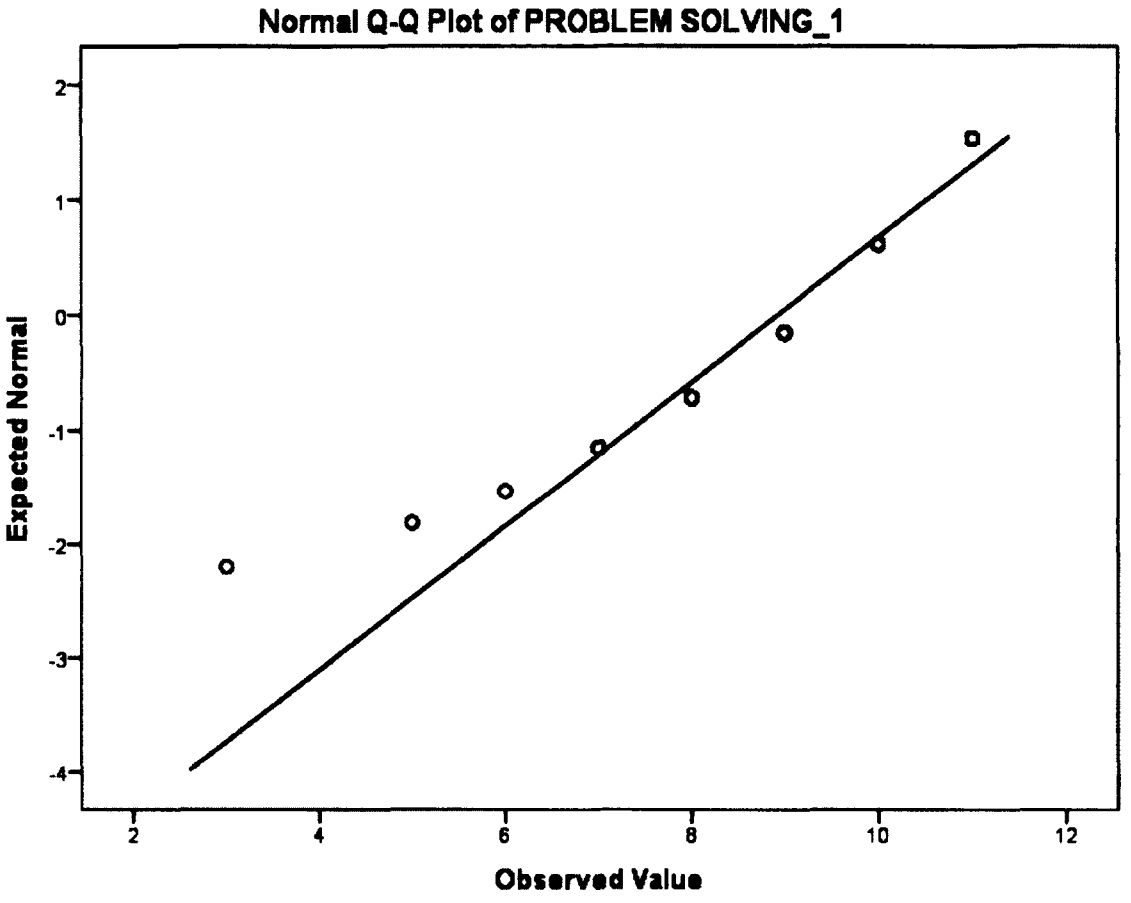

Figure 34. Normality Plot – PROBLEM SOLVING_1

(When looking back at my last deployment, I devised creative solutions to complex problems. Approximately, what percentage of time?)

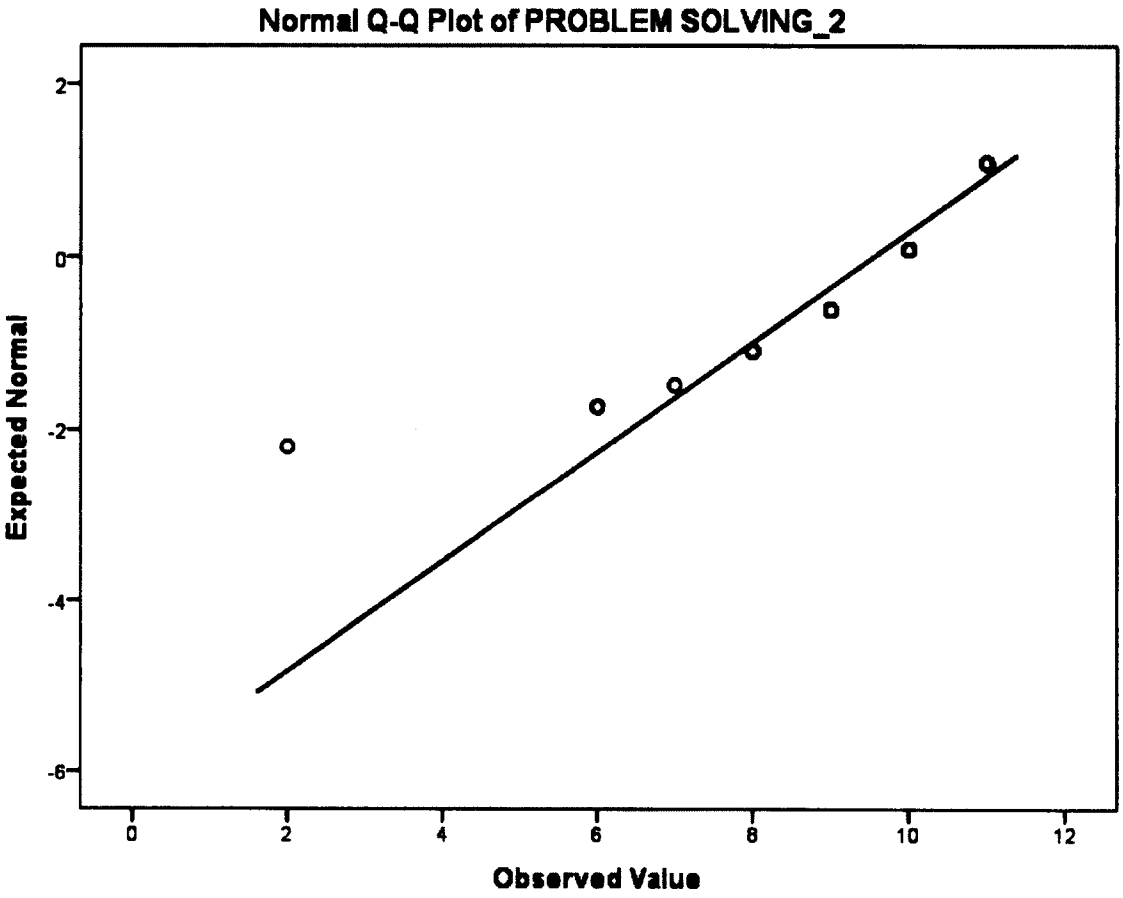

Figure 35. Normality Plot – PROBLEM SOLVING_2

(When looking back at my last deployment, I considered different perspectives and outcomes prior to making decisions. Approximately, what percentage of time?)

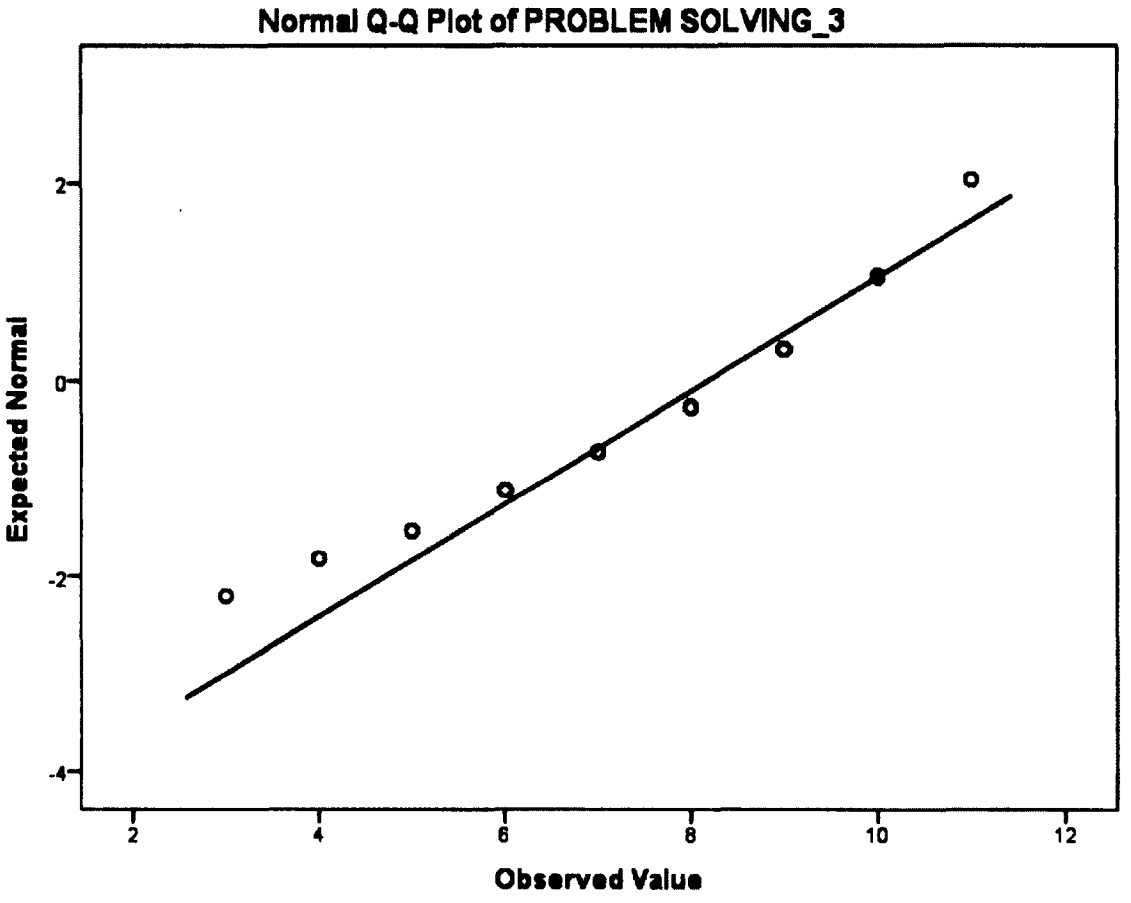

Figure 36. Normality Plot – PROBLEM SOLVING_3

(When looking back at my last deployment, I saw connections among seemingly unrelated information when solving problems. Approximately, what percentage of time?)

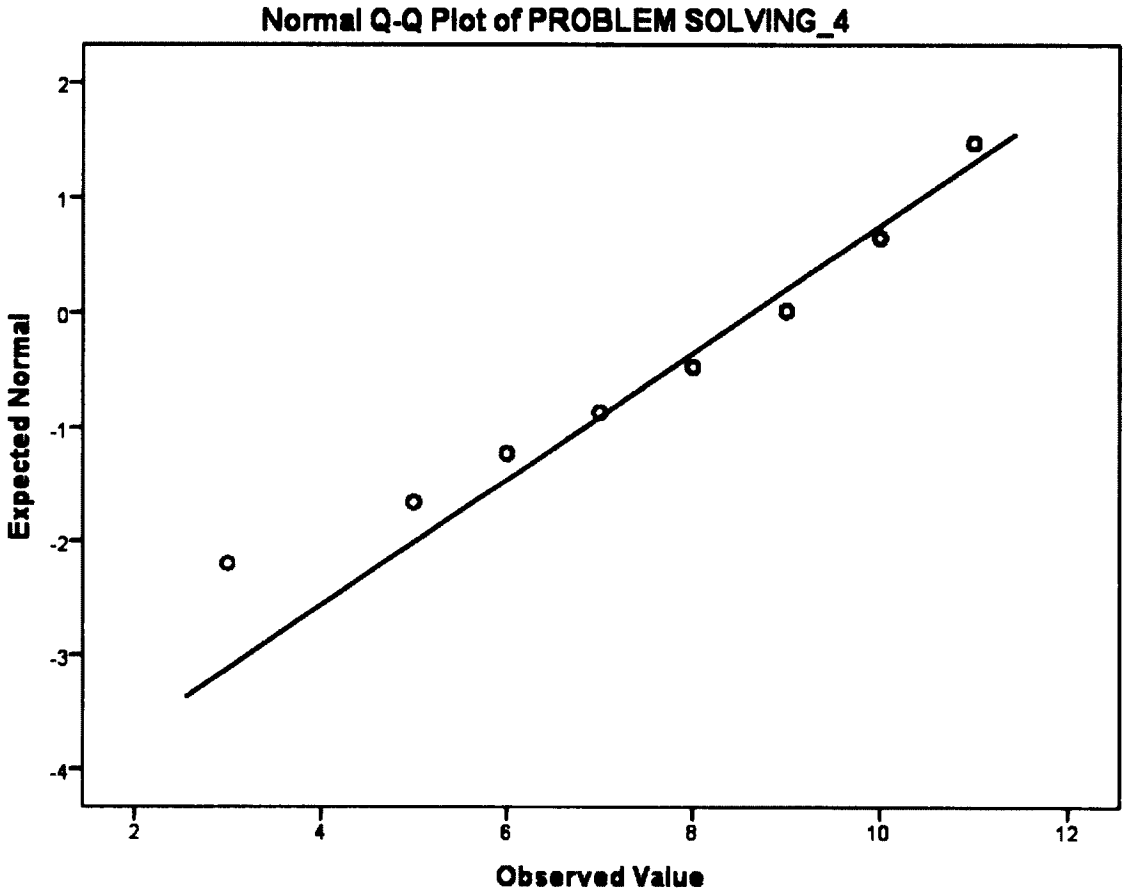

Figure 37. Normality Plot – PROBLEM SOLVING_4

(When looking back at my last deployment, I was able think out of the box when solving problems. Approximately, what percentage of time?)

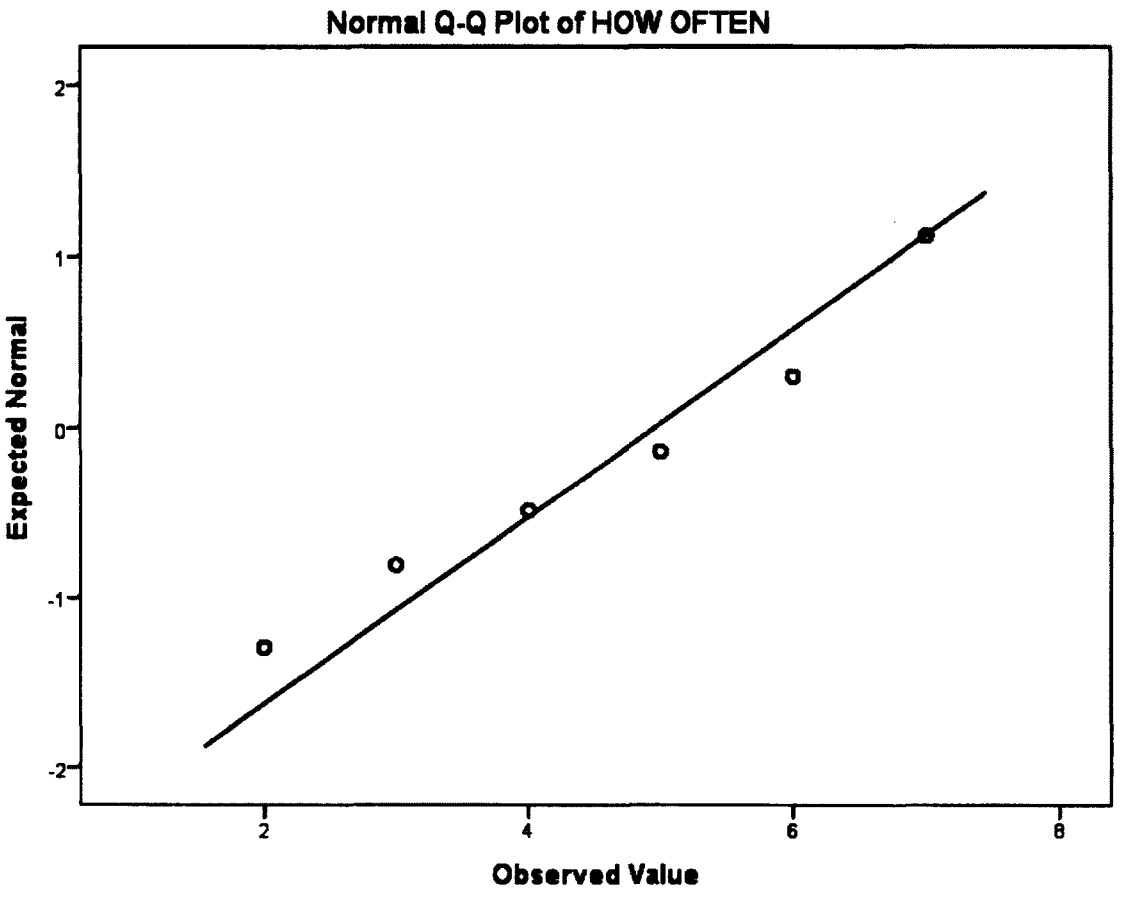

Figure 38. Normality Plot – HOW OFTEN

(When looking back at your last deployment, approximately how often did you encounter dangerous, unpredictable and challenging operational situations?)

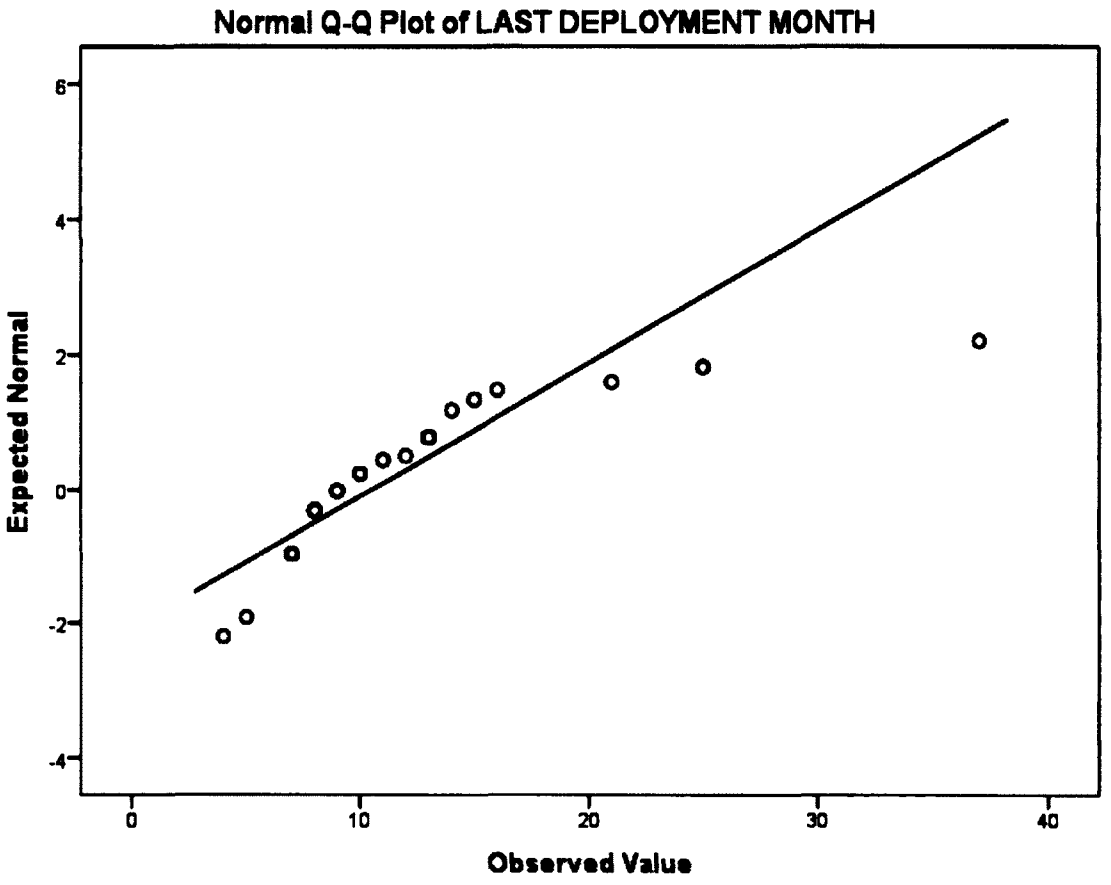

Figure 39. Normality Plot – LAST DEPLOYMENT MONTH

(What was the length of your last operational deployment in months?)

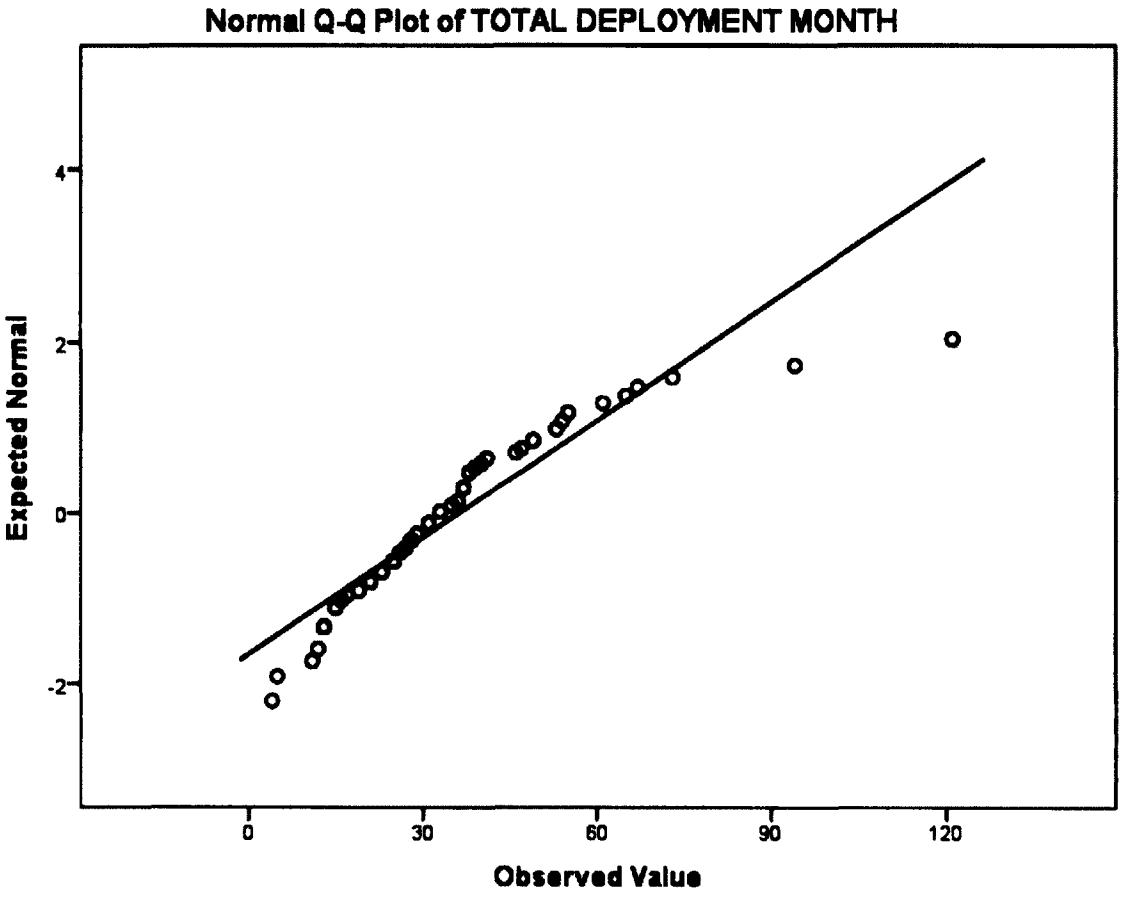

Figure 40. Normality Plot – TOTAL DEPLOYMENT MONTH

(During your military career, what is the approximate number of your total months deployed?)

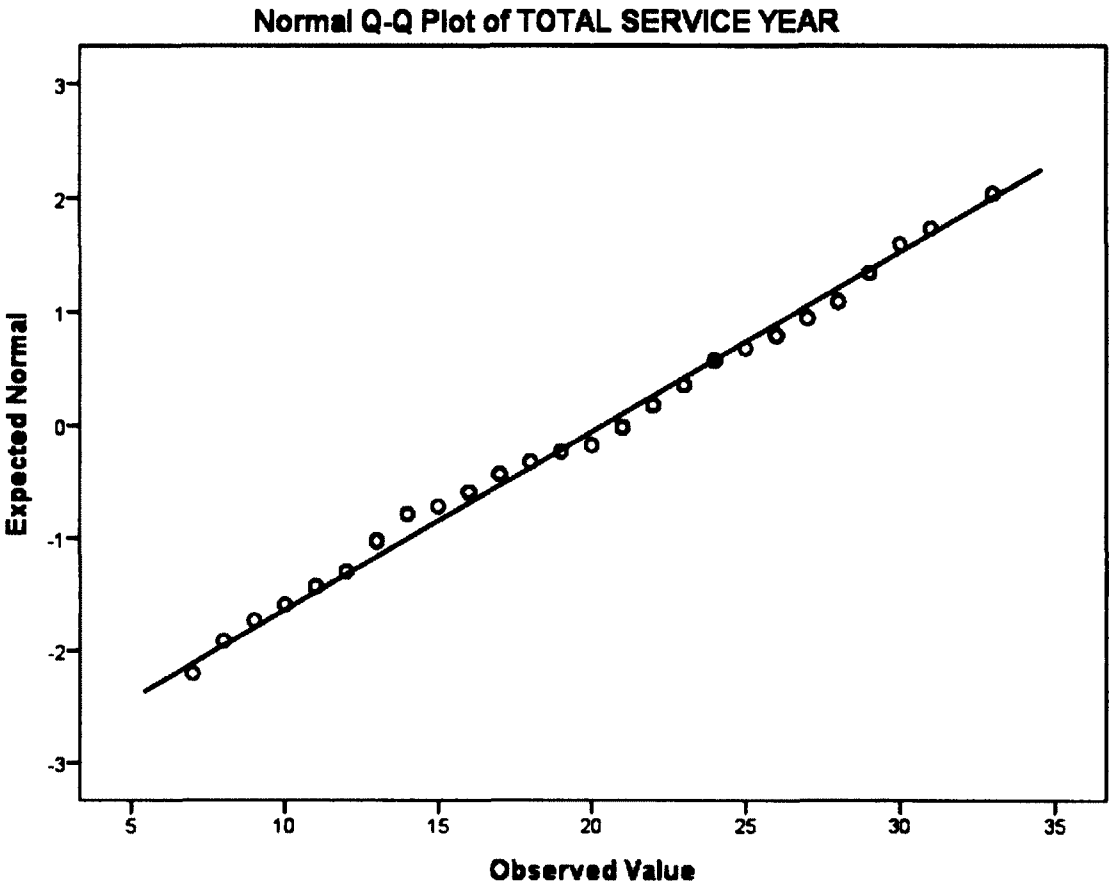

Figure 41. Normality Plot – TOTAL SERVICE YEAR

(What is the length of your total military service experience in years?)

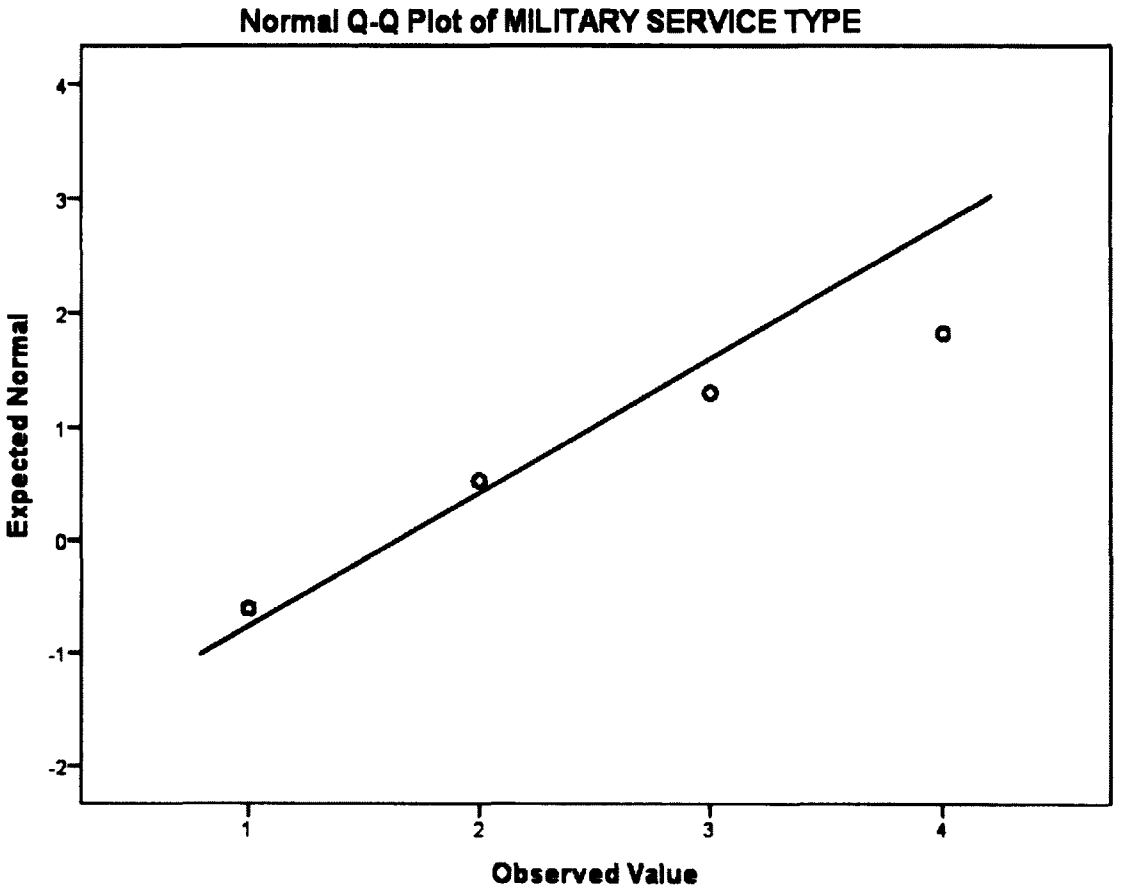

Figure 42. Normality Plot – MILITARY SERVICE TYPE

(Select your military service.)

APPENDIX F: CORRELATION ANALYSIS

Table 108. Correlation Analysis for Knowledge Transfer – Handling Crisis Variables

Spearman's rho		HANDLING CRISIS_1	HANDLING CRISIS_2	HANDLING CRISIS_3	HANDLING CRISIS_4	HANDLING CRISIS_5
INTER_LL_S	Correlation Coefficient	.169	.192**	.021**	-.065**	.007**
	Sig. (2-tailed)	.158	.108	.859	.590	.953
	N	71	71	71	71	71
INTER_BP_S	Correlation Coefficient	.151**	.191	-.038**	-.068**	-.051**
	Sig. (2-tailed)	.209	.110	.752	.576	.675
	N	71	71	71	71	71
INTER_LL_D	Correlation Coefficient	.173**	.231**	.036	.034**	.020**
	Sig. (2-tailed)	.149	.053	.764	.781	.868
	N	71	71	71	71	71
INTER_BP_D	Correlation Coefficient	.151**	.233**	.081**	.019	.009**
	Sig. (2-tailed)	.208	.051	.501	.875	.940
	N	71	71	71	71	71
INTRA_LL_S	Correlation Coefficient	.099**	.063**	-.056**	-.067**	.024
	Sig. (2-tailed)	.411	.600	.645	.579	.842
	N	71	71	71	71	71
INTRA_BP_S	Correlation Coefficient	.157**	.117**	-.046**	-.032**	.062**
	Sig. (2-tailed)	.192	.333	.703	.792	.606
	N	71	71	71	71	71
INTRA_LL_D	Correlation Coefficient	.241**	.165**	.020**	-.007**	-.002**
	Sig. (2-tailed)	.043	.170	.866	.951	.988
	N	71	71	71	71	71
INTRA_BP_D	Correlation Coefficient	.247**	.220**	.002**	-.002**	.061**
	Sig. (2-tailed)	.038	.065	.984	.990	.616
	N	71	71	71	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 109. Correlation Analysis for Knowledge Transfer – Dealing with Change Variables

Spearman's rho		DEALING CHANGE_1	DEALING CHANGE_2	DEALING CHANGE_3	DEALING CHANGE_4
INTER_LL_S	Correlation Coefficient	.026**	.133**	-.129**	.121
	Sig. (2-tailed)	.827	.269	.282	.316
	N	71	71	71	71
INTER_BP_S	Correlation Coefficient	.007**	.153**	-.061**	.092**
	Sig. (2-tailed)	.951	.202	.614	.444
	N	71	71	71	71
INTER_LL_D	Correlation Coefficient	.002**	.086**	-.073**	.092**
	Sig. (2-tailed)	.985	.473	.547	.446
	N	71	71	71	71
INTER_BP_D	Correlation Coefficient	-.046**	.122**	.020**	.130**
	Sig. (2-tailed)	.701	.309	.869	.281
	N	71	71	71	71
INTRA_LL_S	Correlation Coefficient	.184**	.131**	-.164**	.117**
	Sig. (2-tailed)	.125	.275	.171	.333
	N	71	71	71	71
INTRA_BP_S	Correlation Coefficient	.191	.176**	-.097**	.148**
	Sig. (2-tailed)	.111	.141	.423	.218
	N	71	71	71	71
INTRA_LL_D	Correlation Coefficient	.104**	.133	-.185**	.041**
	Sig. (2-tailed)	.389	.267	.123	.733
	N	71	71	71	71
INTRA_BP_D	Correlation Coefficient	.126**	.218**	-.082	.112**
	Sig. (2-tailed)	.294	.068	.497	.353
	N	71	71	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 110. Correlation Analysis for Knowledge Transfer – Problem Solving Variables

Spearman's rho		PROBLEM SOLVING_1	PROBLEM SOLVING_2	PROBLEM SOLVING_3	PROBLEM SOLVING_4
INTER_LL_S	Correlation Coefficient	-.019**	-.122**	.050**	.082**
	Sig. (2-tailed)	.874	.309	.676	.497
	N	71	71	71	71
INTER_BP_S	Correlation Coefficient	-.044	-.108**	.055**	.081**
	Sig. (2-tailed)	.718	.370	.647	.501
	N	71	71	71	71
INTER_LL_D	Correlation Coefficient	-.052**	-.065	.023**	.060**
	Sig. (2-tailed)	.667	.592	.848	.618
	N	71	71	71	71
INTER_BP_D	Correlation Coefficient	-.054**	-.021**	.034	.073**
	Sig. (2-tailed)	.654	.863	.779	.545
	N	71	71	71	71
INTRA_LL_S	Correlation Coefficient	-.050**	-.019**	.123**	.147
	Sig. (2-tailed)	.681	.876	.307	.220
	N	71	71	71	71
INTRA_BP_S	Correlation Coefficient	-.003**	.019**	.180**	.205**
	Sig. (2-tailed)	.983	.874	.133	.086
	N	71	71	71	71
INTRA_LL_D	Correlation Coefficient	-.073**	-.017**	.078**	.071**
	Sig. (2-tailed)	.547	.888	.516	.554
	N	71	71	71	71
INTRA_BP_D	Correlation Coefficient	-.057**	.054**	.106**	.124**
	Sig. (2-tailed)	.635	.654	.378	.303
	N	71	71	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 111. Correlation Analysis for Demographics and Inter-K/T Variables

Spearman's rho		INTER_LL_S	INTER_BP_S	INTER_LL_D	INTER_BP_D
HOW OFTEN	Correlation Coefficient	.216	.245*	.234*	.221
	Sig. (2-tailed)	.070	.040	.050	.064
	N	71	71	71	71
LAST DEPLOYMENT MONTH	Correlation Coefficient	.189	.218	.124	.119
	Sig. (2-tailed)	.114	.068	.304	.321
	N	71	71	71	71
TOTAL DEPLOYMENT MONTH	Correlation Coefficient	.141	.174	.199	.191
	Sig. (2-tailed)	.241	.147	.097	.111
	N	71	71	71	71
TOTAL SERVICE YEAR	Correlation Coefficient	-.185	-.195	-.133	-.128
	Sig. (2-tailed)	.123	.103	.269	.289
	N	71	71	71	71

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 112. Correlation Analysis for Demographics and Intra-K/T Variables

Spearman's rho		INTRA_LL_S	INTRA_BP_S	INTRA_LL_D	INTRA_BP_D
HOW OFTEN	Correlation Coefficient	.318**	.395**	.339**	.333**
	Sig. (2-tailed)	.007	.001	.004	.005
	N	71	71	71	71
LAST DEPLOYMENT MONTH	Correlation Coefficient	.143	.137	.114	.067
	Sig. (2-tailed)	.234	.254	.344	.578
	N	71	71	71	71
TOTAL DEPLOYMENT MONTH	Correlation Coefficient	.133	.126	.106	.128
	Sig. (2-tailed)	.270	.295	.379	.287
	N	71	71	71	71
TOTAL SERVICE YEAR	Correlation Coefficient	-.093	-.094	-.162	-.127
	Sig. (2-tailed)	.440	.438	.177	.290
	N	71	71	71	71

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 113. Correlation Analysis for Demographics and Handling Crisis Variables

Spearman's rho		HANDLING CRISIS_1	HANDLING CRISIS_2	HANDLING CRISIS_3	HANDLING CRISIS_4	HANDLING CRISIS_5
HOW OFTEN	Correlation Coefficient	.262*	.089	.105	.057	.034
	Sig. (2-tailed)	.028	.463	.382	.636	.781
	N	71	71	71	71	71
LAST DEPLOYMENT MONTH	Correlation Coefficient	.042	.065	-.043	-.039	.009
	Sig. (2-tailed)	.728	.589	.721	.749	.944
	N	71	71	71	71	71
TOTAL DEPLOYMENT MONTH	Correlation Coefficient	.215	.199	-.059	-.029	.010
	Sig. (2-tailed)	.071	.097	.624	.811	.933
	N	71	71	71	71	71
TOTAL SERVICE YEAR	Correlation Coefficient	-.025	-.115	-.048	-.113	.058
	Sig. (2-tailed)	.833	.341	.689	.347	.634
	N	71	71	71	71	71

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 114. Correlation Analysis for Demographics and Dealing with Change Variables

Spearman's rho		DEALING CHANGE_1	DEALING CHANGE_2	DEALING CHANGE_3	DEALING CHANGE_4
HOW OFTEN	Correlation Coefficient	.078	.064	-.011	.122
	Sig. (2-tailed)	.518	.595	.925	.313
	N	71	71	71	71
LAST DEPLOYMENT MONTH	Correlation Coefficient	.215	.058	-.098	.059
	Sig. (2-tailed)	.072	.633	.418	.626
	N	71	71	71	71
TOTAL DEPLOYMENT MONTH	Correlation Coefficient	-.003	-.063	.015	.129
	Sig. (2-tailed)	.978	.603	.903	.285
	N	71	71	71	71
TOTAL SERVICE YEAR	Correlation Coefficient	.186	.009	.029	.139
	Sig. (2-tailed)	.121	.942	.808	.248
	N	71	71	71	71

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 115. Correlation Analysis for Demographics and Problem Solving Variables

Spearman's rho		PROBLEM SOLVING_1	PROBLEM SOLVING_2	PROBLEM SOLVING_3	PROBLEM SOLVING_4
HOW OFTEN	Correlation Coefficient	.259*	.162	.377**	.341**
	Sig. (2-tailed)	.029	.176	.001	.004
	N	71	71	71	71
LAST DEPLOYMENT MONTH	Correlation Coefficient	.005	.052	.005	-.031
	Sig. (2-tailed)	.965	.665	.965	.795
	N	71	71	71	71
TOTAL DEPLOYMENT MONTH	Correlation Coefficient	.040	.151	.103	.127
	Sig. (2-tailed)	.743	.209	.391	.291
	N	71	71	71	71
TOTAL SERVICE YEAR	Correlation Coefficient	.189	.233	.065	.092
	Sig. (2-tailed)	.114	.051	.593	.444
	N	71	71	71	71

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

APPENDIX G: ADDITIONAL REGRESSION ANALYSIS

Table 116. Regression Analysis for Knowledge Transfer and Handling Crisis Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.120[a]	.015	.000	.99988667	.015	1.016	1	69	.317
a. Predictors: (Constant), KNOWLEDGE TRANSFER									

Table 117. Regression Analysis for Knowledge Transfer and Dealing with Change Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.142[a]	.020	.006	.99700263	.020	1.422	1	69	.237
a. Predictors: (Constant), KNOWLEDGE TRANSFER									

Table 118. Regression Analysis for Knowledge Transfer and Problem Solving Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.131[a]	.017	.003	.99855610	.017	1.203	1	69	.277
a. Predictors: (Constant), KNOWLEDGE TRANSFER									

Table 119. Regression Analysis for Inter-Knowledge Transfer and Handling Crisis Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.121[a]	.015	.000	.99977244	.015	1.032	1	69	.313
a. Predictors: (Constant), INTER-K/T									

Table 120. Regression Analysis for Inter-Knowledge Transfer and Dealing with Change Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.153[a]	.023	.009	.99537792	.023	1.652	1	69	.203
a. Predictors: (Constant), INTER-K/T									

Table 121. Regression Analysis for Inter-Knowledge Transfer and Problem Solving Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.117[a]	.014	-.001	1.00026880	.014	.962	1	69	.330
a. Predictors: (Constant), INTER-K/T									

Table 122. Regression Analysis for Intra-Knowledge Transfer and Handling Crisis Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.111[a]	.012	-.002	1.00098601	.012	.862	1	69	.356
a. Predictors: (Constant), INTRA-K/T									

Table 123. Regression Analysis for Intra-Knowledge Transfer and Dealing with Change Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.120[a]	.014	.000	.99994340	.014	1.008	1	69	.319
a. Predictors: (Constant), INTRA-K/T									

Table 124. Regression Analysis for Intra-Knowledge Transfer and Problem Solving Constructs

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.136[a]	.019	.004	.99782329	.019	1.306	1	69	.257
a. Predictors: (Constant), INTRA-K/T									

Table 125. Regression Analysis for How Often and Operational Adaptability Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.184[a]	.034	.020	.99007364	.034	2.411	1	69	.125
a. Predictors: (Constant), HOW OFTEN									

Table 126. Regression Analysis for How Often and Handling Crisis Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.089[a]	.008	-.006	1.00321465	.008	.552	1	69	.460
a. Predictors: (Constant), HOW OFTEN									

Table 127. Regression Analysis for How Often and Dealing with Change Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.076[a]	.006	-.009	1.00432597	.006	.398	1	69	.530
a. Predictors: (Constant), HOW OFTEN									

Table 128. Regression Analysis for How Often and Problem Solving Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.368[a]	.135	.123	.93651373	.135	10.812	1	69	.002
a. Predictors: (Constant), HOW OFTEN									

Table 129. Regression Analysis for Last Deployment and Operational Adaptability Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.037[a]	.001	-.013	1.00652965	.001	.095	1	69	.759
a. Predictors: (Constant), LAST DEPLOYMENT MONTH									

Table 130. Regression Analysis for Last Deployment and Handling Crisis Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.057[a]	.003	-.011	1.00559133	.003	.224	1	69	.638
a. Predictors: (Constant), LAST DEPLOYMENT MONTH									

Table 131. Regression Analysis for Last Deployment and Dealing with Change Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.054[a]	.003	-.012	1.00575776	.003	.201	1	69	.655
a. Predictors: (Constant), LAST DEPLOYMENT MONTH									

Table 132. Regression Analysis for Last Deployment and Problem Solving Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.053[a]	.003	-.012	1.00581363	.003	.193	1	69	.662
a. Predictors: (Constant), LAST DEPLOYMENT MONTH									

Table 133. Regression Analysis for Total Deployment and Operational Adaptability Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.132[a]	.017	.003	.99840512	.017	1.224	1	69	.272
a. Predictors: (Constant), TOTAL DEPLOYMENT MONTH									

Table 134. Regression Analysis for Total Deployment and Handling Crisis Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.160[a]	.025	.011	.99431260	.025	1.803	1	69	.184
a. Predictors: (Constant), TOTAL DEPLOYMENT MONTH									

Table 135. Regression Analysis for Total Deployment and Dealing with Change Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.012[a]	.000	-.014	1.00714564	.000	.010	1	69	.920
a. Predictors: (Constant), TOTAL DEPLOYMENT MONTH									

Table 136. Regression Analysis for Total Deployment and Problem Solving Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.173a	.030	.016	.99210440	.030	2.119	1	69	.150
a. Predictors: (Constant), TOTAL DEPLOYMENT MONTH									

Table 137. Regression Analysis for Service Year and Operational Adaptability Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.044[a]	.002	-.013	1.00625905	.002	.132	1	69	.718
a. Predictors: (Constant), TOTAL SERVICE YEAR									

Table 138. Regression Analysis for Service Year and Handling Crisis Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.119[a]	.014	.000	1.00006674	.014	.991	1	69	.323
a. Predictors: (Constant), TOTAL SERVICE YEAR									

Table 139. Regression Analysis for Service Year and Dealing with Change Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.142[a]	.020	.006	.99702281	.020	1.419	1	69	.238
a. Predictors: (Constant), TOTAL SERVICE YEAR									

Table 140. Regression Analysis for Service Year and Problem Solving Construct

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.202[a]	.041	.027	.98638552	.041	2.946	1	69	.091
a. Predictors: (Constant), TOTAL SERVICE YEAR									

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