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Agile Knowledge Management; A Review, Reconceptualization, and Extension to Military Applications

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AGILE KNOWLEDGE MANAGEMENT; A REVIEW, RECONCEPTUALIZATION, AND EXTENSION TO MILITARY APPLICATIONS

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ABSTRACT

AGILE KNOWLEDGE MANAGEMENT: A REVIEW, RECONCEPTUALIZATION, AND EXTENSION TO MILITARY APPLICATIONS

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The purpose of this research is to explore the conceptual background of agility in knowledge management, re-conceptualize it and extend it to military applications with a special focus on Counterinsurgency (COIN).

An initial qualitative exploration of agility in knowledge management was performed. Three different concepts and their interrelationships were analyzed: (1) knowledge management, (2) agility in operations, and (3) military organizations in the COIN environment. Findings from this initial qualitative analysis were used to inductively redefine, re-conceptualize and extend the concept of Agile Knowledge Management (AKM), as well as, to compare and adapt the AKM concept to the military environment of COIN.

An additional qualitative analysis was performed to validate the extended concept of AKM.

While this study is mainly focused on AKM in dynamic multinational and joint military environment of COIN, conclusions may be applicable in a broader context.

The results of this research can be used by engineering managers and knowledge management practitioners and academics with particular focus on the military environment as foundation for (a) further research and development in agile knowledge management (b) developing customized agile knowledge management education programs and (c) extending the concept of AKM and its application to other environments.

This dissertation is dedicated to my late father, Fikri Öztürk.
I know he watches me and he is proud!

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I have to admit that there are many people who supported me to complete this dissertation. At the end although it will be a product under my name, I could not be able finalize this study without those individuals' extensive support and efforts.

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Last of all, I would like to thank my parents for their solid education, love and unconditional support over the last 40 years. I have always felt my mother's prayer blessing me. And, I have always believed my late father is watching me.

NOMENCLATURE

ACAP	Absorptive Capacity
AFKN	Air Force Knowledge Now
BCKS	Battle Command Knowledge System
AKE	Agile Enterprise
AKO	Army Knowledge Online
AKM	Agile Knowledge Management
ASD	Agile Software Development
CA	Comprehensive Approach
CALL	Center for Army Lessons Learned
CAS	Complex Adaptive System
CEO	Chief Executive Officer
CIO	Chief Information Officer
COIN	Counterinsurgency
CoP	Community of Practice
DKO	Defense Knowledge Online
DoD	Department of Defence
DON	Department of the Navy
DOTMLPFI	Doctrine, Organization, Training, Material, Leadership and Education, Personnel, Facility, Interoperability
eKM	Enterprise Knowledge Management
EU	European Union
HQ	Headquarter
HN	Host Nation
IM	Information Management
IO(s)	International Organization(s)
IS	Information Science
IT	Information Technology
JKO	Joint Knowledge Online
JOG	Joint Operational Guidelines

KD	Knowledge Development
KM	Knowledge Management
KMS	Knowledge Management Systems
LI	Lessons Identified
LL	Lessons Learned
MAKE	Marine Ammunition Knowledge Enterprise
MCCDC	Marine Corps Combat Development Command
MCCLL	Marine Corps Center for Lessons Learned
NATO	North Atlantic Treaty Organization
NCS	NATO Command Structure
NFS	NATO Force Structure
NGO(s)	Non-Governmental Organization(s)
NKO	Navy Knowledge Online
NPS	Naval Postgraduate School
PALs	Process Asset Libraries
PMESII	Political, Military, Economic, Social, Infrastructure and Information
RM	Risk Management
QDA	Qualitative Data Analysis
SoS	Systems of Systems
STS	Socio-technical Systems
UN	United Nations
WRT	With Respect To

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CHAPTER 1
INTRODUCTION

1.1 Background of the Study, Importance and Relevance of the Topic

Exponentially developing and transforming human life mandates extremely dynamic environment in the world. The changing nature of the life offers highly volatile and ambiguous environment for the organizations. Hite (1999) denotes such environments as `chaotic` and he claims that we stood in awe of the unknown and incomprehensible, either personal or universal level.

Every organization, no matter what its scale and type is, endeavors to adapt to this constantly changing environment. And, it is commonly accepted that change is neither temporary and nor will disappear.

For that reason, sustainability of any organization requires high level of adaptation capacity and capability. But, this capability may not even be sufficient by itself. It might also require prompt responsiveness in order to comply with the high speed of change in the environment. If the organizations cannot keep up with the speed of change in the environment, then, even if they can realize the adaptation, they might still remain obsolete.

That is why organizations in dynamic environments put tremendous effort, and allocate big amount of budget in order to adapt rapidly and correctly. In other words, they strive to be `agile`. Agility has already become and apparently will remain as one of the most important challenges for the organizations. Although its importance has newly started to be recognized, still there are big question marks about how to achieve it.

It is generally claimed that the abilities of knowing and learning constitute significant domains for agility. While individual knowing and learning would rather be perceived as a manageable process, organizational aspects of learning and knowing requires significant management capability. With a similar perspective, Alavi and Leidner (2001) advocate that the organizational knowledge prompted the issue of managing knowledge in favor of the organizations' benefit. For that reason, organizations implement Knowledge Management (KM) practices and technologies on

the promise of increasing their effectiveness, efficiency, and competitiveness through knowing and learning (Schultze & Leidner, 2002).

Despite the difficulties associated with defining and identifying knowledge, knowledge has become a primary resource for organizations. Knowledge-based assets are now widely recognized by scholars and managers as the modern firm's most valuable resources (Alavi & Tiwana, 2002).

It is obvious that, one who endeavors to overcome the challenges against KM should recognize that dynamic environments are not repeatable, and there is no single magic correct answer of KM implementation that is applicable to all types of environments.

Alavi and Tiwana (2002) identify the knowledge distribution across the organization which is also known as organizational knowledge. According to them, KM and knowledge management systems (KMS) appear to be necessities for organizational effectiveness and competitiveness in the new millennium (Alavi & Tiwana, 2002).

The knowledge acquisition/absorption and learning of an organization in order to adapt to the dynamic environment is quite sophisticated. That is why the constructs of `knowledge management` and `organizational learning` have been scholarly addressed in order to explain the basis for the complex organizational processes of knowing and learning.

Very recently, a new term has been introduced in the areas of Information Systems (IS) and Information Technology (IT), which tries to capture agility requirements and their respective answers in terms of knowing and learning. This term is referred as `Agile Knowledge Management` (AKM). Since it is rather a new construct, it is difficult to claim that it has been sufficiently discussed and analyzed in practical and theoretical terms.

When one mentions AKM, it is not possible to ignore its overarching conceptual domain, which is `KM`. Actually, with a broader view, we can describe the AKM as KM in which agility is integrated.

KM, with the aim of capturing knowledge gained by individuals and spreading it to the others in the organizations is an idea, about which a lot of organizations have interest. However, organizations also need to consider the dynamic environmental

conditions in which KM is applied, and should realize this idea of doing KM in an agile manner.

1.2 Statement of the Problem

KM has been applied in various areas including business, public services and even in the military domain. However, AKM does not have for the same extent of application since it has newly emerged. Therefore, there are vast areas where AKM would promise to contribute to the different organizational operations, one of which is and will most probably be the military.

There has been some low scale or particular applications of KM in the military. Those particular applications would rather be characterized as the specialized approaches of KM towards a specific military area. However, overarching KM application through the military organizations and operations still remains a significant challenge. Additionally, AKM seems to remain untouched for military applications, except for some individual attempts. These attempts address the need of AKM, rather than suggesting practical or theoretical articulations as it is described in detail in the literature review provided in the next chapter. The current literature reveals that KM and the newly introduced AKM concept has mostly been involved in the commercial and business organizations. Especially, AKM applications across the military organizations appear to be lacking.

The military environment itself also needs a closer look in order to propose a robust application of AKM and KM. The military operations taking place today are significantly different than they were 20 years ago. The nature of war 20 years ago is also significantly different than the one 60 years ago during the period of World War II. That is also a good indication that the nature of the war most probably will not be the same ten or 20 years from now.

We can see the trend that the form of the war has transformed into irregularity from the state of regularity. Current irregular warfare, one of which is Counterinsurgency (COIN) has significantly different aspects from regular activities or operations. Additionally, current military forces mostly have multinational structures. Threats against the military forces have international and interagency aspects as well as

being infused with different actors and organizations in the theatre of operations. The military conducts especially in COIN could hardly be immune from the civilian intervention. Today, the participants or the perpetrators of the war contain other government agencies, international actors and even civilians. Obviously, future threats would even be more complicated.

Similarly, the NATO (North Atlantic Treaty Organization) - the only military and political international organization in the world- describes its perspective over the current security environment within the framework of a `comprehensive approach` (CA). Where, it is stated that within a complex operational environment there is a need to proactively coordinate the activities of a wide range of actors. "A comprehensive approach seeks to stimulate a cooperative culture within a collaborative environment, while facilitating a shared understanding of the situation" (NATO COIN JOG, 2010, p.1-6).

The transformational aspects of the contemporary warfare promises highly rapid change along with volatile, ambiguous and unpredictable military environment. This enforces the military to adapt and react very rapidly, which will enable the military to sense/recognize the change, adapt itself, take suitable courses of actions and in the end to succeed in order to defeat the opponents and acquire the superiority in the field of war.

For example, the US Army Knowledge Vision designates a similar projection, by describing a transformed army, with agile capabilities and adaptive processes, powered by world class network-centric access to knowledge, systems and services, interoperable with the joint environment (AR 25-1, 2005).

This perspective of the army can be extended into the joint (Army, Navy, Air Force, and Marine Corps) and multinational forces as well.

Hence the complexity, volatility and the rapidly changing nature of the military environment requires the agility which addresses the need for applying the AKM to the military organizations. In multi-disciplinary, multi-organizational, and joint military environments such as COIN, those who innovate, learn, rapidly adapt, and act decisively will prevail against adversaries.

The AR 25-1 (2005) describes the challenge as to connect those who know with those who need to know (know-why, know-what, know-how, and know-who) by leveraging tacit and explicit knowledge transfers from one-to-many across the enterprise

to meet mission objectives. Additionally it projects military strategy and operations depending on consistent but rapidly adaptable decision making across the Army. Without consistent strategy and policy, units and commands will generate islands of information and knowledge inaccessible to others (AR 25-1, 2005). This is a recipe for disaster from an enterprise perspective.

Along with rapidly changing environment, the levels of ambition for similar military strategies will mandate the use of AKM across the military organizations. Furthermore, AKM also will need to be widely assessed with respect to its military applications.

1.3 Purpose of the Study

The intent of this two-phase and parallel research project is to explore the conceptual background of AKM, then re-conceptualize and extend its understanding to military implications.

The first phase is the qualitative exploration of AKM along with major milestones and implications of KM. Findings from this qualitative phase are used to compare and adapt it to the military environment of COIN. This enables us to inductively redefine, re-conceptualize and extend the AKM construct based on the literature studied.

Second phase of the research employs qualitative analysis methods in order to validate the new concept of AKM.

1.4 Research Questions

This research aims to answer following research questions:

1.4.1. Primary Research Question

- How can we redefine, re-conceptualize and extend AKM with the perspective of applications to the military?

1.4.2. Research Sub-Questions

- What is the current expansion of AKM and KM with regard to past research and applications?

- How can we comprehensively review the conceptualization of AKM with contribution of up-to-date understanding of KM?
- What are the overall significant dimensions and attributes of AKM up to date?
- How can we identify the necessity of AKM applications across the military organizations in a dynamic environment?
- What are the significant dimensions of AKM with respect to military implications?
- How can we compare the military systems with up-to-date application and research areas of AKM?
- How can we describe the significant dimensions and their expansions across military organizations of the re-conceptualization of AKM?

1.5 Significance of the Study

Limited applications of KM and lack of AKM approaches towards the military implications support the need of this research. This research proposes a comprehensive understanding of applying the AKM across the military organizations, and reviews existing AKM conceptualizations that are currently limited to the IS/IT environment with a new conceptualization. It promises a pace of redefining and extending the understanding of this construct.

While this study is mainly focused on implementing AKM in very dynamic multinational and joint military environment, conclusions may be applicable in a broader context. The philosophy of successfully implementing AKM could be universal. Greater perspectives towards how to deal with challenges of AKM could prove to be broadly applicable.

This study highlights the distinction made by Nonaka (1988a), between information processing to reduce uncertainty and information creation that generates uncertainty but simultaneously increases opportunity, particularly in new product creation. Effective AKM is supposed to incorporate both perspectives, where similarly Hite (1999) suggests taking advantage of learning in the chaotic or near-chaotic systems rather than trying to control the chaos.

In summary, this study fills a gap in the current literature with respect to integrating agility in knowledge management operations, especially in military environments.

1.6 Research Contribution

The contribution of this research has two aspects.

- *A new approach to KM with integration of `Agility` is introduced.*

Although some scholars of KM multidiscipline implied the need of agility, the area of KM has not clearly been imposed with integration of agility in its process. This research proposes integration of agility in the KM via a newly articulated construct of AKM.

- *An application of an enhanced process of KM (AKM) across the military is articulated.*

As it is revealed in detail with the Literature Review (Chapter 2) there is a lack of literature that addressed KM applications in the military, while there is no application of AKM other than the identification of the need for agility. This research provides an opportunity of articulated AKM applications for the needs of military organizations. Being the core purpose of this research, a new concept of AKM is defined and articulated with a special focus on military organizations in COIN.

1.7 Research Methodology

This research comprises two phases of analyses: In the first phase, past research is investigated and then analyzed with a `systematic approach`, in order to assess where the body of knowledge stand in terms of AKM and KM applications including the military aspects. Then, putting aside the current body of knowledge, the `need to have` for the military environment is identified using a `systemic approach`. This leads to comparing the generic current situation of AKM and the desired level of AKM with respect to military applications. In this comparison the gaps of the current body of knowledge are identified. Dimensions and attributes of the AKM concept are described and assessed by carefully analyzing these gaps. Based on the findings, inductively a concept of AKM is

developed (i.e., re-conceptualized and extended) with various propositions based on the military environment.

In the second phase, qualitative analysis techniques are employed in order to validate the new Concept of AKM.

The theorizing approach or method of theory building used in this research is based on the methodology of `theorizing across multiple bodies of literature, with explicit construct of the literature` which falls under Suddaby, Hardy and Huy's (2011) category of `blending` in his `map of different theorizing approaches` depicted in Table 1.

Table 1. Map of Different Theorizing Approaches (adapted from Suddaby et al., 2011)

	Theorizing Within One Literature	**Theorizing Across Multiple Bodies of Literature**
Theorizing With Implicit Assumptions of the Literature	- Problematization	- Combining Epistemologies - Metaphorical Bricolage
Theorizing With Explicit Constructs of the Literature	- Contrasting - Particle Rationality - Inductive Top-Down Theorizing	- ***Blending (This research fits in this approach)***

Additionally, categorization process was implemented to facilitate the theory building process of this research with respect to defining implications of the new AKM concept to military environments. An overview towards the environment of the military (with the idea of desired level of AKM) and the civilian environment (with the background of up-to-date applications of KM and AKM) with regard to their attributes suggest three categories. Afterwards coherence and harmonization of those categories provide foundation of literature-based induction for the KM and AKM with its military implications.

1st Category (Similar Aspects of the Military in COIN): The military and civilian environment reflect some similar attributes. There might be some aspects of the previous studies where significant changes are not needed other than some minor alignments with respect to military understanding.

2nd Category (Unique Aspects of the Military in COIN): The military environment reflects some diversified attributes from the civilian environment. We might be able find some aspects where it is not necessary for the civilian perspective, while they might gain crucial importance in order to apply the constructs of AKM and KM across the military environment.

3rd Category (Extended Aspects of the Military in COIN): The military environment reflects some attributes those already exist in the civilian environment but they might need further interpretations with a military view. We might need to interpret some of previous applications with a different angle of military perspective.

These three categories enable the identification of the unknowns and lacking dimensions and/or attributes of the AKM concept with respect to the military environment. These categories facilitate the re-conceptualization of the AKM concept

1.7.1. Systematic Approach

KM construct is analyzed starting with its presumably first applications and scholarly emergence in 1990s. It is obvious that KM has expanded into various areas of applications and gained extended conceptual understanding. The important milestones of this expansion and extension of KM are traced and described in this research. Hence, most of the KM applications and relevant scholar studies are identified in accordance with their fields of interests. In the meantime, relevant terms and constructs those have been closely related to KM are also noted down, since they also carry importance for the conceptual understanding of KM. The idea with the conceptual background investigation is to contribute to constituting and identifying the dimensions and the attributes of AKM.

Research about AKM is conducted with a similar approach, where both theoretic and practical expansions of the construct are designated. Then the extent to which AKM applications and studies have reached is identified along with related terms and constructs.

With the light of that overarching research about literature the gaps and unknowns with respect to military implications can be identified, and necessary dimensions and attributes of new AKM concept can be induced as well.

1.7.2. Systemic Approach

The military organizations are considered to be complex adaptive systems (CAS) in this research. But the idea is to approach military systems as combining the aspects of complex systems, socio-technical systems (STS), open systems and systems of systems (SoS). The entities, sub-entities, interrelations, stakeholders and especially the dynamic and in a sense chaotic environment of this huge system is analyzed with regards to the AKM application.

Based upon the basics of this systemic understanding a comparative analysis of the military organizations and up-to-date civilian organizations is conducted. That enables to identify the different dimensions, aspects, perspectives and sub-sets of the desired level of AKM application across the military organizations.

This enables a process of inductive literature-based reconceptualization along with new definitions and extensions derived by some hypotheses and theories.

Figure 1 depicts the visual representation of the research methodology explained in this section.

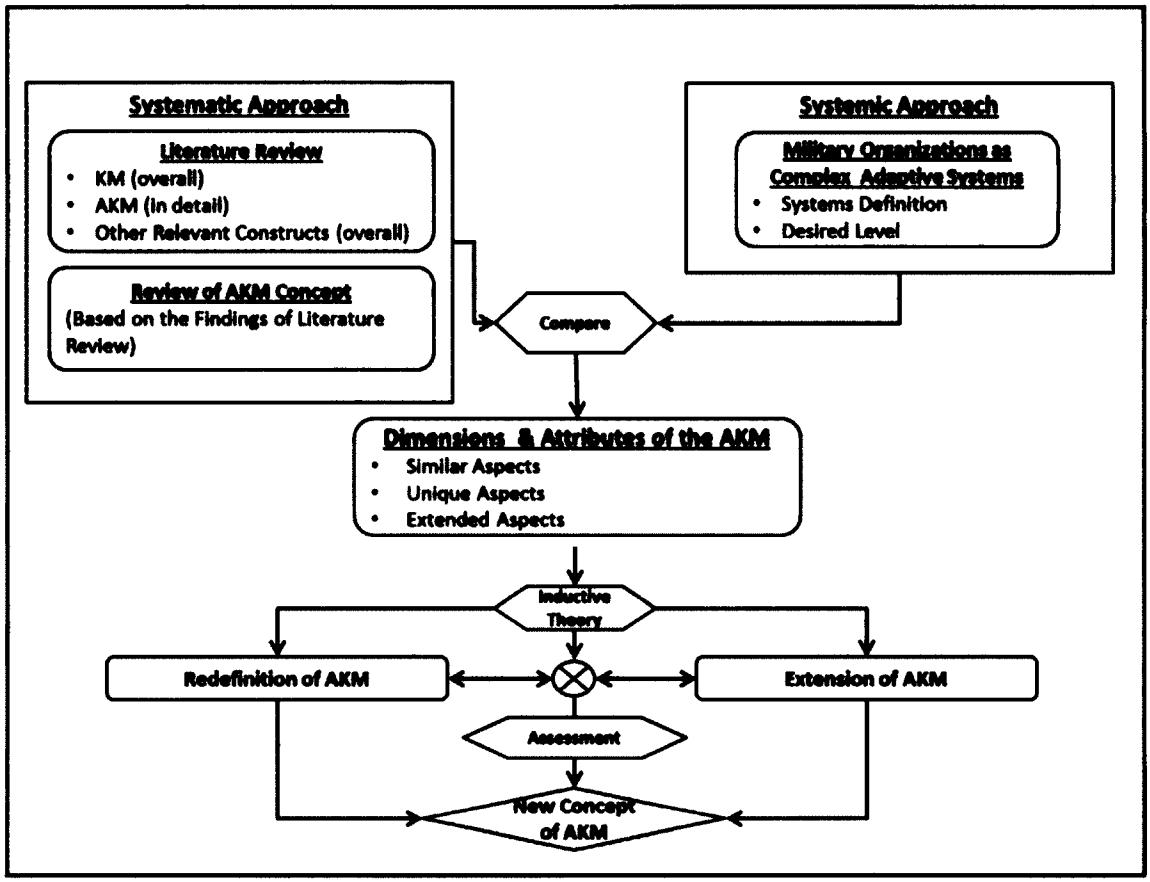

Figure 1. Research Methodology

1.8 Assumptions and Limitations

Based on the literature review, this research assumes that there are limited and specific applications of KM across the military organizations while there is a significant gap with regard to application of AKM across the military organizations.

This research assumes that the military organizations and the operations occur in continuously and rapidly changing environment. It is also assumed that the COIN operations are supposed to comprehend multinational and worldwide operations with involvement of other international and domestic organizations.

The goal of this research is to focus on the military organizations in the COIN through application of AKM. Although, this research identifies some similarities with other organizations and environments, it mainly does not intend to find solutions to other organizations or enterprises.

As it might have some dimensions of the findings to be applicable to other fields of interests, it may not be applicable with its all dimensions.

It is obvious that, there is no a single and magic AKM solution that applies to all types of organizations and environment.

But this research may offer to be a good example where some other specific organizations might adapt this methodology for their organizations as well.

Analyses of this research have special focus on one attribute of AKM concept, `Agility`. While this attribute is studied thoroughly, other attributes and their relevant aspects are touched to a certain extent by referring to future studies.

Finally, as with any qualitative research, the analysis and results of this research are the result of the knowledge, skills, and abilities of the researcher and therefore are limited to his world view and bias. A summary of the qualifications and experience of the researcher is provided in Appendix F.

1.9 Structure of the Research

This research comprises five chapters.

1.9.1. Chapter 1: Introduction

Chapter 1 gives an overall understanding about the dissertation by addressing the background of the topic, problem statement, purpose of the research, research questions, significance of the research, research methodology, structure of the research and important definitions.

1.9.2. Chapter 2: Review of Literature

This chapter constitutes the basis for the analyses in this research. It provides comprehensive summary of researches, studies and applications of the Knowledge, KM, AKM and Agility (with its relevant aspects) along with the military applications with regard to these disciplines/constructs.

1.9.3. Chapter 3: Methodology

This chapter explains the research methodology used in this dissertation and its basis in the literature.

1.9.4. Chapter 4: Analysis and Results

This chapter constitutes the major body of the dissertation, where all analyses and the theory are studied and delineated. The results of the analyses are presented with detailed explanations and interpretations, in this chapter as well.

1.9.5. Chapter 5: Conclusion and Recommendations

The findings and the conclusion of the whole dissertation along with the relevant recommendations is expressed in this chapter. This research eventually identifies and addresses promising avenues for the future studies as well.

1.10 Definitions of Key Terms

1.10.1. Key Terms Definitions

What is Knowledge?

Knowledge is a broad and abstract notion that has defined epistemological debate in western philosophy since the classical Greek era (Alavi & Leidner, 2001). The philosophical background and the definitions of the knowledge are beyond the scope of this research.

This research rather assumes the knowledge with organizational perspective that constitutes the basis for application of AKM and hence KM. Within that context, it has recently been approached as an organizational asset, which has expansions into organizational knowledge and KM. In that perspective Huber (1991) and Nonaka (1994) define knowledge as a `justified belief that increases an entity's capacity for effective action` (Alavi & Leidner, 2001, p.108). However, knowledge is a double-edged sword: while too little might result in expensive mistakes, too much might result in unwanted accountability (Schultze & Leidner, 2002).

Nonaka (1991, 1994) classifies the knowledge as `tacit` and `explicit` knowledge, he also categorizes it `individual` or `collective` knowledge (Nonaka, 1994). Tacit

knowledge represents the internalized knowledge for which an individual may not be consciously aware. At the opposite end of the spectrum explicit knowledge represents knowledge that the individual holds consciously in mental focus in a form that can easily be communicated to others (Alavi & Leidner, 2001).

Alavi and Leidner (2001) provides overall knowledge taxonomy and examples after their comprehensive literature review. They describe the knowledge types as `tacit (cognitive tacit and technical tacit)`, `explicit`, `individual`, `social`, `declarative`, `procedural`, `causal`, `conditional`, `relational` and `pragmatic` (Alavi & Leidner, 2001). After a rigorous reconciliation, Chua (2002) organized knowledge into a hierarchical tree, with public and private elements, architectural and component elements, individual and collective elements, tacit and explicit elements, and technical and mental elements.

What is Knowledge Management (KM)?

Alavi and Leidner (2001) claim that different views about the knowledge lead to different perceptions of KM. KM is largely regarded as a process involving various activities. It consists four basic processes of creating, storing/retrieving, sharing/transferring, and applying knowledge (Alavi & Leidner, 2001). Additional sub-processes are also defined as creating internal knowledge, acquiring external knowledge, and updating knowledge.

KM is an established scholar discipline since 1990s, which is widely used and taught in the fields of business administration, IS (Information Systems), management and library and information sciences. Most recently some additional fields have also started to use KM, including media, computer science, public health and public policy.

Generally KM overlaps with organizational learning where it specifically deals with management and sharing of the knowledge (Alavi & Tiwana, 2002).

Since its establishment, the KM discipline has been gradually moving towards academic maturity. As the discipline advanced, academic debates have increased regarding both the theory and practice of KM by including different perspectives.

What is Agile Learning?

Agile learning is mostly mentioned and practiced in the field of electronic learning and information technologies. For that reason it is rather addressed along with

some software programs such as knowledge-based process asset libraries (PALs), Wiki (Web 2.0 technology), (Amescua, Bermon, Garcia & Sanchez-Segura, 2010) or agile learning portals (such as Intrepid Learning Systems), on line, electronic teaching portals, and of course with the agile software development techniques called SCRUM.

In this context, agile learning is referred in order for the learners to get exactly what they need, precisely when they need it.

But within the organizational perspective, agile learning understanding is traced back to Peter Senge, with his book called `The Fifth Discipline: The Art and Practice of the Learning Organization` where he challenges the organizations to develop the capability to learn and adapt quickly (Senge, et al., 2001).

What is AKM?

AKM is rather a new term, and like the term 'agile learning' it is also commonly addressed in the software development and IT (Information Technology) fields and across the related areas where those technologies can be applied. The organizational perspective towards AKM, seems to need some more time to become scholarly mature. Nevertheless, in the literature one can come across some theoretical referrals and usages of this term occasionally.

1.10.2. Supporting Terms Definitions

What is Agility?

Lee and Xia (2010) summarize that there is a common underlying about the various definitions and descriptions regarding agility. Agility is generally defined in terms of embracing and responding change. Maropoulos, Bramall, McKay, Rogers & Chapman (2003) claim that realization of an agile enterprise requires substantial development of underpinning modeling, information management and knowledge representation technologies. Companies have realized that agility is essential for their survival and competitiveness (Jain, Benyoucef & Deshmukh, 2008).

What is Agile (Software) Development-ASD?

Agile (software) development approach is the notion of software development agility, which is defined as software team's ability to efficiently and effectively respond to user requirements' changes. As one of the most eminent initiatives, in 2001 the four

core values and twelve principles of agile development were formally introduced and endorsed in the publication of the Agile Manifesto by some of the prominent members of the agile development community (Lee & Xia, 2010).

What is Complex Adaptive System (CAS)?

A complex (adaptive) system can be simply described as a system comprised of a large number of entities that display a high level of interactivity. The nature of this interactivity is mostly nonlinear, containing manifest feedback loops (Richardson, Cilliers & Lissack, 2001).

Basically, whether we deal with the system itself or the problem related to the system, the important part of the system is its integration to the real life. Generally a system which has human beings in it, and which dwells in a huge social environment, could hardly be denoted as simple system. The more sub-systems it has and the more sophisticated relations those sub-systems interact, the more complicated the system will be.

CHAPTER 2
LITERATURE REVIEW

This chapter constitutes the basis for further analyses in the research. It provides comprehensive summary of researches, studies and applications of the KM and AKM with the different views towards these constructs along with different application fields.

In this chapter, first past research about `Knowledge` and `KM` (along with military implications) has been traced and investigated in order to state where the body of knowledge stands, and what the theoretical evolution was. This helps to clarify the foundation of the construct of AKM.

Secondly, the AKM and its relevance with the military applications have been scrutinized in order to identify the needs for AKM and its dimensions necessary for conceptualization. In this regard, some supporting and/or interrelated constructs or disciplines have been screened as well.

Accordingly, the `Literature Review Chapter` in this research is organized in 7 major sections.

The sections along with their sub-sections and expected outcomes are delineated in Table 2 below:

Table 2. Outline of the Literature Review

Chapter-2			
#	**Section Title**	**Sub-sections**	**Purpose**
1.	**Knowledge**	(1) Definition of Knowledge (2) Distinction of `Data`, `Information` and `Knowledge` (3) Taxonomy of Knowledge (4) Knowledge Flow Theory	This section provides overall understanding about `the knowledge related to KM` with the grounds and the development process. Better understanding of knowledge enables to comprehend KM better.
2.	**KM**	(1) Definition of KM (2) Emergence and Expansion of KM (3) KM Process	This section provides the generic understanding, basics, evolution (expansion) of KM. It constitutes the foundation of the AKM concept.

Table 2. Continued

Chapter-2			
#	**Section Title**	**Sub-sections**	**Purpose**
1.	**Knowledge**	(1) Definition of Knowledge (2) Distinction of `Data`, `Information` and `Knowledge` (3) Taxonomy of Knowledge (4) Knowledge Flow Theory	This section provides overall understanding about `the knowledge related to KM` with the grounds and the development process. Better understanding of knowledge enables to comprehend KM better.
2.	**KM**	(1) Definition of KM (2) Emergence and Expansion of KM (3) KM Process	This section provides the generic understanding, basics, evolution (expansion) of KM. It constitutes the foundation of the AKM concept.
3.	**KM in the US Military**	(1) IM in the US Military (2) KM in the US Military	This section provides the current status of KM in the US military with the weaknesses and strength of the practices. This section refers possible application of AKM across the military.
4.	**Agility Towards AKM**	(1) Definition of Agility (2) Theory and Applications of Agility towards AKM	This section provides the understanding and different examples of agility those address KM, which leads to AKM.
5.	**AKM**	(1) AKM (Specific) (2) KM Studies towards AKM	This section gives the background and current literature of the AKM, along with the initiating KM studies those imply AKM.
6.	**Agility and AKM in the US Military**	(1) Agility in the Military (2) AKM in the Military	This section provides the status of the Military with respect to Agility and AKM.
7.	**Gap Analysis in the Literature**	Gaps in the Literature	This section points at the research direction for the rest of the dissertation.

2.1 Knowledge

Knowledge itself is power, not mere argument of ornament.
Francis Bacon (1597, Meditations-Meditationes Sacrae)

Knowledge is a broad and abstract notion that has been subject to epistemological debate in western philosophy since the classical Greek era (Alavi & Leidner, 2001). It is

very normal to encounter different definitions of knowledge throughout its history. The understanding and the definitions have become even more sophisticated over the past couple decades. For that reason, it is hard to find a standard definition of knowledge in the literature.

Nevertheless, the philosophical background and the different definitions of the knowledge with respect to different areas of interest are beyond the scope of this research. This study will not try to investigate and discover every single definition of knowledge throughout its long history. It will rather address the basics of knowledge which will be necessary for better understanding and interpretation towards KM and AKM concepts.

In this respect, knowledge within the scope of this research has been embodied with the organizational perspective for the last couple decades. It has not been so long that the interest in treating knowledge as a significant organizational resource (Alavi & Leidner, 2001) is growing as the time passes.

2.1.1. Definition of Knowledge

The reason why this study attaches importance to define the knowledge is that different views of knowledge lead to different perceptions of KM (Alavi & Leidner, 2001). That is why the complex nature of knowledge has been discussed extensively in KM (Nonaka & Peltokorpi, 2006).

Despite the difficulties associated with defining knowledge, it has become a primary resource for organizations. Consequently, knowledge-based assets are now widely recognized by scholars and practitioners as the modern organizations' most valuable (Alavi & Tiwana, 2002) and underused resources (Ash, 1998).

Although we have limited the definitions of the knowledge with respect to the KM discipline, it is still hard to find a single definition. Even within these limits, different aspects lead us to different definitions. Table 3 along with the following paragraphs, provides the summary of these perspectives.

Table 3. Knowledge Definition Perspectives and Their Implications (adapted from Alavi and Leidner, 2001)

Knowledge Definition Perspectives and Their Implications			
#	**Perspectives**	**Explanation**	**KM Implications**
1.	**Knowledge vis-à-vis data and information** (Fahey & Prusak, 1998; Nonaka & Peltokorpi, 2006)	Data are facts and raw numbers. Information is processed/interpreted data. Knowledge is personalized information.	KM focuses on exposing individuals to potentially useful information and facilitating assimilation of information.
2.	**State of Mind** (Schubert, et al., 1998)	Knowledge is the state of knowing and understanding	KM involves enhancing individual's learning and understanding through provision of information.
3.	**Object** (Carlsson, et al., 1996; McQueen, 1998; Zack,1998)	Knowledge is an object to be stored and manipulated.	Key KM issue is building and managing knowledge stocks.
4.	**Process** (Zack, 1998)	Knowledge is process of applying expertise.	Focus of KM is on knowledge flows and the process of creation, sharing and distributing knowledge.
5.	**Access to Information** (McQueen, 1998)	Knowledge is condition of access to information.	Focus of KM is organized access to and retrieval of content.
6.	**Capability/Capacity** (Huber, 1991; Nonaka, 1994; Carlsson, et al., 1996)	- Knowledge is the potential to influence action. - Capacity for effective action.	KM is about building core competencies and understanding strategic know-how.
7.	**Weapon** (Schultze & Leidner, 2002)	- Double-edged sword (too little result in mistakes, too much result in unwanted accountability).	KM is the art of using the power of knowledge at the right time with the right magnitude.
8.	**Competitive Asset** (Drucker,1993; Kharbanda & Pinto, 1996)	- For business/ commerce the aim is effective performance, not the eternal truths. - Competitive advantage.	KM will use its assets for the sustainable competitiveness of the organization.

Simply, knowledge can be defined as "what is known", but this definition restricts the scope from "what can be known" (Tsoukas, 2005). We can deduce from Tsoukas's (2005) understanding that knowledge does not reflect a static state of mind. It is rather a dynamic state of mind, where it constantly looks for improving. Nissen (2006) also highlights the dynamic aspect of the knowledge. He asserts that knowledge is not a single, static, monolithic concept; rather it is multifaceted, dynamic, and multidimensional (Nissen, 2006).

Holsapple and Jones (2006) state simply that knowledge is the capacity to take action. Huber (1991) and Nonaka (1994) approach knowledge as a `justified belief that increases an entity's capacity for effective action` (Alavi & Leidner, 2001, p.108). One important part of this definition is assuming the knowledge as neither pure objective data or information, nor full of subjective beliefs. It resides somewhere in between. Essentially, the knowledge in this case is either somewhat ambiguous or somewhat concrete, never fully one or the other (Hodges, 2009). The other part of this definition is emphasizing on the dynamism of the knowledge by relating it to action. Bose (2004), Soliman and Youssef (2003) and Wainwright (2001) also support this idea by defining knowledge as information that is `contextual, relevant and actionable`. According to Senge, Kleiner, Roberts, Ross and Smith (1994) knowledge is the capability for effective action. In accordance with Senge, et al. (1994) the stress should be on use of knowledge application through action, which is highlighting the actionable perspective of knowledge.

Some scholars preferred to specify knowledge with the eyes of commerce and business. Knowledge has been suggested to be one of the strongest competitive advantages in modern markets (Davenport & Prusak, 1998; Drucker, 1993; Kharbanda & Pinto, 1996; Landaeta, 2008). Knowledge becomes as the key enabler for effective competitiveness. Or it is a key for effective competition; it constitutes the key source or the advantage in that respect. That is why some scholars claim that the aim is effective performance, not eternal truths. Similarly, "knowledge" is defined to represent one of the strongest competitive advantages in modern markets (Drucker, 1993; Kharbanda & Pinto, 1996). Or in other words, it is considered to be main competitive asset of an organization. Stewart (1997) also shares the aforementioned perspectives that he approaches to the

knowledge as the preeminent economic resource which is more important than both raw material and money. For him it is the most important element of production in the modern economy. Nonaka and Teece (1998) relate the competitive advantage to the knowledge assets that are hard to replicate in open economies. Shariq (1997) sees knowledge assets as human intellectual capital and technology. For him intellectual capital -not natural resources, machinery, or even financial capital - has become the one indispensable asset of corporations. With a similar perspective, Grant (1996) sees knowledge as the critical input production and primary source of value. Knowledge can be considered as both an economic output as well as being strategic resource. Basically the view here is that productivity of the organizations heavily depends on knowledge. Leibold, Probst and Gibbert (2005) value knowledge as the source of wealth which they see it as an intellectual asset to be managed.

Many companies and management literature authors have realized the importance of knowledge as one of the most significant factors for value creation (Alder & Peterson, 2010) and sustainable competitive advantage (Nonaka, 1991).

Other views examine cognitive levels, processes, and outcomes. Knowledge is viewed as information that proves itself in action by Drucker (1993). For Davenport and Prusak (1998) it is also a mix of information and experience.

Alavi and Leidner (2001) posit that knowledge is information possessed in the mind of individuals: it is personalized information (which may or may not be new, unique, useful, or accurate) related to facts, procedures, concepts, interpretations, ideas, observations, and judgments.

Nissen (2006) highlights a very interesting part of the knowledge. He portrays it to be `sticky` as clumping to an individual and being hard to move.

With a different perspective, Schultze and Leidner (2002) attract the attentions over the delicate balance over the knowledge. They define knowledge as a double-edged sword where on one hand too little might result in expensive mistakes, and on the other hand too much might result in unwanted accountability.

It is obvious that, it is really hard to comprehend all definitions published. It is equivalently hard to find a definition that covers all perspectives or has clear consensus on it. Maybe the easiest way would be to cite a definition from Webster's dictionary

which defines knowledge as "the result of what is gained through the process of learning" (Webster's Dictionary, 2009, p.565).

In a sense, in terms of its importance, knowledge is a very valuable asset for any organization or company where it could be transferred into huge amount of raw material, money, product or an end state when used and managed appropriately.

2.1.2. Distinction of `Data`, `Information` and `Knowledge`

Most of the scholars tend to distinguish knowledge from `information` and `data`. Fahey and Prusak (1998) argues that if knowledge does not have any difference from information and data, then there is nothing new or interesting about knowledge management.

For better understanding over the KM and its related concepts, it is necessary to grasp the distinction of the knowledge from information and data.

Actually, to distinguish it from data and information is one of the most common ways to describe knowledge (Nonaka & Peltokorpi, 2006). Glaser (1998) is one those scholars defines those terms with each other. He defines knowledge as information that has been given meaning, and information as data has been given structure.

As most of the scholars, Nonaka (1994) also prefers to distinct specifically knowledge and information, although he recognizes some intents of using them interchangeably. He gives a brief distinction by comparing these two constructs, by defining information as a flow of messages, while knowledge is created and organized by the very flow of information, anchored on the commitment and beliefs of its holder.

Bell's (1999) distinctive delineation also provides a good outline to understand the specific differences of these three constructs. Data come from imposing ordered sequence on otherwise chaotic and indiscernible information (Bell, 1999). Nonaka (1994) identifies data that can be classified as raw numbers, images, words, and sounds derived from observation or measurement. Information, then, arises from the contextual arrangement of relationships that are known either observed or implied (Bell, 1999). Nonaka (1994) sees information to represent data arranged in a meaningful pattern. Unlike information, knowledge is about beliefs, commitment, perspectives, intention and

action (Nonaka, 1994). Knowledge is the judgment of what stems from this context (Bell, 1999).

Being possessed in the minds of individuals is the most distinguishing feature of knowledge. In other words it is personalized information. Information is converted to knowledge once it is processed in the mind of individuals and knowledge becomes information once it is articulated and presented in the form of text, graphics, words and or other symbolic forms (Alavi & Leidner, 2001).

Apparently, there is a thin distinctive layer or even some sort of confusions with the data-information-knowledge and `tacit, explicit knowledge` understanding. Nissen (2006) emphasizes the distinction by describing the knowledge as enabling action, and is required at every level of the information hierarchy.

With a rather military and specifically command and control perspective, Atkinson and Maffot (2007) try to simplify the scholars' knowledge understanding within the military network and complex systems understanding. They come up with definitions of knowledge and information as follows:

What is shared around the network is Information. This information is then taken by an individual and given meaning within their individual context. Thus, even in a network where there is a high degree of mutual trust and extensive information sharing, each person still has different perspective on the key issues. (Atkinson & Maffot, 2007, p. 92).

The distinction might also touch upon the hierarchy among them. Although Alavi and Leidner (2001) cite different ideas of not really identifying clear line and structure of hierarchy among those terms, most of the scholars tend to be in favor of describing a hierarchy. The implication is to put knowledge in a more powerful position where data precedes information and knowledge follows information. Tuomi (1999) delineates this view of hierarchy as seen in Figure 2:

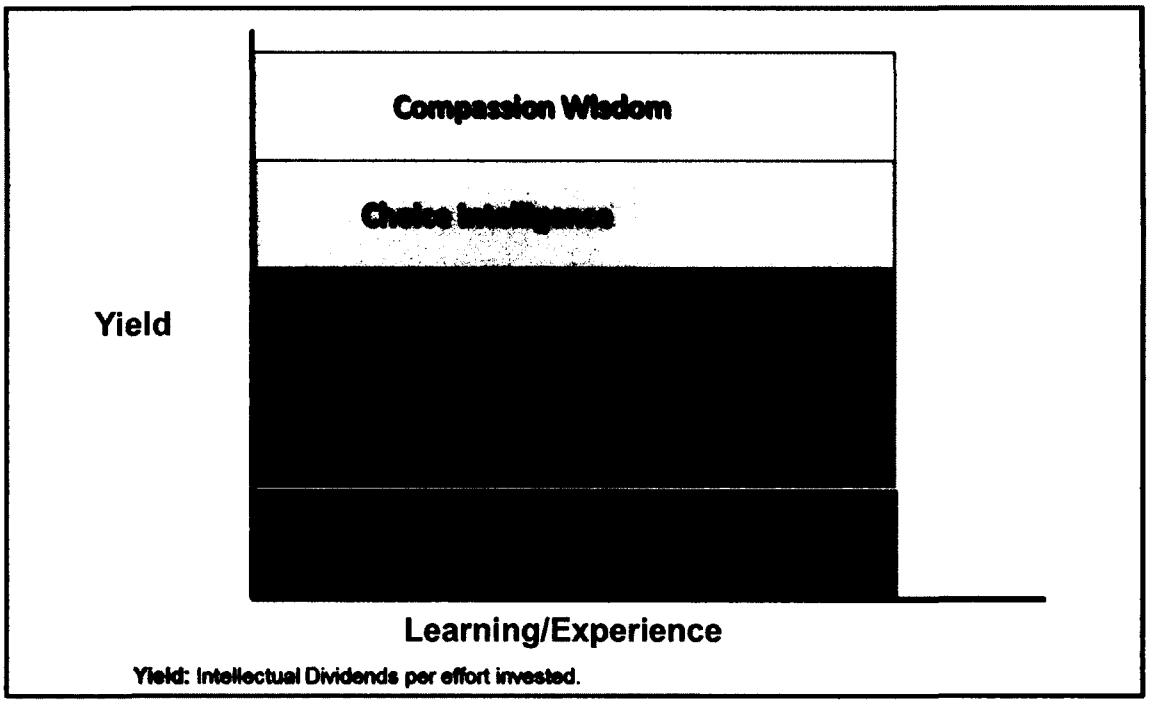

Figure 2. Knowledge Hierarchy (adapted from Tuomi, 1999)

According to Tuomi (1999), it all starts with data, it then becomes information and with adding context and meaning it evolves into knowledge. He sees data to be the precondition of information, where information is precondition of knowledge. He then further elevates knowledge to intelligence level. Finally he introduces the wisdom as a result of a pattern of intelligent behavior.

Leibold, et al. (2005) also advocate a fourth element closely related to knowledge, wisdom. They categorize data as elements of analysis, information as data with context, knowledge as information with meaning, and wisdom knowledge plus insight and sound judgment.

At first, it may appear that there is a continuum from data to information to knowledge and finally to wisdom. However, Wiig (1997) argues that when examining the nature of these conceptual constructs and the processes that create them, there are some discontinuities that make information fundamentally different from knowledge.

Based on Tuomi (1999)'s idea, Nissen (2002) introduces an additional dimension to this hierarchy of knowledge with `directionality of the knowledge flow` where he introduces `producer/source view` and `consumer/receiver view` as the sources of

directions. He claims that depending on the direction, knowledge might need to come before information, which can be turned into data afterwards. Basically the direction of the knowledge flow is related to the originator whether it is the `producer` or the `consumer` (Figure 3). According to consumer/receiver view the knowledge flow has the traditional direction where data comes fist and it turns into information and then knowledge, while according to producer/source view it is the opposite direction that the knowledge come first in order to get information and then the data.

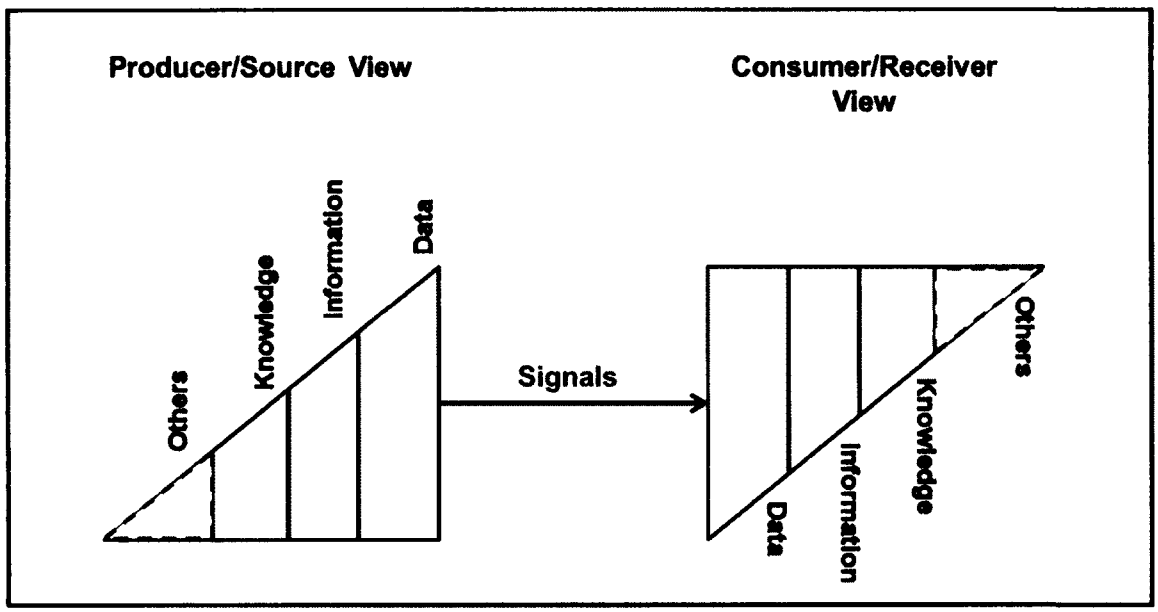

Figure 3. Knowledge Flow Directionality (Nissen, 2002).

2.1.3. Taxonomy of Knowledge

Generally the tendency of the scholars has been to classify the knowledge with dichotomizations.

Economic based publications frequently make use of Ryle's (1949) distinction between knowledge-that and knowledge-how (practical knowledge) (Kogut and Zander, 1992, 1996). Perhaps influenced by Nonaka (1991, 1994), most recent KM publications are based on Michael Polanyi's (1966) distinction between tacit and explicit knowledge (Nonaka & Peltokorpi, 2006).

Knowledge is described on a continuum between tacit and explicit. This approach was first posited by Polanyi (1966), reinforced by Nonaka (1991, 1994), and applied to a larger organizational scope by Tsoukas (2005).

The dichotomization of the `tacit` and `explicit` knowledge has largely been accepted by scholars in the KM literature as well (Nonaka,1991; Nonaka,1994; Nonaka, 2008; Nonaka & Konno,1998; Nonaka & Takeuchi, 1995; Nonaka, Takeuchi, & Umemoto, 1996; Nonaka, Toyama & Konno, 2000).

Like the definitions of `knowledge` itself, the definitions of the knowledge taxonomies also differentiate according to different scholars:

- *Tacit Knowledge:* According to Michael Polanyi (1966), "we can know more than we can tell" p.4. It is partly technical know-how, such as the skills of a master craftsman, which are informal skills and are hard to replicate (Nonaka, 2008). Tacit knowledge represents the internalized knowledge that an individual may not be consciously aware of (Alavi & Leidner, 2001). It is highly personal and hard to formalize, which exists in one's head or implicitly possessed by an entity, and is developed over time (Nonaka, 2008). It is translated into words or meaning and hence difficult to communicate. It is not easily expressible (Turner & Makhija, 2006) or even inexpressible. It is the valuable and highly subjective insights and intuitions that are difficult to capture and share because people carry on them in their heads, body and skills. Subjective insights, mental models, intuitions and hunches are all elements inherent in tacit knowledge (Nonaka, et al., 2000; Nonaka 1991). It must be gained individually through repeated like experiences and collectively through like shared experiences (Goldman & Schurman, 2000). It is also called `procedural` (Anderson, 1993). It is comprised of both cognitive and technical elements (Nonaka, 1994). While cognitive tacit knowledge is mental routines and resides in the individual's brain, the tacit technical knowledge is know-how related practical type.
- *Explicit Knowledge:* At the opposite end of the spectrum of tacit, explicit knowledge is formal and systematic. Explicit knowledge can be expressed through a standardized taxonomy of learning (Bloom, 1956). It is codified and captured in written form (Nonaka, 2008). It can be expressed in formal and

systematic language and shared in the form of data, scientific formula, specifications, manuals and such like. It can be easily communicated, stored, processed, transmitted and shared, in product specifications or a scientific formula or a computer program (Nonaka, 1994; Nonaka, et al., 2000). It is codifiable, unambiguous, observable, and indisputable (Makhija & Ganesh, 1997). It is held by the individuals or groups consciously in mental focus in a form that can easily be communicated to others (Alavi & Leidner, 2001). It is also called `declarative` (Anderson, 1993). Explicit knowledge is further acquired by organizations through research, development, and capturing of lessons learned (Dyer & McDonough, 2001). Acquisition of explicit knowledge allows the organization to have on hand common, transferable, and unambiguous data (Freeze & Kulkarni, 2008).

Brown and Duguid (2001) and Tsoukas (1996) argue that all knowledge is tacit or rooted in tacit knowledge.

Liebowitz (1999) suggests that knowledge should be divided into an additionally third category, `implicit knowledge`, supplementing the tacit and explicit dimensions. Liebowitz (1999) argues that both tacit and implicit knowledge only exist in the human minds and in the organizational routines and processes. Liebowitz's (1999) view of the third knowledge category is based on the accessibility of knowledge where implicit knowledge corresponds to a form of informal knowledge that can be accessed "through querying and discussion" making it distinct from tacit knowledge which only with difficulty can be accessed through behavior observations and knowledge elicitation (Liebowitz, 1999).

Alavi and Leidner (2001) argue one of their concern regarding 'tacit` and `explicit` classification of the knowledge. They address potentially problematic aspect in the interpretation that tacit knowledge is more valuable than explicit knowledge. They prefer to see these two types of knowledge as mutually dependent and reinforcing qualities rather than being dichotomous states.

Additionally, different levels of analysis in knowledge processes suggest the existence of `individual knowledge` and the `social/collective knowledge` (Gergen, 1999; Nonaka, 1994). According to Spender (1996) this distinction is vital for understanding

knowledge. The distinction between individual and collective knowledge is further supported by Nonaka et al. (2000) through the discussion of knowledge creation. Spender (1996) combines these two dimensions of explicit/tacit and individual/social knowledge creating a matrix of four different elements of an organization's intellectual capital. This matrix echoes and explains further the Dynamic Model of Knowledge Creation of Nonaka and Takeuchi (1995).

Following the cognitive perspective, knowledge, as the term is used in several publications is considered to be intimately attached to the knower, an individual who holds it (Cohen & Levinthal, 1990; Davenport, De Long, & Beer, 1998). In these publications, collective knowledge is explained as an aggregation of individual knowledge. In contrast, several scholars propose that collective knowledge is not reducible to individuals. Spender (1996), for example separated individual knowledge and collective knowledge in his taxonomy.

As a supplement to the separation of knowledge into tacit and explicit dimensions, knowledge can also be classified according to several other properties. An interesting aspect for knowledge sharing, knowledge transfer and knowledge integration is the conception of `common knowledge`. Common knowledge exists at the intersection of individual's knowledge and consists of the elements and perceptions of knowledge shared by all organizational members (Grant, 1996; Dixon, 2000),

Articulated or codified knowledge is explicitly represented in physical or material objects (Enkel, Heinold, Hofer-Alfeis & Wicki, 2002). Linkages between these taxonomies have been developed. For example, tacit knowledge, hard to articulate and transfer, has been linked with know-how (Conner & Prahalad, 1996; Kogut & Zander, 1992), and explicit knowledge, relatively easy to articulate and codify, to declarative knowledge (Hansen, 1999; Kogut & Zander, 1992, 1996) and articulated knowledge (Hedlund, 1994).

These taxonomies show that knowledge has both objective and subjective dimensions (Nonaka & Peltokorpi, 2006). Nonaka (1994) proposes that explicit and tacit knowledge are not exclusive, but complementary. Thus, knowledge can be converted from one form to the other (Nonaka & Peltokorpi, 2006).

Alavi and Leidner (2001), provide overall knowledge taxonomies and examples after their comprehensive literature review and they describe the knowledge types as `tacit (cognitive tacit and technical tacit)`, `explicit`, `individual`, `social`, `declarative`, `procedural`, `causal`, `conditional`, `relational` and `pragmatic`.

After a rigorous reconciliation, Chua (2002) organizes knowledge into a hierarchical tree, with public and private elements, architectural and component elements, individual and collective elements, tacit and explicit elements, and technical and mental elements.

Aside from the dichotomies, some scholars also used attributive knowledge types. One of which is `organizational knowledge`. The leading work for moving from Polanyi's view to the organizational setting was by Nonaka and Takeuchi (1995). In summary, organizational knowledge creation is the synthesis of subjectivity and objectivity (Nonaka & Peltokorpi, 2006). Nonaka (1994) argues that organizational knowledge is created through a continuous dialogue between tacit and explicit knowledge. Organizational knowledge is found to be related to organizational capability (Turner & Makhija, 2006). Drucker (1993) pointed out that the chief objective for organizational knowledge is goal achievement. The knowledge of an organization represents a valuable resource and a capability for action (Nahapiet & Ghoshal, 1998; Landaeta, et al., 2011).

In addition to aforementioned types, one can encounter some other knowledge types in the literature. Such as `commercial knowledge` (Demarest, 1997), `actionable knowledge` (Argyris, 1992)

Table 4 below depicts the summary of the taxonomy of the knowledge:

Table 4. Knowledge Taxonomies and Examples (adapted from Alavi & Leidner, 2001)

Knowledge Taxonomies and Examples				
#	**Taxonomy**	**Knowledge Type**	**Definitions**	**Examples**
Dichotomial Taxonomy of Knowledge				
1.	**Tacit and Explicit Knowledge** (Nonaka, 1991) and (Polanyi, 1966)	*** Tacit Knowledge** - Cognitive Tacit - Technical Tacit (Nonaka, 1994)	Knowledge embedded as experience, actions and involvement in specific context. -Mental Models. -Know-how applicable to specific work.	-Awareness of the soldier to decide at the firing position. - Firing skills of a soldier.
		*** Explicit** (Nonaka, 1991) and (Polanyi, 1966)	Articulated, generalized knowledge.	- Standardized procedures for how to fire better.
2.	**Individual and Collective Knowledge** (Nonaka, 1994) and (Spender,1996)	**Individual**	Created by and inherent in the individual.	Insights gained from a firing exercise.
		Social/Collective	Created by and inherent in the groups.	Accumulated norms of a team to fire altogether.
3.	**Procedural and Declarative** (Anderson, 1993)	**Procedural**	Facts and information.	The distance of the firing range.
		Declarative	Understand basic actions.	To change the firing style based on the distance.
4.	**Knowledge That and Knowledge How** (Ryle, 1949),(Kogut & Zander, 1992, 1996).	**Knowledge-That**	The facts and data exempt from the context.	The diameter of the bullet.
		Knowledge-How	The actions in the context.	Pick the best bullet for the target.
Other Taxonomies				
5.	**Codified** (Alavi & Leidner, 2001)		Explicit Organizational Knowledge.	Shooting results report.
6.	**Declarative** (Nolan & Norton, 1998)		Know-about, knowledge by acquaintance.	Which weapon is appropriate for a helicopter.

Table 4. Continued

Knowledge Taxonomies and Examples				
#	Taxonomy	Knowledge Type	Definitions	Examples
7.	**Procedural** (Zack, 1998)		Know-how.	How to fire at a target of helicopter.
8.	**Causal** (Zack, 1998)		Know-why.	Understanding why firing 0.5 football field ahead of the helicopter.
9.	**Conditional** (Zack, 1998)		Know-when.	Understanding when to fire at the helicopter.
10.	**Relational** (Zack, 1998)		Know-with.	Understanding how the bullet would affect the helicopter.
11.	**Pragmatic** (KPMG, 1998)		Useful knowledge for an organization.	Tactical procedures, Technical Maintenance, Administrative Limitations.
12.	**Implicit Knowledge** (Liebowitz, 1999)		Supplementing the tacit and explicit dimensions..	Awareness of the pilots and technicians to pre-inspect the helicopter separately.
13.	**Organizational Knowledge** (Alavi & Leidner, 2001; McQueen, 1998)		Continuous dialogue between tacit and explicit knowledge.	The operation of a helicopter squadron in formation.

But actually, scholars, drawing from interpretative philosophies, propose that strict categorization of knowledge is impossible because of its holistic nature (Brown & Duguid, 2001; Nahapiet & Ghoshal, 1998; Tsoukas, 1996).

2.1.4. Knowledge Flow Theory

In a way, we can assume the emergence of knowledge process understanding with the `knowledge creating` idea of Nonaka (1991). Nonaka (1991) describes `creating the new knowledge` not simply a process of objective information. He rather emphasizes the process of transitioning the tacit knowledge into the explicit knowledge for the benefits

of the company, the employees and the customers. He exemplifies the Japanese companies as `knowledge-creating companies` being good at developing exchange between the tacit and explicit knowledge`. He argues making the personal knowledge available to other is the central activity of the `knowledge-creating` company. It takes place continuously at all levels of the knowledge-creating organizations.

Nonaka (1994) asserts that organizational knowledge is created through a continuous dialogue between tacit and explicit knowledge. The nature of this dialogue is examined and four patterns of interaction involving tacit and explicit knowledge are identified in the literature.

Organizational knowledge creation, as distinct from individual knowledge creation, takes place when all four modes of knowledge creation (spiral of knowledge) are "organizationally" managed to form a continual cycle (Nonaka, 1994).

The Spiral of Knowledge:

`The Spiral of Knowledge` model was created by Nonaka (1991), and developed by him in 1994 and Nonaka and Takeuchi (1995). In this model, the transition of the knowledge types (tacit and explicit knowledge) in an organization is described. Simply, in `spiral of knowledge` personal knowledge is being transformed into organizational knowledge which Nonaka (1991) claims valuable to the company as a whole. According to Nonaka and Takeuchi (1995) the flow/transition of knowledge can be in four different dimensions and with corresponding four processes (See Figure 4).

First, Nonaka (1991) tried to draw a pattern of knowledge in the companies especially by giving the examples from `knowledge-creating companies` which he called as `the spiral of knowledge` by transitioning from `tacit knowledge` to `explicit` or vice versa. We can also assume this approach as a different way of describing the pattern of innovation.

In the spiral of knowledge, first step is `socialization (tacit to tacit)`, then `articulation (tacit to explicit)`, third step is `combination (explicit to explicit)` and finally `internalization (explicit to tacit)` (Nonaka,1991). He draws the attentions specifically on the two steps as critical steps in this spiral of knowledge: articulation (converting tacit knowledge into explicit knowledge) and internalization (using that explicit knowledge to

extend one's own tacit knowledge base) as both require the active involvement of the self-that is, personal commitment.

Actually these two steps carry high risks of losing the value of the knowledge or deviating from the knowledge if any mistake is made. There emerges the need of KM in order to minimize (ideally terminate) the possibilities of losses or deviations from the original knowledge.

According to Nonaka (1991) all four of these patterns exist in dynamic interaction in a spiral pattern. This dynamic interaction and the process in our perspective take place in the focal point of the KM process.

Largely accepted four basic patterns for creating knowledge in any organization is as follows (Alavi & Leidner, 2001; Nonaka, 1991; Nonaka, 1994; Nonaka & Takeuchi, 1995) (See Figure 4):

- *From Tacit to Tacit (Socialization):* The key to acquiring tacit knowledge is experience (i.e. in/on the job training). This is rather apprenticing one to another crafter, and socializing himself into the craft. In this pattern, the knowledge never becomes explicit. It cannot easily be leveraged by the organization as a whole. This process of creating tacit knowledge through shared experience is called `socialization`. Nissen (2006) states that the sticky nature of tacit knowledge is a mixed blessing, on one hand it supports competitive advantage; on the other, it restricts knowledge flows within one's own organization.
- *From Explicit to Explicit (Combination):* This is rather combining the discrete pieces of the explicit knowledge into a new whole. But this combination does not really extend the company's existing knowledge either. This process of creating knowledge is called `combination`.
- *From Tacit to Explicit (Articulation/Externalization):* It is converting the tacit knowledge into explicit knowledge where it can be presented to use of the company as a whole, thus allowing it to be shared with the others in the company. Converting tacit knowledge into explicit knowledge is actually finding a way to express the inexpressible. This process of creating tacit knowledge is called `articulation`. Later, Nonaka (1994) also called this process `externalization`.

- *From Explicit to Tacit (Internalization):* A new explicit knowledge is shared throughout an organization. Other employees internalize it. They use it to broaden, extend, and reframe their own tacit knowledge. This process of creating tacit knowledge is called `internalization`. Simply put, "where knowledge flows, learning takes place" (Nissen, 2006, p.7).

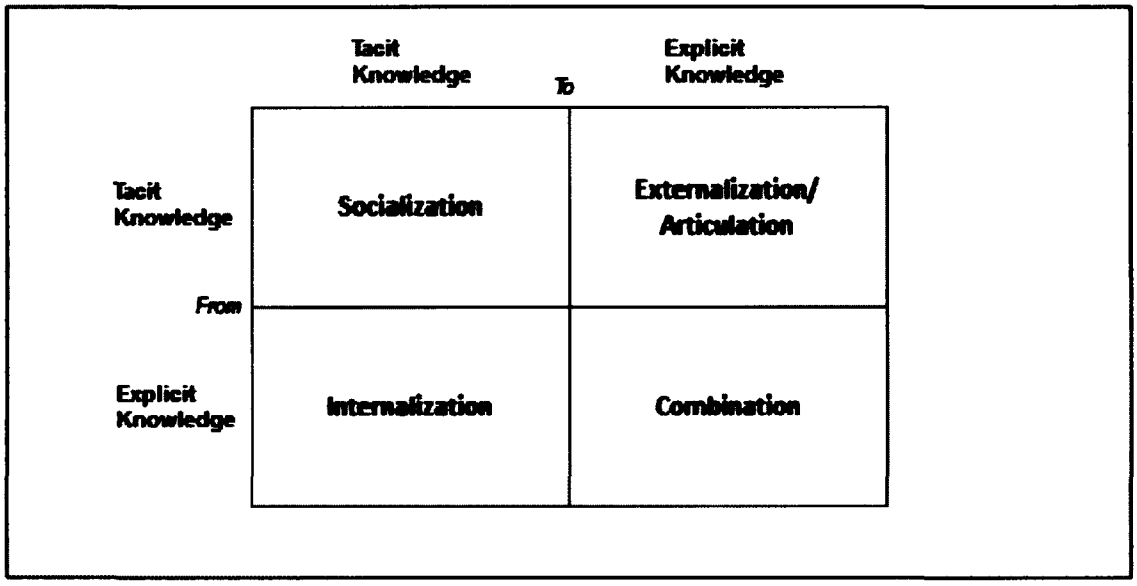

Figure 4. Modes of Knowledge Creation (Nonaka, 1991, 1994)

Nonaka and Takeuchi (1995) called this process as `SECI` which stands for `socialization`, `externalization`, `combination` and `internalization`.

2.2 Knowledge Management (KM)

The global environment and the circumstances eventually lead the organizations to act wisely. We are entering into an era where the future will be essentially determined by our ability to use knowledge wisely (Shariq, 1997). He further claims that the nature of globally expanding and highly competitive knowledge-based economy force the organizations to seek fundamental insights of nurturing, harvesting and managing immense potential of knowledge assets (Shariq, 1997).

With the view of people being the only true agents in business, and further that all assets are merely the result of human action (Sveiby, 1997), knowledge which is largely agreed to be an intellectual capital is an important source as a management objective. In knowledge-based views, the relative advantages of firms over markets relate to firms' superior abilities in creating and exploiting knowledge (Grant, 1996; Kogut and Zander, 1992, 1996; Nonaka and Peltokorpi, 2006; Spender, 1996).

It is widely accepted that knowledge is the key for achieving competitive advantage. Thus, any company or similarly any organization can achieve a great deal of advantage by managing knowledge better over its competitors. Once the organizations can see the importance of knowledge then they will enjoy the potential benefits derived from managing it well. Nonaka and Peltokorpi (2006) describe the successful organization in this age as one that best enables the knowledge creation spiral.

However, the knowledge acquisition/absorption and learning of an organization in order to adapt to the dynamic environment is quite sophisticated. That is why, the constructs of `KM` and `organizational learning` have been scholarly addressed in order to explain the basis for the complex organizational processes of knowledge and learning. Actually the process of knowledge flow carry high risks of losing the value of the knowledge or deviating from the knowledge if any mistake is made. There emerges the need of knowledge management in order to minimize (ideally terminate) the possibilities of losses or deviations of the original knowledge.

In such a rapidly changing world driven by globalization, the knowledge-based economy coupled by ever-fast development of information, communication and technology (Cong & Pandya, 2003) have provided the appropriate means for knowledge management to pace significantly over the past two decades. Since its emergence the literature about KM has developed very rapidly in both theoretic and practical areas. Accordingly, KM has been described with many different definitions based on the describer's perspective, orientation, understanding and area of interest.

Until near past, the foundations and the grounds of KM were not really clear. Back in 2006, as a result of their investigation about the most influencing 20 KM related articles and studies, Nonaka and Petlokorpi (2006), claimed that the scholars were starting to understand the nature of knowledge and its role in social entities, although

they have also identified the lack of clear, unified foundations in KM while giving the credit for KM to have proved to be an alluring one for scholars and practitioners. Over the past years since Nonaka and Petlokorpi's (2006) study, the literature about KM has gained a certain level of maturity. In the theoretical arena, over the past 15 years, there has been a remarkable increase in articles, books and conferences titles (Serenko, Bontis, Booker, Sadeddin & Hardie, 2010). On the other hand, in the practical arena, organizations have been developing processes and programs to deal with the need to manage knowledge (Robles-Flores & Kulkarni, 2005) and advanced since then. It has even interacted with different disciplines that today KM is denoted to be a multidisciplinary subject.

Nevertheless, it is hard to address a consensus over KM definition and scope. While some scholars classify organizational learning and evolutionary economics as KM (Subramani, Nerur & Mahapatra, 2003), others adapt a rather specific view (Nonaka & Toyama, 2004).

2.2.1. Definition of KM

Essentially, KM is the practice of managing intellectual capital or asset of an organization. Learning from past mistakes and avoiding reinventing the wheel are crucial tasks and no organization can today afford not to look for ways to make the best use of its knowledge (Alder & Peterson, 2010).

Organizations implement KM practices and technologies on the promise of increasing their effectiveness, efficiency, and competitiveness (Schultze & Leidner, 2002). According to Alavi and Tiwana (2002), KM and knowledge management systems (KMS) appear to be necessities for organizational effectiveness and competitiveness in the new millennium.

According to Davenport and Prusak (1998), most KM projects have one of the three aims:

1. To make knowledge visible and show the role of knowledge in an organization.

2. To develop a knowledge-intensive culture by encouraging and aggregating behaviors such as `knowledge sharing` (as opposed to hoarding), and proactively seeking and offering knowledge.

3. To build a knowledge infrastructure-with a given space, time, tools and encouragement to interact and collaborate.

Alavi and Leidner (2001) claim that different views about the knowledge lead to different perceptions of KM.

Throughout the review of primary literature, for the sake of simplicity we have concluded three major streams of definitions about the KM. In broad perspective, those are `knowledge-oriented`, `management-oriented` and `other` definitions. Additionally we have also referred to some other important definitions as well.

Knowledge-Oriented Definitions:

Love, Irani and Fong (2004) define KM as sharing and leveraging knowledge within an organization and outwards toward customers and stakeholders. Van Krogh (1998) uses similar definition with the purpose of helping the organizations to compete by identifying and leveraging organization knowledge. KM can also be defined as the attempt of an organization to identify and distinguish knowledge from information, assess the value added of this knowledge in terms of actionable achievement of organizational objectives, and the pursuit of the appropriate amount of resource allocation to the most valuable knowledge-based assets throughout the organization (Nissen, 2006; Davenport et al., 1998). One of the most often used definitions in which KM is described as 'the generation, representation, storage, transfer, transformation, application, embedding and projecting group and organizational knowledge' (Hedlund, 1994; Nonaka & Petlokorpi, 2006).

Management-Oriented Definitions:

Quintas, Lefrere and Jones (1997) describe KM with a brief but comprehensive expression. They define KM as a process of continually managing knowledge of all kinds and requiring an organization-wide (they call it company-wide) strategy which comprises policy, implementation, monitoring and evaluation. Such a policy should ensure that knowledge is available when and where needed and can be acquired from external as well an internal sources (Quintas, et al., 1997). KM is the function of

applying logical organizational processes towards the goal of having knowledge readily available for decisions (Nonaka, 1994; Tsoukas, 2005). One of the benefits of KM is that it leverages the intellectual capital of the entire organization instead of working as individuals (Chua, 2002). According to Chua (2002) this is the only way to gain a competitive advantage. KM aims to use, improve, maintain, and create organizational capabilities to generate sustained competitive advantage in organizations through knowledge (Davenpot & Prusak, 1998; Drucker, 1999; Lubit, 2001; Teece, 1998; Zahra & George, 2002). KM intends to address the challenges of competing and improving performance through knowledge faced by modern organizations (Davies, 2000). One of the KM cornerstones is improving productivity by effective knowledge sharing and transfer. KM must be practical aspect of the general organizational culture (Levy & Hazzan, 2009).

Other Definitions:

KM is not a development of, but rather a divergence from, the organizational learning literature. According to Nonaka and Peltokorpi (2006) and Scarborough, Swan and Preston (2001) knowledge also plays a secondary role in evolutionary economics. According to Nissen (2006) people, processes, and technology are the three pillars of the KM. In order to initiate a KM, it is imperative to take into consideration those three factors. He also thinks that KM involves organizational change. Bose (2004) states that the three goals of KM are to leverage the organization's knowledge, create new knowledge and increase collaboration.

KM is recognized as a legitimate management practice that helps organization distribute the right knowledge to the right people at the right time (Van Der Spek & Carter, 2003). Similarly, Landaeta, Pinto and Kotnour (2009) define KM as the processes, tools, and techniques that make available the right knowledge to the right knowledge worker, at the right time.

We can easily increase the number of definitions of KM. But, more or less it is evident that different definitions depending on their various perspectives put the lights on similar theme which is sharing and leveraging the knowledge to increase understanding, performance and competitiveness throughout the organization.

Knowledge Management Systems (KMS)

KMS has emerged among the information technology community and organizations. Consistent with the interest in `organizational knowledge` and `KM`, Information Science researchers have begun promoting a class of information systems referred to as `knowledge management systems` (KMS) (Alavi & Leidner, 2001). But it has gained its mature understanding across the management organizations as well. With regards to KM, Alavi & Tiwana (2002) identify some challenges about the phases of KM and then proposes to use KMS in order to overcome those challenges. The objective of KMS is to support creation, transfer and application of knowledge in organizations. Despite this IT perspective given to the definition of what KMSs are, Landaeta, Viscardi and Tolk (2011) propose that the definition of KMSs should include more than technology aspects, and should incorporate the human/social and governance aspect of knowledge management to represent them as complex systems.

2.2.2. Emergence and Expansion of KM

Similar to its definition, we cannot really trace a clear emergence point of KM in the literature.

For some scholars, KM has roots of beginning in the early 1900s. According to this idea, Taylor (1911) laid a groundwork frame for scientific management. In the 1950s and 1960s, organizational learning gained traction by the efforts of researchers like Cangelosi and Dill (1965) and Cyert and March (1963). Argyris and Schon (1978) advanced a theory of using single-loop vs. double-loop methods of learning in that respect.

This initial momentum was supported by a string of popular books. Endorsements by highly respected scholars, such as Dr Baruch Lev (New York University) and Dr Tom Davenport (Babson College) were coupled with some practitioner icons (e.g. Leif Edvinsson at Skandia, Hubert Saint-Onge at CIBC, Goran Roos at ICS, Patrick Sullivan at ICM Group, etc...) (Bontis, 1998; Serenko, et al. 2010).

But in reality, convergence of a new management discipline with the advent of the Internet Age provided the perfect ingredients for a new field with a promising future (Serenko, et al., 2010). The overall field of KM research in the early 1990s was

supported primarily by practitioners. The Chief Knowledge Officers (CKOs) were entrusted with an important corporate asset (Bontis, 2001; Serenko, et al., 2010). The task of exploring the development of intellectual capital through KM initiatives, and later, understanding how to better exploit them for competitive gain, was not at all easy. At the time, there were no degrees, university programs or training seminars that targeted this field. However, several pioneering CKOs gravitated towards each other and created global networks of expertise (Serenko, 2010). Some consider Leif Edvinsson of Sweden as one of the godfathers of this group. He spearheaded the development of the world's first intellectual capital statements at Skandia, which provided the foundation for a new language, framework and operationalization of the KM/IC (Intellectual Capital) field (Bontis, 1998).

According to Alavi and Leidner (2001), the organizational knowledge has prompted the issue of managing the knowledge to the organization's benefit. Problems maintaining, locating and applying knowledge have led to systematic attempts to manage knowledge (Alavi & Leidner, 2001). In the late 1980s and early 1990s, Nonaka (1988b) came up with the idea of `knowledge creation`, which is widely accepted as one of the major steps towards KM. For him, organizations must not only process information; they must also create it (Nonaka, 1988b). He gave the example of Honda Company (Honda City development) where they had high level of information sharing. In Honda Company, after the successful completion of a project, participants are assigned to other projects so that the knowledge they have acquired can be transferred throughout the organization (Nonaka, 1988b). In the meantime, Karl Sveiby and Thomas Davenport, whose book published in the 1990s have gained wide reputation (Nonaka & Peltokorpi, 2006).

For most of the scholars, KM formally became a major field around 1990s either with 1988 or 1991 studies of Nonaka. The advent of computing technology and power helped to show the increased value of knowledge. With access to information becoming ever more available, the value of cognitive skills becomes more evident (Prusak, 2001).

In 1993, Prusak and a few colleagues held the first dedicated KM conference (Prusak, 2001). Nonaka (1994) articulated a philosophy to develop a practical perspective on the management of organizational knowledge creation process. During

this time, the KM field was also being expanded by researchers like Leonard-Barton (1995) and Nonaka and Takeuchi (1995).

When the first KM papers appeared between 1994 and 1998, non-academics constituted one-third of all authors. In fact, it was key practitioners who provided the initial impetus for the field (Bontis, 1998; Serenko, et al. 2010). But, In terms of the role of practitioners, their contribution to the body of knowledge has been declining. Overall, there is a great danger that KM may lose its practical side and become a pure scholarly discipline (Serenko, et al, 2010).

Many of the initial academic papers were case studies and re-conceptualizations of what had already occurred in practice. Normally, it is not unusual to witness practice to lead academia initially in the new fields. Serenko, et al. (2010) claim that while KM had been initially discussed by the mid-1990s in practitioner books, magazines and trade journals (e.g. KM World), academic journals followed only a few years later. Then, gradually KM captured the attention of academics from various disciplines. They have started to develop the theoretic grounds of this new field and contribute to the literature.

Alavi and Leidner (2001) presume that KM is an established scholar discipline since 1991 (Nonaka, 1991). But they claim the knowledge-based perspective of the firm has emerged in the strategic management literature with Cole (1998), Nonaka and Takeuchi (1995) and Spender (1996) in period of 1996-1998. Allegedly this perspective builds upon and extends the resource-based theory of the firm initially promoted by Penrose (1959) and expanded by others like Barney (1991), Conner (1991) and Wernerfelt (1984).

Despite its relatively short history, KM already boasts a continuously growing body of knowledge. The discipline has attracted the attention of a tremendous number of individual contributors from a variety of both academic and non-academic institutions. The literature of KM is actually is the cumulative contribution of a large variety of individuals from hundreds of academic and non-academic organizations that shape the KM scholarly domain (Serenko, et al., 2010). And, it still continues to mature as a scientific multidiscipline.

Bibliometric/Scientometric Studies:

Significant contributions to the KM discipline have been studied by different scholars over the last decade. These researches provide valuable insights about the scholarly development and advancement of KM. Table 5 depicts the summary of those researches.

Table 5. Bibliometric/Scientometric Analyses About KM

Bibliometic/Scientometric Studies About KM			
#	**Year**	**Author**	**Scope**
1.	2003	Submarini, et al. (2003)	Listed 58 of the most frequently cited KM scholars between 1990 and 2002.
2.	2004	Serenko and Bontis (2004)	Ranked publications on KM and intellectual capital published/cited in the Journal of Intellectual Capital, the Journal of Knowledge Management, and Knowledge and Process Management between 1993 and 2003.
3.	2004	Gu (2004)	Analyzed 2,727 authors have contributed 1,407 KM publications between 1975 and 2004.
4.	2006	Nonaka and Peltokorpi (2006)	Studied twenty most known publications between 1991-2002
5.	2010	Serenko et al. (2010)	Out of eleven major peer-reviewed journals 2,175 IC/KM articles were analyzed.

As an indication, in Gu's (2004) bibliometric analysis shows that 2,727 authors have contributed 1,407 KM publications between 1975 and 2004. Taking into account Serenko, et al.'s (2010) analysis, it is obvious that this number has been exponentially increasing.

Serenko, et al. (2010) conducted an overarching scientometric analysis of literature contained in eleven major knowledge management and intellectual capital (KM/IC) peer-reviewed journals. 2,175 articles were reviewed, based on their findings they have concluded that many implications emerged that improve one's understanding of the identity of KM/IC as a distinct scientific field. They claim that selected

publications represent over 70 percent of the body of knowledge existing in KM/ICspecific outlets (Serenko, et al, 2010).

On the other hand, the study of Nonaka and Peltokorpi (2006) gives a good idea of the most influential KM publications in management journals as seen in Table 6:

Table 6. Most Influential KM Publications in Management Journals Reviewed (Nonaka and Peltokorpi, 2006)

Most Influential KM Publications in Management Journals Reviewed (of 2006)			
#	Year	Author	Scope
1.	1990	Cohen, et al.	Absorptive Capacity: A New Perspective on Learning and Innovation.
2.	1991	Barney	Firm Resources and Sustained Competitive Advantage
3.	1992	Kogut & Zander	Knowledge of the Firm, Combinative Capabilities and the Replication of Technology
4.	1994	Hedlund	A Model of Knowledge Management and N-Form Corporation
5.	1994	Nonaka	A Dynamic Theory of Organizational Knowledge Creation
6.	1996	Conner & Prahalad	A Resource-Based Theory of the Firm: Knowledge versus Opportunism.
7.	1996	Kogut & Zander	What do Firms Do? Coordination, Identity and Learning
8.	1996	Tsoukas	The Firm as a Distributed Knowledge System: A Constructivist Approach
9.	1996	Grant	Toward a Knowledge-Based of the Firm
10.	1996	Spender	Making Knowledge as the Basis of a Dynamic Theory of the Firm
11.	1996	Sanchez & Mahoney.	Modularity, Flexibility, and Knowledge Management in Product and Organization Design
12.	1997	Teece, et al.	Dynamic Capabilities and Strategic Management
13.	1998	Davenport, et al.	Successful Knowledge Management Projects
14.	1998	Nonaka & Konno	The Concept of Ba: Building a Foundation for a Knowledge Creation
15.	1998	Van Krogh	Care in Knowledge Creation
16.	1998	Leonar & Sensiper	The Role of Tacit Knowledge in Group Innovation
17.	1998	Nahapiet & Ghoshal	Social Capital, Intellectual Capital and the Organizational Advantage
18.	1999	Hansen, M.	The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge Across Organization Subunits
19.	2001	Brown & Duguid	Knowledge and Organization: A Social Practice Perpective
20.	2002	Sveiby & Simons	Collaborative Climate and Effectiveness

Applications of KM:

KM is widely used and taught in the fields of business administration, information systems, management and library and information sciences (Alavi & Leidner, 2001).

Most recently some additional fields have also started to use KM, including media, computer science, public health, public policy, governmental organizations and military.

IT/IS and Knowledge Management:

Some previous investigations support the prominent saying that an effective KM is 80% related to organizational culture and human factors, and 20% related to technology (Landaeta, et al., 2009). Nevertheless, technology, hence information technology (IT) and information systems (IS) are still important factors for the KM.

Applications of IT to organizational KM initiatives reveal three common applications (Alavi & Leidner, 2001):

- Coding and sharing of best practices (KPMG, 1998; O'Dell & Grayson, 1998),
- Creation of corporate knowledge directories (Ruggles, 1998), and
- Creation of knowledge networks (Ruggles, 1998).

2.2.3. KM Process

KM is largely regarded as a process involving various activities. Slight differences in the delineation of the processes appear in the literature. Those are mostly related to number and labeling of processes rather than the underlying concepts.

Different knowledge processes have been identified in the literature on KM, these include but are not limited to: knowledge creation, knowledge organization (i.e., storage and code), knowledge transfer (i.e., acquisition and dissemination), knowledge assimilation (i.e., learning), and knowledge application (Dixon, 2000; Landeta, et al, 2009; Nonaka, et al., 1996; Park & Kim, 2006).

Freeze and Kurkani (2005) describe the knowledge management process as the set of organizational actions of acquiring, storing, presenting, and applying knowledge

and then draw the attentions over the variety of processes in KM. Nevertheless, they also advocate that these processes often follow a pattern of acquire, store, present, and apply.

Majority of the scholars consider the four basic processes of creating, storing/retrieving, transferring, and applying knowledge (Alavi & Leidner, 2001) as the pillars of KM. These major processes can be subdivided, for example into `creating internal knowledge`, `acquiring external knowledge`, storing knowledge in documents, versus storing in routines, updating knowledge and sharing knowledge internally/externally (Teece, 1998).

This cycle does not need to be sequential and it is definitely not discrete. It is rather a continuous and intended to build on known information (Alavi & Leidner, 2001).

The premise that all knowledge is neither fully tacit nor fully explicit means that the processes in place to manage it cannot be optimized for either type. The processes are, therefore, required to be flexible to accommodate the more prevalent type of knowledge for the particular situation (Kurkarni et al., 2007).

The importance of the KM Cycle for a company relies upon the need of transforming individuals' personal knowledge (tacit knowledge) into organizational knowledge across the whole company (Nonaka, 2008).

As stated before, although some scholars tend to add or differentiate some steps, we will also follow the majority of the literature for the `KM Cycle` of four steps. These are `creation`, `sharing`, `capture` and `application`.

For better understanding the steps in the cycle are elaborated below:

1. `*Knowledge Creation*` is where product knowledge is generated. Alavi&Leidner (2001) posit that knowledge creation involves developing new content or replacing existing content within the organization's tacit and explicit knowledge by drawing from Pentland (1995). This view is in concert with Nonaka's knowledge spiral. It matches succinctly the four modes of knowledge creation discussed by Nonaka (1994): socialization, externalization, internalization, and combination. It involves developing new content or replacing existing content within the organization's tacit and explicit knowledge (Pentland, 1995). Essential question of knowledge creation is establishing an organization's `ba` (defined as a common place or space for creating knowledge). Four types of

ba corresponding to the four modes of knowledge creation are (1) originating ba, (2) interacting ba, (3) cyber ba, (4) exercising ba (Nonaka & Konno, 1998).

Challenges of the Knowledge Creation Step:

- Cultural barriers to KM (e.g. organizational norms that promote and encourage knowledge hoarding) cannot be effectively reduced or eliminated through IT applications (Alavi & Leidner, 2001). Close ties in a community limit knowledge creation because individuals are unlikely to encounter new ideas in close-knit networks where they tend to possess similar information (Robertson, Swan & Newell, 1996).

2. `*Knowledge Capture/Knowledge Storage and Retrieve*` is where knowledge is translated into objective and transferrable knowledge or explicit knowledge (Nonaka, 2008). While organizations create knowledge and learn, they also forget (i.e. do not remember or lose track of the acquired knowledge) (Argote, Beckman & Epple, 1990, Darr et al. 1995). The storage, organization and retrieval of organizational knowledge, also referred to as `organizational memory` (Stein & Zwass, 1995; Walsh & Ungson, 1991). Organizational memory is the means by which knowledge from past, experience, and events influence present organizational activities (Stein & Zwass, 1995). Despite the concerns about the potential constraining role of organizational memory, there is a positive perspective on the influence of `IT-enabled organizational memory`. This step is actually, about the concept of organizational memory which includes, `knowledge residing in various component forms, including written documentation, structured information stored in electronic databases, codified human knowledge stored in expert systems, documented organizational procedures and processes and tacit knowledge acquired by individuals and networks of individuals` (Tan, Teo, Tan, & Wei, 1998). Once the knowledge is acquired, in either form, for organizational purposes, it must be stored for future use. The act of storing knowledge can be subconscious, in the case of individual tacit knowledge, or a deliberate function of a branch of an organization (Nonaka & Toyama, 2004). Storing tacit knowledge is not necessarily difficult. However, cataloging that knowledge for quick retrieval and presentation is highly difficult

for organizations (Freeze & Kulkarni, 2008). Because people can `know more than they know` and may not know what information is on hand or useful (Polanyi, 1966). This storage is a necessary collection of useable knowledge for the purposes of presentation at precisely the right place and time (Schutt, 2003).

Challenges of the Storage/Retrieval Step:

- The barriers include lack of employee time to contribute their knowledge (KPMG, 1998) and a corporate culture that has historically not rewarded contributing and sharing of insights (Brown & Duguid, 1998; KPMG, 1998).
- When the context surrounding the knowledge creation is not shared, it is questionable whether storing the knowledge without sufficient contextual detail will result in effective uses. This could lead to the essence of knowledge being lost (Zack, 1998).
- At the organizational level memory may lead to maintaining the status quo by reinforcing single loop learning (Argyris & Schon, 1978). This could in turn lead to stable, consistent organizational cultures that are resistant to change (Denison & Mishra, 1995).
- The challenge in design of organizational knowledge retrieval strategies is providing timely and easy access to knowledge while avoiding a condition of information overload (Alavi & Leidner, 2001).
- Viewing knowledge as existing predominantly outside the heads of individuals: Although knowledge can be represented in and often embedded in organizational processes, routines, and networks, and sometimes in document repositories, it cannot originate outside the heads of individuals (Fahey & Prusak, 1998).

3. `*Knowledge Sharing/Knowledge Transfer*` is socialization through the interested parties. Transfer occurs at various levels: between individuals, from individuals to explicit sources, from individuals to groups, between groups, across groups, and from the group to the organization (Alavi & Leidner, 2001). Literature abounds on this topic of knowledge transfer and Gupta and Govindarajan (2000) have popularly conceptualized it in terms of five elements:

1) perceived value of the source unit's knowledge, 2) motivational disposition of the source (i.e., their willingness to share knowledge), 3) existence and richness of transmission channels, 4) motivational disposition of the receiving unit (i.e., their willingness to acquire knowledge from the source), and 5) the absorptive capacity of the receiving unit, defined as the ability not only to acquire and assimilate but also to use knowledge. `Communication processes` and `information flows` drive knowledge transfer in organizations (Alavi & Leidner, 2001).

Challenges of the Sharing Step:

- In many organizations, members feel that their futures with the company are dependent upon the expertise they generate, and they would be reluctant to help others. In such situations, it is then expected that individuals will attempt to build up and defend their own hegemonies of knowledge (Van Krogh 1998).

4. `*Knowledge Application*` is use of the knowledge in applicable situation. The source of competitive advantage resides in the application of the knowledge rather than in the knowledge itself (Alavi & Leidner, 2001). Three primary mechanisms for the integration of knowledge to create organizational capability: (1) directives, (2) organizational routines, and (3) self-contained task teams (Grant, 1996).

Challenges to Application Step:

- There may be several reasons for organizational members to access and assimilate knowledge but not apply (i.e. act upon it). Reasons include distrusting the source of knowledge, lack of time or opportunity to apply knowledge, or risk aversion (particularly in organizations that punish mistakes) (Davenport & Prusak, 1998).

Among these four processes acquisition which is recognition of value and the decision to transfer is claimed to be primary one by Freeze and Kulkarni (2008). Once the knowledge is acquired, it must be stored in a manner consistent with organizational standards for cataloging. When the knowledge is needed, it must be presented through a straightforward system. Finally, the knowledge must be applied towards attainment of an outcome (Drucker, 1993).

Other similar processes are addressed in the literature. For example, generation, codification/and transfer are used in a process for knowledge management developed by Davenport and Prusak (1998).

Turner and Makhija (2006) define this process slightly different as they call the processes as creation, transfer, interpretation, and application. This process is usually applied to interpreting ways of controlling organizational knowledge (Hodges, 2009).

Bose (2004) also presents a slightly different KM process model: create knowledge, capture knowledge, refine knowledge, store knowledge, manage knowledge and disseminate knowledge.

2.3 Knowledge and KM in the US Military

Maule (2006) elevates the value of KM in the military. He argues that knowledge systems have become a priority for the military because new life-threatening confronted and the new types of behaviors exhibited in conflicts. This is evident by the number of KM initiatives taken on by organizations throughout the US DoD today.

From a military perspective, KM is defined as:

A discipline that promotes an integrated approach to identifying, retrieving, evaluating, and sharing an enterprise's tacit and explicit knowledge assets to meet mission objectives. The objective is to connect those who know with those who need to know (know-why, know-what, know-who, and know-how) by leveraging knowledge transfers from one-to-many across the enterprise. (AR 25-1, 2005, p. 75)

Generally, military tends to use two different forms of management of this type, one is `Information Management` (IM) the other one is `Knowledge Management` (KM). Sometimes both are used in the same context as `Information/Knowledge Management` (IKM). And, mostly one can see the overlapping, conflicting and confusion of implications in these two areas in the military.

With a broad perspective, the expectations from the usage of KM across the military are: First is allocating the funding to be used efficiently and effectively in order to increase the overall performance. Second is providing lessons identified/learned in order to avoid system design problems and improve the performance. Note that, the

ultimate aim of the military organization is the performance, rather than improving the competitiveness.

2.3.1. Information Management (IM) in the US Military

Generally speaking, the Information Management at every level of command in the military is utilized to facilitate and support the decision making of the Commander. Alberts (2011) asserts that the key technology for future warfare is the `management of information`.

Information Managers are responsible for providing a `timely flow of relevant information` to the Commander that assists him/her in anticipating and understanding changing conditions and their impact on operations (MCWP 3-40.2, 2002) in order to provide him the means for the best decision. In this process, the Information Management Officer (IMO) works with each staff section to create an Information Management Plan (IMP) that identifies procedures used to facilitate the delivery of quality information to those who need it in a format they can quickly understand (MCWP 3-40.2, 2002).

In an effort to improve its information sharing capabilities, the US DoD has adopted KM as a practice to help establishing a better information sharing environment. KM can be seen as an important part of the transformation that US DoD is harnessing the power of information superiority by stating that a KM capability can further advance information sharing (DoD IM/IT Strategic Plan 2008-2009, 2008).

2.3.2. KM in the US Military

Although the definitions of the KM with the perspectives of different scholars were discussed earlier in this research, it will be beneficiary to trace the different military definitions for KM in order to establish a better understanding over the similarities and differences in the civilian and military approaches.

From a US DoD perspective, the Defense Acquisition University (DAU) Press has put forward its own definition in its publishing that KM is "the process for effectively applying intellectual capital (human, social, and organizational) to enable faster, better organizational decisions" (Pollock, 2002, p. 3).

The Department of the Navy Knowledge Management Strategy defines KM as, th integration of people and processes, enabled by technology, to facilitate the exchange of operationally relevant information and expertise to increase organizational performance (Johnson, 2010; Wennergren, 2005).

In the US joint publication (JP 6-0, 2003), KM is defined as `handling, directing, governing, or controlling of natural knowledge processes` (acquire/validate, produce, transfer/integrate knowledge) within an organization in order to achieve the goals and objectives of the organization.

KM supports the creation, organization, application and transfer of knowledge to facilitate situational understanding and decision making. (AR 25-1, 2005).

In the DoD IM/IT Strategic Plan of 2008–2009, the DoD CIO defines KM as the systematic process of discovering, selecting, organizing, distilling, sharing, developing and using information. It provides the basis from which decisions are made and actions are taken (DoD IM/IT Strategic Plan 2008-2009, 2008).

Having understood the importance of KM, The US DoD aggressively adopted KM as means of improving communications, operations, and decision-making in its complex operating environment.

Actually as a good indication of the US military awareness regarding the importance of the KM, we can exemplify the annual `KM Conference` which is being conducted since 2000. The conference gives the opportunity to review the progress made by the DoD and military services to employ KM tools and techniques for improved interoperability, business operations, and decision-support. The twelfth of those conferences was held in October 2011 in Washington DC, USA (Digital Government Institute [DGI], s.a.).

Military perspective to the hierarchy of knowledge is more or less consistent with the all services. Visualization of it in the US Marine Corps Doctrine (MCWP 3-40.2, 2002) is depicted in Figure 5 below:

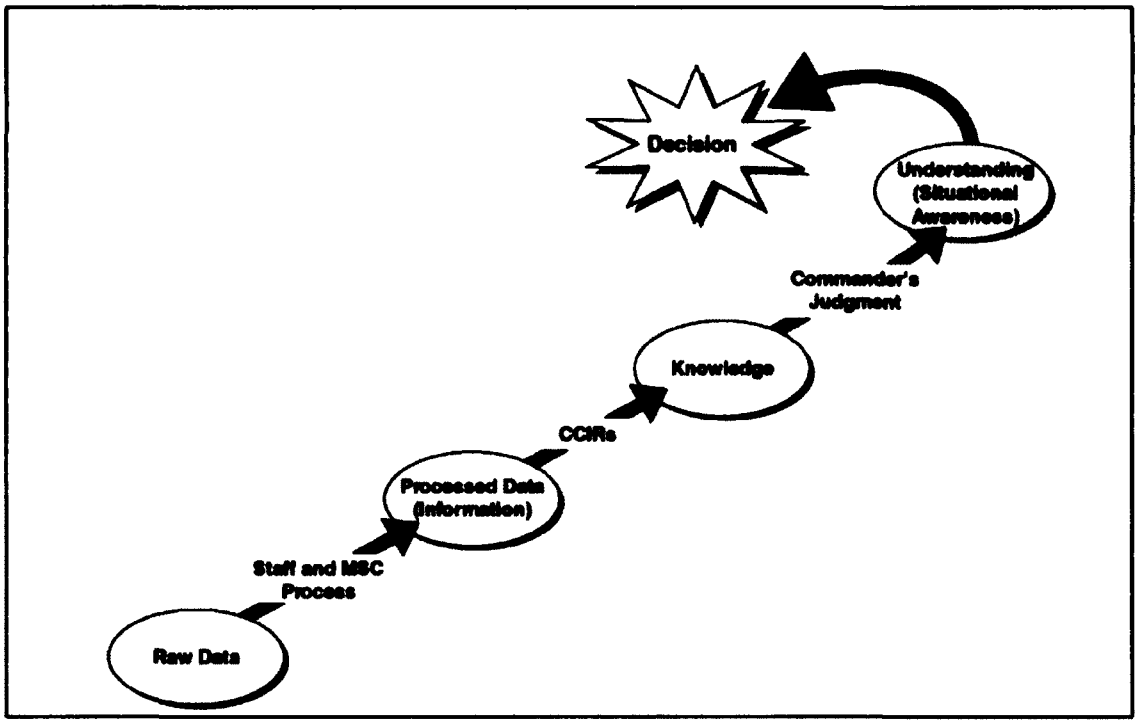

Figure 5. USMC Information Flow (MCWP 3-40.2, 2002)

It is obvious that the end state of the KM for a military organization is formed with respect to the commander's intention, as a reflection of the hierarchical structure.

In concert with the DoD IM/IT Strategic Plan of 2008-2009 in which the objectives of KM are itemized as `create a knowledge sharing environment` and `apply knowledge sharing (e.g., lessons learned)` during the planning of joint experiments, operational concept development, combat operations and other missions, each of the services is implementing their own KM to enhance organizational change efforts DoD IM/IT Strategic Plan 2008-2009, 2008)..

KM in the US Army

The US Army uses its own publication (AR 25-1, 2005) which defines KM as a tool supports creation, organization, application and transfer of knowledge to facilitate situational understanding and decision making (AR 25-1, 2005).

The US Army operates the Army Knowledge Online (AKO) portal for the KM practices. Additionally, the Army has also a subordinate organization of the US Combined Arms Center (CAC), which develops and implements KM products and

services that support collaboration among soldiers and units through a KM implementation known as the `Battle Command Knowledge System (BCKS)`(Johnson, 2010).

The BCKS lists specific objectives of `enable battle command`, `enhance professional education`, `facilitate exchange of knowledge`, `foster leader development`, `support doctrine development`, `support lessons learned` and `support training` (US Army CAC, 2011).

With a step further, the Army also identifies its organization benefits that is expected through the use of KM as `reduce the time to resolve specific technical or leadership problems and challenges`, `significantly shorten the learning curve`, `help create innovative/breakthrough ideas and tools`, `transfer best practices from one individual to another in near real-time`, `decrease negative outcomes for first-time real-world contact experiences`, `reduce the cost of mission accomplishment through superior knowledge transfer`, `fill the knowledge gap between doctrine` and `harness the collective minds of the military profession to generate "on the fly" knowledge as needed` (US Army CAC, 2011, p.1).

KM in the US Navy

The definition provided by the Navy is by far, the most comprehensive provided by all of the services with its discussion of integrating KM practices with technology for the purpose of exchanging operationally relevant information and expertise (knowledge) across the organization. Of the four definitions of each service's purpose for pursuing KM initiatives, Navy seems to be addressing the issue of involving organizational learning in its articulation of a robust KM strategy (Johnson, 2010).

KM, as defined by the DON CIO (Department of Navy Chief Information Officer), is the integration of people and processes, enabled by technology, to facilitate the exchange of operationally relevant information and expertise to increase organizational performance (DON KM Strategy, 2005). Four initiatives are highlighted: `broaden awareness`, `broad implementation`, `proliferate KM lessons learned` and `build new implementation programs and share KM resources` along with two levels of ` enterprise-wide process improvement` and `day-to-day operations at the command level` (DON KM Strategy, 2005, p.5). According the DON KM Strategy, the DON CIO is

responsible for promoting and assisting in advancement of KM implementation within the Department, which involves supporting and promoting a community of practice, conducting semi-annual meetings and providing tools to facilitate learning organizations.

The Navy Knowledge Online (NKO) portal is the technology hub that integrates all of the Navy's KM initiatives (US Navy DoN CIO Memo, 2011).

The importance of KM to the Navy is stressed in its two focus areas of implementation: 1) KM Advocacy, in which the DON remains committed to enabling mission accomplishment through KM efforts; and 2) Training and Education, where the Navy is providing organization wide training such as the Afloat Knowledge Management Course, The Command Knowledge Management Course, a two course series on knowledge management through the Naval Postgraduate School, and Navy E-learning via the NKO portal. Additional instructions on KM principles are being incorporated into all levels of formal education discussing topics like CoPs, KM Collaboration, KM Integration and Related Initiatives, and KM Technology tools (Johnson, 2010).

KM in the US Air Force

The US Air force publication (AFPD 33-3, 2006) describes the KM that it seeks to make the best use of the knowledge that is available to an organization, creating new knowledge, and increasing awareness and understanding in the process (AFPD 33-3, 2006).

The US Air Force has a `KM Center of Excellence` which has the goals of `Decision Quality Information`, `Transform Military Functions`, `Retain Corporate Skills` and `Accelerate Learning Processes` (Johnson, 2010).

The Air force has initiated a KM program called `Air Force Knowledge Now (AFKN) Program` which is the major program utilized to accomplish the goals of inter-organizational communication, cooperation, interaction among team members and knowledge capture. It also has HQ AFMC/A5BK which provides expertise in management of information and knowledge. This body focuses on providing `customized and tailored knowledge management solutions that facilitate the execution of mission objectives and strategic goals` and `consultative assistance in design/implementation of knowledge-centric solution sets` (Johnson, 2010).

KM in the US Marine Corps

KM is rather a new initiative for the Marines when compared with afore mentioned services. The Marine Corps, unlike the other services, does not provide its own definition of KM, it rather adapts the definition of the Navy.

In the US Marine Corps, Marine Corps Information Management is performed in accordance with Marine Corps Warfighting Publication MCWP 3-40.2 (2002), which offers a methodology for how four classes of information [Raw Data, Processed Data (Information), Knowledge, Understanding] should flow through the Information Hierarchy (Johnson, 2010) .

In MCO 5400.52 (2010) (a recent Marine Corps Order, dated Jan 5, 2010) KM is defined as the integration of people and processes, enabled by technology, to facilitate the exchange of operationally relevant information and expertise to increase organizational performance. This operational function enables organizational learning to improve mission performance (MCO 5400.52, 2010).

Like the Air Force, the Marine Corps also adopts KM practices with CoPs to encourage and facilitate knowledge sharing. With the use of CoPs they expect to provide support through three focus areas of `collaboration (identification of best practices, support community for deployment issues`), `education (brown bag-style demonstrations, electronic resources, facilitated training)`, and `cohesion (Recognition of CoP practitioners, Standardized approaches, Command-wide resources)` (Johnson, 2010).

Examples for Practice of KM in the US Military

In his research, Johnson (2010) summarizes examples of organization and unit level KM initiatives implemented throughout DoD, as well as components of each program that contributes to the development of knowledge sharing environments. His summary is depicted in Table 7 below:

Table 7. The US DoD KM Initiatives (Johnson, 2010)

	Air Force	Army	Marines	Navy
Service Level Programs	*Air Force Portal *Air Force Knowledge Now (AFKN)	* Army Knowledge Online (AKO Portal) * Defense Knowledge Online (DKO) Portal * Battle Command Knowledge System (BCKS)	* Marine Net (Learning Portal) * Marine Ammunition Knowledge Enterprise (MAKE) * Marine Corps Combat Development Command (MCCDC) KM Center	* Navy Knowledge Online (NKO) Portal * Enterprise Knowledge Management (eKM)
Unit Level Programs	* Air Force Material Command * 77 Weapons Squadron * >15K Virtual CoPs	* 1st Cav. Division * 4th Infantry Division * US Army Reserve Affairs * Center for Army Lessons Learned (CALL)	* Marine Corps Center for Lessons Learned (MCCLL) * Marine Corps Knowledge Management Portal MCCDCKM CoP	* Naval Education Training Command * Naval Personnel Development Command * US Pacific Command * Naval Postgraduate School (NPS)
KM Education Offered	* AFKN Workshops AFKN 101 Intro to KM * AFKN FM KM Overview AFKN CoP Training AFKN Wiki Training	* Basic KM Course * Battle Command Officer * Integration Course * Army Knowledge Management Qualification Course * MS Sharepoint * Adobe Connect	Under Development	* CoP Course (7) * IPTR: Knowledge Distribution, Knowledge Flow, and Organizational Performance (KM) * Navy Afloat Knowledge Managers Course * NPS: IS3210 KM in Defense * NPS IS4310 Knowledge Superiority
KM Methodology	*Community of Practice * Knowledge Centric Operations	* Community of Practice * Army Knowledge Management Knowledge Advisors	* Community of Practice	* Community of Practice

He also provides KM evolution of Air Force and Army in his research as depicted in Table 8 below (Johnson, 2010):

Table 8. The US DoD KM Evolution (Johnson, 2010)

	Air Force	Army
KM Evolution in Air Force and Army	1999 - Air Force Material Command (AFMC) launches KM Initiative 2001 – AFMC KM becomes AFKM 2001 – AFKM adopts CoP methodology 2002 – AFKM has 200 CoPs and 1500 users 2002 – AFKM becomes Air Force Knowledge Now (AFKN) 2004 – AFKN has 700 CoPs and 14K users 2006 – AFKN adopts Knowledge Centric Operations (KCO)concept 2006 – AFKN has >7K CoPs and >160K users	1990s – Old Soldiers Bulletin Boards 2000 – Company Command Com 2002 – Early CoP (S3-XO Net) * AKO 2004 – BCKS 2004-2006 BCKS grows to over 80K participants 2006 – FM 6.0.1 first KM Doctrine 2007 – Present BCKS assists Army units with KM initiatives 2009- BCKS receives Authority to Operate (ATO) for NIPR and SIPR networks 2009 – 5th Annual AKM Conference

There is also a Joint Knowledge Management website called `Joint Knowledge Online (JKO)` which is the enterprise portal system providing convenient access to online joint training and information resources. JKO integrates with other DoD systems and uses the latest advanced distributed learning technologies to provide training courses and resources that better prepare warfighters for joint exercises and integrated operations (JKO, 2011).

2.4 Agility towards AKM

Every organization, no matter what their scales and types are, endeavors to adapt to continuously changing environment. And, it is commonly accepted that change is not

temporary and will not disappear. In that respect, companies have realized that agility is essential for their survival and competitiveness (Jain, et al., 2008).

In such a volatile environment, sustainability of any organization requires high level of adaptation capacity and capability. But, this capability may not even be sufficient by itself. It might also require prompt responsiveness in order to comply with the high speed of change in the environment. If the organizations cannot keep up with the change of the environment, then, although they can realize their organizational adaptation, they might still remain obsolete due to the slow rate of adaptation capability.

The firms ought to be courting their own radical transformation, rather than continuing to do what they have always done in the way that they have always done it (Demarest, 1997).

In that respect, organizations put tremendous effort, and allocate big amount of budget in order to adapt themselves quickly and correctly. In other words, they strive to be `agile`.

Agility has already become and apparently will remain as one of the most important challenges for the organizations. Although its importance has newly started to be recognized, still there are big question marks about how to achieve it. That is why the organizations also need to consider the dynamic environment conditions, and should realize the process of KM in an agile manner.

Agility and adaptiveness coexist within the context of the complex and changing environment (Atkinson & Maffot, 2005).

2.4.1. Definition of Agility

Lee and Xia (2010) summarize that there is a common underlying for the various definitions and descriptions. Agility is generally defined in terms of embracing and responding to change (Conboy & Fitzgerald 2004; Henderson-Sellers & Serour 2005; Highsmith 2004; Larman 2004; Qumer & Henderson-Sellers, 2008).

In the information technology, it is proclaimed that `agile development can be captured by the sentiment, `fit the process to the people, rather than people to the process` (Fenstermacher, 2005, p.444). This expression may not be limited to the field of information technology. It can be valid for all the fields in terms of agility.

Alberts (2011) defines agility as "the capability to successfully cope with changes in circumstances" (p.66). He further elaborates agility as an ability to successfully effect, cope with and/or exploit changes in circumstance. Success here means a state where a satisfactory level of performance, effectiveness and/or efficiency is reached (Alberts, 2011). To reach that success requires getting better at recognizing the significant changes in the environment and developing ability to respond appropriately (Alberts, 2011). He further argues that agility is not a way of reducing the problem difficulty, but rather a way of dealing with the combined effects of the presence of complexity and uncertainty (Alberts, 2011).

It is generally suggested that the abilities of knowledge and learning constitute significant domain for agility.

2.4.2. Application and Theories of Agility towards AKM

The literature presents a little in terms of explicitly addressing AKM applications and theories. However, there are plenty of practical and theoretical studies those imply different aspects of AKM.

Agile Enterprises

The reason being of the enterprises are not just to respond to the requests for the services. They are also driven by the internal events of the enterprise and business environment in which the enterprise functions.

In his book, Cummings (2009) also sheds the lights over the specifics of the new era. He asserts that realization of the benefits new era (changing environment) requires transformation of the enterprise. Enterprises that fully exploit this paradigm shift are identified as agile. They continually improve the speed, cost and quality of operations, and they rapidly respond to new business opportunities (Cummings, 2009).

That might be the reason that in most of the companies/enterprises Chief Information Officers (CIO) are the ones who are orchestrating the transformation.

Agility is an essential quality of the enterprise of the future. An agile enterprise rapidly adapts to changing business challenges and opportunities. It continuously improves to optimize cost, quality, and speed of delivery. Cummings (2009) finds KM

critical to enterprises agility because it provides insights from determining what changes are needed and how to make them.

Vandergiff (2006) on the other hand, drives the attentions on the decision supports systems in the enterprises that she argues the enterprises need a more aware, inclusive and responsive decision support system.

Agile Project Management

The relation of the KM with the project management is addressed and studied by various scholars.

Landaeta, et al. (2011) recognize that critical knowledge for projects enables the development and implementation of strategies focused in making available the right knowledge at the right time to the right individual or project.

The ultimate aim of a project manager would be to finalize a project successfully. Kotnour (1999) elaborates this project success as to make better project decision, solve project's problems and deliver successful series of projects. For that drawing from Kotnour (1999), Landaeta, et al. (2011) assert that having the right knowledge at the right time enables project managers and project members to enhance the capability to be successful in a project by reducing the unavoidable complexity that characterize project environments.

According to Landaeta, et al. (2011) the perception of projects as complex adaptive systems has generated the concept of agile project management. Within this domain, Scrum (an agile software development technique) has become the choice of many organizations that have struggled for decades on how to remain in business while meeting the project objectives. Per the generic idea of agility, Scrum also seeks to response the changes rapidly and effectively.

Agile Learning

Agile learning is mostly mentioned and practiced in the field of electronic learning and information technologies. For that reason it is rather addressed along with some software programs such as knowledge-based process asset libraries (PALs), Wiki (Web 2.0 technology), (Amescua, et al., 2010) or agile learning portals (ea. Intrepid Learning Systems), on line, electronic teaching portals, and with the agile software

development techniques called Scrum. In this context, agile learning is referred in order for the learners getting exactly what they need, precisely when they need it.

Within the organizational perspective, agile learning understanding can be traced back to Peter Senge in 1997, with his book called `The Fifth Discipline: The Art and Practice of the Learning Organization` he challenges the organizations to develop the capability to learn and adapt quickly (Senge, et al, 2001).

Along with that idea, agile learning understanding has been mainly acknowledged with its importance to respond the need of complying with the speed of change in order for a better competitiveness.

Clark and Gottfredson (2009), being the CEO and the Chief Learning Officer of TRClark Company, direct a question for the companies and then try to find some responses for these questions. Their basic question is: `how can organizations sustain competiveness?` They suggest the answer would be in the pursuit of learning agility. They describe it as `the ability of an organization to learn at or above the speed of change`. And they claim that organizations must accelerate knowledge cycles to keep pace with competitive cycles (Clark & Gottfredson, 2009, p.19).

Agile Software Development (ASD) and Agile Manifesto

Both the software practitioners and the scholars admittedly agree on the importance of knowledge that software development is a knowledge-intensive activity. Dove (1999) and Holz, Melnik and Schaaf (2003) have first acknowledged the similarities and the connection between the ASD and KM where they emphasize that both disciplines deal with organizational culture and change management.

ASD approaches have evolved since the mid-1990s as new alternative solutions to the inability of traditional "heavyweight" methods to address such enduring problems as time/cost overruns and the lack of responsiveness to changing requirements (Beck & Andres, 2005; Boehm & Turner 2004; Cockburn 2001; Highsmith 2004; Larman 2004). The unprecedented rate of change in business and technology has made it increasingly difficult for software teams to determine user requirements and respond to their changes (Schmidt, Lyytinen, Keil & Cule, 2001). It emerged in response to the unique problems that characterize software development process (Highsmith, 2002) and the challenges of

the dynamic environment. However, agility is difficult to achieve in practice (Cockburn 2001).

Agility in the software development was first recognized by the practitioners, like the other disciplines. Until a certain time, despite the growing popularity and importance of agile approaches, little amount of research has empirically examined key concepts and underlying theoretical relationships (Baskerville 2006; Boehm & Turner 2004; Larman 2004; Erickson, Lyytinen & Siau, 2005). Lee and Xia (2010) also highlight this aspect of the ASD that they claim the agile development literature is largely anecdotal and prescriptive, lacking empirical evidence and theoretical foundation to support the principles and practices of agile development. They further argue the lack of understanding about how organizations can effectively implement an agile development approach (Lee & Xia, 2010).

As one of the most eminent initiatives, in 2001 the four core values and twelve principles of agile development were formally introduced and endorsed in the publication of the Agile Manifesto by some of the prominent members of the agile development community (Lee and Xia, 2010). Since then, agile development has attracted much interest from the software industry (Dybå & Dingsøyr, 2008).

This manifesto declares twelve principles for Agile Software Development (Agile Alliance, 2001):

1. The highest priority is to satisfy the customer through early and continuous delivery of valuable software.

2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

4. Business people and developers must work together daily throughout the project.

5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

7. Working software is the primary measure of progress.

8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

9. Continuous attention to technical excellence and good design enhances agility.

10. Simplicity-the art of maximizing the amount of work not done--is essential.

11. The best architectures, requirements, and designs emerge from self-organizing teams.

12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly (Agile Alliance, 2011).

According to the Agile Manifesto, agile development values individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (Agile Alliance, 2011).

In their study Levy and Hazzan (2009b) discuss KM enablers that are embedded in the agile software engineering approach, and illustrate how collaborating processes and knowledge transparency can weaken the dilemmas people face and lead to better knowledge extraction and sharing.

ASD promotes frequent and continuous delivery of working software, embracing changing requirements, close collaboration between developers and users, self-organizing and empowered teams, face-to-face communication, technical excellence, simplicity, sense-and-respond, cross-functional teams and continuous adaptation (Agile Alliance 2001; Lee & Xia, 2010).

Commonly used agile development methods include XP (eXtreme Programming), Scrum, DSDM (Dynamic Systems Development Method), and FDD (Feature-Drive Development) (Schwaber & Beedle 2002; Lee & Xia, 2010).

Table 9 indicates the summary agile development literature, while Table 10 depicts the examples of agile approaches/methods:

Table 9. Agile Development Literature on Agility (Lee & Xia, 2010)

Construct	Literature	Relevant Definitions/Concepts/Ideas
Software Development Agility	Conboy & Fitzgerald (2004)	Agility is defined as the continual readiness of an entity to rapidly or inherently, proactively or reactively, embrace change, through high-quality, simplistic, economical components and relationships with its environment.
	Highsmith (2004)	Agility is the ability to both create and respond to change in order to profit in a turbulent business environment; it is the ability to balance flexibility and stability.
	Larman (2004)	Agility is rapid and flexible response to change.
	Erickson et al. (2005)	Agility is associated with such related concepts as nimbleness, suppleness, quickness, dexterity, liveliness, or alertness; it means to strip away the heaviness in traditional software development methodologies to promote quick response to changing environments and changes in user requirements.
	Henderson-Seller & Seour (2005)	Agility refers to readiness for action or change; it has two dimensions: (1) the ability to adapt to various changes and (2) the ability to fine-tune and reengineer software development processes when needed.
	Lyytinen & Rose (2006)	Agility is defined as the ability to sense and respond swiftly to technical changes and new business opportunities; it is enacted by exploration-based learning and exploitation-based learning.
	Cockburn (2007)	Agility is being light, barely sufficient, and manoeuvrable.
	Qumer & Henderson-Sellers (2008)	Agility is a persistent behaviour or ability of an entity that exhibits flexibility to accommodate expected or unexpected changes rapidly, follows the shortest time span, and uses economical, simple, and quality instruments in a dynamic environment; agility can be evaluated by flexibility, speed, leanness, learning, and responsiveness

Table 10. Key Principles and Practices of Agile Approaches/Methods (Lee & Xia, 2010)

Agile Approach/ Method	Principles/Practices Emphasizing Software Development Agility
Agile Alliance Manifesto (Agile Alliance, 2001)	• Welcome changing requirements, even late in development • Agile processes promote sustainable development • Deliver working software frequently • Continuous attention to technical excellence enhances agility
Scrum (Schwaber & Beedle, 2002)	• Software team determines features of each sprint from an evolving product backlog • Create an increment of potentially shippable software during each sprint
XP (Beck & Andres, 2005)	• The highest priority is continuously satisfy changing customer needs • Rapid user review and feedback
DSDM (Stapleton, 1997)	• Development is iterative, incremental, and driven by user feedback • Delivering a perfect system is less important than delivering a system that addresses the current business needs
FDD (Coad, De Luca & Lefebre, 1999)	• Customer/feature-centered iterative cycles • Regular build and inspection to ensure up-to-date systems

Examples of Agile Studies Implying KM

Along with aforementioned fields, there are also some other areas those imply AKM as well. Table 11 below indicates the summary of these examples along with the agile applications mentioned before.

Table 11. Examples of Agility Studies Towards KM

Agility Studies Addressing the KM			
Author	**Specifics of Agility**	**Proposed Solution**	**Relevance to KM**
Song & Nagi (1997)	- Flexible structures	- Agile Manufacturing IS	- Manage and control the knowledge flow
Reich, et al. (1999)	- Quick response to information needs	- Agile Manufacturing Organizations	- Constant inflow of knowledge

Table 11. Continued

Agility Studies Addressing the KM			
Author	**Specifics of Agility**	**Proposed Solution**	**Relevance to KM**
Youssef, Mohamed, Sawyer & Whaley (2002)	- Time as the new norm for competence - To be ready for the challenges of change	- Time-based-technology (TBT)	- Agile and learning organizations
Thunbers & Hallberg (2002).	- Suit the need of each patient	- Agile organization	- Common core knowledge
Le & Lo (2003)	- The need to adapt the change	- Agile, change-adaptive business processes	- Integrate business across KM
Maropoulos, et al. (2003)	- Substantial development	- Agile enterprise	- Information management and Knowledge representation
Lee & Lo (2003)	- The need to adapt the change	- Agile, change-adaptive business processes	- Integrate business across KM
Salazar, Hackney, & Howells (2003).	- Competitiveness - Ability to create new products - Relationship with customers, suppliers, intermediaries	- Classificatory Framework for Internet and Biotechnology	- Ability to create new knowledge - Knowledge production and Intellectual property management
Holz, et al. (2003)	- Adaptiveness	- IEEE WETICED 2003 Workshop on KM for Distributed Agile Processes	- Adaptation of modern KM techniques by agile teams
Kang, Son, & Standkovic, (2004)	- Deadline before the real-world status changes	- Real-time data services	- Using fresh data (temporarily consistent)
Norman, et al (2004)	- Respond rapidly to changes - Robust and flexible systems	- Agent-based models and techniques	- Knowledge maintenance of virtual organizations
Ramesh, Jain, Nissen, & Peng (2005)	- Continuously focus on change and innovations - Survive in dynamic environments	- Business Process Management System (BPMS	- Knowledge-based system - Managing contextual knowledge
Karni & Kaner (2005)	- Decision making during sudden change / unexpected development	- Agile Project Management	- Decision upon timely knowledge support
Weber & Werner (2005)	- Dynamic and uncertain business environment - Quick Reaction - Flexibly adapt to change	- Agility in workflow management	- Provide learning capabilities - Process oriented KMS

Table 11. Continued

Agility Studies Addressing the KM			
Author	**Specifics of Agility**	**Proposed Solution**	**Relevance to KM**
Fenstermacher, (2005b)	- Reaction to heavyweight methods - Sensible in dynamic environments - Quickly changing requirements	- Agile methods	- Software development much closer to other kinds of knowledge intensive work
Bieberstein, Bose, Walker & Lynch (2005)	- Fast-paced global economy - Corporation to be flexible - Cultural transformation - Adapting on demand methods	- Human Services Bus (HSB) `A new organizational structure`	- Adaptiveness through knowledge-based applications
Fujisawa & Kershberg (2005)	- Worker participation - Proactiveness - Constant Improvement	- Injecting JIT to KM Paradigm	- Optimal information flow - Human-centric information process design
Iwayama and Niwa (2005)	- User oriented - Interactive and systematic refinement	- JIT interactive interface (DualNAVI)	- Knowledge intensive works - KMS
Boehm & Turner (2005)	- Short iterative cycles - Actively involve users - Seeing change as an ally	- Information related agile processes	- Rely on a team's tacit knowledge as opposed to documentation
Trappey, Lin, Kur & Ho (2007)	- Flexibility as a key success factor	- Rule-based knowledge system	- Knowledge to be dynamically represented
Kundu, McKay, & De Pennington (2008)	- Challenge of flexibility - Customer focus of mass customization	- Agile Supply chain operation strategies	- Use knowledge-based techniques - Knowledge from the viewpoints of different experts
Jain et al. (2008)	- Complex process	- Agile Supply chain management (SCM)	- Goal of knowledge acquisition
Lee, Cho & Kims (2008)	- Rapidly digitalized management environment - In a complex situation	- a New Type of ES (expert system) called IMIXAO	- Knowledge-based decision support
Blake & Singh (2008)	- The need for light-weight process and responsiveness	- Model driven software engineering process	- Integration of knowledge to the process

Table 11. Continued

Agility Studies Addressing the KM			
Author	**Specifics of Agility**	**Proposed Solution**	**Relevance to KM**
Genero, Poels, & Piattini (2008)	- Highly dynamic business environment - Flexibility - Incorporate changes	- Conceptual data models	- Knowledge repository (data warehouse)
Macris, Papakonstantinu, Malamateniu, & Vassilacopoulos (2009)	- Active user participation - Reusable, flexible, and adaptable training	- User training material	- Adaptable training - Instill the knowledge and expertise - Ontology-based knowledge networks
Macdonald & Matinez-Uribe (2010)	- The need to increase the affectivity	- Research data repository by employing agile community	- Collaboration and sharing of expertise/knowledge
Ronnback, Regardt, Bergholtz, Johannesson & Wohed (2010)	- Instant change - Complexity - Robust and flexible management of changes	- Agile information modeling technique (Anchor)	- Maintaining and Evolving knowledge (data warehouse)

With the imperative of the new and emerging agile manufacturing paradigm, where multiple firms cooperate under flexible virtual enterprise structures, Song and Nagi (1997) addresses the great need for a mechanism to manage and control information flow among collaborating partners. In response to this pressing need, they suggest the design and implementation of an agile manufacturing information system integrating manufacturing databases dispersed at various partner sites (Song & Nagi, 1997).

Reich, et al. (1999) focus on the agile manufacturing as they think it relies heavily on the quality of information that organizations have and on their ability to organize and reuse it. They further claim that constant inflow of information and knowledge is the fuel of agile manufacturing. In such agile manufacturing organizations the information infrastructure improves the ability of becoming agile manufacturers of information systems, by responding quickly to information needs (Reich, et al., 1999).

In their study regarding Time-Based Technologies (TBTs) and on the operations and manufacturing of the small and medium size firms, Youssef, et al. (2002) introduce the time as the new norm for the competing along with the quality and the cost. They

assert that the organization embracing time as a competitive advantage are agile and learning organizations. That is the reason that such organizations are supposed to initiate change and ready for the challenges that come with it.

In their research, Thunbers and Hallberg (2002) conclude that rehabilitation of chronic pain patients should be organized as an `integrated wholeness`, requiring an `agile organization` to promote solutions tailored to suit the needs of each patient. Moreover, common core knowledge of chronic pain and mission clarity are important guidance for the interdisciplinary practical rehabilitation work (Thunbers & Hallberg, 2002).

Le and Lo (2003) address the need to create agile, therefore, change-adaptive business processes which are the keys to success in business world. The ability to reduce cycle-time, to provide high value-added services and to integrate business across many functions and geographical locations through e-Commerce, information technology and knowledge management will provide the competitive edge for any business enterprise in the 21st century (Le & Lo, 2003).

Maropoulos, et al. (2003) claim that the realization of agile enterprises requires substantial development of the underpinning modeling, information management, and knowledge representation technologies.

Salazar, et al. (2003), conceptualize the strategic impact of internet technology in biotechnology and pharmaceutical firms. They argue that competitiveness of modern, agile pharmaceutical businesses depend on their ability to create and commercialize new knowledge as much as on their ability to produce new products. Hence, knowledge production and intellectual property management provide a strong foundation for emerging, successful e-commerce strategies. They propose a classificatory framework that categorizes the strategic impact of internet technology in biotechnology and pharmaceutical industry, which based upon three key dimensions: converting information into knowledge, the redesign of the innovation process, and knowledge-oriented organizational structure. The authors extend their framework beyond the boundaries of the firms to include relationship with customers, suppliers, intermediaries (Salazar, et al. 2003).

Holz, et al. (2003) summarizes the results and the important outcomes of the 'IEEE WETICED 2003 Workshop on KM for Distributed Agile Processes', which was bearing the main goals of bringing together practitioners and researchers from the areas of KM and Agile Processes from different domains to discuss the states of ongoing research efforts and to share practical experiences with adaptation of modern KM techniques by agile teams.

Kang, et al. (2004) denote the demand for real-time data services as increasing in many applications including e-commerce, agile manufacturing, and telecommunications network management. They identify the desire to execute transactions within their deadlines i.e. before the real-world status changes, using fresh (temporally consistent) data in these applications. Their simulation study achieves a near zero miss ratio and perfect freshness, meeting basic requirements for real-time transaction processing

Norman, et al. (2004) claim that for the modern commercial environment it is essential to respond rapidly to changes in the market to remain competitive. Thus, they identify the need for robust, agile, flexible systems to support the process of virtual organizations management. They develop agent-based models and techniques for the automated formation and maintenance of virtual organizations (Norman, et al., 2004).

Ramesh, et al. (2005) justify the need for identification of a knowledge-based system called 'Business Process Management System' (BPMS) capable of managing contextual knowledge, by reasoning the businesses' need to continuously to focus on change and innovations in order to survive in dynamic environments.

Karni and Kaner (2005) specify an agile process to imply both agility in making decisions and performing the necessary actions. When confronted with a sudden change in project scope or an unexpected development, a project manager must make a series of interrelated decisions in response. The methodology is also applicable to other decision making frameworks, as well as project management (Karni & Kaner, 2005).

Today's dynamic and uncertain business environment requires quick reaction to change and frequent deviations from plans, making business agility indispensable. Therefore process-based systems must be able to flexibly adapt to change and provide learning capabilities. Weber and Werner (2005) propose an approach to achieve agility in workflow management systems based on the integration of workflow management and

conversational case-based reasoning. They propose a lightweight initial workflow model and foster learning from living processes to continuously improve workflow execution. They further claim that process oriented KMS are suitable for knowledge intensive workflows and are often used to provide additional process information to the users (Weber & Werner, 2005).

Agile techniques for software development have advocated loosening the constraints of so-called heavyweight processes in software development. In some ways, agile methods are reactions to heavyweight methods of software development. Agile methods are sensible approach in dynamic environments. For example, quickly changing requirements of retail business lead to rapidly changing software specifications and agile methods offer techniques for such environments. Agile methods bring software development much closer to other kinds of knowledge intensive work (Fenstermacher, 2005).

Bieberstein, et al. (2005) emphasize the fast-paced global economy, the need for a corporation to be flexible and agile to meet the shifting needs of operating in an on demand environment. Bieberstein, et al. (2005) propose the Human Services Bus (HSB), as a new organizational structure that optimizes the workforce and streamlines cross-unit processes to leverage the new IT systems. They discuss the cultural transformation that is required to support the HSB transition and induce the changes required in management and behavioral practices. The issues and insights at all three layers – IT systems, organizational structures, and cultural practices—are based on IBM's experience with adapting on demand methods (Bieberstein, et al., 2005).

In seeking a new KM paradigm the goal of Fujisawa and Kershberg (2005) is to invigorate the long-standing KM paradigm with a new perspective, by injecting JIT (Just-in-Time) concept, which entails the well-known best practices. The core philosophy of JIT is in quality, cost, and worker participation. These values can be mapped into the corresponding values in K/IM methodologies and practices, which may include proactivity, optimal information flow, human-centric information process design, customization based on user context, accuracy in information, and constant improvements through feedback (Fujisawa & Kershberg, 2005).

To reduce the total cost of document searching, Iwayama and Niwa (2005) developed a `Just-In-Time` interactive interface called DualNAVI, which enables for users to recognize where they are during their searching processes and to find next directions to proceed. It also promotes interactive and systematic refinement of search results with which users are liberated from blind trails and errors. The researchers' rationale for this study was that document search is a curial function of assisting users' knowledge intensive works by providing useful documents to the users in KMS.

Boehm and Turner (2007) present information related agile processes in enterprises. According to the authors, agile methods are lightweight processes that employ short iterative cycles, actively involve users to establish, prioritize and verify requirements, and rely on a team's tacit knowledge as opposed to documentation. A truly agile method must be iterative, incremental, self-organizing and emergent. Examples of agile concepts and practices include embracing change, which includes seeing change as an ally rather than an enemy and which allows for more creativity and quicker value to the customer (Boehm & Turner, 2007).

As flexibility and agility become the key success factors of a competitive manufacturing enterprise, the ability to support the short term decision making of manufacturing planning, scheduling, and dispatching becomes a critical issue. In their research, Trappey, et al. (2007) present a rule-based knowledge system run on the Java Expert System Shell (JESS) platform to address how engineering knowledge can be dynamically represented and efficiently utilized in job dispatching. The TFT-LCD panel repair line is applied to demonstrate the rule-based knowledge system for agile TFT-LCD repair job dispatching. (Trappey, et al., 2007).

According to Kundu, et al. (2008) supply chain operations need to overcome the challenges of enabling the delivery of low cost (physically efficient) and flexibility (enabling market-responsiveness). In order to meet those challenges, organizations are devising supply chain operation strategies that enable them to gain the benefits of physical efficiency of mass production and the customer focus of mass customization. With that aim, the researchers and the practitioners use knowledge-based techniques to bring together knowledge from the viewpoints of different experts in the selection of decoupling points in supply chains (Kundu, et al., 2008).

Jain, et al. (2008) assert that the supply chain management (SCM) is a complex process besides its effectiveness. Furthermore, companies have realized that agility is essential for their survival and competitiveness. The goal of knowledge acquisition can be achieved in a framework in which evaluation of agility could be established without constraints, and consequently checked and compared in several details (Jain, et al., 2008).

Lee, et al. (2008) posit that as the management environment has become rapidly digitalized with the advent of the internet, the traditional IE (inference engine) faces severe criticism- i.e. that it cannot effectively provide agile, knowledge-based decision support suitable for a wide variety of problems. They propose a new type of ES (expert system) called IMIXAO (Integer, Matrix, driven Inference based on an eXtended AND-OR graph) in order to make precise and agile inferences in a complex situation (Leet et al., 2008).

Blake and Singh (2008) identify the impracticality of top-down software development life cycle, as consumer organizations typically have no control over the quality and/or consistency of the external services that they incorporate. In that respect, they claim that the software architects and designers require agile, lightweight processes to evaluate tradeoffs in system design based on the `estimated` responsiveness. For that, the authors introduce a model-driven software engineering approach for designing systems under these circumstances and a corresponding simulation-based evaluation pool (Blake & Singh, 2008).

Genero, et al. (2008) emphasize on the problems cause by the database and data model evolution due to the highly dynamic business environment. As the solution, they propose conceptual data models, which constitute the foundation of database design, should be sufficiently flexible to be able to incorporate changes easily and smoothly (Genero, et al., 2008).

For Macris, et al. (2009) the cooperative and collaborative nature of healthcare requires active user participation in healthcare process design and redesign. Hence, they identify a need to provide users with reusable, flexible, agile and adaptable training material in order to enable them instill their knowledge and expertise in healthcare process modeling and automation activities. Upon that, they present a prototype research

approach for designing user training material which is based on externalizing domain knowledge in the form of ontology-based knowledge networks (Macris, et al. 2009).

Macdonald and Matinez-Uribe (2010) bring about the idea of effectively realizing the research data repository infrastructures through collaboration and sharing of expertise/knowledge by employing agile community, strategic and policy judgment, a robust data repository infrastructure in order to increase the affectivity of managing the institutional research data assets.

Ronnback, et al. (2010) identify the problems with maintaining and evolving data warehouse to be complex, error prone, and time consuming. They claim the reason for this state is that the environment of a data warehouse is in constant change, while the warehouse itself needs to provide a stable and consistent interface to information spanning extended period of time. Ronnback, et al. (2010) propose an agile information modeling technique, called `Anchor Modeling`, that offers non-destructive extensibility mechanisms, thereby enabling robust and flexible management of changes.

2.5 Agile Knowledge Management (AKM)

Very recently, a new term has been introduced, which tries to capture agility requirements and their respective answers within the framework of knowledge and learning for the organizations. This term is now commonly used as `Agile Knowledge Management` (AKM). Since it is rather a new construct, it is difficult to claim that it has been sufficiently discussed and analyzed in the practical and theoretical realms.

Like the term 'agile learning' it is also commonly addressed in the software development and information technology fields and across the related areas where those technologies can be applied. The organizational perspective towards AKM, seems to need some more time to become scholarly mature. Nevertheless, in the literature one can come across some implicit usages of this term occasionally.

2.5.1. AKM (Specific)

It is very rare to encounter with the complete term of `agile knowledge management` in the literature except for some software and project management practices and theoretic studies. The studies and practices are not sufficient to address the

conceptual basis of the construct in the scholarly literature. Actually, it is hardly possible to find peer-reviewed publications which explicitly address the AKM related or agility integrated with KM.

Below some studies are presented those use the term `AKM` deriving from Agile Software Development and imply Knowledge Management practices.

In his paper with the title of `Agile Knowledge Management in Practice`, Doran (2004) describes some experiences with the implementation of knowledge management techniques in an agile software development department. In his practical example, the department was to be structured to provide fast response to new market conditions. In today's terminology to be agile, fast response being defined as the rapid prototyping and development of new products.

Levy and Hazzan (2009a) are the two first scholars who introduced the term `AKM` out of the scope of project management and software development, with the assumption of KM is vital for any project. But still their study is more projects oriented rather than focusing on organizational knowledge and learning. They introduce the AKM by illustrating how ASD (Agile Software Development) approach is suitable for the introduction of KM processes. They further illustrate how it is natural to emphasize the concept of AKM in order to improve KM processes, because ASD already encompasses the organizational and cultural infrastructure needed for KM. They assert an Agile KM manifesto by using the background of ASD. But they do not really provide a comprehensive conceptual framework for AKM.

Levy and Hazzan (2009a) have published an article with the specific title of `agile knowledge management`. It was also published in a book named `Encyclopedia of Information Science and Technology, Second Edition-2009`.

KM and ASD are two organizational processes that face common barriers when introduced and applied. Levy and Hazzan (2009a) suggest that the KM practitioners should learn how ASD has coped with very similar barriers.

The pairing of KM and ASD is not new, a connection between the two concepts has been acknowledged by various researchers (Dove,1999; Holz, et al., 2003). This connection however is not surprising because both disciplines deal with organizational culture and change management.

They have also highlighted the way in which KM is already embedded into ASD processes. Thus, in order to improve KM in such processes, it should be made more explicit. Accordingly, they introduce an agile KM manifesto (Levy & Hazzan, 2009a).

Studies reveal that introduction of KM and ASD processes increases productivity, shortens time-to-market and results in higher product quality (i.e. Bennet & Bennet, 2003; Reifer, 2002).

2.5.2. KM Studies towards AKM

Although we cannot explicitly find the term `AKM` in the literature of KM, various scholars implicitly points at it by identifying the specifics of the environment, conditions or process of the KM.

Nonaka (1991) does not specifically identify the name of AKM but gives the hints of the agile knowledge management in one of his most well-known articles named `The Knowledge-Creating Companies`: In his comparison with the Western and Japanese companies, he exemplifies highly successful Japanese competitors like Honda, Canon, Matsushia, NEC, Sharp, and Kao having become famous for their `ability to respond quickly to customers, create new markets, rapidly develop new products, and dominate emergent technologies`. He denotes the secret of their unique approach to managing the creation of new knowledge (Nonaka, 1991). In a sense this understanding can be assumed as the roots of AKM.

He also identifies the dynamic organizational knowledge within the perimeters of the organization those have `how efficiently` they can deal with information and decisions in an uncertain environment. He then suggests that any organization that dynamically deals with changing environment ought not only to process information efficiently but also create information and knowledge (Nonaka, 1994).

When KM was newly starting to attract the attention of the companies, with its idea of capturing the knowledge gained by individuals and spreading it to others in the organization seemed to be one of the newest ideas, Bryne advertised this new discipline in Newsweek 1997. But he also mentioned the need for the `agile strategies` to make it more effective based on the comments of Daniel G. Simpson, Director of Strategy and Planning at Clorox Co. and Bain's 1997 surveys. He quoted `agile strategies` as the

encouraging managers' strategy to wait for profitable courses to emerge and then outrun the competition (Byrne, 1997).

In 2005, the `Third Biennial Conference of professional Knowledge Management` also discussed integration of JIT (Just-In-Time) concept into KM discipline in Kaiserslautren, Germany. In the conference while various scholars shared their perspectives with conceptual understanding, some scholars introduced practical usages of JIT. Over the last three decades, since in 1970s Toyota's Taiichi Ohno manufacturing plants that become to known as just-in-time manufacturing, with its emphasis on quality improvement, streamlining processes, and reducing inventories, has revolutionized manufacturing operations across the industrial world (Fernstermacher, 2005). In the conference (later published as a book) Fernstermacher (2005) introduces the concept of JIT (Just-In-Time) for adapting to KM discipline. In his study, he explores the analogy implied by the idea of delivering knowledge `just-in-time` and argues that this necessarily requires a process-oriented approach to KM. Siebert (2005) also asserts JIT information delivery as a knowledge creation process and derives a framework where he claims this framework enables intelligent technologies. He further posits that JIT information delivery starts with multi-agent environments.

McKellar (2007) implies AKM, although he does not explicitly name it. In his study, he exemplifies a list of companies embracing KM those acknowledge that providing the right information at the right time to the right people is the most effective way to increase value. They play an important role in creating, enhancing, or defining market. Moreover, they demonstrate the all-to-rare quality of facile, agile planning and execution (McKellar, 2007).

Landaeta, et al. (2009) also addresses the need for the agility, while defining the KM as `the processes, tools, and techniques that make available the right knowledge to the right knowledge worker, at the right time` (p.124). They specifically emphasize the importance of transferring the knowledge at the right time.

AKE (Agile Knowledge-Based Enterprises)

Ring (2004) first defines enterprise and then leads us to `agile enterprise`. According to him an enterprise is two or more individuals applying resources through actions to achieve mutual purpose. An agile enterprise on the other hand is one that

exhibits the ability to self-adapt (e.g. display agility) to changes in its context (e.g. fitness landscape), its internal capabilities, and is stakeholder interest (e.g. value) while honoring principles of systems and society (e.g. coherence) (Ring, 2004; Vandergiff, 2006).

The term knowledge-based or knowledge-intense firms are those organizations that are composed mainly of well educated, qualified employees doing mostly intellectual work. These organizations rely mainly on human/intellectual capital instead of physical capital (Swart & Kinnie, 2003; Alvesson, 2000; Starbuck, 1992; Robertson & Swan, 1998).

Mueller and Dyerson (1999) address the requirement of a `comprehensive dynamic knowledge-ubiquitous environment` with everyone in the organization making decisions based on best available intelligence and decision-making tools. In a way, they imply the agile-knowledge based enterprises. For most of the researches, the essential property of the AKE is `informed decision cycle` (p.227).

Vandergiff (2006) conducted a comprehensive research about AKEs. But her research is more focused on the process of decision making. She developed and validated a unified framework to guide business decisions and select the right mix of decision support solutions. She itemized the decision support types as DM (decision making), DI (decision implementation), and KM. The decision support solutions provide new capabilities (e.g. combinations of people, processes, and technology) that address the dynamic business environment and effectively leverage its intellectual capital (Vandergiff, 2006). These solutions provide DM and DI capabilities with extensive support by integrating KM capabilities. She asserts that for AKE, the two of the most valuable capabilities relate to decision-making and implementation knowledge access and reliability (Vandergiff, 2006). She suggests the leaders to make use of `living on the edge of chaos` (p.201) paradigms while ensuring openness to serendipity, emergent behaviors, innovation, and adaptability. In essence, these circumstances are her understanding towards agility. Accordingly, she specifically emphasizes on the `learning and adaptation` of the system during the DM and DI process.

Vardergiff (2006) further provides three major decision support activities in an AKE:

(1) Decision making informed by the intellectual capital of the organization.

(2) Decision implementation operated in a co-evolving environment and enterprise.

(3) Knowledge management integrated within the decision cycle.

Table 12 gives the summary of the KM studies implying the AKM:

Table 12. KM Studies Implying AKM

Year	Author (s)	Relevance to AKM
1991	Nonaka	- Japanese Companies' ability to respond quickly to customers, create new markets, rapidly develop new products, and dominate emergent technologies.
1994	Nonaka	- Organizations dealing with information and decisions in an uncertain environment. - Organization that dynamically deals with changing environment.
1997	Byrne	- The need for the `agile strategies`.
2005	Fernstermacher	- The concept of JIT (Just-In-Time) for adapting to KM discipline. - Delivering knowledge `just-in-time`. - Process-oriented approach to KM.
2005	Siebert	- JIT information delivery as a knowledge creation process - Enabling intelligent technologies.
2007	McKellar	- Companies embracing KM demonstrate the all-to-rare quality of facile, agile planning and execution.
2009	Landaeta, et al.	- KM is the processes, tools, and techniques that make available the right knowledge to the right knowledge worker, at the right time.
Agile-Based Knowledge Enterprise (AKE)		
1999	Mueller & Dyerson	- The enterprise requires of a `comprehensive dynamic knowledge-ubiquitous environment`.
2006	Vandergiff	- Decision support types are DM (decision making), DI (decision implementation), and KM. - Address the dynamic business environment and effectively leverage the intellectual capital. - Solutions provide DM and DI capabilities with extensive support by integrating KM capabilities. - The two of the most valuable capabilities relate to decision. - Making and implementation knowledge access and reliability. - Ensuring openness to serendipity, emergent behaviors, innovation, and adaptability.

2.6 Agility and AKM in the US Military

The transformational aspects of the contemporary warfare promises highly rapid change along with volatile, ambiguous and unpredictable military environment. This enforces the military to adapt and react very rapidly, which will enable the military to sense/realize the change, adapt itself, take suitable courses of actions and in the end to succeed in order to defeat the opponents and acquire the superiority in the field of war.

Accordingly, the US Army Knowledge Vision designates a similar projection: A transformed Army, with agile capabilities and adaptive processes, powered by world class network-centric access to knowledge, systems and services, interoperable with the Joint environment. (AR 25-1, 2005, p.16)

This perspective of the army can be extended into the joint (Army, Navy, Air Force, and Marine Corps) and multinational forces as well.

Hence the complexity, volatility and the rapidly changing nature of the military environment requires a similar adaptation capability of the military organizations. In other words, that requires the agility which addresses the need for applying the AKM to the military environment. In multi-disciplinary, multi-organizational, and joint military environments, those who innovate, learn, rapidly adapt, and act decisively will prevail against adversaries.

KM and newly introduced AKM has mostly been involved in the commercial and business organizations. Especially, AKM applications across the military organizations appear to be lacking.

Along with rapidly changing environment, the levels of ambition for similar military strategies enforce the use of AKM across the military organizations. Furthermore, AKM also needs to be widely assessed with respect to its military applications.

2.6.1. Agility in the US Military

From the commercial perspective, reaction to economic uncertainties has been to adopt institutional structures, which are more flexible and adaptive to change (Atkinson & Maffot, 2007). But, for the military, this might be a more difficult process.

Agility has been a theme of the military interest primarily for the command and control issues starting from the mid-1990s. Especially it has been a theme in CCRP (Command and Control Research Program) for more than a decade which has the mission of improving the US DoD's understanding of the national security and implications of the Information Age (Atkinson & Maffot, 2007).

The information age provided the military to improve to communicate and process the information. The concept of the Network Centric Warfare (NCW) as a new approach to cope with the information age is an attempt to seize an opportunity to create competitive advantage by leveraging information age concepts and capabilities. It is first introduced to a wide audience in 1999 (Alberts, 2011).

Upon the critics on NCW, for a remedy, CCRP released another publication call `Power to Edge`. Power to Edge focused on how the improved ability to capture and disseminate the information that could be used to empower individuals at all levels of the organizations with new approaches to command and control (Alberts, 2011).

Command and control must quickly respond to changes in a dynamic battlefield environment. Ye (2001) presents a hierarchical, object-oriented model of joint air campaign as a dynamic system and a hierarchical structure that distributes architecture of command and control. The model of joint air campaign system and the architecture of command and control tighten the links of C2 activities between different stages, levels and areas for coordinated, agile responses (Ye, 2001).

In one of this (CCRP) organization's book called `Command Arrangements (1995)` lack of agility was identified as a threat to the mission success. In `Information Transformation` (2002), agility was defined as a key characteristic of an Information Age organization `of paramount importance in an uncertain world`, `a characteristic to be sought even at the sacrifice of seeking to perfect capabilities associated with specific missions or tasks` (p.99). This book also defines the attributes of agility as `responsiveness, robustness, innovativeness, flexibility, and adaptability. Power to the Edge (2003) devoted an entire chapter to agility, and added the attribute resiliency, which was formerly included as a sense of robustness, the ability to maintain performance in the face of degradation (Atkinson & Maffot, 2007).

Atkinson and Maffot (2007) denote `agility` as the gold standard for Information Age militaries. They start their first chapter with a unique expressions "Stop the World, I want to Get Off!" (Atkinson & Maffot, 2007) which explains the changing speed of the world and the need for being agile.

The DoD IM/IT Strategic Plan of 2008–2009 (2008) deems information as a strategic asset and goes on to articulate the goal of `use information sharing to enable effective and agile decision making through visible, accessible, understandable and trusted data and services - when and where needed` (p.5).

The Army Regulation projects a military strategy and operations depending on consistent but rapidly adaptable decision making across the Army, other military services and agencies, allies, and non-governmental organizations. Without consistent strategy and policy, units and commands will generate islands of information and knowledge inaccessible to others. This is a recipe for disaster from an enterprise perspective (AR 25-1, 2005).

Mainly agility perspective towards the military is transforming an organization with more information-enabled and network-centric in a complex, dynamic, and challenging security environment. For that reason, they describe the militaries of information age as searching for a way to deal with complexities, uncertainties, and risks associated with the 21st Century security environment where they are discovering the virtues of `agility` not only as a core competency in operations, but as a value metric for policy and investment decisions (Atkinson & Maffot, 2007).

The US military preferred sustaining innovation rather than disruptive innovation (Alberts, 2011). However, military organizations are by their very nature resistant to the change (Alberts, 2011).

2.6.2. AKM in the US Military

Due to its rather longer background compared to AKM, KM has been used in various areas including business, public services and even the military to a certain extent. AKM could not have that amount of time for expansion since it has newly emerged. That is why it is rather a new concept where it has the realm of applications mostly in the information systems and information technology. But, obviously there are vast areas of

interests where AKM would promise to contribute to the different organizational applications, one of which is and will most probably be the military.

Although we can see various implications of KM in different levels of the military organizations, AKM seems to remain untouched for military applications, except for some individual attempts. These attempts are rather some addresses for the need of AKM, rather than practical or theoretical articulations.

There have been two stumbling blocks for the KM. The first is technological – a new software solution does not create knowledge sharing. The second is sociological-information sharing is often not encouraged within organizations. Information hoarders are everywhere. In the US Army, in the past, lessons learned in combat were sent to, Center to Army Lessons Learned, which compiled the information and sent out quarterly bulletins to soldiers. However, this up-the-ladder and down-the-ladder model was not agile enough for urban combat situations. Two majors developed an entirely new model for sharing knowledge, based on unmediated Web-based discussion forums. Now running under the auspices of West Point, Company Command.com and PlatoonLeader.org are secure sites that provide vehicles for sharing information on everything from managing a pregnant subordinate to which sunglasses keep out wind and dust best (Bates, 2005).

Army stating, `operating in an environment of growing complexity and uncertainty, today's Soldiers need the ability to rapidly access information, transfer knowledge and win the learning competition with 21st century adversaries. The side that learns and adapts the fastest gains important advantages` (US Army CAC, 2011, p.1).

Similarly the Army points out the need and the intent of agility in guidance to its soldiers by providing the following issues itemized among the expected benefits (US Army CAC, 2011):

1. Reduce the time needed to resolve specific technical or leadership problems and challenges.
2. Transfer best practices from one individual to another *in near real-time.*
3. Command (TRADOC) schools and the practical *application in a fast changing environment.*

4. Harness the collective minds of the military profession to generate *"on the fly" knowledge* as needed

The US Army Operating Concept 2016-2028 (2010) also emphasizes on the need for being adaptive to changing conditions and evolving threats. The essential part of the adaptation is signified with the development of new ideas and addressing future challenges. In other words, the Army Concept urges the organization to be innovative.

With a similar perspective, the US Army Learning Concept for 2015 (2011) characterizes the next decade's era with persistent conflict, uncertainty, increasing complexity and adaptive adversaries. The concept asserts `adaptivity` (adaptive thinking soldiers and leaders capable of meeting challenges of operational adaptability) as the key factor to cope with the challenges stemming from the characteristics of new era. The concept further introduces two sides of the adaptivity as `adaptive learning` and `operational adaptivity`. Within the framework of `adaptive learning` the concept introduces new method of learning called `continuous adaptive learning model`.

Such an attempt to introduce an `adaptive learning` method in order to cope with change, uncertainty and complexity indicates that Army is proceeding into the AKM applications.

2.7 Results of the Literature Review and the Gap Analysis

The review of the literature provided an overall understanding about `knowledge` and `KM`, revealed the current status of `agility` and `AKM`, and also showed the extent to which the US military comprehends and applies `KM`, `agility` and `AKM`.

This research will be built upon the results of afore mentioned literature review.

2.7.1. Results of the Literature Review

Knowledge

It is hard to comprehend all definitions of knowledge published in the literature. It is equivalently hard to find a definition that covers all perspectives or has clear consensus on it.

In a sense, in terms of its importance, knowledge is a very valuable intellectual asset for any organization including the military.

The literature review on knowledge revealed that `the construct of knowledge` is at the necessary level of maturity.

Knowledge Management (KM)

The two significant domains for the KM are `learning` and `knowledge`. While individual knowledge and learning would rather be assumed as a manageable process, organizational aspects of learning and knowledge requires significant management capability.

KM, with the idea of capturing knowledge gained by individuals and spreading it to the others in the organizations is an idea, about which a lot of organizations have interest including the military.

The literature review poses that the KM discipline has gradually moved towards its academic maturity. As the discipline advanced, academic debates have increased regarding both the theory and practice of KM by including different perspectives.

Agility

The need for agility stems from the specifics of the environment (including external and internal human factors). Rapidly changing environment, uncertainty, changing customer requirements necessitate agility.

In the literature, it has been elaborated that different disciplines use and study agility with respect to their specific needs. Both the academic literature and the practices provide quite many examples of agile applications and theories. Among them, the ones relate to KM have been exemplified in this research. And those examples clearly indicated that there exist many theoretical and practical studies about agility in different disciplines those seek for contribution of KM.

Agile Knowledge Management (AKM)

The review of the literature reveals that there is very little background about AKM in the literature except for some theoretic studies and applications in the area of software development and information technologies.

However, some studies in the KM literature imply the need for the AKM, although none of them explicitly designates the term of `AKM`.

KM, Agility and AKM in the Military

The literature review clearly indicates that the US Military has already understood the importance of KM and started to implement it in all of its services. However, literature review also reveals that the military perceives KM in a rather limited scope:

1. Mostly limited use of KM as a tool for providing the means to reach a better decision.
2. Manage the knowledge flow which is rather framed with the link between data-information-knowledge continuums.
3. Concentrated on display or share the knowledge (which is mostly explicit knowledge).
4. Use of tacit knowledge mostly limited to lessons learned and the best practices.
5. Focus is more on organizational processes and less on unit-level implementations.
6. Mostly `Command, Control, Computers, and Communication` (C4) oriented.
7. Occasionally confusion over `Information Management` and `KM` or interchangeably use of them.

The literature review shows that the US military truly recognizes the importance of adapting to the highly volatile environment and coping with ever-changing threats.

However, there is no indication that the military applies `AKM` except for some implicit referrals for agile (or adaptive) learning initiatives.

2.7.2. Gap Analysis

Visual representation of the gap analysis for the literature review is depicted in Figure 6.

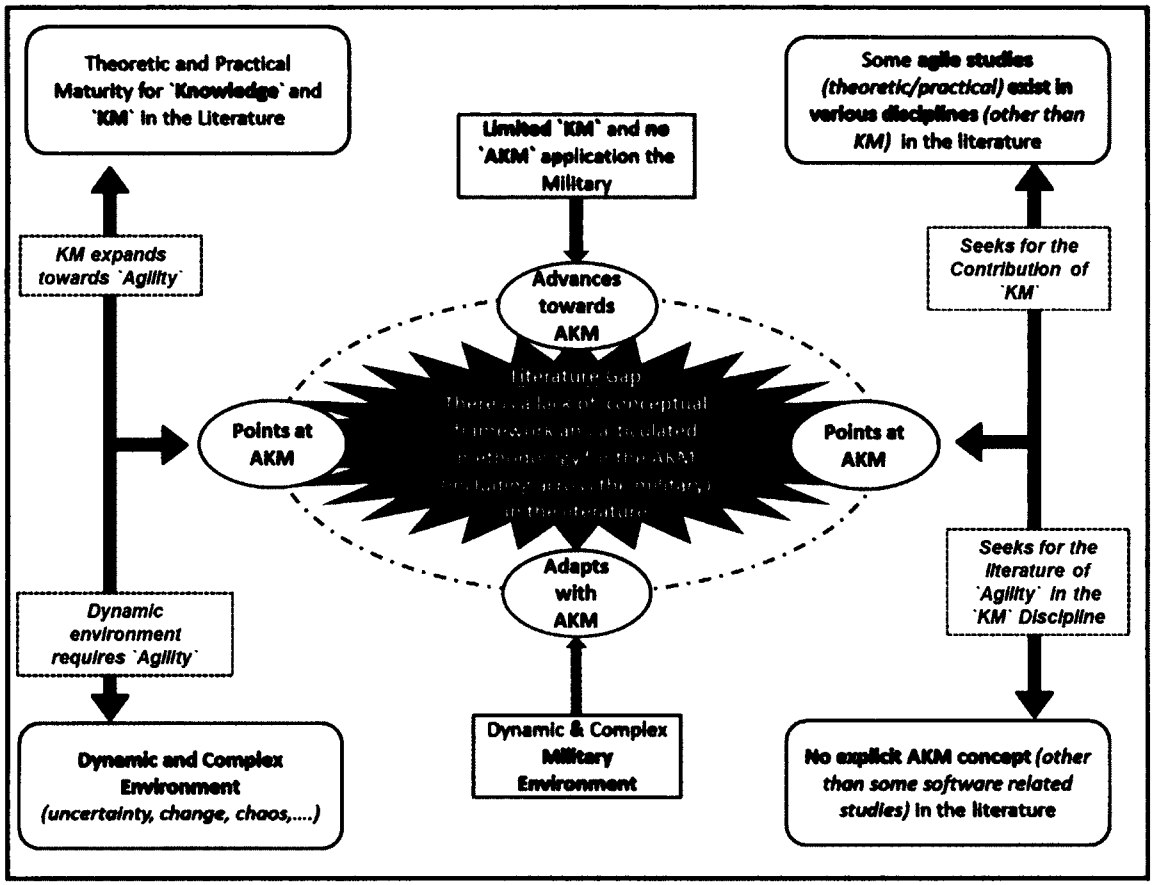

Figure 6. Gap Analysis of the Literature

The literature about KM and Knowledge within the scope of this research is at the level of academic maturity. The literature also shows that interaction of KM with other disciplines and its inevitable expansion moves toward AKM.

On the other hand, the specifics of the dynamic and complex environment necessitate agility and hence AKM in order to adapt to changing environment quickly and cope with the consecutive challenges effectively.

There are numerous agile applications and theoretic studies in different disciplines. Some of them seek for the contribution of KM, which leads us to AKM.

There is not really sufficient AKM conceptual works and practices in the literature. The only exceptions are some studies and practices about software development and information technologies.

With the military perspective, limited application and understanding of KM and no applications of AKM lead the military organizations to work on the AKM. On the

other hand, the military environment reflects similar specifics as the civilian environment (sometimes even more challenging). Those specifics of the environment dictate the military to be more adaptive and agile which actually requires AKM.

Upon those considerations it can be concluded that, the expansion direction of the KM, the needs stemming from both civilian and military environment, the expectations of the other agile disciplines for KM contribution and the insufficient literature about AKM clearly address that in the current body of knowledge:

There is a lack of conceptual framework and articulated methodology of AKM, especially in the military environment.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The value and the importance of a research is generally granted with respect to the level of scholarly support for the concept or theory, the sophistication of the methodology and the validation of the theory with widely accepted assessment techniques.

In general, this is very common and valid approach in order to establish scientific basis of a research.

However, evaluation of research might (in some cases should) also concentrate on the context and the purpose of the research as well.

Because the value of a research and the theory embodies two aspects:

1. What it proposes,
2. How it is proposed.

`How it is proposed` is more or less focused on the methodology and the research techniques, while `what it proposes` is about the purpose of the research. Neither of those aspects should be overlooked.

With a similar perspective, Sandelowski (2000) claims that in terms of using the methods for a research should be evaluated in accordance with its purpose. She further asserts that rather than qualifying research methods as absolutely weak or strong without looking into the context of it, it is better to denote them more or less useful or appropriate in relation to certain purposes (Sandelowski, 2000).

3.1.1. Background of Theory Building as a Research Process

Although there are various definitions of theory starting with its origin in Greek philosophy, it is more appropriate to keep it simple. `Theory` can be defined as an answer or explanation to the question of `why` (Sutton & Staw, 1995; Whetten, 1989; Whetten, Felin & King, 2009).

Culler (1997) sees `theory` as a characteristic of thinking that offers striking `moves` that people can use, in thinking about other topics. For him, "theory is

intimidating, with its most dismaying feature of being endless" (Culler, 1997, p.14). It is continuously being enhanced, augmented and upstaged.

Theories are expected to have both novelty and continuity, where they need to promise different ideas from the existing ones, while in the meantime, they should be connected or built upon the existing literature (McKinley, Mone & Moon,1999; Suddaby et al., 2011).

Culler (1997) identifies four points of a theory to be taken into account:

1. Theory is interdisciplinary
2. Theory is analytical and speculative
3. Theory is critique of the common sense, of concepts taken as natural
4. Theory is reflexive, thinking about thinking. (Culler, 1997, p.13)

Like its definition, it is very normal to encounter with different taxonomies of theory in different disciplines with different perspectives.

Whetten, et al. (2009) claim that the theories broadly fall into two categories:

1. Paradigmatic Theories: Those theories are constituted as broad theoretical perspectives and they are typically used to explain a particular phenomenon.
2. Propositional Theories: Those are constituted as one or more propositional arguments involving the use of concept to explain another concept. This can also be defined as `the theory of relativity` where the theory is an established set of propositions (Culler, 1997).

Another way of categorizing the theories is as `Top-Down` and `Bottom-Up` Theorizing:

1. Top-Down Theorizing aims at discovering a problem in the literature, and sets out to find a solution for this problem (Suddaby, et al., 2011). It is also called as `Problematizing`, `Gap-Spotting` (Sandberg & Alvesson, 2011) or `Deductive Theorizing` (Shepherd & Sutcliffer, 2011).
2. Bottom-Up Theorizing tends to be limited to rich descriptions of specific cases rather than producing more abstract theories (Suddaby, et al, 2011). It is also called as `Inductive Theorizing` (Shepherd & Sutcliffer, 2011).

In addition to above mentioned traditional approaches, as the outcome of a `Special Forum on Theory` with contribution of different scholars, Suddaby, et al (2011)

proposes four different ways of theory development with respect to two different dimensions as new ways of theorizing (Table 13):

1. *Problematization:* Theorizing within one literature and theorizing with implicit assumptions of the literature.
2. *Combining Epistemologies & Metaphorical Bricolage:* Theorizing across multiple bodies of literature and theorizing with implicit assumptions of the literature.
3. *Contrasting & Practical Rationality & Inductive Top-Down Theorizing:* Theorizing within one literature and theorizing with explicit constructs of the literature.
4. *Blending:* Theorizing across the multiple bodies of literature and Theorizing with explicit constructs of the literature.

Table 13. Map of Different Theorizing Approaches (Suddaby, et al., 2011)

	Theorizing Within One Literature	**Theorizing Across Multiple Bodies of Literature**
Theorizing With Implicit Assumptions of the Literature	- Problematization	- Combining Epistemologies - Metaphorical Bricolage
Theorizing With Explicit Constructs of the Literature	- Contrasting - Particle Rationality - Top-Down Theorizing	- Blending

Due to the fact that this research will mainly reside in the area of organizational studies, it might be useful to give a brief insight about `organizational theory` along with aforementioned understandings about the `theory`.

It is largely argued that, the study of management which includes the theories of organizations in it has diverged at a certain point from the core disciplines of engineering,

psychology, and sociology. It has been a separate category of scholarship as early as 1980s (Suddaby, et al., 2011).

In accordance with special topic forum on `Theory Development` results, Suddaby, et al. (2011) claim the outcome of this forum as to conclude that organizational theories are mostly developed via borrowing from other disciplines, but in the meantime they are not indigenous due to the fact that the theories are not adapted to the contexts of the organizations. They collectively point to a need more attentive and self-reflective process of theory creation.

Based on the information provided above, the theory developed in this research reflects following specifications:

1. It is propositional because of using the two different disciplines of `Agility` and `KM` with contribution of one distinct environment of military. And this research investigates and explores new conceptualization via asserting new prepositions related to some generated and tested hypotheses.
2. It is developed with inductive literature-based method with rigorous investigation and studies over the constructs of `Knowledge, KM, Agility and AKM` along with a systemic perspective over the military organizations (with special focus on the COIN environment).
3. The analysis and theory development is based upon the qualitative methods. Accordingly, the some hypotheses in the development process were developed (as unique aspect of the qualitative studies), some have been by the virtue of interviews conducted in due course.
4. The developed theory and its relevant concepts/models are verified and validated deductively (top-down) by using the results of the interviews.
5. The researcher's view and the literature review directed the research in discovering gap in the literature which addresses the need for adapting to the rapidly changing environment (agility) and using the actionable knowledge in the organizations wisely (KM).
6. This research has the blending theory development approach. As mentioned before this research also makes use of *theory borrowing* to a certain

extent because of its roots originating from KM and the approach of benefitting from the construct of `agility`.

Although in different disciplines different types of theory building methods can be utilized, Carlile and Christensen (2004) assert that building of theory occurs in two major stages for management and organizational studies:

1. The Descriptive Stage
2. The Normative Stage

Carlile and Christensen (2004) claim the theory-building process iterates through these stages again and again. They further propose that it is more useful to think of the term `theory` as a body of understanding that researchers build cumulatively as they work through each of the three steps in the descriptive and normative stages.

Within each of these stages, theory builders proceed through three steps.

Descriptive Theory Building

This stage consists of three steps: Observation, Categorization and Association (Carlile & Christensen, 2004) (Figure 7).

Step 1: Observation: In this step the researcher observes the phenomena which is subject to his/her study. Based on his observations depending on the type of his research (qualitative or quantitative) he carefully describes and/or measures what he sees in the phenomena. Carlile and Christensen (2004) argue that this phenomena being explored includes not just things such as people, organizations and technologies *but processes* as well. The important and concrete product developed by the researchers is *`abstractions`* which is deduced, interpreted and analysed from the observed phenomena. Some scholars called them *`constructs`* as well. Carlile and Christensen (2004) strongly assert not to label those constructs as the theories, they rather prefer to denote them as `part of the theories (building blocks upon which the understanding is built)`.

Step 2: Classification: Once the phenomena is observed in detail; based upon the descriptions and measurements with the help of the developed constructs, the researcher then makes a classification of the phenomena into some categories. This categorization mostly derived by the researcher's interest upon the phenomena, where he or she identifies some attributes for his categorization perspective. In the management

discipline the product of such descriptive categorization schemes can be called as *`frameworks` or `typologies`* (Carlile & Christensen, 2004).

Step 3: Defining the Relationship: In this step the researcher explores and tries to identify the association between the category-defining and the outcomes of the observations. He or she intends to identify a correlation between the *patterns* with respect to his area of interest. The product of this stage is generally a model. The *model* represents the average tendency. At the end of this stage the *hypotheses* are created by the researcher, and hence this consequence of theory building is called as the *`inductive (bottom-up)`* theory building process.

Nevertheless, up to this point theory building cannot be assumed as completed. The process needs to be *tested from top-down*, which is called `deductive` process. In this process, the hypothesized correlation in the `inductive` process is tested with different data and techniques and the outcomes are compared. If the outcomes are correlated as predicted, then the researches concludes that the *`test`* confirms the theory `of use under the conditions and circumstances observed` (Carlile & Christensen, 2004). *In such a situation the researcher can only claim that the theory is `corroborated` or `failed to dis-confirm` the theory* (p.5). With the similar perspective, Carlile and Christensen (2004) claim in this circumstance the *model/theory has been tested but not improved.* Actually the researcher have the opportunity to improve his theory/model when he encounters with an *`anomaly`*. Because in this case the researcher will revisit the categorization scheme and re-analyse with a different perspective (or cut the data in a different way).

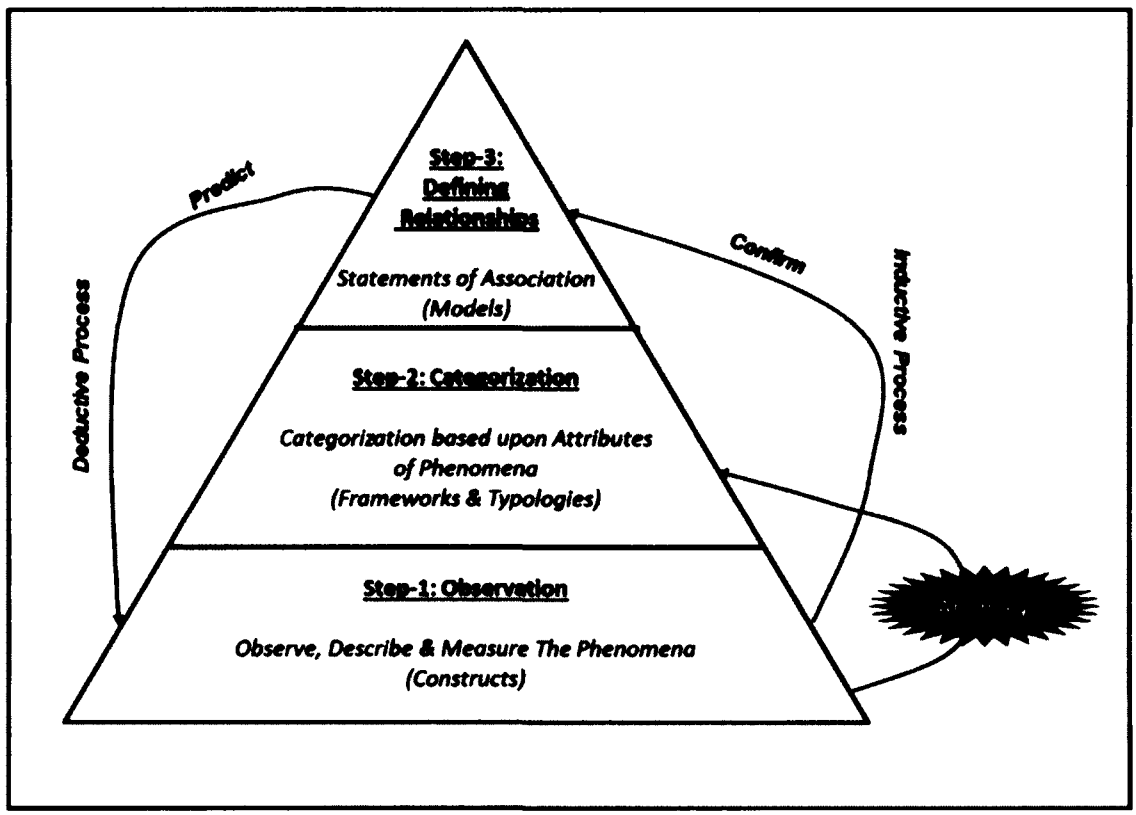

Figure 7. The Process of Building Theory (Carlile & Christensen, 2004)

With the figure above, Carlile and Christensen (2004) suggest that any complete cycle of theory building should include both the deductive and inductive process.

Normative Theory

The confusions and contradictions with respect to the descriptive theory can be resolved by trying to define the causes of the statements of correlation through use of *detailed empirical and ethnographic observation.* In this stage the researcher follows the same steps as in the Descriptive Stage with the understanding of casualty. The researcher cycles deductively and tests the casual statement whether his/her hypothesis is correct or not (Figure 8).

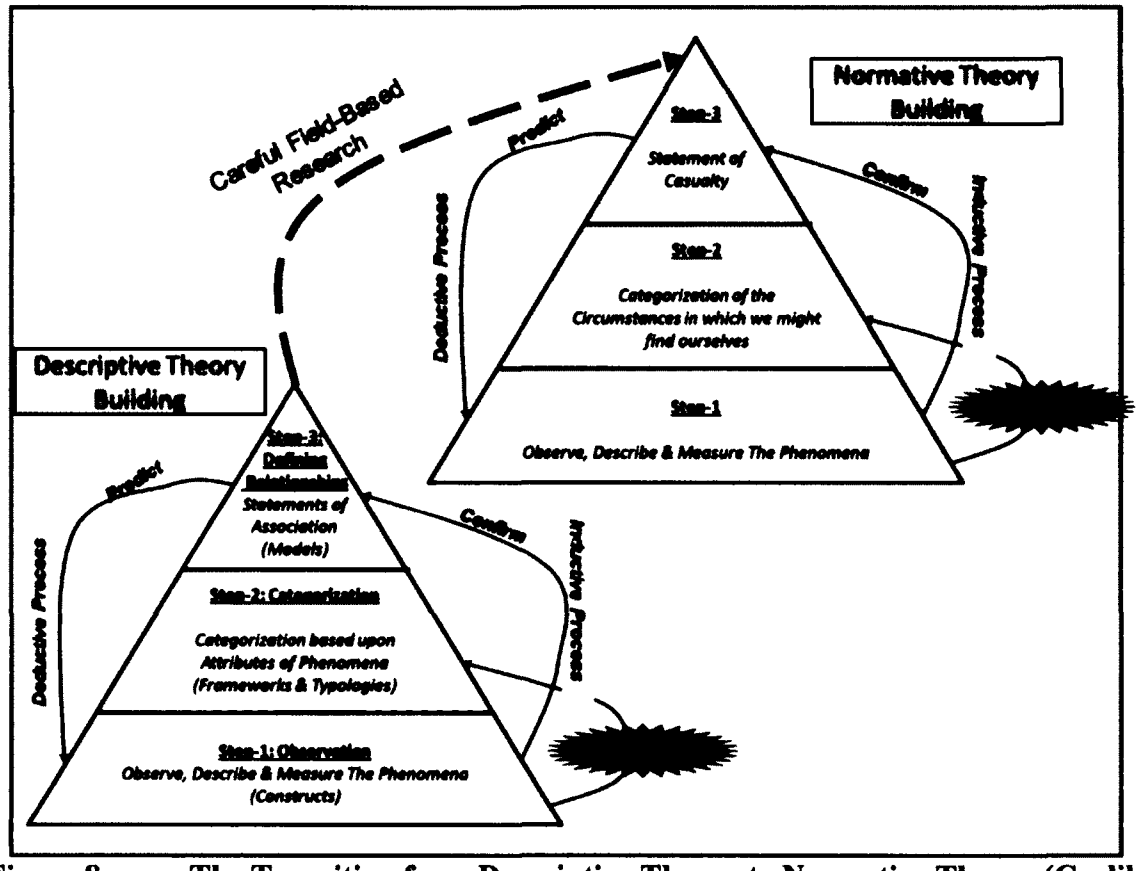

Figure 8. The Transition from Descriptive Theory to Normative Theory (Carlile & Christensen, 2004)

Additionally, `the researcher's view` and `colligation` are the important techniques used in the qualitative analysis.

Colligation is used to conduct a mental operation of bringing together a number of empirical facts by super inducing upon them some idea or conception that unites the facts and renders them capable of being expressed by a general law (Snyder, 1997).

The Researcher's View: The research paradigm that underlies any research perspective describes the following set of basic assumptions for conducting research (Iivari, Hirschheim, & Klein, 1998):

1. Ontology: The structure and properties of what is assumed to exist
2. Epistemology: The nature of knowledge and the proper methods of inquiry
3. Axiology: The responsibility of a researcher for the consequence of his research approach and its results.
4. Research Methodology: The procedures used to acquire knowledge.

3.1.2. Concepts and Their Relation with Theory

The character of concepts is a longstanding issue (Rodgers, 2000). Concepts are sometimes called `the building blocks of theory` (Walker & Avant, 2005). Theoretical concepts are assumed to be core component and important pre-phase of the organizational theories, and are abstractions of empirical phenomena (Boxenbaum & Rouleau, 2011).

However, military understanding about the concepts is different from the theoretical concept understanding. A military concept is the description of a method or scheme for employing specified military capabilities in the achievement of a stated objective or aim (Schmitt, 2002).

There are four basic levels of military concepts, which reflect a hierarchy. From top to bottom, these are (Schmitt, 2002):

1. Institutional Concepts, which describe military institutions,
2. Operating Concepts, which describe how military forces operate,
3. Functional Concepts, which describe the performance of individual military functions or sub-functions, and
4. Enabling Concepts, which describe the capabilities required in order to perform military functions or sub-functions. (Schmitt, 2002, p.5)

One of the outstanding questions is how concepts relate to theories (Risjord, 2008). Concepts can be fruitfully developed prior to any significant theorizing (Risjord, 2008). Concepts, when further abstracted and specified, become the constructs that supply a theory with its conceptual clarity and inherent structure (Boxenbaum & Rouleau, 2011). In the process of theory building, scholars link theoretical concepts from one to another to form new propositions about organizational life. Therefore, theoretical concepts need to be clearly specified and firmly grounded in empirical phenomena (Boxenbaum & Rouleau, 2011).

Suddaby (2010) highlights the importance that the scholars should carefully craft and specify theoretical concepts when they engage in theory building, where he claims construct clarity is expressed through definitions, scope conditions, semantic relationships to other constructs, and coherence.

In this research, although AKM has been identified as the concept, it is actually a set of concepts combining its subsequent prepositions with regard the different concepts and constructs of `agility`, `knowledge`, `KM` and the `military concept` those constitute the theory.

3.1.3. Assessment of the Theories/Concepts

Normally, it is very common to use reliability and validity criteria for the quantitative analysis (Golafshani, 2003). But this is not admitted by all the scholars for the qualitative analysis. Nevertheless, Patton (2002) asserts `validity` and `reliability` as two factors should be taken into account for any qualitative researchers, and they are criteria for the quality of the research as well.

Yin (1984) defines two types of validity for a theory, which help to gauge whether and when we can trust the theory:

1. *Internal Validity:* Internal validity commonly referred to as "a test of the credibility of the results of reviews" (Majewska-Button, 2010). The best way to know and ensure the internal validity of a theory is to examine the phenomena through the *lenses of as many disciplines and parts of the organization* as possible (Carlile & Christensen, 2004). There are several different types of internal validity to assess. Face or measurement validity asks: "did I measure what I claimed to measure?" A second type of internal validity examines the reliability and consistency of the coding system (Majewska-Button, 2010).
2. *External Validity:* The external validity of a theory is the extent to which a relationship that was observed between phenomena and outcomes in one context can be trusted to apply in *different contexts* as well. Many researchers believe this can be done by testing the theory with different data (Carlile & Christensen, 2004). This type of validity investigates the findings of the analysis performed on one type of organization to be generalized to other types of organizations? (Majewska-Button, 2010) This is actually seeking the degree of generalizability.

In qualitative paradigms the terms *`credibility`*, *`neutrality or conformability`*, *`consistency or dependability` and `applicability or transferability`* have been also pronounced to be essential criteria (Lincoln & Guba, 1985) instead of the criteria of

`validity` in the quantitative paradigms (Golafshani, 2003). While on the other hand, some scholars claim some other terms such as *`quality`*, *`rigor`* or *`trustworthiness`* can be used for the qualitative analysis (Golafshani, 2003) instead of `validity` as well.

Validity:

According to Bornheimer, Fitzpatrick, Lehmann, Pierce and Whalen. (2008), while the validity of the quantitative studies can be established through, `measurements`, `scores`, `instruments used` and `research design`; the validity of the qualitative studies can be established through `ways that researchers have devised to establish credibility`, `member checking`, `triangulation`, `thick description`, `peer reviews` and `external audits`.

Reliability:

On the hand, Bornheimer, et al. (2008) claim that the reliability of quantitative studies can be established through `assumption of repeatability` and the reliability of qualitative studies can be established through `reframe as dependability and conformability`.

Actually, with a rather overarching perspective, with a slightly different categorization, Strauss and Corbin (1990) suggests that *usual canons of good science* can be used for judging or testing the qualitative studies. But they further claim that it needs to be redefined in order to fit into the qualitative analysis.

Compliance with the Canons of Science:

Within the framework of `canons of science` four generally accepted criteria for used by answering the following questions (Lincoln & Guba, 1985) (Table 14):

1. *The Truth Value (Internal Validity):* How can one establish confidence in the truth of the findings of a particular inquiry for the subjects (respondents) with which and the context in which the inquiry was carried out? (Adams, 2007). The inquiry should contain only the true facts. The researcher's opinions should not affect the raw data (true facts) of the inquiries.
2. *Applicability (External Validity-Generalization):* How can one determine the extent to which the findings of a particular inquiry have applicability in other contexts or with other respondents (Adams, 2007)? It investigates the results whether they can be applied out the context of the research.

3. *Consistency (Reliability):* Does the findings of the inquiry repeat if the context or the respondent is changed (Adams, 2007). It ensures that the study is consistent over the time and across other contexts of the researches (Miles & Huberman, 1994).

4. *Neutrality (Objectivity-External Reliability):* Can we ensure that the findings of an inquiry are determined by the respondents and conditions of the inquiry and not by the biases, motivations, interests, or perspectives of the inquirer (Adams, 2007)? It is to investigate the findings whether independent researchers would discover the same phenomena or generate the same constructs in the same or similar conditions (Lecompte & Goetx, 1982).

Table 14. Canons of Science and Design Quality Concepts (Adams, 2007).

Canon of Science	Quantitative Research Methods and Positivist Paradigm	Qualitative Research Methods and Naturalist Paradigm
Truth Value	Internal Validity	Trustworthiness or Credibility
Applicability	External Validity or Generalizability	Transferability
Consistency	Reliability	Dependability or Auditability
Neutrality	Objectivity and External Reliability	Conformability of Data

3.2 Research Methodology

This research comprises two phases of analyses: In the first phase, past research is investigated and then analyzed with a `systematic approach`, in order to assess where the body of knowledge stand in terms of AKM and KM applications including the military aspects. Then, putting aside the current body of knowledge, the `need to have` for the military environment is identified using a `systemic approach`. This leads to comparing the generic current situation of AKM and the desired level of AKM with respect to military applications. In this comparison the gaps of the current body of knowledge are identified. Dimensions and attributes of the AKM concept are described and assessed by

carefully analyzing these gaps. Based on the findings, inductively a concept of AKM is developed (i.e., re-conceptualized and extended) with various propositions based on the military environment.

In the second phase, qualitative analysis techniques are employed in order to validate the new concept of AKM.

The theorizing approach or method of theory building used in this research is based on the methodology of `theorizing across multiple bodies of literature, with explicit construct of the literature` which falls under Suddaby, et al.'s (2011) category of `blending` in his `map of different theorizing approaches` depicted in Table 15.

Table 15. Map of Different Theorizing Approaches (adapted from Suddaby, et al., 2011)

	Theorizing Within One Literature	**Theorizing Across Multiple Bodies of Literature**
Theorizing With Implicit Assumptions of the Literature	- Problematization	- Combining Epistemologies - Metaphorical Bricolage
Theorizing With Explicit Constructs of the Literature	- Contrasting - Particle Rationality - Inductive Top-Down Theorizing	- ***Blending*** ***(This research fits in this approach)***

Additionally, categorization process was implemented to facilitate the theory building process of this research with respect to defining implications of the new AKM concept to military environments. An overview towards the environment of the military (with the idea of desired level of AKM) and the civilian environment (with the background of up-to-date applications of KM and AKM) with regard to their attributes suggest three categories. Afterwards coherence and harmonization of those categories provide foundation of literature-based induction for the KM andAKM with its military implications.

1st Category (Similar Aspects of the Military in COIN): The military and civilian environment reflect some similar attributes. There might be some aspects of the previous studies where significant changes are not needed other than some minor alignments with respect to military understanding.

2nd Category (Unique Aspects of the Military in COIN): The military environment reflects some diversified attributes from the civilian environment. We might be able find some aspects where it is not necessary for the civilian perspective, while they might gain crucial importance in order to apply the constructs of AKM & KM across the military environment.

3rd Category (Extended Aspects of the Military in COIN): The military environment reflects some attributes those already exist in the civilian environment but they might need further interpretations with a military view. We might need to interpret some of previous applications with a different angle of military perspective.

These three categories enable the identification of the unknowns and lacking dimensions and/or attributes of the AKM concept with respect to the military environment. These categories facilitate there-conceptualization of the AKM concept

3.2.1. Systematic Approach

KM construct is analyzed starting with its presumably first applications and scholarly emergence in 1990s. It is obvious that KM has expanded into various areas of applications and gained extended conceptual understanding. The important milestones of this expansion and extension of KM are traced and described in this research. Hence, most of the KM applications and relevant scholar studies are identified in accordance with their field of interests. In the meantime, relevant terms and constructs those have been closely related to KM are also noted down, since they also carry importance for the conceptual understanding of KM. The idea with the conceptual background investigation is to contribute to constitute and identify the dimensions and the attributes of AKM.

Research about the AKM is conducted with a similar approach, where both theoretic and practical expansions of the construct are designated. Then the extent to which AKM applications and studies have reached is identified along with related terms and constructs.

A clear distinction is made between the published literature that is founded on empirical research and that has been published with no empirical basis (Adams, 2007). The intent is to indicate the extent of which the term `AKM` has been investigated and/or introduced to the body of knowledge in both theory and practice.

With the light of these overarching researches about literature we can identify the gaps and unknowns with respect to military implications, as well as inducing necessary dimensions and attributes of new AKM model and concept.

3.2.2. Systemic Approach

The military organizations are considered to be CAS in this research. But the idea is to approach military systems as combining the aspects of complex systems, socio-technical systems (STS), open systems and systems of systems (SoS) as well. The entities, sub-entities, interrelations, stakeholders and especially the dynamic and in a sense chaotic environment of this huge system is analyzed with regards to the AKM application.

Based upon the basics of this systemic understanding a comparative analysis of the military organizations and up-to-date civilian organizations is conducted. That enables us to identify the different dimensions, aspects, perspectives and sub-sets of the desired level of AKM application across the military organizations.

This enables a process of inductive literature-based reconceptualization along with new definitions and extensions derived by some hypothesis and theories.

Figure 9 depicts the visual representation of the research methodology explained in this section.

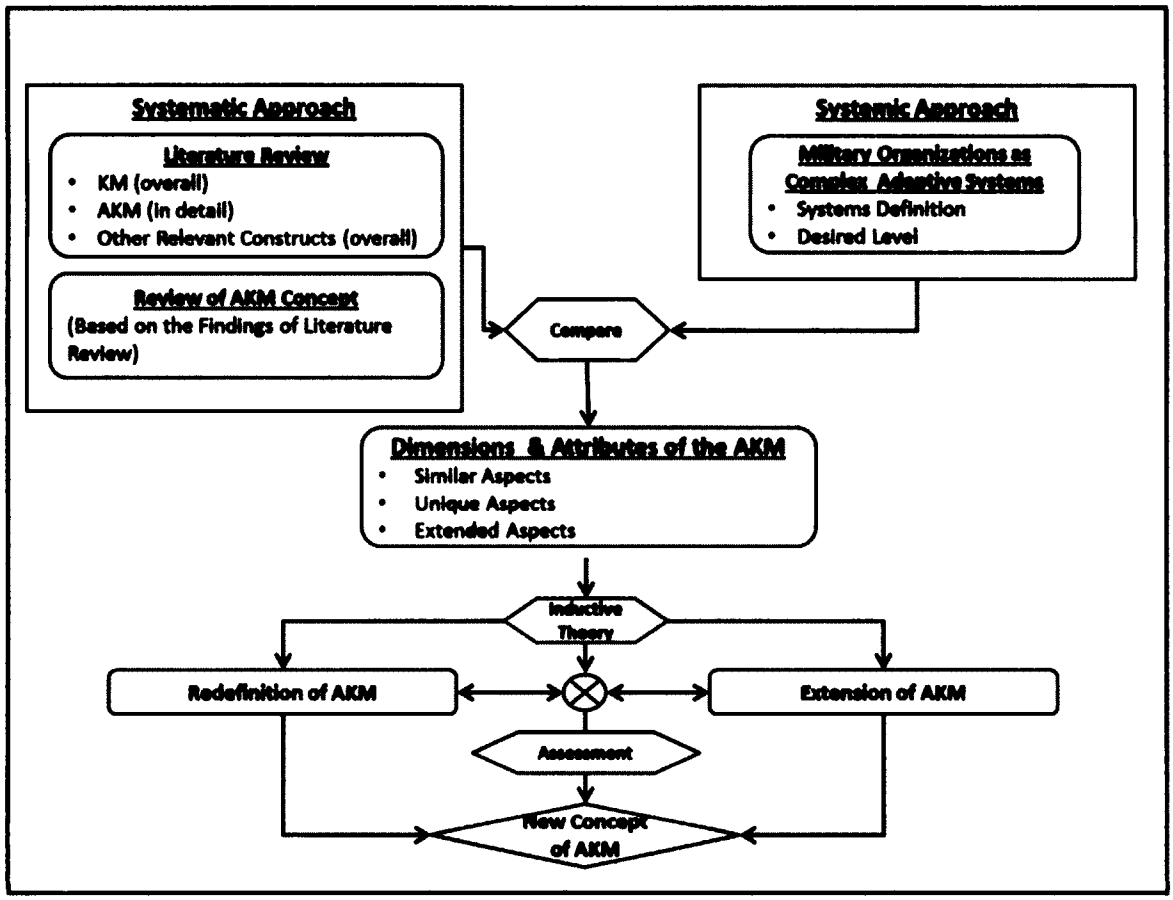

Figure 9. Research Methodology

3.2.2. Design and Concept of the Study

Within the framework of the methodology above, this research applies the inductive method of the qualitative analysis (Figure 10):

The `inductive method` by which the body of knowledge formed is used in the Literature Review. This method -`discoverers' induction`- is applied with the literature-intensive research effort, which forms Chapter 2. The aim is to provide the empirical facts used in the process of `*colligation*`. The intent of the colligation is to supply something to the facts, which causes them to be seen from a different and/or new point of view. Meanwhile, the systemic approach is used upon the empirical facts gathered from the literature as well.

This part is mainly an exploratory study to develop pertinent hypotheses and then propositions for further inquiry with respect to the factors as delineated below:

Contextual Compatibility: In the qualitative researches the context plays very important role (Adams, 2007). The context in this research is related to the environment of the military system in COIN. The viewpoint of the researcher directly affects the context of the study.

The Researcher's View: The theoretical and philosophical perspectives of the researcher, represented in the ontological, epistemological, axiological and methodological views directly influence the conduct of the research.

The Body of Knowledge: The body of knowledge about the Knowledge, KM, and Agility provides the foundational materials to conduct the research study.

Research Literature: The literature about the research methods and techniques provide the researcher to use the proven methods for conduct of the qualitative research quality.

Qualitative Element: Once the new construct is created based upon the `body of knowledge` and `researcher's view` with an inductive approach, the theory is qualitatively tested and iterated with respect to its dimensions and the attributes.

This qualitative testing is focused on three different areas with similar perspective of developing the theory.

The KM aspects of the research are tested with focus group interview (semi-structured interview), panel of experts in addition to personal interviews and the feedbacks of the KM experts (both in theory and in practice).

Agility aspects are tested with personal interviews, external expert review, panel of experts those are working on innovative agile organizational (military) projects.

Additionally, the military context and its components are tested with the military personnel from different nations (NATO nations) via focus group and personal interviews.

Those three pillars of the qualitative testing manifest the `Model and Concept of AKM` to be iterated various times, which actually provides important improvement of the concept.

Canons of Science: The canons of science provide universally accepted scientific standard for the research. While providing the canons of science, the strategies of `expert

review`, `panel of experts`, `focus group`, `personal (one-on-one) interviews`, `member checking` and` peer review` are utilized.

The Model and Concept of AKM

The concept of the AKM is described with a `model` where application of AKM in a military organization (complex adaptive system) is depicted. The model basically comprises the `dimensions` and `attributes` of the AKM concept. The details of the model and their components are explained in Chapter 4.

However, due to the vast scope of the concept (AKM) and its application across the military mandate this study is limited into specific attribute of this model namely `agility` and particular military context namely `Counterinsurgency (COIN)`. Other attributes of the concept are touched upon with an overall perspective, by referring them to the future studies for detailed analyses.

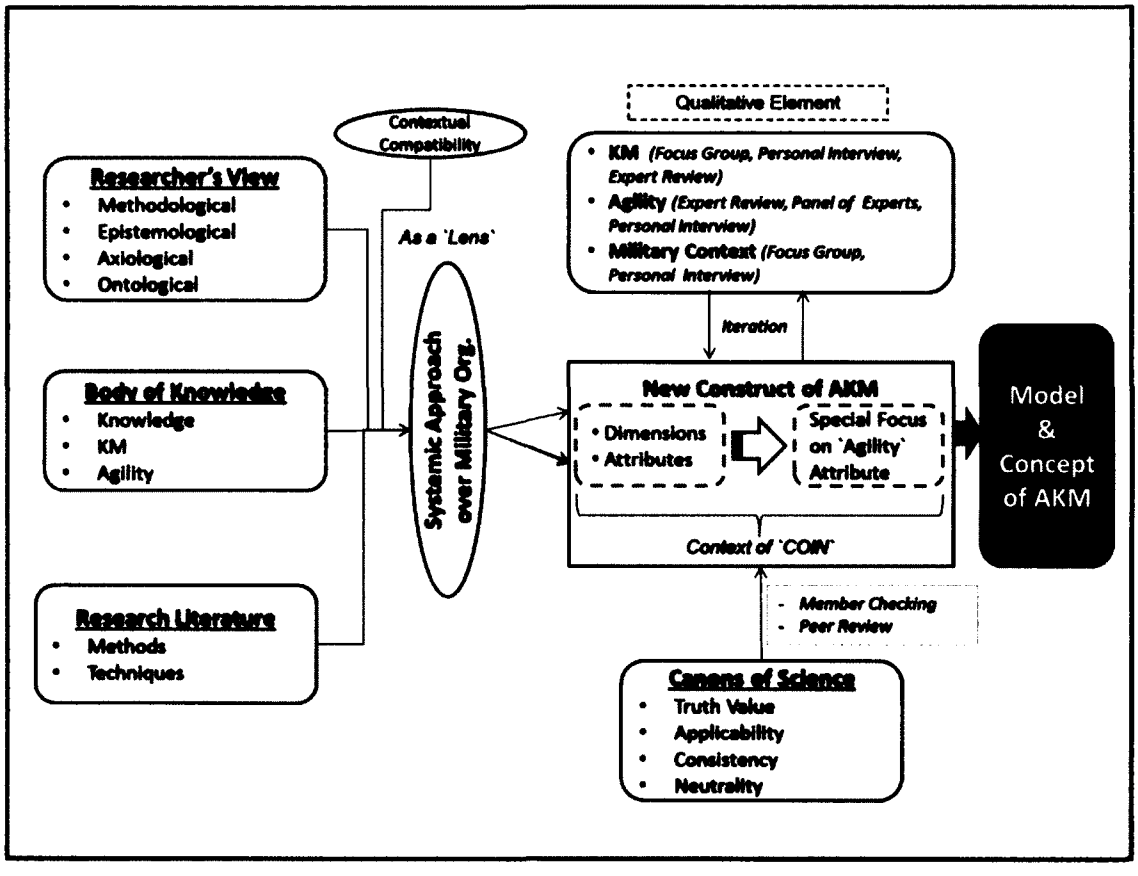

Figure 10. Inductive Method of the Qualitative Analysis

3.3 Hypothesized Model or Extended Concept of AKM

The research methodology in Figure 9 and the inductive method of the qualitative analysis depicted in Figure 10 are restated as the *Hypothesized Model* as shown in Figure 11.

In the Hypothesized Model or extended concept of AKM, this research investigates (generates and validates) 7 different prepositions those are related research questions via developed hypotheses **(H.1.1 to H.7.2.)** as summarized in Table 16.

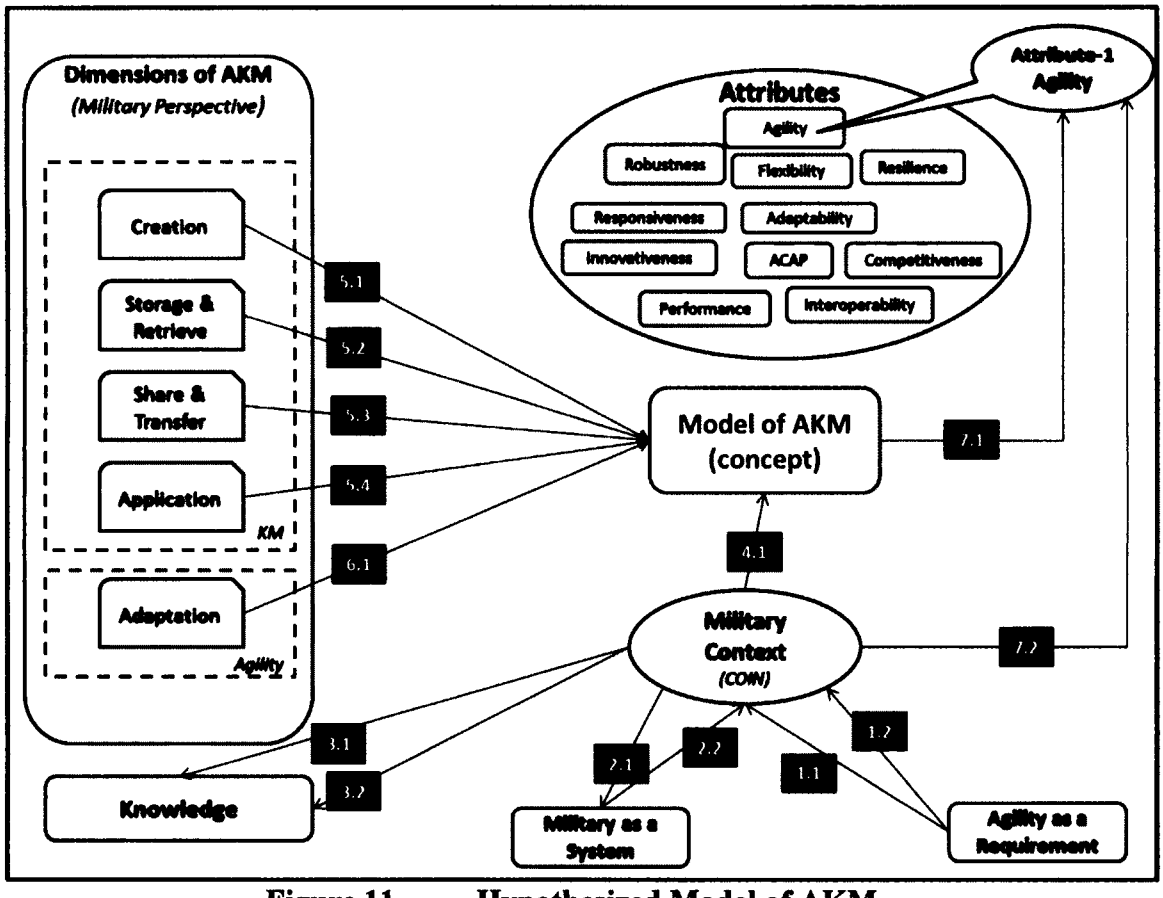

Figure 11. Hypothesized Model of AKM

Table 16. Summary of Research Questions, Prepositions and Hypothesis

Related Construct	Research Questions	Research Prepositions	Research Hypothesis (Reconceptualization of AKM Concept)
Agility (as a Requirement)	• How can we describe the evolutionary transformation of military organizations and their environment?	**R.P.1.** Agility is an imperative for the Military Organizations (COIN) to attain.	**H.1.1.** The definition of Agility can be operationalized with respect to Military Context (COIN).
			H.1.2. Agility has significant effects to Military Organizations (COIN) as an imperative.
Military Organization as System	• How can we define the military organizations with a systemic approach? • How can we compare the military systems with up-to-date application and research areas of AKM?	**R.P.2.** Military Organizations in the COIN Environment are CAS' with their unique aspects.	**H.2.1.** Military organizations (COIN) can be defined as systems with their unique aspects.
			H.2.2. The Systems perspective provides the opportunity of describing the elements of Military Organizations (COIN) with respect to AKM/KM.

Table 16. Continued

Related Construct	Research Questions	Research Prepositions	Research Hypothesis (Reconceptualization of AKM Concept)
Knowledge	• What is the current expansion of AKM and KM with regard to past researches and applications?	**R.P.3.** Military Context (COIN) urges extension of Knowledge.	**H.3.1.** Knowledge can be extended with respect to the Military Context (COIN).
			H.3.2. Knowledge flow can be extended with respect to the Military Context (COIN).
AKM	• How can we comprehensively review the conceptualization of AKM with contribution of up-to-date understanding of KM? • What are the overall significant dimensions and attributes of AKM up to this date? • How can we identify the necessity of AKM applications across the military organizations in a dynamic environment? • What are the significant dimensions of AKM with respect to military implications? •How can we describe the significant dimensions and their expansions across the military organizations for re-conceptualization of AKM?	**RP.4.** The Military context affects the AKM Processes with its unique aspects.	**H.4.1.** Military Context has unique, extended and similar aspects to be reflected on the Model of AKM.
		RP.5. AKM Model uses four dimensions of KM with adoptive modifications in accordance with the Military Context.	**H.5.1.** `Knowledge Creation` process of KM can be applied to the Model of AKM with modifications pertaining to the military context.
			H.5.2. `Knowledge Storage and Retrieval` process of KM can be applied to the Model of AKM with modifications pertaining to the military context.
			H.5.3. `Knowledge Sharing and Transfer` process of KM can be applied to the Model of AKM with modifications pertaining to the military context.
			H.5.4. `Knowledge Application` process of KM can be applied to the Model of AKM with modifications pertaining to the military context.
		RP.6. Agility urges the AKM Model to have an additional dimension of `Adaptation`.	**H.6.1.** An additional process of `Adaptation` can be applied to the Model of AKM pertaining to the military context.

Table 16. Continued

Related Construct	Research Questions	Research Prepositions	Research Hypothesis (Reconceptualization of AKM Concept)
Attributes of AKM and Agility	• How can we describe the evolutionary transformation of military organizations and their environment? • What are the significant dimensions of AKM with respect to military implications?	**RP.7.** The Model of AKM improves the Agility of the Military Organizations (COIN).	**H.7.1.** Agility reflects different aspects as an attribute with respect to the AKM Model.
			H.7.2. Military Context has a significant impact on the attribute of `Agility`.

CHAPTER 4

ANALYSIS AND PRESENTATION OF FINDINGS

4.1 Introduction

Parallel to the methodology described in detail in Chapter 3, the structure of the analysis comprises two overarching phases:

Phase 1: Qualitatively develop the literature-based inductive theory of re-conceptualized AKM.

Phase 2: Deductively validate the developed theory with qualitative methods.

The results of the analysis are going to be presented in six consecutive sub-sections in order to present a comprehensive re-conceptualized AKM:

1. Results of the analysis about `agility as an imperative and a requirement` is provided. At this stage, agility is analyzed as the triggering effect of developing a re-conceptualized AKM process model.
2. A summary of the military environment (with a special focus on COIN) through the systems approach is presented. The intent for this section is not to provide a full systems analysis of the military units in the COIN environment. The purpose is to have a better perspective towards the military organization and its environment while developing the AKM Concept.
3. The results of the analysis over Knowledge and Extended Knowledge understanding to use in the AKM Concept are presented.
4. Newly developed AKM Concept based on the findings of the previous parts' results is explained with its five steps (processes).
5. `Agility as an attribute` of the AKM Concept and Model is analyzed and findings are presented. Other attributes of the AKM Concept and Model are superficially touched upon and not analyzed in detail.
6. The results of the previous 5 sub-sections are validated using of the following qualitative analysis techniques: `outside expert review`, `panel of experts`, `focus group`, `personal review`, `peer review` and `member check`. A summary of the hypothesized model with the results of analyses is also depicted.

4.2 Agility as an Imperative and a Requirement

Every organization, no matter what their scales and types are, endeavours to adapt to continuously changing environment. It is commonly accepted that change is not temporary and will not disappear. In that respect, organizations have realized that `agility` is essential for their survival and competitiveness (Jain, et al., 2008).

Sustainability of any organization requires high level of `adaptation`, `capacity` and `capability`. But, this capability may not even be sufficient by itself. It might also require `prompt responsiveness` in order to comply with the high speed of `change` in the environment. If the organizations cannot keep up with the speed of the change, then, even if they can realize their adaptation, they might still remain obsolete.

That is why the organizations put tremendous effort, and allocate big amount of budget in order to adapt rapidly and correctly. In other words, they strive to be `agile`. Agility has already become and apparently will remain as one of the most important challenges for the organizations. Although its importance has newly started to be recognized, still there are big question marks about how to achieve it.

4.2.1 Definition

Different disciplines and areas of interests approach and perceive agility differently to a certain extent. But, with a broader perspective, it is not hard to see the generic understanding where all of those difference perspectives would point. Lee and Xia (2010) advocate that agility is generally defined in terms of embracing and responding to change. Agility and adaptiveness coexist within the context of the complex and changing environment (Atkinson & Maffot, 2005).

In the IT area, it is proclaimed that `agile development` can be captured by the sentiment, "fit the process to the people, rather than people to the process" (Fenstermacher, 2005). According to the Agile Manifesto, agile development values individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan (Agile Alliance, 2001).

ASD promotes frequent and continuous delivery of working software, embracing changing requirements, close collaboration between developers and users, self-organizing and empowered teams, face-to-face communication, technical excellence, simplicity, sense-and-respond, cross-functional teams and continuous adaptation (Agile Alliance 2001; Lee & Xia, 2010).

Alberts (2011) defines agility as "the capability to successfully cope with changes in circumstances" (p.66). He further elaborates agility as `an ability to successfully effect, cope with and/or exploit changes in circumstance`. Success means a state of satisfactory level in terms of performance, effectiveness and/or efficiency (Alberts, 2011). In his elaborations, Alberts (2011) asserts requisites of success as getting better at recognizing the significant changes in the environment and developing ability to respond appropriately. He further argues that agility is a way of dealing with the combined effects of the complexity and uncertainty (Alberts, 2011).

In his book, Cummings (2009) also sheds the lights over the specifics of the new era. He asserts that realization of the benefits new area (changing environment) requires transformation of the enterprise. Maropoulos, et al. (2003) relate the realization of an agile enterprise with substantial development of underpinning modelling, information management and knowledge representation technologies.

Agility is an essential quality parameter for the organizations. An agile enterprise rapidly adapts to change and opportunities. Cummings (2008) finds KM critical to enterprises' agility because it provides insights for recognizing the change and how to react it.

Vandergiff (2006) alternatively drives the attentions on the decision support systems in the enterprises that she argues the enterprises need more aware, inclusive and responsive decision support system. An agile enterprise (AKE) on the other hand is one that exhibits the ability to self-adapt (e.g. display agility) to changes in its context (e.g. fitness landscape), its internal capabilities, and stakeholder interest (e.g. value) while honoring principles of systems and society (e.g. coherence) (Ring, 2004; Vandergiff, 2006). For most of the researches, the essential property of the AKE is the `informed decision cycle`.

Vandergiff (2006) suggests the leaders to make use of "living on the edge of chaos" paradigms while ensuring openness to serendipity, emergent behaviors, innovation, and adaptability. In essence, these circumstances are her understanding towards agility. Accordingly, she specifically emphasizes on the `learning and adaptation` of the system during the DM (Decision Making) process.

It is generally suggested that the abilities of knowledge and learning constitute significant domain for agility.

However, agility is difficult to achieve in practice (Cockburn, 2001). The challenge is to turn this desired agility into actuality (Atkinson & Moffat, 2007).

With a similar perspective, Alberts (2011) asserts that improving one's agility is not simple. He recommends four tasks to be agile:

1. Accept the new age realities
2. Recognize the agility imperative
3. Understand the agility
4. Improve agility

4.2.2 Taxonomy (Components) of Agility

Alberts (2011) asserts that agility has components that are both `passive` and `active`.

1. Passive agility, involves characteristics that allow an entity to continue to operate effectively as is, despite changes in circumstances or conditions. An example of this passive quality is versatility (formerly referred to as robustness).
2. Active agility requires both to recognize the possible significant change in circumstances and to be capable of responding appropriately.

4.2.3. Operational Definition of Agility for the Purpose of this Research

The organizations ought to develop policies for their own (radical) transformation, rather than continuing to do what they have always done in the way that they have been doing (Demarest, 1997).

In order to come up with a comprehensive definition of agility for an organization or system, it is essential to have an overall understanding about what an organization is.

Whetten, et al. (2009) identify an organization as a social actor which is recognized to have a certain extent of sovereignty and, in turn, held to be responsible of their actions. With a broader perspective, Aldrich (1999) defines organizations as goal-directed, boundary-maintaining system.

One of the pioneers of modern organizational theory, Swanson (1971), highlights two logical perils related to organizational studies:

1. Treating the organizations as if they have the same properties as individuals,
2. Treating the organizational outcomes as if aggregation of outcomes produced by the individuals.

The operational definition of agility for this research is based upon two pillars of the agility through the organizational perspective. Those are, namely `the change (including the rate of the change)` and the `adaptation (including the embracement of change)`.

Agility has also been defined as an attribute by some scholars. Actually, attribute aspect of the agility is employed in this research in the subsequent sections. Once the AKM concept is introduced, agility as an attribute to this model will also be analysed.

But at this stage agility will be assumed as an imperative which initiates the organizations to take some actions to cope with the change. In this perspective, it is not just a conceptual term, it is rather a capability which enables an organization to both survive and provide competitiveness.

In summary, within the framework of above mentioned understanding, the definition of agility which bridges relevance to the following conceptual development for the purpose of this study is as follows:

`Agility is a capability, that enables the organization to detect and embrace the change, and adapts itself faster than the rate of the change`.

4.2.4 Implementation of Operational Definition of Agility

While delineating the underlying grounds of the operational definition of agility, the means to reach or improve the agility has been summoned as:

1. Adaptation,

2. Organizational Learning, and
3. Transformation (includes innovation).

This research claims that, such extent of agility can be applied and achieved via effective use of KM in a timely manner. The term `timely manner` actually points at the AKM.

When it is defined as a `capability`, inspiring from the Defense Planning understanding and NATO Defense Planning Procedure (NATO Handbook) like any capability, agility should also affect various functional areas. Those areas are (also called DOTMLPFI):

1. Doctrine
2. Organization
3. Training
4. Material
5. Leadership and Education
6. Personnel
7. Facility
8. Interoperability (interoperability has a unique position that, it is not assumed as a functional area, but as an attribute across the other seven functional areas).

To analyse those functional areas and their relations with agility is beyond the scope of this research. Nevertheless, it is worth to mention both to recognize the effects of such constructs over the core studies of this research as well as opening some windows for further studies.

4.2.5 Agility of a System:

The important question about the agility (as an imperative) is whether to try the control the change or to adapt it. Tendency in the military organizations is to control anything that causes uncertainty. But, in reality, none of the organizations including the military have the capability of controlling the environment. Because, they need to realize that they have very limited commanding authority over the environment.

Clark and Gottfredson (2009), being the CEO and the chief learning officer of TRClark company, direct a question for the companies and then try to find some responses for these questions. Their basic question is: "how can organizations sustain competiveness?" They suggest the answer would be in the pursuit of learning agility. They describe it as `the ability of an organization to learn at or above the speed of change`. And they claim that organizations must accelerate knowledge cycles to keep pace with competitive cycles (Clark & Gottfredson, 2009).

It is generally suggested that the abilities of knowledge and learning constitute significant domains for agility. While individual knowledge and learning would rather be assumed as a manageable process, organizational aspects of learning and knowledge requires significant management capability.

Atkinson and Maffot (2007) denote the agility of an enterprise as a function of `how it is organized` and more specifically, a function of `its approach to command and control`. They suggest a loosely coupled management process to succeed when conditions are very uncertain and dynamic (Atkinson & Maffot, 2007).

Nonaka (1998) makes a distinction between information processing to reduce uncertainty and information creation that generates uncertainty but simultaneously increases opportunity, particularly in new product creation.

Effective AKM is supposed to incorporate both perspectives, where similarly Hite (1999) suggests taking advantage of learning in the chaotic or near-chaotic systems rather than trying to control the chaos.

In summary, in light of the new age challenges and highly volatile environmental conditions the organizations should try to adapt to the change rather than desperately struggling to control the change surrounding them.

4.3. Military as a System in the COIN Environment

The details of the analyses of this section is discussed in Appendix A.

In Appendix A, the entities, sub-entities, interrelations/interactions, stakeholders and especially the dynamic (in a sense chaotic) environment of the huge system of COIN are analyzed based on the *researcher's colligation* and the results of the *personal reviews (one-on-one reviews)* in Appendix E.

Based on the findings of those analyses and additional qualitative data rendered from the personal reviews, along with the perspective of `literature-based `Knowledge, KM, Agility and AKM` understanding, following coding and correlations are reached:

- *Scope and Limitation:* The focus area of this research is the multinational military organization (NATO) in the counterinsurgency (COIN) environment. However, this research does not claim to present a thorough systems analysis of a military organization in the COIN environment, which is out of the scope this study. The findings of the analysis provide overall systemic foundation for this research.
- *The Environment, Stakeholders and Entities and Subsystems:* COIN has large number of entities due to many actors' involvement in and outside the system. Obviously the quantity of the elements can easily be outnumbered in the real life. COIN has very complicated and changing environment. From the perspective of NATO, the environment has the parties of the `supporters`, `opponents` and `neutrals`. For that reason, COIN environment requires AKM more than any other military environment due to its very fast changing nature, highly adaptive threat, involvement of many actors and the ambiguity.
- *Boundary:* Depending on the specific COIN environment, it is hard to draw the boundaries of the system. Although, the physical boundaries of the system could be assumed as the borders of the HN, the reality of the COIN mandates to take into account every possible effect into environment. In that case, the conceptual boundary of the system becomes the whole world.
- *Inputs and Outputs:* With the AKM perspective, the input of the system is any form of the knowledge. Inputs can be in the form of signal, data, information or knowledge. On the other hand the output should be `actionable knowledge` or knowledge that is both useful and usable.

The dimensions of the AKM concept are constructed with the view of literature studied in Chapter-2 and scrutinizing it with the 'lens' of the systemic approach in Appendix A. Respectively, integrating the systems related findings with the dimension of AKM drive forward important aspects for reconceptualization. Those aspects are denoted as `element` in this research as follows:

- End State (Objective): What is needed? Why is it needed?
- Environment (with stakeholders): Where are we operating? Who has perceptual interest?
- Organization and Structure (CAS) (Planning, Execution and Decision): What is it for? Who is conducting the process?
- Process (Procedures): How can we do it?
- Input-Output (Knowledge as an Asset, Intellectual Capital): What is used?
- Capability (Tools) (Technology, channels, innovation): With what we can do it? What do we affect?
- The Human Factor: For whom it is needed? With whom it will be realized?

As a conclusion, the military of the COIN environment with respect to AKM/KM as a system is depicted in Figure 12 and explained as follows:

- *End State:* The `end state` is the primary factor in the military system. No matter what the scale and the responsibility of the military organization is, it should have a clear `end state`. The end state affects the whole KM process as well as other activities.
- *The Process:* The system employs a KM/AKM process with its all steps. The asset processed in KM/AKM is naturally the knowledge. This process will directly affect the capabilities of the system. It will also affect the human factors in the system as well as being affected by the human factors.
- *Input of the System:* The organization gets `any form of knowledge` in the system. The inputs of the KM/AKM Process could be:
  - Knowledge,
  - Information,
  - Data, or
  - Signal.

The first three forms have already been explained in the literature review (Chapter 2). The definitions of those three terms also apply to the military organization. But, especially the COIN environment highlights an additional form of knowledge. Occasionally, especially at lower levels, *signal* would also need to be processed. The

signal is not really data yet, but it is rather some symptoms that the units can sense from the environment.

Example: A patrolling unit in the HN land can see some people are unusually gathering. Normally, this might not really mean anything security wise. There could be a lot of reasons for the people to gather: it could be a game, it could be celebration, it could be sales event etc. However, the experience and the knowledge that this particular unit have, could trigger a sense for this unit. By observing and noticing to the very little details of gathering, the unit can sense a signal of a security issue, or a threat. Similar examples are very common in the COIN environment.

Note that LL generated from the system will also feed into the AKM/KM Process.

- *Output of the System:* Output of the KM/AKM process would also naturally be the knowledge. But, there is a unique aspect of the military COIN organizations that the result of this knowledge should sooner or later turn into an action. If the knowledge acquired cannot be transformed into action, and stays as an asset of the organization, with very fast changing environmental conditions this knowledge will most probably become useless. Therefore, the knowledge generated must have practical value (i.e., useful) at the same time that it is generated in a way that facilitates its application (i.e., usable). Useful knowledge that is not usable will have challenges in its implementation. Usable knowledge (or any knowledge generated) that is not useful is a waste.
- *Environment and Stakeholders:* The environment of the COIN has various and highly influencing differences from regular warfare environment. Related to complexity of the environment, the COIN has very large number of entities and stakeholders. In this research relevant stakeholders and entities can be categorized as `friend`, `foe` and `neutral` in accordance with the NATO COIN Doctrine (2011).
- *Feedback:* The feedback for the process is institutionalized in most of the military organization as LL process. This process is actually using the facts or `Lessons Identified (LI)` as well as using the `best practices`. Common critics about the real effect of this LL process are that, there are more `lessons unlearned` than `lessons learned` in the COIN operations. This is also a good indication of a

better KM process requirement for the COIN military organizations. Additionally, LL can come in forms of near-misses and near successes (i.e., counterfactual thinking).

- *Type of the System:* Based on the above mentioned considerations, such a COIN military organization can be described as:
  - An open system, because of its various interactions in the environment with different entities and the stakeholders
  - A system of system, because of embodying a large number of entities in it, which are also complex systems
  - A socio-technical system, because of its combinative structure of consisting technical subsystem (including facilities, tools, equipment, and knowledge) and social subsystem (including human factors and the population)
  - And finally, a Complex Adaptive System (CAS), because of the complexity of the COIN environment and military organization as well as the need for adapting to fast change in the environment.

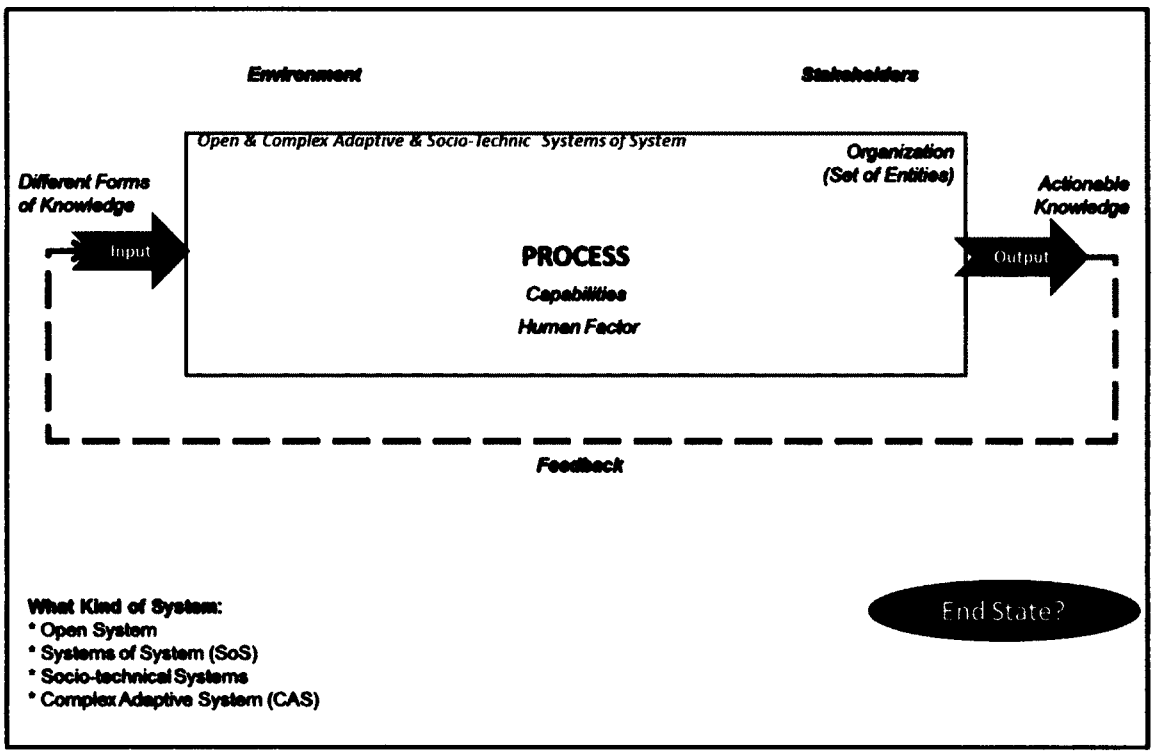

Figure 12. Military COIN Organization as System WRT KM/AKM

4.4 Extension of Knowledge and Knowledge Flow

4.4.1 Extension of Knowledge

This research does not endeavor and claim to redefine `knowledge`, as different definitions based on the contexts, areas of the interest and perspectives of the researchers have already been introduced to the literature.

However, some of the definitions among the ones elaborated in detail in Chapter 2 (Literature Review) draw more attention in this research because of their some specific aspects. The reason is the unique nature of the military COIN environment combined with the goal of coping with the challenges with regard to agility requirements.

First of all, knowledge under study in this research is mainly perceived as `organizational knowledge`, `individual knowledge` is explicitly specified whenever it is needed to be mentioned. As it was delineated in Chapter 2 (Literature Review) some scholars had the tendency of denoting knowledge as organizational knowledge (Alavi&Leidner, 2001; Alavi & Tiwana, 2002). This approach is rather reasonable for this research as well. The individual is already considered as part of the organization.

Second, following the majority of KM scholars, this research also prefers to denote the knowledge as an `asset` (Drucker,1993; Kharbanda & Pinto, 1996; Nonaka & Teece, 1998) or an `intellectual asset` (Leibold, et al.,2005: Shariq, 1997; Spender, 1996). Common understanding is to have this asset (knowledge) and make better use of it towards the goals of the organization.

Knowledge which is not really used by the organization might be a `nice to have thing`, but is not a `need to have thing`. The organizations should strive to acquire the knowledge that they need and that is for their benefits. Otherwise it will remain only in the realm of philosophy. That might hardly promise practical use for the benefit of the organization. Additionally, unnecessary knowledge might even cost additional expenses in terms of money, manpower or resources. Since, any knowledge in an organization needs to be processed and stored (which is actually a topic analysed in the following sections of this research).

Third, the aforementioned idea of practical use of knowledge opens a new window into this research. Normally, this research is in favour of prominent KM scholars' understandings (Alavi & Leidner, 2001; Bose, 2004; Holsapple & James, 2006; Huber, 1991; Nonaka, 1994; Senge, et al., 1994; Soliman & Youssef, 2003;Wainwright, 2001), where they prefer to highlight the importance of knowledge as to initiate an action.

This will be denoted as `*actionable aspect of the knowledge*` in this research. Note that this idea is very much related to previous paragraphs. If knowledge is not a useful asset for an organization and if it cannot be transformed into any meaningful actions for the organization, then it is actually either useless or requires more resources, manpower and money than it would promise benefits for the organization.

Additionally, this research also complies with the largely accepted `knowledge taxonomy` in the KM Multidiscipline, namely `tacit knowledge` and `explicit knowledge` (Nonaka, 1991; Polanyi, 1966). Nevertheless, with the perspective of complex nature of a military organization in COIN environment along with the challenges attached to the requirement of agility, `taxonomy of knowledge` needs further extension.

Knowledge in an organization can be either `*already possessed by the organization*`, or `*needs to be possessed*` based on the requirements. By nature, this is a

never ending struggle of an organization in terms of knowledge, since the organization operates in a constantly changing environment.

The organization might have a specific knowledge at a certain time. But, it will need to have additional knowledge in order to cope with the change in the environment. This change might result from both the outside and the inside of the organization. The organization will always experience such situations as long as it survives and the change in the environment continues.

This research claims that the taxonomy of the knowledge has two different aspects. One of which is *`organization oriented perspective`*, while the other one is *`knowledge (as a construct) oriented perspective`*.

According to the `Organization Oriented Perspective`, knowledge can be categorized as (as mentioned above):

1. Knowledge Possessed (by the organization)
2. Knowledge Need to Have (for the organization)

According to `Knowledge Oriented Perspective`, the literature of KM dominantly proposes that knowledge is categorizes as (Nonaka,1991; Polanyi, 1966):

1. Tacit Knowledge
2. Explicit Knowledge

Based on aforementioned idea of assuming the knowledge as `organizational knowledge`, in order for better understanding KM practices in the military (most probably that might apply to the most complex organizations) the knowledge in this research should involve both perspectives. Ignoring either of them would lead us to misinterpretation of conceptual understanding of KM and hence AKM.

In that respect, a distinction should be clearly stated in between the organization and the individual which is also a part of the organization. Although the organizations are composed of the individuals, they resemble more than being sum of individuals. There would be some unexplainable and intangible synergetic combinations of people that those people would not be able to establish individually (organizational capability, culture, spirit of unit etc.).

Based on that, this research proposes to have the taxonomy of knowledge as indicated in Figure 13:

1. *Knowledge Possessed:* This type of knowledge contains four types of knowledge taxonomy:
    a. Individual Tacit
    b. Organizational Tacit
    c. Individual Explicit
    d. Organizational Explicit
2. *Need to Have Knowledge:* This type of knowledge also contains the same four types of knowledge taxonomy:
    a. Individual Tacit
    b. Organizational Tacit
    c. Individual Explicit
    d. Organizational Explicit

The dashed lines in Figure 13 depict that the `knowledge possessed` need to be informed into (as a feedback for comparison) the organizational knowledge, while the knowledge that is acquired out of `knowledge need to have` is forwarded to the organizational knowledge for the use of organization.

This can be functionalized as follows:

Organizational Knowledge = F (Knowledge Possessed, Knowledge Need to Have, Time)

The comparison and acquisition process of knowledge is a constant endeavor over the `time`.

A knowledge designated as a `need to have knowledge` at time=t, can become a `knowledge possessed` at time=t+1. The other way around, a `knowledge possessed` at time=t, can become a `knowledge need to have` at time=t+1, if the organization cannot sustain it.

On the other hand, a `knowledge possessed` at time=t can become `obsolete` or `not really useful` for the organization at time=t+1 due to the changing nature of the environment. Ironically, due to the very same reason, `not really useful knowledge` might become `a necessary knowledge` over time *(this part is incorporated, in the virtue of the inputs provided by the expert of Agility).*

For that reason the organization needs to have a continuous comparison and communication between the two types of knowledge. Note that Figure 13 should not lead to a misunderstanding that communication and comparison of knowledge seem as if only exist at the top level of the organization. That is not really the case. Figure 13 represents any level (for the military it could be from a single soldier, to the team, to company, to battalion, to the brigade, to the corps, to the army, to the armed forces, even to the Head of State, which can be denoted as tactical, operational and strategic level) in the organization depending on the level of knowledge process.

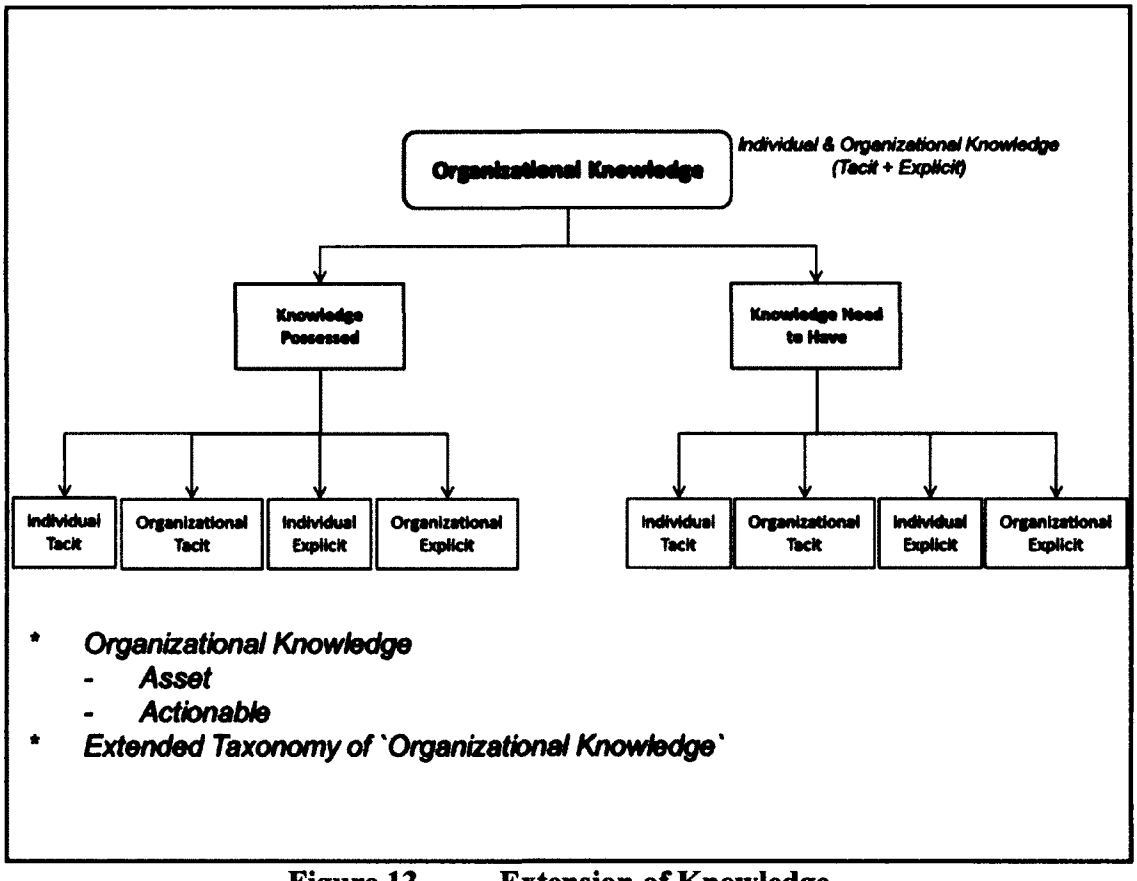

Figure 13. Extension of Knowledge

4.4.2 Extension of Knowledge Flow

According to his widely accepted model, Nonaka (1991, 1994) articulates four modes of knowledge flow among tacit and explicit knowledge types as explained in

detail in Chapter 2 (Literature Review). The most common definitions for those modes are `socialization (from tacit to tacit)`, `externalization (from tacit to explicit), `combination (from explicit to explicit)`, and `internalization (from explicit to tacit)`.

Upon this research's preposition regarding the extension of knowledge, classic knowledge flow theory of Nonaka (1991; 1994) needs to be reviewed as well.

Actually, this articulation of the knowledge flow has extensive usage in the literature as well as having numerous practical examples. For that reason, this research does not claim to innovate a new flow of knowledge by disregarding Nonaka's (1991, 1994) knowledge flow understanding. It is just a new way or defining the same articulation with a different perspective inspired by both the new preposition of `extended knowledge` in this research and the imperative effect of the change in the military COIN environment.

In this respect, this research proposes an extension of knowledge flow as depicted in Figure 14. This extension is a consequence of previously claimed knowledge extension, where tacit knowledge was categorized as `individual and organizational tacit knowledge` and explicit knowledge was categorized as `individual and organizational explicit knowledge`.

Accordingly, by using Nonaka's (1991, 1994) philosophy and staying within his articulation of the flow of knowledge, we further propose to use the expression of *`individual`* for the relevant mode when a transition from individual to individual occurs, and the expression of *`organizational`* for relevant mode when a transition occurs from organizational to organizational. On the other hand, if a flow occurs from individual to organizational that is called as *`popularized`* for the relevant mode, while the flow occurs from organizational to individual that is called *`personalized`* for the relevant mode. See details in Figure 14 and below:

1. If the flow occurs from `individual tacit` to `individual tacit` that is denoted as `individual socialization`,
2. If the flow occurs from `individual tacit` to `organizational tacit` that is denoted as `popularized socialization`,
3. If the flow occurs from `individual tacit` to `individual explicit` that is denoted as `individual externalization`,

4. If the flow occurs from `individual tacit` to `organization explicit` that is denoted as `popularized externalization`.

5. If the flow occurs from `organizational tacit` to `individual tacit` that is denoted as `personalized socialization`.

6. If the flow occurs from `organizational tacit` to `organizational tacit` that is denoted as `organizational socialization`,

7. If the flow occurs from `organizational tacit` to `individual explicit` that is denoted as `personalized externalization`,

8. If the flow occurs from `organizational tacit` to `organizational explicit` that is denoted as `organizational externalization`,

9. If the flow occurs from `individual explicit` to `individual tacit` that is denoted as `individual internalization`,

10. If the flow occurs from `individual explicit` to `organizational tacit`, that is denoted as `popularized internalization`,

11. If the flow occurs from `individual explicit` to `individual explicit`, that is denoted as `individual combination`,

12. If the flow occurs from `individual explicit` to `organizational explicit`, that is denoted as `popularized socialization`,

13. If the flow occurs from `organizational explicit` to `individual tacit`, that is denoted as `personalized internalization`,

14. If the flow occurs from `organizational explicit` to `organizational tacit`, that is denoted as `organizational internalization`,

15. If the flow occurs from `organizational explicit` to `individual explicit`, that is denoted as `personalized combination`,

16. If the flow occurs from `organizational explicit` to `organizational explicit`, that is denoted as `organizational combination`.

It is useful to elaborate the terms `individual`, `organizational`, `personalized` and `popularized` used above and in Figure 14:

The term `individual` in any mode of the flow indicates a flow of knowledge from an individual of the organization to the other individual of the organization, where it is not exposed to the whole organization.

The term `organizational` in any mode of the flow indicates a flow of knowledge from an organization to another (or itself), where whole organization is exposed.

The term `personalized` in any mode of the flow indicates a flow of knowledge from the organization to an individual, where this individual acquires the knowledge from the organization.

The term `popularized` in any mode of the flow indicates a flow of knowledge from an individual to the whole organization, where the organization exploits a knowledge of an individual to the benefit of the whole organization.

(This portion –Figure 14- is developed based on the feedback received from the Panel of Experts interview on KM comments).

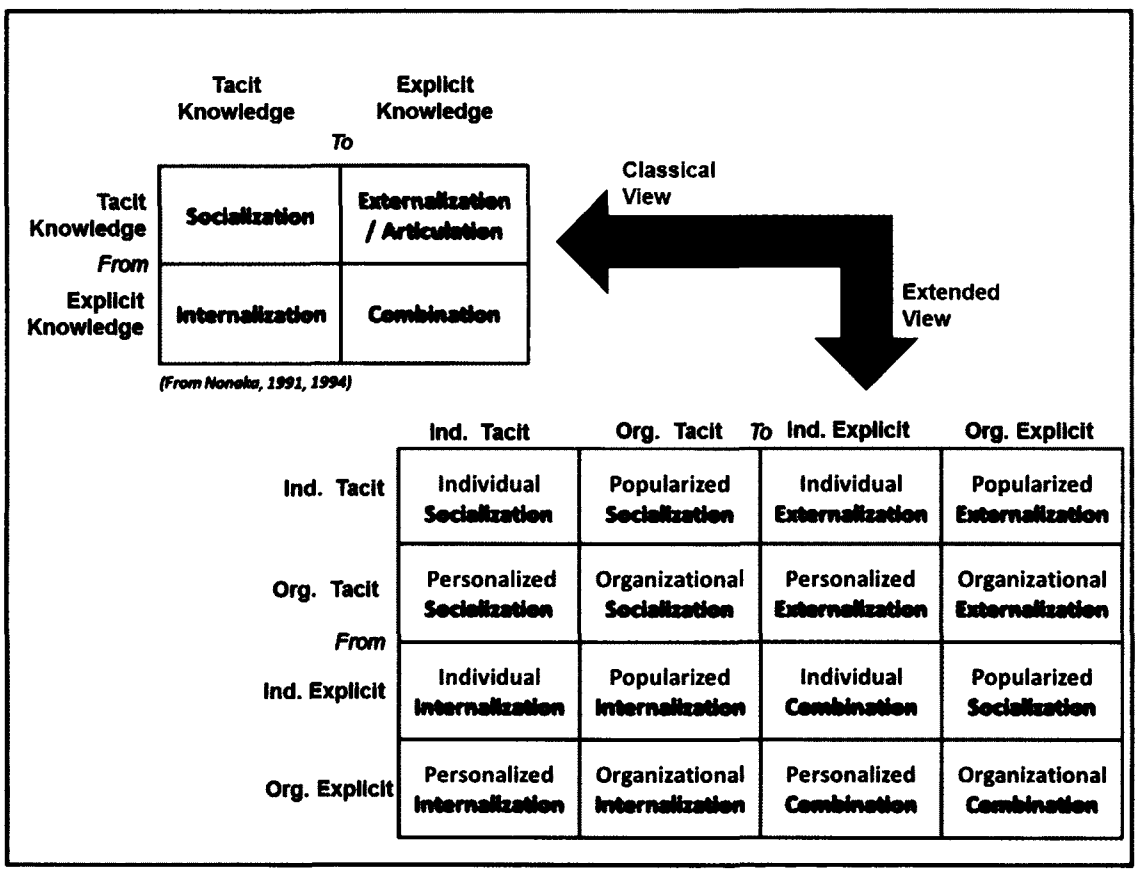

Figure 14. Extension of Knowledge Flow

The ultimate point for an organization is to possess the knowledge as an `organizational tacit` where whole organization embraces the knowledge and internalizes it.

The modes explained in Figure 15 are also an ordinary journey of the knowledge that occurs in an organization. Ideally, the journey of the knowledge might start in any mode of the knowledge. But, normally (according to the longest possible cycle), it could start as a knowledge of an individual (individual tacit), then with `individual externalization` it can become `individual explicit`, then with popularized combination, it can become `organizational explicit` and then with organizational internalization it can become `organizational tacit`.

Due to the nature of knowledge, we should not expect the knowledge to have such a sequence at all times. It might flow in any direction, from any mode to any other mode.

The knowledge in the organization can then be described in four steps with different possibilities of 16 different flow of knowledge (according to proposed knowledge flow extension) with respect to extended `knowledge` as can be seen in Figure 15:

`0` Step: If we start with the ultimate point; the organization might have `organizational tacit` knowledge. That is actually the desired level. But, in constantly changing environment, the organization might be exposed with the change from the external and internal effects. In that case, the organization needs to continue to keep the knowledge updated (as the knowledge can easily become `obsolete` due to high rate of change) as organizational tacit (due to circulation of the personnel in the organization or for some other reasons, the knowledge might easily loose it organizational tacit cognitive level and become individual tacit or even explicit which will require a re-acquisition process for the organization). That is why even organizational tacit knowledge needs to be `organizationally sustained` which is called as `0 Step` in this research.

`1` Step: The knowledge at the stage of `organizational explicit` needs to be internalized by the organization, which is `organizational internalization` and then apply `0 Step` procedure. This is called `1 Step` in this research.

`2` Step: The knowledge that has already been externalized as in the form of `individual explicit` needs to be external knowledge asset which is available for the

whole organization via `popularized combination` then it will follow the `1 Step` procedure. This is called `2 Step` procedure in this research.

`3` Step: The knowledge that is in the stage of `individual tacit` first needs to be articulated and made available to use of others via `individual externalization`, then it is organizationally scrutinized and made available to the whole organization which is more systematic and professional, high quality external knowledge (individual explicit is rather a low quality and amateur articulation of the tacit knowledge) via `popularized externalization` with consolidation of more than one individual explicit knowledge. Then it follows the pattern of `2 Step` procedure. This is called `3 Step` in this research.

This research posits the patterns above (and in Figure 15) to be additional extension of the knowledge flow, along with the all possible patterns that a knowledge can follow from one to other as described in Figure 15.

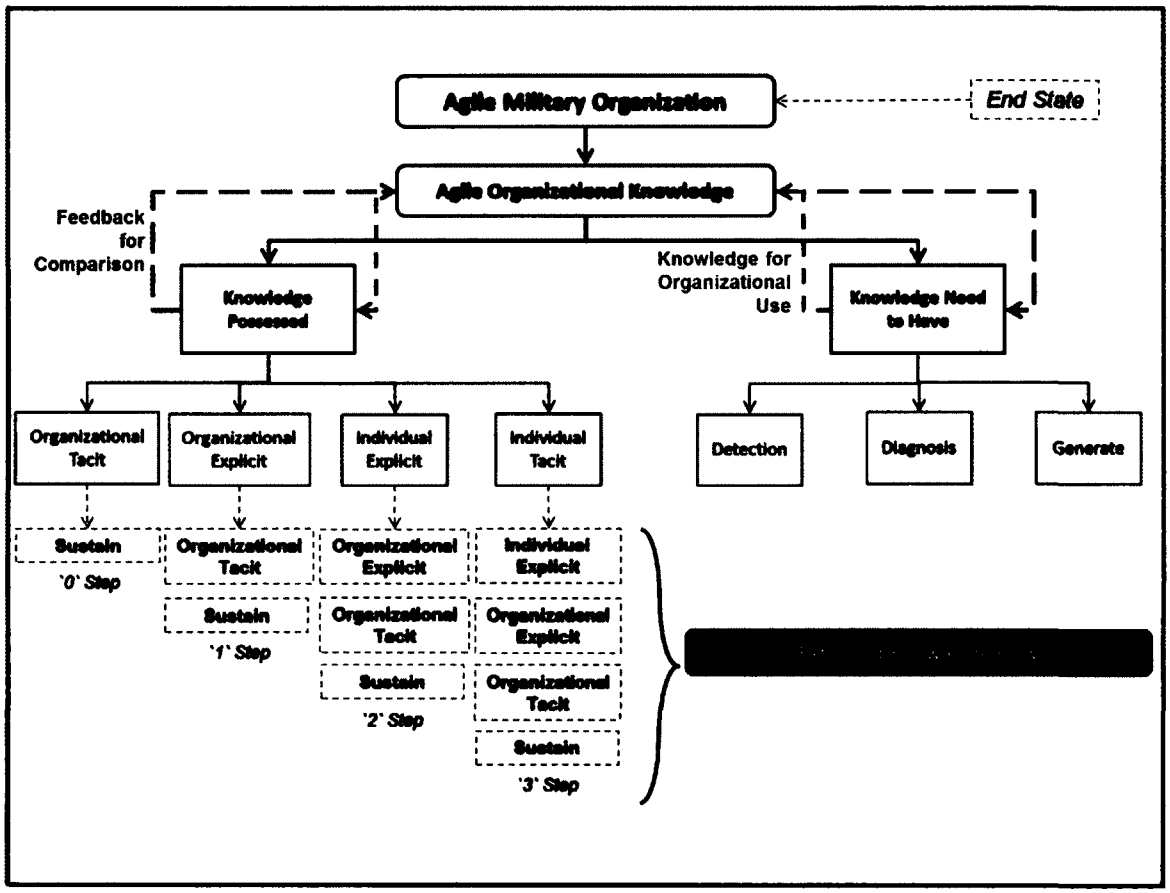

Figure 15. Extension of Knowledge and Knowledge Flow with Patterns

4.5 Agile Knowledge Management (AKM)

4.5.1 Objectives of KM and Value of KM in the Research

Alavi and Leidner (2001) claim different views about the knowledge lead to different perceptions of KM. Accordingly, it is fairly normal to see different objectives of KM expressed with regard to the areas of interest for different scholars. But this diversity is a good indication of KM being a multidiscipline. Consequently, depending on the orientation and aims of the subject matter organization, system or individual KM naturally promises different objectives.

The knowledge acquisition/absorption and learning of an organization in order to adapt to the dynamic environment is quite sophisticated. That is why, the constructs of `KM` and `organizational learning` have been scholarly addressed in order to explain the basis for the complex organizational processes of knowledge and learning. Actually the process of knowledge flow carry high risks of losing the value of the knowledge or deviating from the knowledge if any mistake is made. *As one of the deductions of this research out of the literature is that `there emerges the need of knowledge management` in order to minimize (ideally terminate) the possibilities of losses or deviations of the original knowledge.*

Some scholars also perceive KM as the attempt of an organization to identify and distinguish knowledge from information; assess the value added of this knowledge in terms of actionable achievement of organizational objectives, and the pursuit of the appropriate amount of resource allocation to the most valuable knowledge-based assets throughout the organization (Davenport et al., 1998; Nissen, 2006).

According to Davenport and Prusak (1998), most KM projects have one of the three aims:

1. To make knowledge visible and show the role of knowledge in an organization.
2. To develop a knowledge-intensive culture by encouraging and aggregating behaviours such as `knowledge sharing` (as opposed to hoarding), and proactively seeking and offering knowledge.
3. To build a knowledge infrastructure-with a given space, time, tools and encouragement to interact and collaborate.

Essentially, KM is the practice of managing intellectual capital or asset of an organization. Learning from past mistakes and avoiding reinventing the wheel are crucial tasks and no organization can today afford not to look for ways to make the best use of its knowledge (Alder & Peterson, 2010).

Bose (2004) states that the three goals of KM are to leverage the organization's knowledge create new knowledge and increase collaboration.

KM can be used in order to manage the knowledge in favour of the organizations' benefit. KM and knowledge management systems (KMS) appear to be necessities for organizational effectiveness and competitiveness in the new millennium (Alavi & Leidner, 2001).

Most of the organizations use KM practices and technologies on the promise of increasing their effectiveness, efficiency, and competitiveness (Schultze & Leidner, 2002). The nature of globally expanding and highly competitive knowledge-based economy force the organizations to seek fundamental insights of nurturing, harvesting and managing immense potential of knowledge assets (Shariq, 1997).

Some scholars have a tendency to see the KM as the function of applying logical organizational processes towards the goal of having knowledge readily available for decisions (Nonaka, 1994; Tsoukas, 2005).

Knowledge Management (KM) aims to use, improve, maintain, and create organizational capabilities to generate sustained competitive advantage in organizations through knowledge (Davenport & Prusak, 1998; Drucker, 1999; Lubit, 2001; Teece, 1998; Zahra & George, 2002).

Dove (1999) and Holz, et al. (2003) have first acknowledged the similarities and the connection between the ASD and KM where they emphasize that both disciplines to be dealing with organizational culture and change management.

One of the KM cornerstones is improving productivity by effective knowledge sharing and transfer. KM must be practical aspect of the general organizational culture (Levy & Hazzan, 2009b).

According to Wiig (1997), the goal of KM is to build and exploit intellectual capital effectively and gainfully.

In addition to the scholarly itemized one, some other objectives of KM can be follows:

1. Share valuable organizational insights
2. Reduce redundant work
3. Reduce training time for new employees
4. Retain intellectual capital as employee's turnover in an organization
5. Adapt changing environments and markets

The Extent to which the Concept of the Research Address the KM Objectives

The essential orientation of the conceptual model of this research is a military organization. For that reason, KM needs to be elaborated with the perspective of the military. For that, the objectives of KM mentioned previously in the commercial, business or theoretical literature need to be adopted into the military environment.

This process of adopting will use three categories of objectives;

1. *Directly as is (knowledge-oriented objectives):* Because in some cases the nature of the organization does not change whether it is a military or a civilian organization. This portion includes common lessons learned and learning aspects as well.
2. *By modifying (performance oriented):* Some unique aspects of the military will require modifying the civilian perspective on those objectives and re-adopting it. This portion includes the use of asset as well.
3. *By generating new one (mission oriented and decision oriented):* Some unique aspects of the military will require some new objectives those are actually have not explicitly phrased in the civilian organizations.

Knowledge Oriented Objectives (As is)

Referring to the previous sections where these objectives are explained, they will be itemized shortly as follows:

- Make knowledge visible
- Manage the knowledge in favour of the organizations' benefit
- Develop a knowledge-intensive culture
- Build a knowledge infrastructure
- Leverage the organization's knowledge

- Create new knowledge and increase collaboration
- Minimize (ideally terminate) the possibilities of losses or deviations of the original knowledge
- Learn from past mistakes and avoid reinventing the wheel
- Share valuable organizational insights
- Retain intellectual capital as employees' turnover in an organization

Performance (efficiency and effectiveness) oriented objectives

With a broad perspective, the expectations from usage of KM across the military are:

First is allocating the funding to be used efficiently and effectively in order to increase the overall performance.

Second is providing lessons identified/learned in order to avoid system design problems and improve the performance. Note that, the ultimate aim of the military organization is the performance, rather than improving the competitiveness. Unlike the market/business environment, military organizations generally do not compete and they do not confront with the competitors. They normally are confronted by the enemy, for that reason their purpose to achieve the task/mission in the field is to gain the 'superiority or dominance' rather than reaching a good level of 'competitiveness'.

According to `The Department of the Navy (DON) Chief Information Officer (CIO), KM is the integration of people and processes, enabled by technology, to facilitate the exchange of operationally relevant information and expertise to increase organizational performance (DoN KM Strategy, 2005).

The US Army specifically uses KM for specific objectives of `enable battle command`, `enhance professional education`, `facilitate exchange of knowledge`, `foster leader development`, `support doctrine development`, `support lessons learned` and `support training`(US Army CAC, 2011).

With a step further, the Army also identifies its organization benefits that is expected through the use of KM as `reduce the time to resolve specific technical or leadership problems and challenges`, `significantly shorten the learning curve`, `help create innovative/breakthrough ideas and tools`, `transfer best practices from one individual to another in near real-time`, `decrease negative outcomes for first-time real-

world contact experiences`, `reduce the cost of mission accomplishment through superior knowledge transfer`, `fill the knowledge gap between doctrine` and `harness the collective minds of the military profession to generate "on the fly" knowledge as needed` (US Army CAC, 2011).

Accordingly, relevant objectives of KM literature in the civilian organizations can be itemized as follows:

- Organizational culture and change management
- Increase effectiveness, efficiency, and competitiveness: generate sustained competitive advantage in organizations through knowledge
- Assess the value added of knowledge and resource allocation to the most valuable knowledge-based assets
- Seek fundamental insights of nurturing, harvesting and managing immense potential of knowledge assets
- Allocating the funding to be used efficiently and effectively in order to increase the overall performance.
- Reduce redundant work
- Reduce training time for new employees
- Adapt changing environments and markets

Decision Making oriented objectives

Recently, it has been suggested that KM is also utilized to facilitate and support the decision making of the Commander. KM is the process for effectively applying intellectual capital (human, social, and organizational) to enable faster, better organizational decisions" (Pollock, 2002).

Having understood the importance of KM, The US DoD aggressively adopted KM as means of improving communications, operations, and decision-making in its complex operating environment. DoD uses KM tools and techniques for improved interoperability, business operations, and decision-support. The Air Force has a `KM Center of Excellence` which has the goals of `Decision Quality Information`, `Transform Military Functions`, `Retain Corporate Skills` and `Accelerate Learning Processes` (US Air Force FAF, 2011).

Mission Oriented Objectives

For the military the goal is to meet mission objectives (AR 25-1, 2005).

The importance of KM to the Navy is stressed in its two focus areas of implementation: 1) KM Advocacy, in which the DON remains committed to enabling mission accomplishment through KM efforts; and 2) Training and Education (Johnson, 2010).

For the US Marine Corps KM is an operational function that enables organizational learning to improve mission performance (MCO 5400.52, 2010).

The only objective phrased in the civilian organization related to this portion is `to meet mission objectives`. However, this objective has some contextual difference when compared to the military organizations.

4.5.2 Dimensions:

4.5.2.1 Agile Knowledge Management (AKM) Model

Although there are couple different steps described for KM process in the Literature, the most common one comprises four steps, namely `knowledge creation` (Alavi & Leidner, 2001; Nonaka, 1994; Nonaka & Konno, 1998; Pentland, 1995), `knowledge storage/retrieval` (Argote, et al., 1990; Darr, et al., 1995; Freeze & Kulkarni, 2008; Nonaka, 2008; Nonaka & Toyama, 2004; Stein & Zwass, 1995), `knowledge transfer/share` (Alavi & Leidner, 2001; Gupta & Govindarajan, 2000) and `knowledge application` (Alavi & Leidner, 2001; Grant, 1996) as details of those processes have been elaborated in Chapter 2 (Literature Review).

This research proposes to have an additional stage for KM process, in order to comply with the requirement of agility. In accordance with the previously presented background of the agility, this additional process is called `adaptation` (Figure 16). Along with some extensive articulation of the other four steps, this additional step leads us to a new process of AKM.

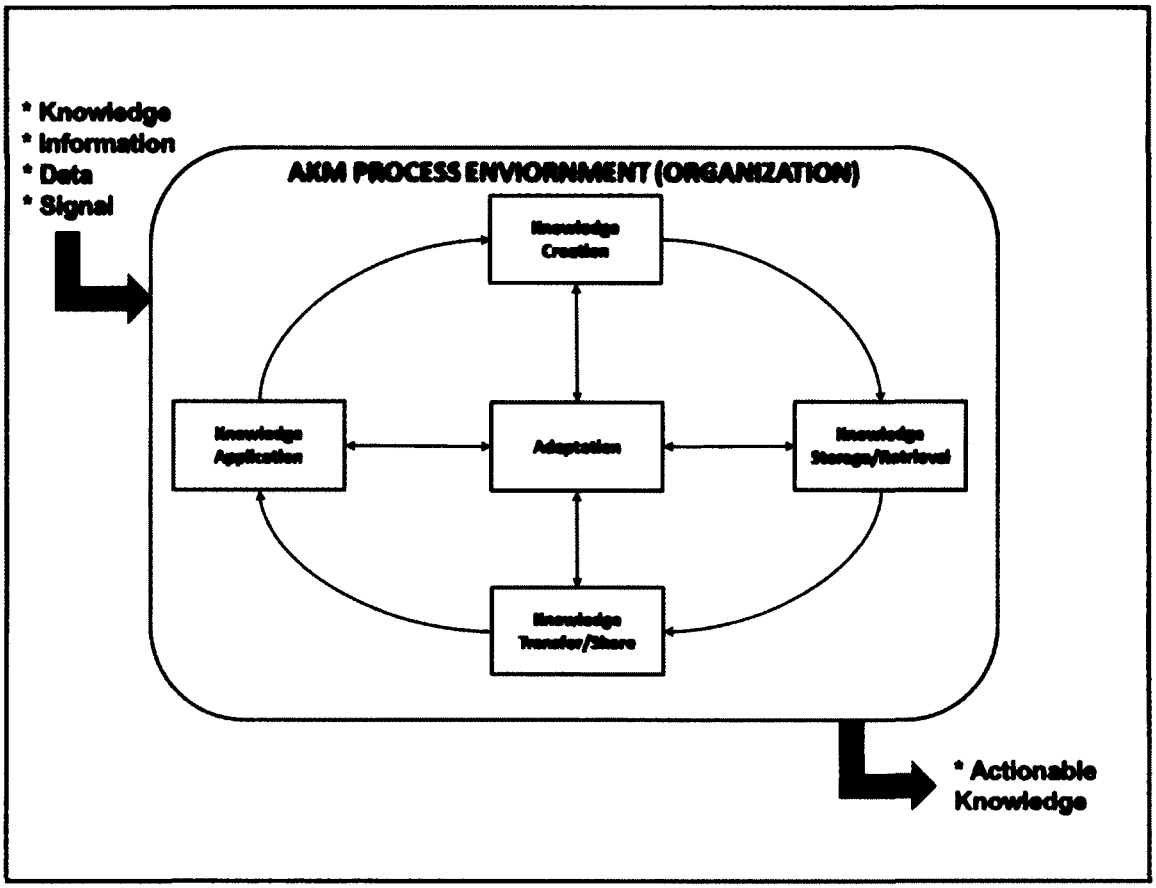

Figure 16. Model of AKM Cycle

4.5.2.2 Knowledge Creation (Generation)

Knowledge creation dimension of the AKM Process is visually presented in Figure 17.

The `Knowledge Need to Have` (see Figure 13) should detect the need for the new knowledge. The source for that will be the whole environment of the organization. It comprises the *external environment* which denotes everything outside the organization, and the *internal environment* which denotes everything in the organization.

External Environment

The organization needs to have the capability of detecting/sensing the change and then recognize the requirement for knowledge creation.

Note that initiators for a `knowledge creation` process have been asserted as either (1) change or (2) directly any form of the direct knowledge requirement input.

Because in the first part of the assertion, the idea is that the `change` triggers the process of knowledge creation/generation process. In the latter part of the assertion, `knowledge requirement` initiates the knowledge creation/generation process. A slight difference in here needs to be taken into account by the knowledge management mechanisms in the organizations.

In addition to this assertion, there is a need to mention the categories of different sources of change/knowledge especially with respect to the military organization. The inputs could be in any form which could be `signal`, `data`, `information` or even `knowledge` itself.

The theatre that the organization dwells in is one of the sources in the external environment. The stakeholders of the organization, the friends (friendly forces, allies etc.) in the theatre, and the foe (the enemy) and the neutrals (especially in the current security environment, COIN theatre like Afghanistan etc.) are the sources as well. They could be the reasons of the change, or the indicators of the change or the origins of the knowledge (signal, data, information, and knowledge).

Acquisition of any form of the knowledge from afore mentioned sources, is now called `Knowledge Development` in the military. This is assumed to be a smart way of collecting intelligence or processing intelligence.

(This portion of the process promises a good avenue of doing future researches. Especially outlining and scrutinizing the relations between KM and KD).

Internal Environment

On the other hand, the internal environment might also be exposed with `change` or different forms knowledge (signal, data, information, knowledge) where the organization needs to have capability to detect/sense and start a knowledge creation/generation process.

But, additionally, internal environment of the organization might also have another source that needs to be taken into account as well. This is the unused stored knowledge *(This portions of the analysis has been added after having expert review with the expert of Agility).*

Because, if the process of AKM has a primary imperative of `agility` surrounding it, then naturally the process will be about using the knowledge over time. Time is an

important variable in this process. Accordingly, there might be some occasions that some knowledge that has been used once and has not been needed anymore, or some knowledge that has not been used at all might become necessary for the benefit of the organization over time. In that case the `unused stored knowledge` might initiate the knowledge creation/generation process.

The inputs from both `internal` and `external` environment, are the triggers and initiators for knowledge creation.

Note the difference between the terms `trigger` and `initiator`. The change triggers the `knowledge creation` while different forms of knowledge initiate the `knowledge creation/generation` process.

The inputs would be the first step of the `knowledge creation/generation process`, since the organization needs to diagnose the detected input from external or the internal environment (sources). The diagnosis activity comprises first `analysis` then `decision` activity. The inputs reach to the organization through its capabilities (channels) in accordance with the constant comparison with the need and the current knowledge (possessed knowledge). Then the organization goes through a decision process for further actions towards creation of the necessary knowledge with its necessary breadth and depth.

The organization uses its limited resources to create knowledge. That means, the organization will not be able to finance (allocate its resources) for some other requirements. For that reason it is vitally important for the organization whether the creation of this knowledge is necessary or not. Additionally it is also equally crucial how much of that knowledge is necessary to create/acquire. The organization will allocate its resources (manpower, money and time) accordingly. This step of the knowledge creation process can be denoted as the `institutionalization`.

Upon decision of proceeding towards creating/acquiring the necessary knowledge, the organization starts its generation process in which the creation or acquisition of the knowledge is realized. Afterwards, this generated knowledge needs to be embraced/adopted by the organization so that it can become the asset of the organization. This step could be denoted as `internalization`.

Concurrently, the organization should have been struggling with its internal knowledge process where it figures out some internal sources that initiate or trigger the knowledge creation process. The internal process of the organization would naturally include its knowledge flow as well.

As it is pictured in Figure 17 the process of internal AKM activity is called `Internal (AKM Knowledge Creation) Process` and the external AKM activity is called `External (AKM Knowledge Creation) Process` in this research.

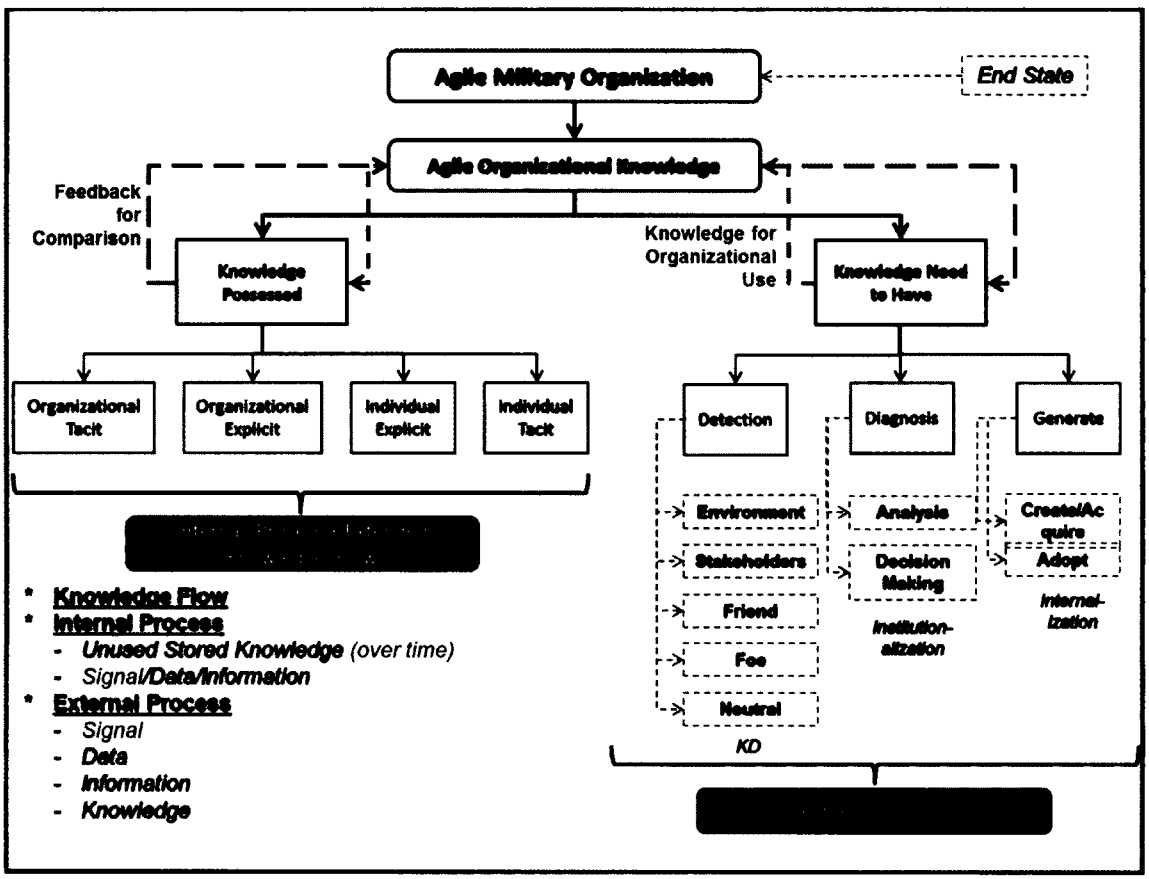

Figure 17. Knowledge Creation (Generation) Step

4.5.2.3 Knowledge Storage/Retrieval

One of the other important process of the AKM is `knowledge storage and retrieval process`. This process is depicted in Figure 18.

The importance of this process stems from the need of keeping the knowledge and to be able to use it when it is necessary. For that reason, it is also closely related to `risk management` where Landaeta, et al. (2009) relates it to cope with the risk of losing knowledge.

Introducing the phenomenon of change in the environment and the agility into the knowledge domain adds additional aspects to the risk management and knowledge management areas. In addition to the risk of losing the knowledge, there also happens to be the risks of having the knowledge 'obsolete' or `valid but late`.

For better understanding it is more useful to categorize those `Risk Management` and `AKM` related issues into three items and as follows *(this research will briefly explain the three items below and leave a broad avenue for the future studies)*:

- *Risk of losing the knowledge* (Landaeta, et al., 2009): The struggle for any organization is not just to acquire the knowledge but also keep the knowledge that is acquired. This is also a big challenge for the organizations.
- *Risk of having obsolete knowledge*: The changing environment and the agility requirement add another aspect to the risks related to knowledge that the organization should also take precautions to avoid the knowledge become obsolete. If not adapted quickly, the knowledge can soon become obsolete due to the rapid change.
- *Risk of having valid but late knowledge*: The knowledge could be valid but not on time. There might be some specific occasions for an organization, especially for the military organization (in the COIN environment) that although the knowledge remain valid it cannot be used for the desired task at that moment because of retrieving it late.

There is slight difference between the latter two items. On one hand, the `obsolete knowledge` denotes the knowledge that is useless due to the change of the environment or no longer existing need of the organization. Over time, with the change in the environment the knowledge acquired or stored could easily become useless and/or lose its validity (become incorrect).

On the other hand, because of the unique agility requirements of the organization (which is very much applicable to the military organization especially for the highly

volatile and complex COIN environment), although the knowledge could remain valid (it could be useful and valid for generic purposes) the knowledge could simply be late for the benefit of a specific task in the organization. That makes such knowledge `valid but late`.

That is the reason that the repository (storage) of the knowledge and retrieval of the right knowledge, at the right time for the right part of the organization is crucially important (Landaeta, et al., 2009; McKellar, 2007; Nonaka, 1994).

`Storage of the knowledge` and `Retrieval of the knowledge` need a bit more elaboration in order to have a better understanding for this phase of the AKM:

Storage of the Knowledge

This process has two aspects.

First, the organization needs to have high quality of storage abilities that the knowledge acquired by any means should not be lost, or ignored (stay out of the use of the whole organization). For that, the organization needs to allocate quite amount of resources (time, money and manpower).

Second, the classification of the knowledge is also important, where the organization needs to decide about the category of the knowledge whether:

- It is obsolete (not valid anymore for any case) or,
- It is useless for the organization (could be valid, but do not have value for the organization), or
- It is valuable for the moment (not sure for its value in the future), or
- It is not valuable for the moment but could be valuable in the future.

Such stratification allows the organization to decide which knowledge to be stored and which not to be stored. This process is not only needed for the first time of storing, but also needed to be cycled every once a while. Since, changing nature of the environment and the organization require to update the status of the stored knowledge. Cost-efficiency in storing the knowledge is also a primary factor in this phase.

Retrieval of the Knowledge

This phase also has very important role where the stored knowledge is needed to be ready for use when necessary. Actually, whole reason of the storage of knowledge is to have it ready for use. If the knowledge cannot be retrieved correctly and on time, when

a necessary knowledge is needed then storage efforts and the expenses become just waste or resources.

In addition to above mentioned operational aspects of this `knowledge storage/ retrieval` process, there is also a second aspect of it, which is the `memory`.

No matter what tools are used in an organization to store the knowledge, storage process of the knowledge eventually refers to the `memory` of the organization. It is also called as `organizational memory` by various scholars (Stein & Zwass, 1995; Walsh & Ungson, 1991). This research will also prefer to use the term `organizational memory`.

There is a need for further delineation about `organizational memory`. Organizational memory can be perceived as combination of two distinct memories. They will be denoted as *`virtual organizational memory/storage`* and *`physical organization memory/storage`* in this research as seen in Figure 18.

Virtual Organizational Memory

This memory is not really a physical device. It is rather an abstract phenomenon that is built upon the cultural (Brown & Duguid, 1998; KPMG, 1998) and traditional foundation of the organization. Naturally, it has close relation with the organizational tacit knowledge. But it is not limited to organizational tacit knowledge only. That is why the `virtual organizational memory` would have different relations with the different types of the knowledge in the organization as depicted in Figure 18 and explained as follows:

1. The `Organizational tacit knowledge` would feed into the virtual memory (or even we could say that once a knowledge becomes organizational tacit, it will be directly stored in the virtual organizational memory). But Organizational tacit knowledge does not need to be retrieved. That is why the organizational tacit has one-way relation with the virtual organizational memory.
2. The `Organizational explicit knowledge` can feed into the `virtual organizational memory` and can be retrieved from it as well.
3. The `Individual explicit knowledge` can feed into the `virtual organizational memory` and can be retrieved from it.
4. The `Individual tacit knowledge` could also feed into the `virtual organizational memory` and an individual can tacitly retrieve from it.

5. The organization can also be fed by the newly generated knowledge (with any type) and can of course initiate a knowledge creation process.

Note that the relations with the virtual organization storage are depicted with dashed lines in Figure 18.

Physical Knowledge

The organization also needs to have physical means to store its explicit memory. This type of memory cannot store the tacit knowledge, since is not tangible. The tacit knowledge just resides in the cognitive consciousness or with the skills of the individual or of the organization itself. For that reason, the physical storage has more traceable relations, as depicted in Figure 18 and explained as follows:

1. The `Organizational explicit knowledge` can feed into the `physical Organizational Storage` and can be retrieved from it.
2. The `INDIVIDUAL explicit knowledge` can also feed into the `physical Organization Storage` and can be retrieved from it.
3. The `Organizational tacit knowledge` can be retrieved from `physical organizational storage`, while it cannot feed into the physical storage directly (it need to become organizationally explicit).
4. Similarly, `individual tacit knowledge` can be retrieved from the `physical organizational storage`, while it cannot feed into the physical storage directly (it also needs to become individually explicit).
5. `Physical organization storage` can be fed by the newly created knowledge, while it can also initiate a new knowledge.

For the `physical organizational storage` technology, information technologies and other innovative techniques would play significant role.

It is beneficial to further explain the `virtual memory` with an example:

In the well-known movie `A few Good Men`, while the two soldiers were put on trial, in one of the scenes the prosecutor questions the soldiers to show them the exact place of the `red code` (which is defined as a traditional order of punishment in the US Marine Corps to force and put under physical pressure a soldier in the manual. Needless to say, the soldiers could not show it since it is not really written in the book. Then the defending attorney grabs the manual (book) and asks the soldiers where they eat their

lunch. The soldiers reply `mess hall`, then the attorney asks them to show how to go the mess hall in the manual. The soldiers say `it is not written in the book`. Then the defending attorney asks `then how can you find the mess hall?`. They answer: `We follow the crowd at lunch time` (Brown, 1992).

In this example while the manual is an example of the physical memory, the tradition of collective behavior of the new soldiers to follow the crowd is a good example of the virtual organizational memory as well as applying the red code which is not stored in the physical memory either.

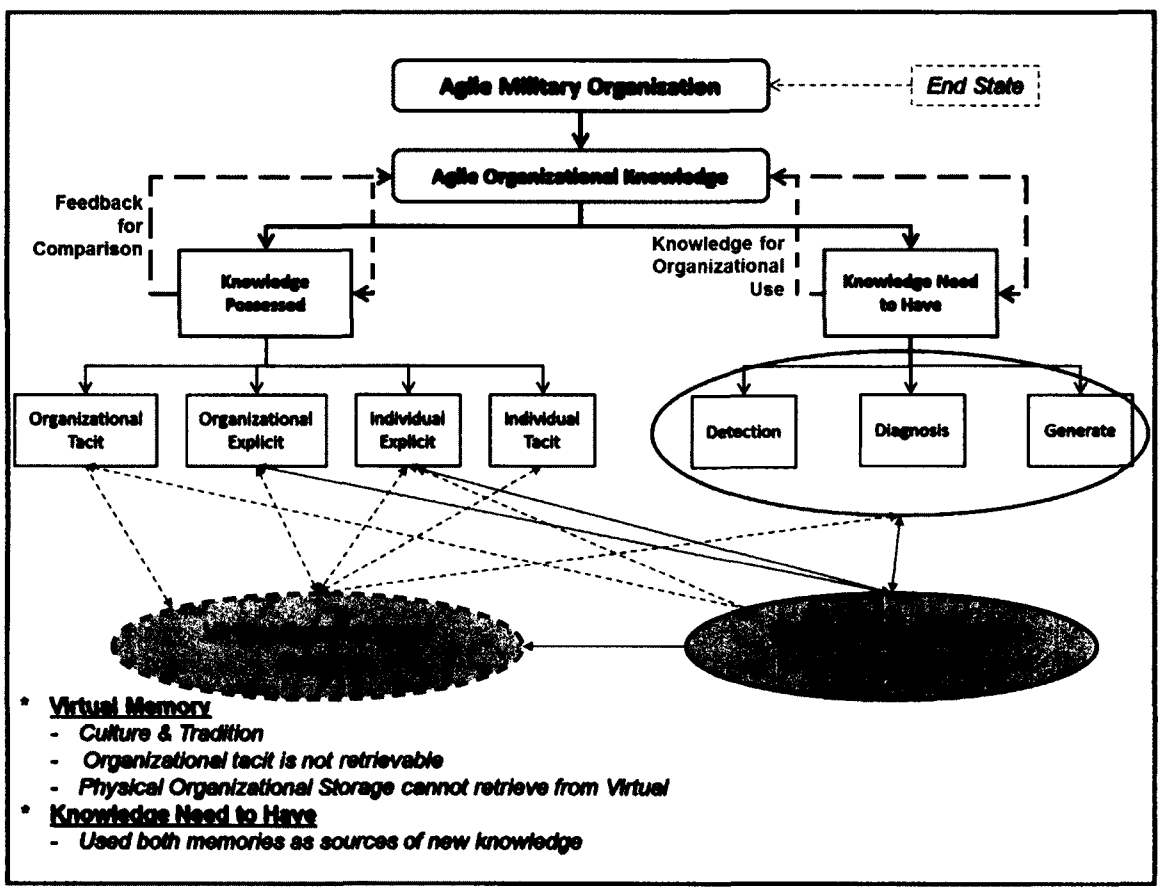

Figure 18. Knowledge Storage/Retrieval (Capture) Step

4.5.2.4 Knowledge Share/Transfer

This process needs available `knowledge highways` as Despres and Chauvel (1999) asserted, in order to have desired level of knowledge traffic in the organization as well as having good gateways for the external knowledge transfer (Figure 19).

It will be better to articulate this process into three parts in terms of the action of transferring the knowledge:

1. First one is *to transfer of the knowledge from a source (The Willingness of the Source for Knowledge Transfer)*: This is actually an essential step for knowledge transfer. Without having a source of the transfer it is not possible to have the transferring activity. For this part, it is required to have the willingness of the source to transfer his knowledge. For this we might both need to have better organizational means and cultural awareness where knowledge transfer is encouraged and knowledge hoarding is avoided.
2. The second one *is the transfer of the knowledge to the Receiver (The Openness/Willingness/Awareness of the Receiver for Knowledge Transfer)*: This is the other end of the requirement for a successful knowledge transfer to occur. Even if an organization would achieve an ideal level of willingness from the source of the knowledge, the transfer would not be realized unless the receiver accepts it. For that reason, the organization needs to use similar methods as used for the source of the knowledge, in order to realize a successful transfer, where the receiver is encouraged to be open and willing to receive knowledge as well as having the awareness of that he is the target of the knowledge transfer. The organization will need to establish better organizational means to facilitate the transfer process along with encouraging culture.
3. The transfer will need the *knowledge highways* to send knowledge from one source to another receiver in the organization. The highways will require high level of technology where the knowledge can be transferred as quick as possible. Constant change in the environment and the imperative of agility require such capability. The organization will also need to establish the appropriate knowledge transfer environment in order to facilitate the transfer.

The other core activity in this process (phase) is to share the knowledge. There is a slight difference between sharing and transferring the knowledge. `Share of knowledge` connotes dissemination of the knowledge of an entity to the whole organization. The idea is making the knowledge available to the whole organization. For that reason, it does not necessarily mean to aim at a target. It is rather making the knowledge disclosed and ready for anybody in the organization.

In this aspect the sharing of knowledge would have three aspects as well:

1. *Motivation of the Source to Make his/her Knowledge Available (willingness of the source):* The source of the knowledge in the organization needs to have the willingness to share the knowledge. The ability/capability is also needed to have the knowledge available for the use of organization. It is important for the organization to establish the required means for the willingness of the sources along with establishing an organizational culture to encourage the sources to share their knowledge. The organization also needs to establish the required environmental conditions for a better knowledge sharing in the organization.

2. *Willingness/Openness and Awareness of the Receivers for Acquiring the Available Knowledge:* All the entities (smaller organizations or the individuals) in the organization should have the willingness to acquire the available knowledge. They should be open (looking for the available) knowledge that they need and more importantly they should have the awareness that there is the availability of a knowledge in the organization that is needed. As stated above, the organization needs to establish the means to encourage its entities to wish to look for the knowledge they need. Additionally, the organization should also establish an organizational culture that the entities should be willing to get the knowledge in the organization that has been made available for their use. On top of it, the organization needs to make the environment available for knowledge sharing.

3. As stated for knowledge transferring, the organization will need to have *knowledge highways* to have the necessary knowledge in the organization shared among its entities.

Another aspect of the knowledge sharing/transferring relates to the technology, information technology and organizational innovations in order to realize knowledge transfer/share with the right knowledge, at the right time for the right entity (Landaeta, et al., 2009). That is actually the agility aspect of this process.

The military organizations allocate great amount of budget and resources for this process which it is called as Command-Control, C4ISR capabilities and NEC (Network Enabling Capabilities).

Note that the knowledge highways could be in any direction, towards any entity in any environment of the organizations. Any limitations to those highways would naturally limit the knowledge sharing/transfer process.

The military, especially multinational military organizations such as the COIN tasked military organizations in NATO experience a great deal of challenge in which the private sector organizations could hardly encounter or may have very rare occasions. The multinational military organizations would always be in debate between to share the knowledge to the most possible extent in the organization and with other organizations, or to obey the strict security restrictions of sharing and transferring the knowledge. Security measures would be the most limiting factor in the military organization that might be a challenge for the organization to share and transfer the knowledge.

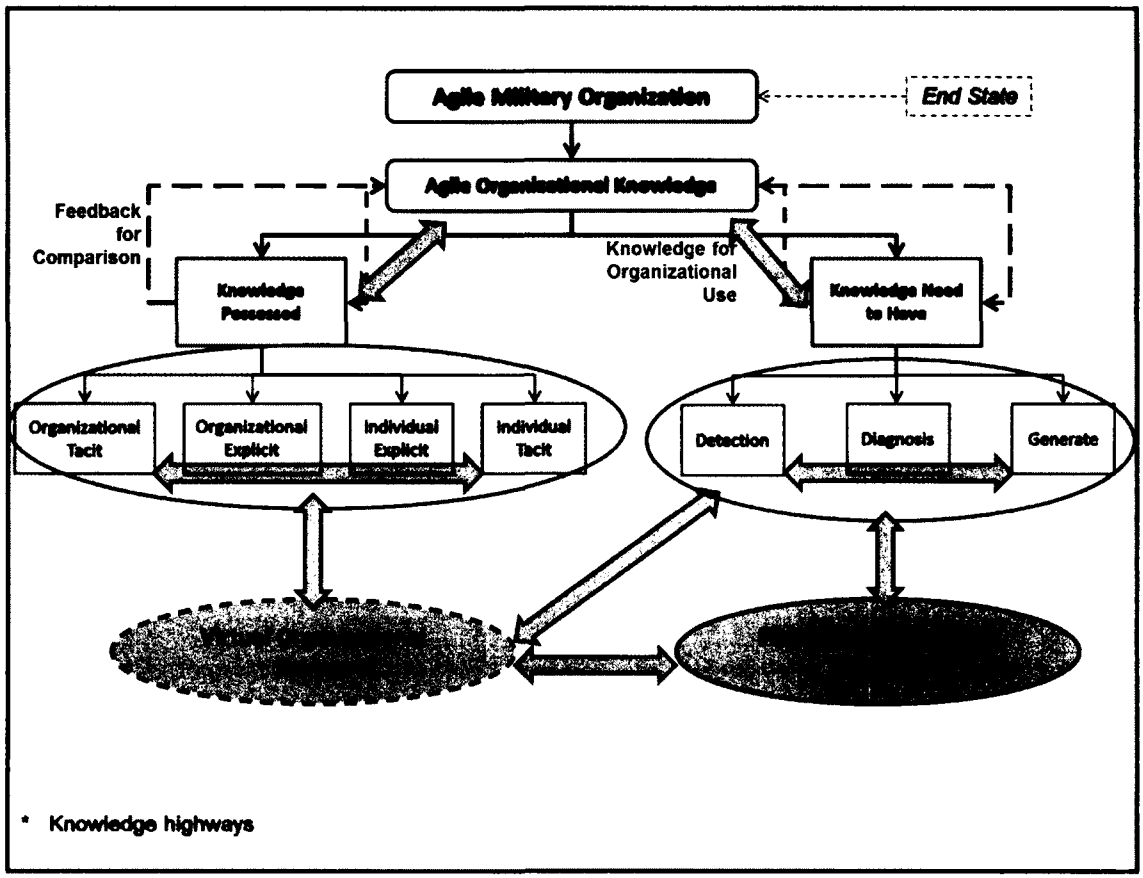

Figure 19. Knowledge Transfer and Share Step

4.5.2.5 Knowledge Application

In accordance with the extension of knowledge elaborated in this research, the knowledge has an actionable aspect. Although it could be the case for the civilian organizations, military organizations need to turn the knowledge into action at a certain point, or it may not be useful for the organization.

Pure knowledge which does not lead to any action in the organization can merely be an intellectual asset. But, that is not the primary goal of the AKM process, unless it will be used as an actionable knowledge in the future.

That is why, important aspect of the AKM is to transition the knowledge from the state of intellectual asset to the actionable knowledge. In reality there is not clear distinctive line between the intellectual aspect and the actionable aspect of the knowledge. The dashed line in Figure 20 is drawn for the sake of simplicity with the aim

of ease of understanding. It should be noted that, in the real life there would not be such distinction between the two aspects of the knowledge.

In addition to the classical KM perspective upon knowledge application in the literature, `application of the knowledge` connotes leveraging any form of the knowledge in or outside of the organization to an asset of the organization which intends to be agile. For that reason, the organization constantly questions the accuracy and punctuality of the knowledge in terms of creating/acquiring, storing, retrieving and sharing/transferring the knowledge (this part will be analysed in detail in the section about `Agility an Attribute`).

Appropriate application of the knowledge makes the knowledge a truly intellectual asset of the organization while responding to its agility requirements.

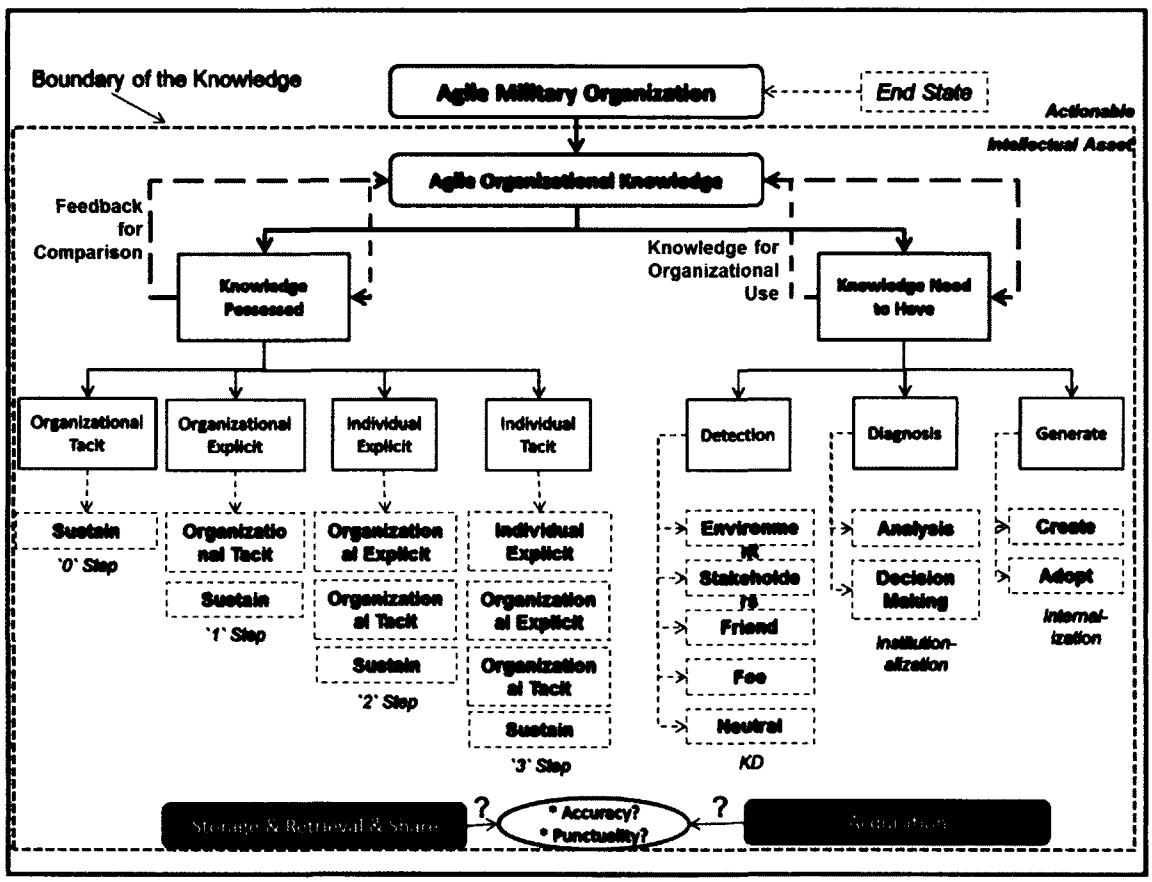

Figure 20. Knowledge Application Process

4.5.2.6 Adaptation

Normally, most of the KM theories would define the process until the previous step, where the ultimate point is to have the knowledge applied in the organization and become the truly asset of the organization. That is a good articulation of having KM process in the organization.

But the question for an organization is: `what is the end state?` Is it to have knowledge or to use it in the organization as needed? This research is clearly in favor of having the knowledge to use it as needed. That requires the actionable aspect of the knowledge. The key point here is to use the `agile organizational knowledge` within the organization wherever and whenever it is needed.

As it is clearly stated in the military documents the end state of the military organization is to do the right thing, at the right time with right power. Any mistake in any of those elements would prevent the organization to be agile as desired.

1. The organization need to use the right knowledge for a specific task. If the knowledge is not right, whatever the organization does in order to complete the task, it would never be the correct course of action, even if the task is done at the right time with the most effective power usage.
2. The knowledge could be right, and the organization might have used the most effective power for the completion of the task, but it is not finished by the desired deadline, then the mission is not accomplished, because it is already late.
3. The deadline could have been met, the knowledge would be perfectly correct, but if the mission is accomplished with excessive use of power, then it is again not a desired solution, since the organization could not reach to the end state with a cost-effective course of action.

What does the organization need for its any courses of action, tasks or missions in order to make them as an agile military organization? By consolidating the sources related to `agility`, based on the Literature Review studied in Chapter 2, agility can be accomplished with `adaptation` which comprises `learning` and `transformation` (this idea will be analysed in the `agility as an attribute` section in detail.)

Actually, two domains of the adaptation are assumed to be learning and knowledge in the literature (Alberts, 2011; Vandergiff, 2006). According to the view of

this research, they are not two different domains. They are rather interconnected, interrelated and nested. That is why this research asserts knowledge constitutes the basis of learning process (via AKM). Then learning provides the ability of adapting itself to the changing environment for the organization. So ideally, the learning starts with knowledge and leverages it to the new knowledge and/or to the new entities.

The other aspect of the adaptation would be `transformation` where the idea is to adapt the organization with organizational change. Learning may not be the only solution for adaptation of the organization to the change. If the organization does not have the structural fitness to cope with the change, then learning efforts will become redundant. The organization needs to investigate the ways of structurally coping with the change, and innovatively apply the solutions (Figure 21).

Both of those aspects should be endeavors of the organization at all times as long as the change exists in the environment. Neither of them should be used interchangeably. They should be considered as two supporting aspects of the right agility related course of action, rather than approaching them as alternatives to each other.

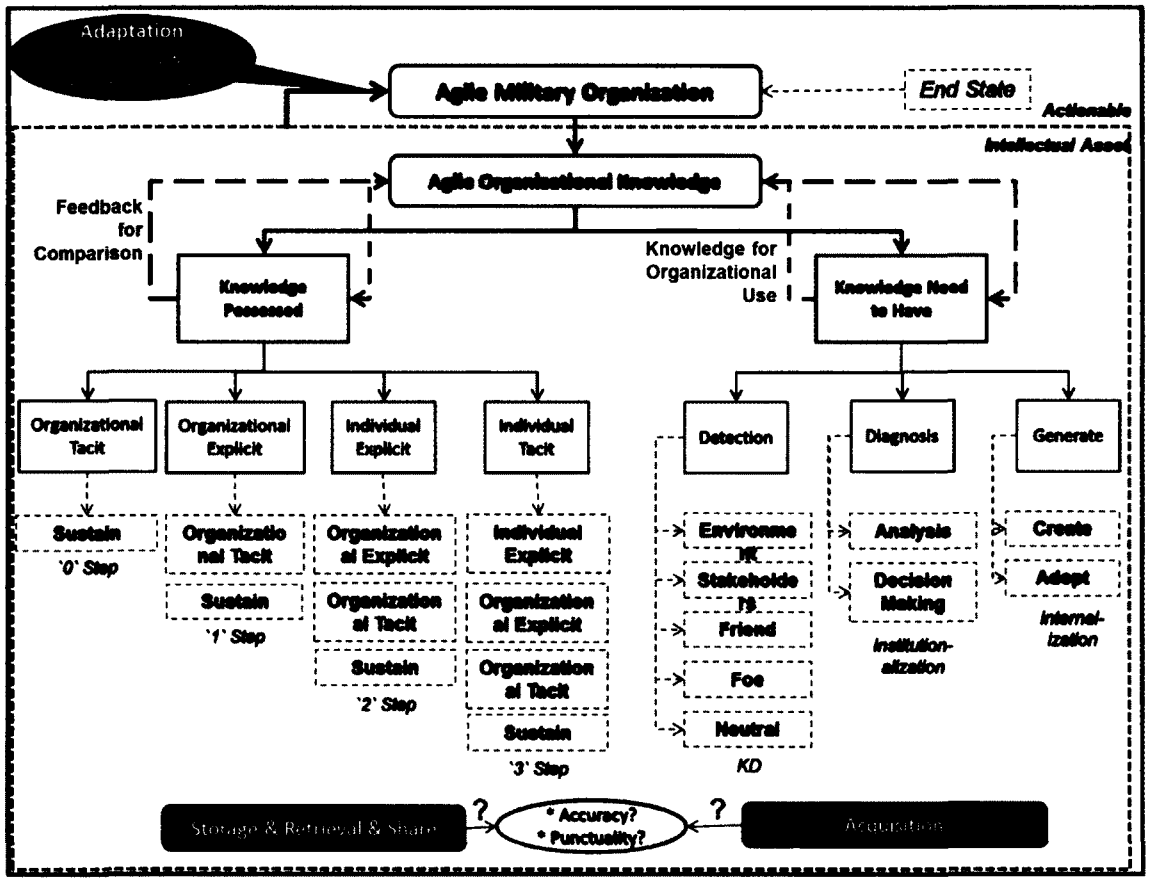

Figure 21. Knowledge Adaptation Step

4.6 Attributes of Agile Knowledge Management (AKM)

4.6.1 Generic

Normally, as it was discussed for the agility, measurement of AKM is also very challenging that needs to be studied in detail. Such detailed analyses promise good opportunities for the future studies. Similarly, the attributes of AKM process also open new research areas for future studies, where they will probably serve as the measurement tools for the AKM as well.

Having left the details to the future studies, this research only touches upon possible attributes of AKM concept and model where it was identified during the rigorous literature review period. Additional scrutinized studies might lead the future researches to eliminate some of those attributes as well as adding some additional ones. It is possible that this research might have overlooked possible overlaps or duplications

among some attributes. Or, it is also possible that this research was not able to identify some necessary attributes.

Nevertheless, this research only focuses on the agility attribute of the AKM Concept and Model. The term `agility as an attribute` is deliberately used differently from the previous usage of `agility as a requirement`. The meaning of `agility as a requirement` has been induced from various resources in the literature. But, on the other hand, the `agility as an attribute` is a natural consequence of the development of the AKM model and concept where it has emerged as a need to measure some aspects of this model process.

Based on the literature review and further investigations during the analysis period, different attributes with direct or indirect relationships with the AKM are identified (Figure 22).

Alberts (2011) and Atkinson and Maffot (2007) preferred to describe some of the following attributes as part of the agility:

1. Robustness (versatility): "Versatility permits the entity to achieve an acceptable level of performance or effectiveness in accomplishing the new or significantly ordered task or mission" (Alberts, 2011, p. 214).

2. Flexibility: "Flexibility provides an entity with more than one way of accomplishing a given task" (Alberts, 2011, p. 216).

3. Responsiveness: "Responsiveness is related to the time it takes to recognize and respond to a change or anticipated change in circumstances" (Alberts, 2011, p. 205).

4. Resilience (claimed to includes performance, efficiency and effectiveness): "Resilience provides an entity the ability to repair, replace, patch, or otherwise reconstitute lost capability of performance (and hence effectiveness)" (Alberts, 2011, p. 218). Effectiveness provides a measure of "how well" a system is performing usually in relation to a goal or a benchmark. In collaboration systems it generally addresses the value and accessibility of the content of a system. In most cases only the users of the system can ultimately determine or estimate its effectiveness (AR 25-1, 2005).

5. Adaptability / Adaptiveness: "Adaptability permits an entity to change itself that is to change its organization, processes and/or structure to become better suited for the challenge" (Alberts, 2011, p. 218).

6. Innovativeness (includes productivity): "Innovativeness permits the entity to generate or develop a new tactic or way of accomplishing something a discovery of invention" (Alberts, 2011, p. 218). In Nonaka's (1991) famous study of `knowledge creating company`, the position of a company being about ideas as it is about the ideals, fuels innovation. In his opinion, the essence of innovation is to re-create the world according to a particular vision or ideal.

7. Agility: Agility is generally defined in terms of embracing and responding to change (Conboy & Fitzgerald 2004; Erickson, et al. 2005; Henderson-Sellers & Serour 2005; Highsmith 2004; Larman 2004; Qumer & Henderson-Sellers 2008). "Agility is the capability to successfully cope with changes in circumstances" (Alberts, 2011 p. 66).

8. Interoperability: NATO defines `Interoperability` as "the ability to act together coherently, effectively and efficiently, to achieve Allied tactical, operational and strategic objectives" (NATO Handbook, 2006, p.88). Interoperability has three main dimensions, technical (e.g. hardware systems), procedural (e.g. doctrine, procedures), and human (e.g. language, terminology, training). In many cases weaknesses in one dimension can be mitigated by strengths of the others.

9. ACAP (Absorptive Capacity): Cohen and Levinthal (1990) have offered the most widely cited definition of ACAP, viewing it as the ability of valuing, assimilating, and applying new knowledge. Zahra and George (2002) later extended this definition, as a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability. There is an agreement that ACAP is a multidimensional construct involving the ability to value, assimilate and apply knowledge (Zahra & George, 2002).

In addition to those nine attributes, `Performance, Success, Competitiveness and Superiority` can also be mentioned in those attributes.

Measurement capabilities of the attributes (as discussed some of which could be sub-attributes) can be realized by correlating them with components designated previously based on the systems approach.

4.6.2 Possible Taxonomy (Cap Attributes and Sub-Attributes)

There remains another area of discussion with respect to the attributes that all of those attributes are naturally interconnected and interrelated where some might have reflections over the others.

Additionally, the attributes itemized in Figure 22 can also be categorized into some cap-attributes and sub-attributes. Where some attributes like agility, interoperability seem to have cap-attribute indicators. But, this can be a subject of further researches.

With a similar perspective, agility is considered as an umbrella or composite of six different properties (Alberts, 2011). He, prefers to call these properties as the components of agility (Alberts, 2011).

But such prepositions will need to be analyzed in the future studies. As mentioned before, this study will only focus on the attribute of `agility`.

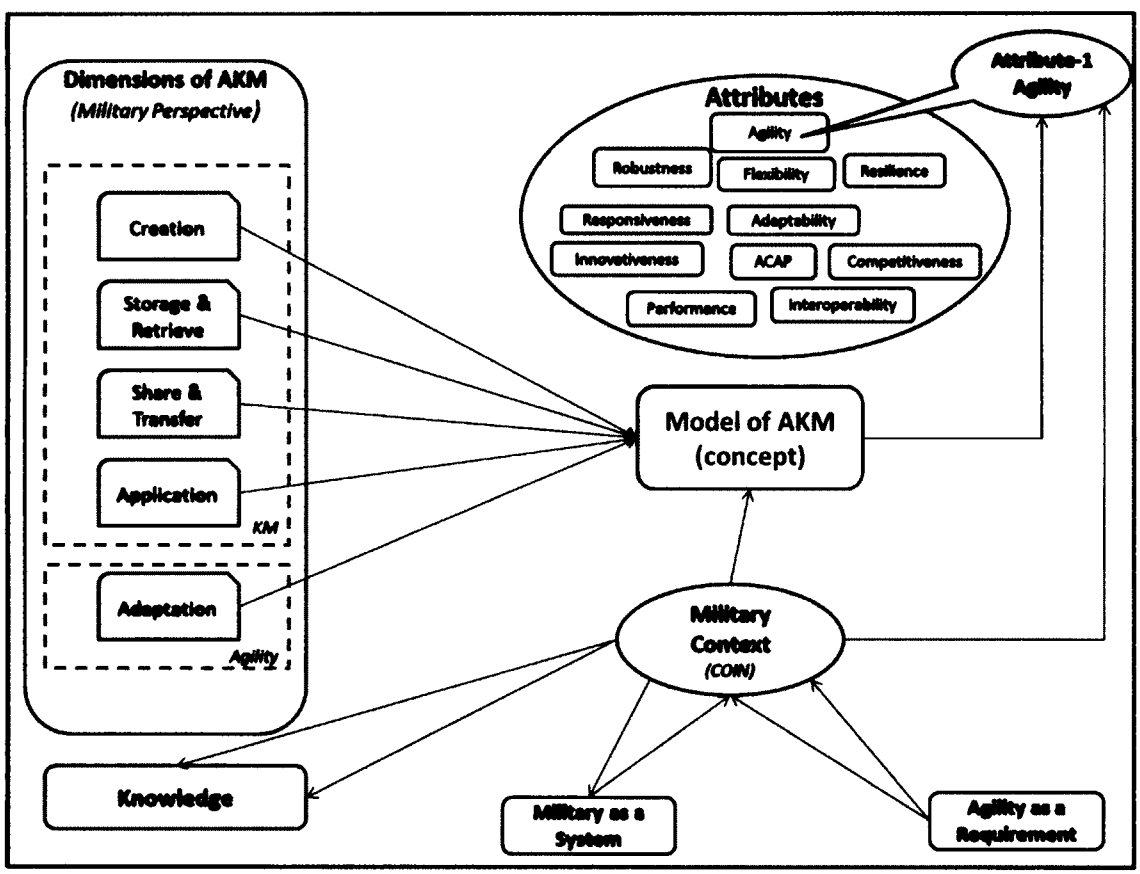

Figure 22. Attributes of the Model of AKM

4.6.3 Special Focus on Agility (as an Attribute)

4.6.3.1 Observing and Measuring Agility

Organizations should measure what matters for their benefits. Measuring something just for the sake of measuring and noting it down is fruitless and a waste of time. It is important that measures and metrics should be developed and collected for the purpose of continuous improvement of agility (American Productivity and Quality Center [APQC], 2003).

To observe and measure the agility depends on the perceptions, the interests and purposes of the organizations. A radical change in the markets may require a substantial change for a commercial company, while the same change might require very little or even nothing to take as courses of actions for a military organization.

Nevertheless, depending on the circumstances with respect to the context of the subject matter system/organization to observe and to measure the agility is one of the biggest challenging pieces of achieving the agility as well.

The agility of the organizations and systems can mostly be observed with rigorous attention on the symptoms of the agility. It is rather hard to observe the agility itself as a whole and hence to measure it is also very hard.

Bose (2004) denotes those symptoms as indicators and lists of measurable indicators such as patents pending, training expenses and investment in information technology.

Another tool of measuring agility could be to measure its maturity. Minonne and Turner (2009) assert that agility's degree of progression can be explained via a two-dimensional model in which the level of implementation is dependent, and the information provided by the control system independent. In essence, successful agile actions/organizations should be measured by assessing the level of maturity in implementing the agility strategy very similar to the use of KM (Johnson, 2010).

One method is to collect stories that explain metrics. For example – telling a story of how agility improved organizational efficiency by explaining how metrics were developed, collected and analysed is extremely valuable. After data is collected, it is important to post the results and analyse them. When we can show leaders and employees

that agility initiatives produced results, this will result in greater buy-in to using those initiatives (Hoss & Schlussel, 2009).

Some other metrics such as 'cost', 'schedule', 'performance' or 'customer satisfaction' have also been discussed among the scholars as well.

Alberts (2011) categorizes the `agility` into two groups, either `manifest agility` or `potential agility`.

1. Manifest Agility measures how well an entity has responded to a change in circumstances. Manifest agility is a relative measure where it compare the `as is scenario` with `might have been scenario`. This type of measuring can be denoted as the `past performance` of an organization in terms agility.
2. Potential Agility is an estimate of how well an entity will respond to some future unspecified change in circumstances. Potential agility is also a relative measure that is used to compare the agility of readiness of the entities or the relative impact on an entity's potential agility of alternate approaches, policies, processes, or investment options. This type of measuring can be denoted as the `level of agility an organization promises for the future changes and challenges`.

In the struggle of measuring the agility, it might be rather easy to denote the lack of agility than describing the agility in real life. Because, the failures of the organization/systems can describe the reasons and that might lead us to the lack of agility.

In real life, the organizations and the systems even the individuals might be performing very good examples of agility. But, day to day achievements pertaining to agility do not attract the attentions. Failures along with their consequences are more noticeable.

Measurement of agility needs to be accounted for both the amount of variety and the levels of effectiveness that is maintained (Alberts, 2011).

Referring to the basics of the operational definition in this research provides generic understanding about what is needed to be agile for an organization.

The basic underlying pillars of the definition are:

1. *The Change:* Any organization aiming to be agile needs to have the ability of detecting, sensing or recognizing the change in its environment including

possible stakeholders. This change also includes the direction of the change and more importantly the frequency/rate of the change. Naturally the requirements will be identified based on this change understanding.

2. *The Adaptation:* While the detection of the change is a prerequisite for recognition of agility. Adaptation is the latter requisite which enables realizing the agility. The organization needs to analyse the change detected and then embrace it. Afterwards the organization should take necessary courses of actions in order to adapt to the change. Additionally this adaptation process should be faster than the rate of the change.

For that reason, relevant variables of agility can be denoted as `time` and the `accuracy`:

1. *Time:* It should be defined in terms of the rate of the change (mathematically this can be denoted as `Δ State of Environment`). Time Pressure is simply the time required relative to the time available. If one has available time, then it could be manageable, but even simple decisions could be quite challenging when the time is very limited. Time constraint needs to be carefully considered (Alberts, 2011).

2. *Accuracy:* Accuracy comprises to recognize the change correctly, then develop and apply correct knowledge and finally adapt to the change as the whole organization correctly.

Figure 23 depicts the basic difference between KM and AKM in terms agility with respect to the `accuracy` and `time` variables.

- *Knowledge is provided on time, but it is not accurate:* It is not acceptable for neither KM nor AKM.
- *Knowledge is provided late, and it is not accurate:* It is not acceptable for neither KM nor AKM.
- *Knowledge is provided late, but it is accurate:* It is partially acceptable for KM but not acceptable for AKM.
- *Knowledge is provided on time, and it is accurate:* It is accepted for both KM and AKM.

As it is depicted in the Figure 23, while an accurate but late KM process can be partially (or in some cases mostly) acceptable, for the rapidly and constantly changing environment a 100% accurate but late AKM process is unacceptable. Due to rapid change of the environment, the circumstances change rapidly and the adapted knowledge would not be applicable anymore then.

For that reason, while the multidiscipline of KM promises very valuable means of solving the adaptation, transformation and learning requirements of an organization, it additionally requires an additional dimension of agility in order to cope with the change.

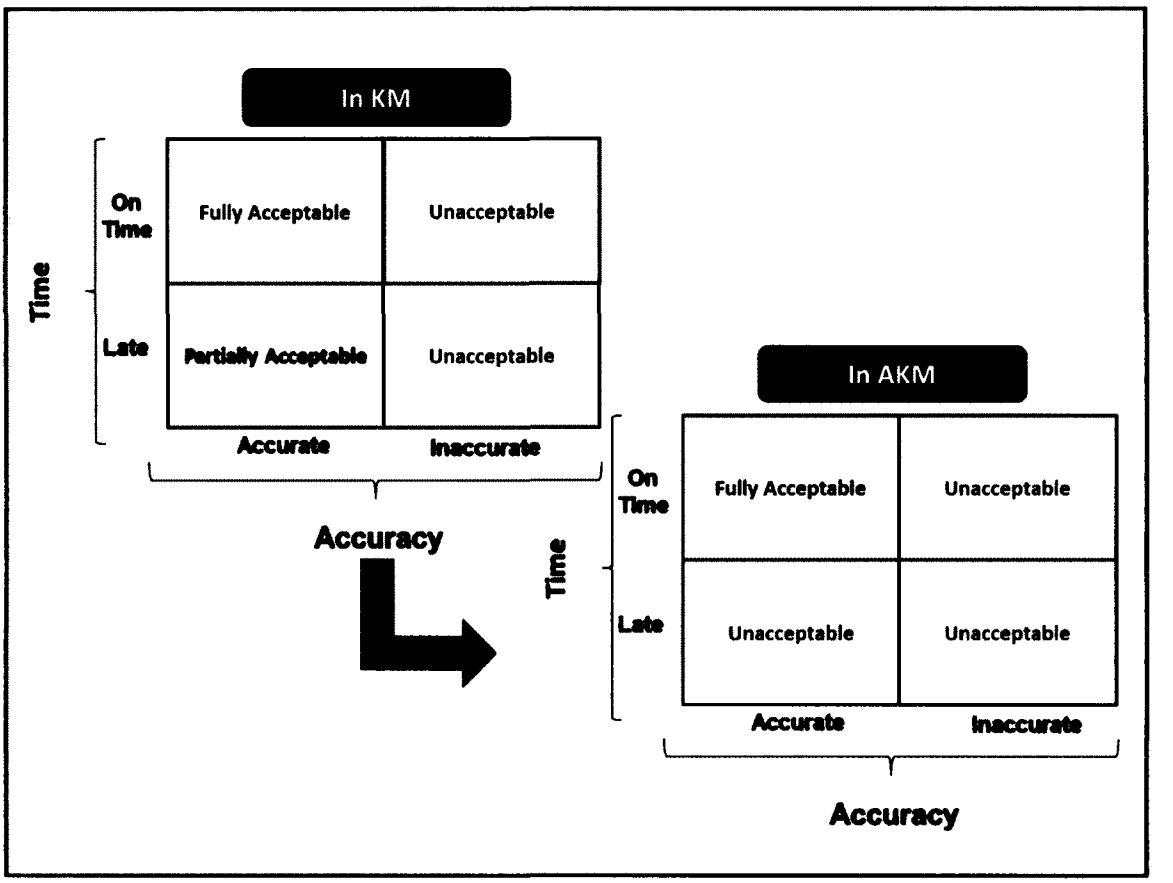

Figure 23. Agility and AKM Variables

An organization dwelling in the changing environment, will constantly ask the following questions:

- How can the `time` that it takes to develop/acquire the new organizationally needed `Knowledge` be reduced?
- Is this AKM process fast enough to cope with the change, or is the `change` faster than the organization's responsiveness.

Proper application of AKM for such an organization articulates those organizational questions as follows (Figure 24):

- *How fast does the organization need the new Knowledge?*

  The driving factor for the need of new Knowledge is actually the need of the organization. Based on organization's time wise and extent wise requirements, the AKM should optimize the knowledge acquisition/generation.

- *How fast can the organization provide it?*

  Having recognized the knowledge requirements of the organization, next step is to determine whether the organization has the capabilities to acquire or generate this new Knowledge. If the organization would not be able acquire/generate the knowledge fast enough then the organization will need additional capabilities.

- *How fast can the organization master its application?*

  Although acquisition/generation of knowledge is very important, it will not be enough until it is applied in the organization. For that reason, next thing is to master the application of the new Knowledge. Mastering knowledge will require taking into consideration different factors, such as psychological, biological, organizational and technological facts.

- *How fast can the organization adapt the new Knowledge?*

  As discussed in detail during description of the AKM Process, next thing is the adaptation of the organization with this newly applied knowledge. Ultimately, the new Knowledge should be transformed into an organizational action.

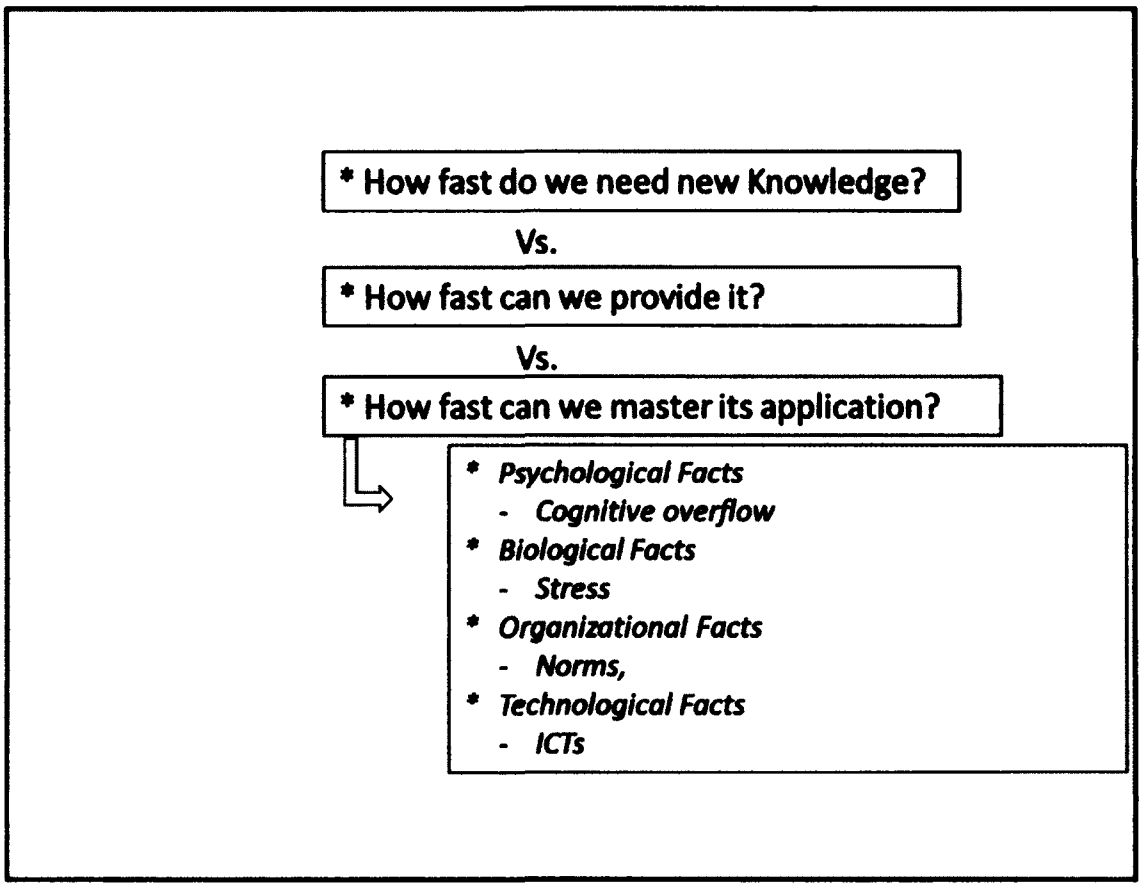

Figure 24. Agility and Knowledge

AKM is actually is a continuous endeavor of observing the knowledge over the time. The organization should constantly trace the knowledge gap. As shown in Figure 25, the Knowledge Gap (ΔK) is the difference between the Knowledge Needed Today (K1) and the Knowledge Needed Yesterday (K0). But in a very short time, new Knowledge Gap (ΔK) will be the difference between the Knowledge will be needed in the future (K2) and the Knowledge needed Today (K1). It is obvious that the organizations those have the capability of recognizing and then acquiring the knowledge of the future will be more competitive (superior).

As the Knowledge Gap (ΔK) changes, the change over time (ΔChange) moves ahead on the timeline as well.

Conceptually, AKM will operate to observe both of these phenomena over time:

- *Observe the Knowledge Gap:* How big is the gap? What is the breadth and depth of this gap?
- *Observe the Change over Time:* How fast is it? What is the length (duration) of it? And what is the rate of the change? The rate and length of the change can also be identified as the frequency (*f*) of the change as well.

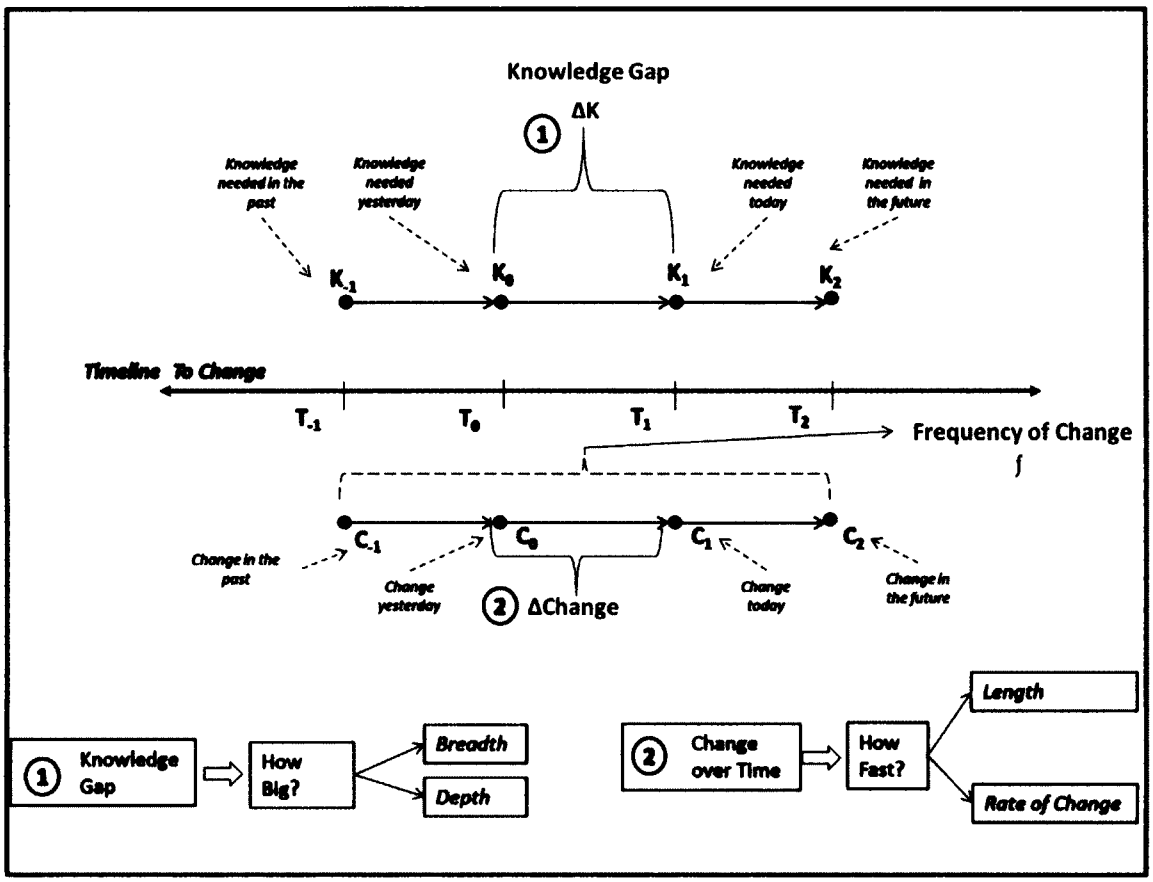

Figure 25. Agility and Knowledge Gap (I)

The extent of the knowledge gap and subsequent actions are also important responsibilities of the AKM Process. For that the AKM process in the organization will (Figure 26):

- *Recognize the Change and Knowledge Gap thoroughly* (the goal at this stage is to perform this recognition process fast enough and accurately).
- *Fill the Gap effectively and efficiently* (the goal is to acquire the knowledge fast and accurately to fill the gap. Meanwhile the AKM process will also investigate the need of the knowledge whether it already exists inside/outside the organization or not. If it exists then it will need to be transferred/acquired, if it is not then it needs to be created/generated).

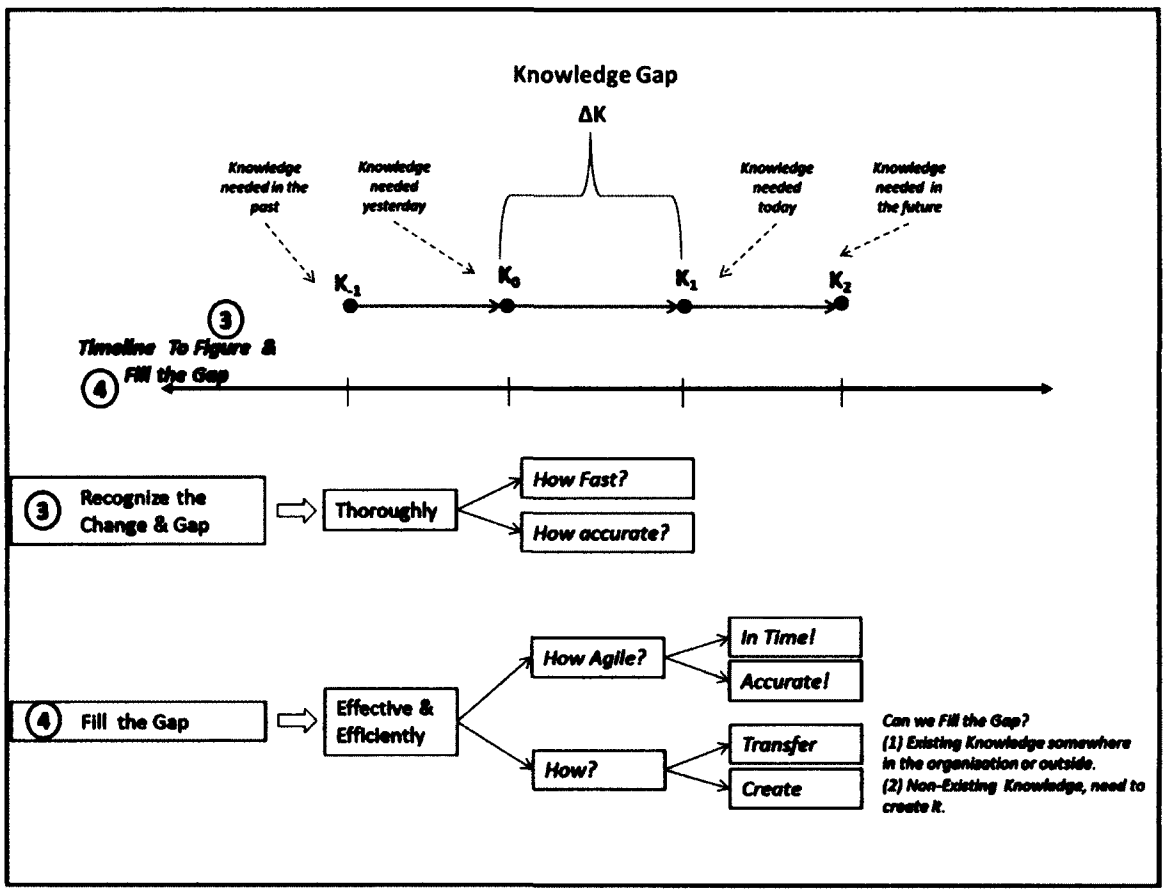

Figure 26. Agility and Knowledge Gap (II)

Actually, the whole process is a race with time. The organization tries to manage this race over the `timeline of change`. Knowledge Gap (ΔK) vs. Time Difference (ΔT) is compared at all time.

As shown in Figure 27, AKM process compares:

- The speed of change over time (ΔI)

with

- The speed of recognizing the change and knowledge gap (ΔII)
- The speed of filling the gap (ΔIII)
- The speed of adapting the new knowledge (ΔIV)

The goal is to have the total time of AKM process (ΔII + ΔIII + ΔIV) less than the speed of the change (ΔI), in order to be responsive to the change.

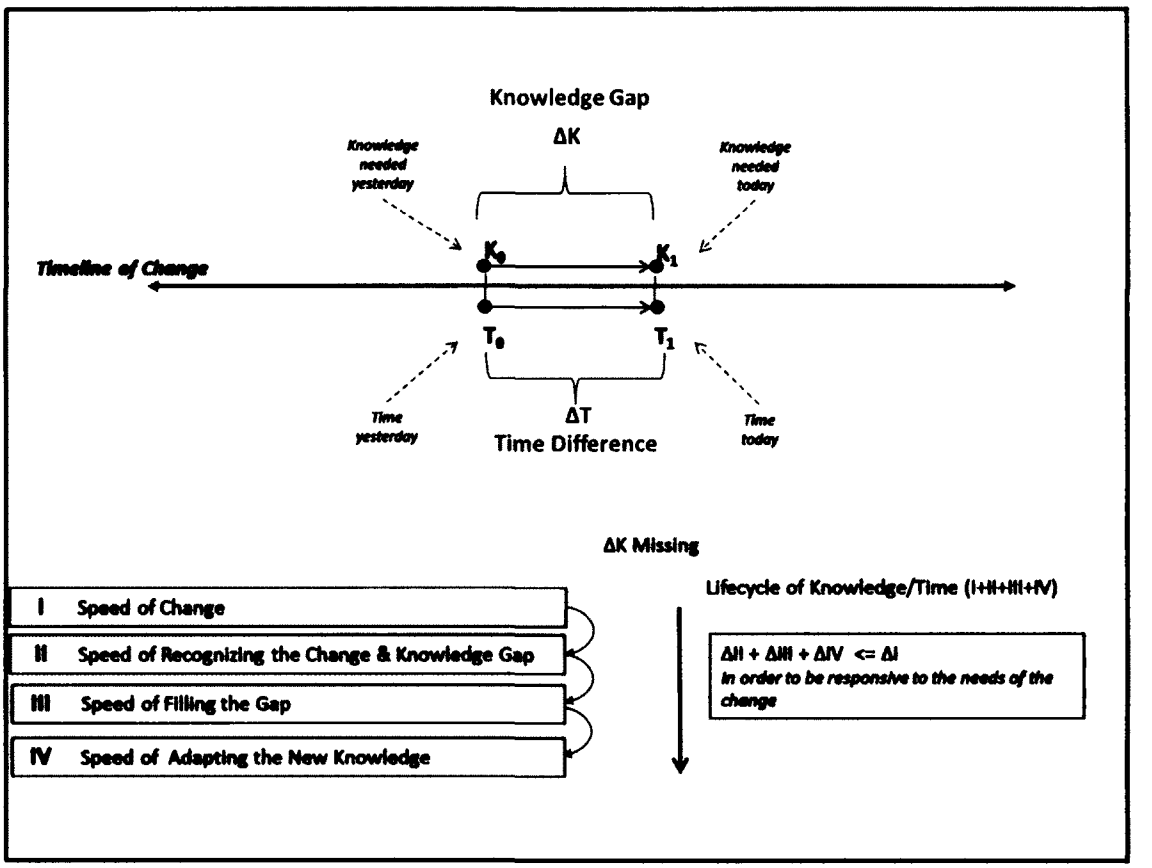

Figure 27. Agility and Lifecycle of Knowledge

The need of an effective AKM can be recognized in the dynamic environment. Figure 28 shows that a `stable environment` does not really experience constantly

changing Knowledge Need. It rather has a stable (predictable) knowledge needs. Hence stable environment does not really need to worry about the timeline.

However a `dynamic environment` is subject to change over the time. This consequently affects the Knowledge Needed. The knowledge needs are not predictable anymore. It changes based on the change intervals of the environment. More importantly, the intervals of the change over time become the major constraint for the responsiveness of the organization. Shorter timeline of change requires more agility.

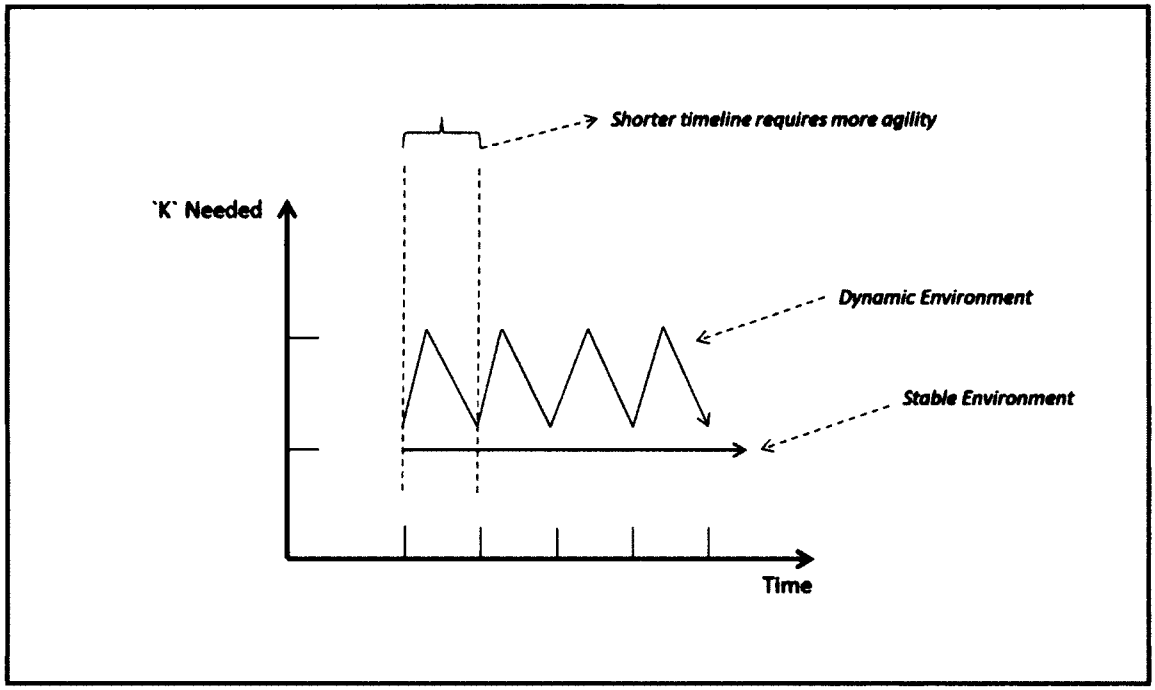

Figure 28. Knowledge Needed versus Time

4.6.3.2 Examples of Agility

Since this research essentially focused on the military organizations, two of the examples are gathered from the military environment, while the first example is used from the civilian market in order to provide better understanding.

Example 1: KFC Selling Fish Instead of Chicken

The Avian flu affects birds such as chickens and ducks. During the outbreak of the Avian flu in Asia in 2004, KFC (Kentucky Fried Chicken) known the world over for its vintage chicken recipes had tough times to sell the chicken products. Actually dropping the reference to `Chicken` in KFC would have helped tremendously during these tough times. The company in Asia quickly adapted to selling fish in Vietnam and a few other countries.

As a result KFC did close most chains in Vietnam to create a fish menu. KFC, whose parent company Yum Brands Inc. owns 12,500 KFC chains in Asia, said the recent outbreak of Avian flu did not hurt sales. Stocks were expected to still hit the 43 cents a share average as analysts predict (Matthew,2006).

This short example reveals two important aspects of the agility:

The change: Actually for a commercial company, this was a substantial change in the market (environment) that the disease essentially affects chickens. That should have had a huge effect on the company.

Adaptation: On the other, apparently the company performed a very fast track of a KM process so that it effectively and efficiently turned into an action. They might have had detected the problem right away, went through a very fast decision process then performed clear and fast execution. After a short while the company changed its main recipe from chicken to fish. That is a very good example of agile adaptation for such a huge company.

Example 2: The Special Forces Operations and Death of Osama Bin Laden

The evidence that bin Laden was hiding in a compound in Pakistan was largely circumstantial and he had not been seen. President Obama authorized a risky operation, scheduled for a time of little moonlight, so US helicopters could enter into Pakistan low to the ground and undetected. In April, the Navy Seals ran two practice runs at the replica compound they built in the United States to practice the raid. The operation was authorized Friday morning and was originally planned for Saturday night, but on Friday, for weather reasons, it was pushed to Sunday. The US National Security Team gathered in the White House Situation Room to monitor the progress of Operation Neptune Spear.

Four helicopters swooped in to the compound and the Navy Seals fought a close quarters' gun battle. According to the mission plan, the first helicopter would hover over the compound's yard while its full team of SEALs fast-roped to the ground. At the same time, the second helicopter would fly to the northeast corner of the compound and deploy the translator, the dog, and four SEALs to secure the perimeter. The second helicopter would then hover over the house and the team leader and six SEALs would fast-rope onto the roof. The team in the courtyard was to enter the house from the ground floor. As they hovered above the target, however, the first helicopter experienced a hazardous airflow condition known as a vortex ring state. This was aggravated by higher than expected air temperature ("a so-called 'hot and high' environment" and the high compound walls, which stopped the rotor downwash from diffusing. The helicopter's tail grazed one of the compound's walls, damaging its tail rotor, and the helicopter rolled onto its side. The pilot quickly buried the aircraft's nose to keep it from tipping over. None of the SEALs, crew and pilots on the helicopter were seriously injured in the soft crash landing, which ended with it pitched at a forty-five-degree angle resting against the wall. The other helicopter then landed outside the compound and the SEALs scaled the walls to get inside. The SEALs advanced into the house, breaching walls and doors with explosives.

When the gunfire stopped, the SEALS quickly moved to determine his identity. Two of the women at the compound identified him and the military flew bin Laden's body to Jalalabad, Afghanistan to have his DNA tested for positive identification. SEALS measured the corpse and determined it to be over 6-feet-4. They then transmitted photographs back to CIA headquarters and agency analysts conducted facial recognition analysis. Their report concluded it was a 90 to 95 percent match. Bin Laden's DNA was matched with at least two of his relatives, including one of his sisters who died in Boston and whose brain was kept by the United States. The result came back as a 99.9 percent match (Death of Osama Bin Laden, 2011)

This specific incident reveals us some good examples about KM and AKM:

Best practices related to KM:

1. The US Government and the military conducted a very good sequence of gathering information and turning it into valuable intelligence.

2. The US Government, the military and specifically the Special Operations Forces made a very rigor and detailed plan that they took into account every possible environmental factor in their planning.

3. The Special Operation Forces conducted training with the exact replica of the compound of the terrorists.

Best practices related to AKM:

1. Fast evaluation of the intelligence and acting rapidly enough (faster than the change of the environment) reveals that the US Military was agile enough that the intelligence was not obsolete when the operation was executed.

2. The training method of the Special Operations Forces was good indication of agile adaptation with training that the Special Operations Forces performed their training activities in very short time with a very efficient way.

3. When the circumstances have changed the US Government Authorities (Civilian and Military) quickly changed their plans of operation. That shows the decision flexibility of the highest level authorities.

4. The operation was followed by the US National Security Team (including the President) in the White House with real time monitoring. This reveals that the US Government made best use of the technology to be agile as needed.

5. While the helicopters were landing in the operations area, unexpected happened and a helicopter could not land in the compound as planned. The pilots of the helicopters and the Special Operations Units quickly modified the plan and executed the operations successfully. This shows very high level of training and education of the individuals and the units. Additionally, it is also a good indication of fast decision making process of the individuals (pilots) and small units (Special Operations Unit) and execution of the mission.

6. Another unique event in terms of agility occurred in the aftermath of the operation. The special operations unit had to decide whether the deceased terrorist was Osama Bin Laden or not. They did not have much time, and they needed a very practical way of deciding about it. They have asked the two women to verify the dead man, additionally a Special Operations Soldier who is about the similar height of Osama Bin Laden laid next to the deceased and

compared their heights. That is also an agile method of solving a sudden and apparently unplanned problem.

Example-3: Counter Insurgency (COIN) Example

Marine Corps and Army Officers were engaged in writing the Small-Unit-Operations Guide about COIN in late March of 2007. This was meant to be ne field manual, designed to give junior commanders a set of tactics, techniques, and procedures for COIN. Scott Cuomo a Marine Corps Captain was one of those small group of officers to develop this doctrine.

Scott graduated from Naval Academy in 2001 and like his whole generation of the Army and Marine Corps, he was thrown straight into the war, commanding an infantry platoon in Iraq from the end of 2002 until 2005. He was struggling to develop and trying to find practical advice at company level in this doctrine. The fact is at this time, more than four years into the war in Afghanistan and three years in Iraq, tactical commanders like Scott were already much more experienced in the realities of counterinsurgency warfare that most senior officers, or academic counterinsurgency experts. The junior commanders had fought through that first, chaotic period in Iraq and Afghanistan, living through the difficult time in 2003-4 when field operators realized clearly that they were in a COIN fight, but for political reasons (a desire not to legitimize the enemy) and though institutional inertia, the Defense Department refused to recognize this.

Many junior officers realized early that the way they had been trained to fight was not going to work in this environment, and that their institutions and older generation of leaders did not have the answers they needed. So they had begun –on their own initiative-looking past doctrine and experience of COIN to fill the gap. But to these field operators, many of the prescriptions laid out in the classical COIN literature, or in interim doctrinal publications such as October 2004 interim field manual COIN Operations seemed unrealistic, outdated or had to apply in places like Fallujah, Ramadi or Bermel Valley.

Senior officers-everybody from the rank of Major upward at this time- had grown up on diet of Cold War exercises with a focus on `conventional` (ie. State on state, force on force) warfare against the Soviets, leavened by the extremely brief and successful hundred-hour ground campaign during the first Gulf War of 1990-1991. Some had

gained extremely valuable experience in peace operations in Somalia, the Balkans, East Timor, Liberia, and Sierra Leone during the 1990s.

As Dr. Janine Davidson shows her in definitive study of military organizational learning in 1990s, Lifting the Fog of Peace: How Americans Learned to Fight Modern War, commanders applied this knowledge to their new environment in Iraq and Afghanistan with excellent effect in some cases. But as she convincingly demonstrates, these were ad hoc adaptations, supported –indeed, sometimes actively undermined- by existing institutions and senior officials, and applied in a patchy, inconsistent manner that was largely determined by the outlook and experience of individual commander and units.

But the military as an institution had also learned how to learn, and this turned out to be critically important. The Army had established training facilities like the National Training Center and the Joint Readiness Training Centers where units were tested in dynamic, unforgiving two-sided exercises, and had created processes like the Lessons Learned system and the After-Action Review, which encouraged radically honest criticism and self-criticism. As the Fog of Peace shows, even before the outbreak of war in Afghanistan and Iraq, this had done a huge amount to give Soldiers and Marines the tools to learn from their experiences and adapt quickly when the time came.

In COIN success depends on adaptability in the face of rapidly evolving insurgent threat and a changing environment. Armies that successfully `read` this environment and adapt –using tools like field manuals-are more apt to succeed. (Kilcullen, 2010, p.18-19)

The example above illustrates a good example of `what to do`s and `what not to do`s about adapting to the change of the threat and the environment.

The best practices of this example in terms of AKM are:

1. The junior officers read the environment well and developed their own working process in order to cope with the changing threat.
2. Some officers made use of their past experiences by adapting them in the new environment. They have also taught their experiences to their subordinates as well.
3. The Army and Marine Corps have realized the need for more updated doctrine with more delineation in the tactical level.

4. In various levels, the Marines and the Army have realized the importance of rapid learning and applying them into the real life, so that they have developed new ways of training techniques to get ready for the COIN environment.

5. In the small units, they used flexible organizational structure in order to adapt quickly.

6. The units made use of lessons learned and best practices.

To mistakes in this example in terms of AKM are:

1. Senior officers ignored the change and resisted to the change.

2. The hierarchical structure made it hard to be flexible.

3. Senior officers tend to apply the same tactics as they have used in a different environment.

The reason why we have exemplified the above mentioned incident is to show that COIN environment requires AKM more than any other military environment due its very fast changing nature, highly adaptive threat, involvement of many actors and the ambiguity in the environment.

4.7 Assessment of the Theory and Hypothesized Model

As outlined in Chapter 3 and explained in the beginning of this Chapter, this research inductively developed the Model and Concept of AKM (theory) based on the literature (with some inputs from personal reviews). This research preferred to use pre-identified factors based on the rigorous literature research, rather than identifying the variables with case-by-case inductive analysis.

Afterwards the model is deductively examined (Majewska-Button, 2010) in accordance with the cannons of science as explained below in this section (Table 17). The examination process provided the theory to comply with the scientific fitness as well as improving the theory by reiterating the Concept of the AKM based on the inputs and anomalies identified.

The `canons of science` is used to ensure the scientific quality of this research with some universally accepted criteria as detailed in Chapter 3 and as outlined in Table 17.

The threats to the internal and external validity of the study were carefully considered in this research. In order to impartially comply with the canons of science, this study employed couple qualitative interview methods. These were, `focus group (mini)`,`outside expert review`, `panel of experts` and `personal interviews`. Additional validation techniques of `peer review` and `member check` have also been used in the analyses.

Peer Reviews and Member Checks were performed with one graduate student (student of Ph.D. studies KM) and a graduate student (who has a master's degree in Systems Engineering) in the role of consultants. They have also been asked to read through the transcripts and comment on them.

The interviews are conducted in accordance with the areas those are analyzed in this research:

- *Military Context:* Personal reviews and Panel of Experts are used.
- *Knowledge, KM and AKM:* Personal reviews, Panel of Experts and a Focus Group are used.
- *Agility:* Outside Expert Review, Panel of Experts and Personal Interviews are used.

The scopes and purposes of the interviews are summarized below, where the details of the interviews and their analyses can be found in Appendices B, C, D and E.

4.7.1 Outside Expert Review

Scope of the Expert Review

This review was used for the `agility` aspects of the research, where the studies were related and proposing solutions to agility as well as using various sources in the literature about agility. The `expert review` was conducted as a one-time feedback loop (Adams, 2007), after development of `literature-based inductive theory` in the research. The expert used in this research is a researcher who is outside of this research and Old Dominion University in order to keep his impartially. He has Ph.D. degree and numerous academic publications along with published books. His special area of expertise is `agility`. His two books are about agility. Additionally, he has good level of understanding about military context and NATO with regard to his expertise area due to

his collaborative studies with them. The expert provided his review based on his training, education, experience and personal expertise (Adams, 2007) about `agility` and its roles in the multinational/national military context.

Role and Purpose of the Expert Review

During the inductive development of the `AKM model` and the concepts related to it, the observed and collected facts serve as the empirical data. According to Sutherland (1973) the validity of the research primarily depends on the quality of the database from which the inductive inferences were derived. The observation and collection of empirical data have direct effect on the validity (Adams, 2007) of the inductively developed concepts of AKM model and its attributes. The use of an expert within the scope as explained above intended to decrease the research risk of deviating the research with possible biases of the researcher, as well as ensuring the adequacy of the information gathered by the researcher that it provides good foundation for the researcher's literature-based induction.

4.7.2 Panels of Experts

Scope of the Panels of Experts Reviews

Three different panels of experts conducted for this research. Each of them aimed to validate and verify different aspects of the research.

- *Panel of Experts Review for `KM/AKM`:* This review was used for AKM concept and model (which is actually core of the study) of the research.
- *Panel of Experts Review for `Generic Understanding of the Research in the NATO Environment`:* This review was used in order to get generic insights of the participants based on their experience and broader perspectives.
- *Panel of Experts Review for `Agility`:* This review was used for the `agility` aspects of the research, where the studies are related and proposing solutions to agility as well as using various sources in the literature about agility.

The `panel reviews` were conducted as a one-time feedback loop (Adams, 2007), after development of `literature-based inductive theory` in the research. The experts in the panels provided their inputs based on their training, education, experience and personal expertise (Adams, 2007).

Role of the Reviews

These panels increased the validity of the inductive concept development, the stability and applicability of the model, and the external validity and transferability of the research (Adams, 2007). Inspiring from the study of Adams (2007), this research will also try to evaluate three key features of this proposed theoretical study:

1. Boundaries of the model and concept:
2. Utility of the model and concept
3. Pragmatic factors of the model and concept

The Method of Conducting the Panels

1. Panel of Experts with KM Experts and Practitioners:

This panel was formed with different KM experts and practitioners from all around the US Army organizations while they were having a KM seminar. This panel was realized face to face (the panel members were aware of the study and were informed about this research).

2. Panel of Experts with the Agility Related Experts and Capability Developers:

This panel was formed with different attendees from different countries. This panel was realized via web-mail communication (the panel members were not fully, but partially aware of the study, mostly about the agility aspects of the study). The panel was provided with briefing slides and a description of the studies placed in this research via a POC for the panel. The panel members (other than the POC and the mentor of the panel) did not know the researcher and did not communicate with the researcher.

3. Panel of Experts with the Military Doctrine Experts:

This panel was formed with different attendees from different countries, doctrine related representatives. The panel members were not aware of the content and the scope of the study. The panel members were just presented a short introduction of the dissertation outcome mainly related to the AKM using military organization, its attributes and then the relevance of this with the multinational military environment.

The Purpose of the Reviews

Ultimately the expectation from those panels of experts was to get their judgments about the model and the concept, and provide recommendations which will help to improve the study and add clarity as well as avoiding possible mistakes that might stem from the researcher's biases. In general, the purpose of the all three panels was to verify that the proposed concept and model are really measuring what they have been intended to measure (Adams, 2007; Nunnally, 1967).

4.7.3 Scope of the Focus Group

This interview was used for all three aspects of the research. But special focus was on the AKM and KM model, since this group was actually the practitioners of the `Information Knowledge Management (IKM)` in NATO.

After development of `literature-based inductive theory`, the `focus group` interview was conducted three times (with varying participants) due to the availability constraints of the personnel.

This focus group was conducted as the last iteration, after the `expert review` and three `panel s of experts`.

Number of focus group attendees were five (two of them very actively participated, one of them partially participated, two of them with minor participations).

Due to the number of participants, this interview was rather a mini focus group application.

The Specifications of the Group

The panel members were the IKM users and administers at NATO. The participants were the manager (branch head), IKM systems administrator, technicians, and an IKM teacher.

Some of them had only technical/practical experiences while some others (especially the higher ranks) have both theoretical background and the practical experience about the IKM usage and the applications across the NATO.

Role and Purpose of the Focus Group

This focus group was conducted for the validity of the inductively developed concepts of AKM model and its attributes. The use of focus group within the scope as

explained above intends to decrease the research risk of deviating the research with possible biases of the researcher, as well as ensuring the adequacy of the information gathered by the researcher that it provides good foundation for the researcher's literature-based induction, and previous iteration of the concepts. The special aspect of this focus group is to get the insights of the practitioners who are dealing with KM issues to a certain extent based on the scope of their capabilities.

Primary purpose for the `focus group` was to verify validity and applicability of the development of AKM and KM and the need originating such conceptual development.

Based on the feedback from the group, the researcher intended to receive the comments about the `inductively developed AKM model and concept` and recommendations to improve and validate the concepts.

4.7.4 Personal Interviews (One-on-One Interviews)

Scope of the Personal Interviews

The interviews were conducted with 15 different participants on one-on-one personal conversation basis. The researcher conducted face-to-face conversation with six of the participants, telephone interview with two of them, and mail correspondence with seven of them.

All of the participants were military personnel. They were from different countries. The researcher did not ask the ranks or the genders of the participants.

The participants have either COIN or counter-terrorism experience (the researcher deliberately accepted the inputs for the participants who had counter-terrorism experience, due to the fact that the environment is similar to the COIN environment).

The interviews were unstructured an open-ended conversations. The interviews were conducted as one-time feedback loop, before, during and after the development of the inductive theory. In that respect these interviews were different from the other interviews, that all of the others were conducted after development of the theory.

Role and Purpose of the Personal Interviews

The inputs provided by the participants were used for inductive/grounded theory development coded data. The researcher used the inputs in all three major areas of studies. Those are `Agility, KM and AKM and of course COIN Military Context`.

These interviews were used for both inductively generating hypotheses and testing them. `Investigation of The Military Context related to Coin Operations/Theatre with respect to Systems Approach`, `Agility` And `Knowledge Management Issues `were planned to discussed in detail.

Because of the large number of participants and rather large volume of inputs, the researcher used *QSR NVivo9* software package to analyse the data. The results of the *QSR NVivo9* analysis constituted additional inputs to the insights of the researcher already induced. The results of the NVivo Analysis are used for verification of the induced insights of the researcher as well as adding the new inductions those have not been captured by the researcher.

Table 17. Validation of the Research Findings WRT Usual Cannons of Science

Canon of Science	Qualitative Research Methods and Naturalist Paradigm	Part of the Study	Techniques Used to Validate
Truth Value	**Trustworthiness or Credibility**	Military Context	Personal Interviews Generic Panel of Experts
		Knowledge, KM and AKM	KM Panel of Experts Focus Group
		Agility	Outside Expert Review Agility Panel of Experts Personal Interviews
Applicability	**Transferability**	Military Context	Personal Interviews Generic Panel of Experts Literature Triangulation
		Knowledge, KM and AKM	KM Panel of Experts Focus Group Personal Interviews Literature Triangulation
		Agility	Outside Expert Review Agility Panel of Experts Personal Interviews Literature Triangulation
Consistency	**Dependability or Auditability**	Military Context	Peer Reviews Generic Panel of Experts NVivo9 Analysis
		Knowledge, KM and AKM	Member Check Peer Review
		Agility	Outside Expert Review Peer Review NVivo9 Analysis
Neutrality	**Conformability of Data**	Military Context	Peer Review Generic Panel of Experts NVivo9 Analysis
		Knowledge, KM and AKM	Member Check Peer Review KM Panel of Experts
		Agility	Peer Reviews Outside Expert Review Agility Panel of Experts NVivo9 Analysis

5. Hypothesized Model

Investigating `KM, Agility and Military Context` from a multidiscipline, complex and dynamic environment perspective in order to develop a new Model and Concept of AKM with respect to Military Organization in COIN urged the research to use qualitative hypothesized model as outlined in Chapter 3.

This research was conducted with the perspective of inductively generating hypothesizes and the theory based on the literature and the data from the personal interviews. Afterwards the theory (and hence hypotheses) was tested with the interviews. The results of the interviews provided additional inputs to modify the theory (or in some cases to update hypothesizes) as well was ensuring the validity.

Table 18 gives the generated and tested hypothesis, their respective prepositions and the methods used to test them.

Table 18. Results of Research Questions, Prepositions and Hypothesis

Related Construct	Research Prepositions	Research Hypothesis (Reconceptualization of AKM Concept)	Tested
Agility (as a Requirement)	**R.P.1.** Agility is an imperative for the Military Organizations (COIN) to attain.	**H.1.1.** The definition of Agility can be operationalized with respect to Military Context (COIN).	-Expert Review -Panel of Experts (Generic)-partially - Panels of Experts (Agility) - Personal Reviews
		H.1.2. Agility has significant effects to Military Organizations (COIN) as an imperative.	- Expert Review - Panel of Experts (Generic)-partially - Panel of Experts (Agility) - Focus Group-partially - Personal Reviews
Military Organization as System	**R.P.2.** Military Organizations in the COIN Environment are CASs with their unique aspects.	**H.2.1.** Military organizations (COIN) can be defined as systems with their unique aspects.	- Panel of Experts (Generic)-partially - Personal Reviews
		H.2.2. The Systems perspective provides the opportunity of describing the elements of Military Organizations (COIN) with respect to AKM/KM.	- Panel of Experts (Generic) partially - Focus Group – partially - Personal Reviews
Knowledge	**R.P.3.** Military Context (COIN) urges extension of Knowledge.	**H.3.1.** Knowledge can be extended with respect to the Military Context (COIN).	- Panel of Experts (KM) - Focus Group - Personal Reviews
		H.3.2. Knowledge flow can be extended with respect to the Military Context (COIN).	- Panel of Experts (KM) - Focus Group - Personal Reviews

Table 18. Continued

Related Construct	Research Prepositions	Research Hypothesis (Reconceptualization of AKM Concept)	Tested
AKM	**RP.4.** The Military context affects the AKM Processes with its unique aspects.	**H.4.1.** Military Context has unique, extended and similar aspects to be reflected on the Model of AKM.	- Panel of Experts (KM) - Panel of Experts (Generic) –partially - Focus Group - Personal Reviews
	RP.5. AKM Model uses four dimensions of KM with adoptive modifications in accordance with the Military Context.	**H.5.1.** `Knowledge Creation` process of KM can be applied to the Model of AKM with modifications pertaining to the military context.	- Panel of Expert (KM) - Panel of Experts (Generic) –partially - Focus Group
		H.5.2. `Knowledge Storage and Retrieval` process of KM can be applied to the Model of AKM with modifications pertaining to the military context.	- Panel of expert (KM) - Panel of Experts (Generic) –partially - Focus Group
		H.5.3. `Knowledge Sharing and Transfer` process of KM can be applied to the Model of AKM with modifications pertaining to the military context.	- Panel of Expert (KM) - Panel of Experts (Generic) –partially - Focus Group - Personal Reviews-partially
		H.5.4. `Knowledge Application` process of KM can be applied to the Model of AKM with modifications pertaining to the military context.	- Panel of Expert (KM) - Panel of Experts (Generic) –partially - Focus Group
	RP.6. Agility urges the AKM Model to have an additional dimension of `Adaptation`.	**H.6.1.** An additional process of `Adaptation` can be applied to the Model of AKM pertaining to the military context.	- Expert Review (partially) - Panel of Expert (KM) - Panel of Experts (Generic) –partially - Panel of Experts (Agility)-partially - Focus Group - Personal Reviews - partially

Table 18. Continued

Related Construct	Research Prepositions	Research Hypothesis (Reconceptualization of AKM Concept)	Tested
Attributes of AKM and Agility	**RP.7.** The Model of AKM improves the Agility of the Military Organizations (COIN).	**H.7.1.** Agility reflects different aspects as an attribute with respect to the AKM Model.	- Expert Review - Panel of Expert (KM)-partially - Panel of Experts (Agility) - Focus Group-partially - Personal Reviews
		H.7.2. Military Context has a significant impact on the attribute of `Agility`.	- Expert Review - Panel of Expert (KM)-partially - Panel of Experts (Agility) - Personal Reviews - Focus Group-partially

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter discusses the summary of the findings, limitations, implications of the results, conclusions and recommendations of the dissertation.

5.1 Introduction

The purpose of this two-phase and parallel research was to explore the conceptual background of AKM, then re-conceptualize and extend its understanding across military applications with a special focus on Counterinsurgency (COIN).

First phase was the qualitative exploration of Agile Knowledge Management (AKM) along with major milestones and implications of Knowledge Management (KM). Findings from this qualitative phase were used to compare and adapt it to the military environment of COIN. This enabled us to inductively redefine, re-conceptualize and extend the AKM construct based on the literature studied.

Second phase of the research employed qualitative analysis methods in order to re-iterate and assess the new concept of AKM.

The foundation of the analysis was planted on combination of three different disciplines and constructs:

- `Agility` was operationalized in the military context with KM perspective,
- `Military organization in the COIN environment` visualized with systemic approach,
- `Knowledge` and `Knowledge Management` are revisited, with the effects of `agility as a requirement` and `military organization of COIN as a system`.

Based on the findings of this rigorous study, a` Concept of AKM` was inductively developed.

Finally, the ` Concept of AKM` along with the relevant findings are judged, validated and re-iterated with qualitative techniques.

The summary of the results of the study, as outlined above is depicted in Table 19 below.

Table 19. Results of Research Questions, Prepositions and Hypothesis

Stage	Scope	Analysis
Literature Review	**Review of Concept of AKM**	- Foundational understanding of Knowledge and KM - Exploration of `Agility` as a requirement - Review of existing AKM - Exploration of the extent of military applications regarding KM and AKM
Theory Building	**Re-conceptualization of AKM**	- Operational definition of `agility` as an imperative - Description of the COIN military as a system - Extension of knowledge and knowledge flow - Development of an AKM model and conceptualization - Touching upon the attributes of AKM and analysis of `agility` as an attribute
	Extension of AKM	
	Extension of AKM to a Military Applications	

This research is structured in five chapters.

- Chapter 1 gives an overall understanding about this research with its significant aspects and milestones.
- Chapter 2 constitutes the basis for the analyses in this research. It provides comprehensive summary of Knowledge, KM, AKM and Agility (with its relevant aspects) along with the military applications.
- Chapter 3 explains the research methodology used in this dissertation and its basis in the literature.
- Chapter 4 describes the analyses and the theory along with the results with detailed explanations and interpretations.
- Finally, Chapter 5 expresses the findings and the conclusions of the whole dissertation. It also addresses the limitations and implications of the study along with promising avenues for the future studies.

5.2 Research Findings

Parallel to the methodology described in detail in Chapter 3, the structure of the analysis comprises two overarching phases:

Phase 1: Qualitatively develop the literature-based inductive theory of re-conceptualized AKM.

Phase 2: Deductively validate the developed theory with qualitative methods.

The results of the analysis are going to be presented in six consecutive sub-sections in order to present a comprehensive re-conceptualized AKM:

1. Results of the analysis about `agility as an imperative and a requirement` is provided. At this stage, agility is analyzed as the triggering effect of developing a re-conceptualized AKM process model.
2. Summary of the military environment (with a special focus on COIN) through the systems approach is presented. The intent for this section is not to provide a full systems analysis of the military units in the COIN environment. The purpose is to have a better perspective towards the military organization and its environment while developing the AKM Concept.
3. The results of the analysis over Knowledge and Extended Knowledge understanding to use in the AKM Concept are presented.
4. Newly developed AKM Concept based on the findings of previous parts' results is explained with its five steps (processes).
5. `Agility as an attribute` of the AKM Concept and Model is analyzed and findings are presented. Other attributes of the AKM Concept and Model are superficially touched upon and not analyzed in detail.
6. The results of the previous five sub-sections are validated using following qualitative analysis techniques: `outside expert review`, `panel of experts`, `focus group`, `personal interview`, `peer review` and `member check`. A summary of the hypothesized model with the results of analyses is also depicted.

5.2.1 Agility as a Requirement:

At that stage, agility was assumed as an imperative which initiates the organizations to take some actions to cope with the change. In this perspective, it is not just a conceptual term, it is rather a capability which enables an organization to both survive and provide competitiveness. Within the framework of understandings

analyzed in Chapter 4 in detail, the operational definition of agility which bridges relevance to the conceptual development of AKM was proposed as follows:

`Agility is a capability, that enables the organization to detect and embrace the change, and adapts itself faster than the rate of the change`.

While delineating the underlying foundations of the definition of agility, the means to reach or improve the agility has been summoned as:

1. Adaptation,
2. Organization Learning, and
3. Transformation (includes innovation).

This research claimed that, such extent of agility can be applied and achieved via effective use of KM with a timely manner. The term `timely manner` actually points at the AKM.

The important question about the agility (as an imperative) is whether to try the control the change or to adapt to it. Tendency in the military organizations is to control anything that causes uncertainty. But, in reality, none of the organizations including the military have the capability of controlling the environment. Because, they need to realize that they have very limited command and control authority over the environment.

In awe of the new age challenges and highly volatile environmental conditions, the organizations should try to adapt to the change rather than desperately struggling to control the change surrounding them.

5.2.2 Military as System

Based on the findings analyzed in Chapter 4 and detailed in Appendix A, the COIN military organization can be described as:

- *An open system,* because of its various interactions in the environment with different entities and the stakeholders
- *A system of system (SoS),* because of embodying a large number of entities in it, which are also complex systems
- *A socio-technical system (STS),* because of its combinative structure of consisting technical subsystem (including facilities, tools, equipment, and knowledge) and social subsystem (including human factors and the population)

- And finally a *Complex Adaptive System (CAS)*, because of the complexity of the COIN environment and military organization as well as the need for adapting to fast change in the environment.

5.2.3. Extension of Knowledge

This research did not endeavor and claim to redefine `knowledge`, as different definitions based on the contexts, areas of the interest and perspectives of the researchers have already been introduced to the literature (Chapter 2). This research rather proposed to have an extension to the understanding of knowledge and flow of knowledge because of the unique aspects of the COIN military environment studied.

Accordingly, taxonomy of the knowledge was claimed to have two different aspects. One of which was `*organization oriented perspective*`, while the other one was `*knowledge (as a construct) oriented perspective*` (Figure 29).

According to the `Organization Oriented Perspective`, knowledge proposed to be categorized as:

1. Knowledge Possessed (by the organization)
2. Knowledge Need to Have (for the organization)

While the `Knowledge Oriented Perspective` was embraced in accordance with the literature of KM dominantly proposes (Nonaka,1991; Polanyi, 1966) with slightly modification as follows:

1. Individual Tacit Knowledge
2. Organizational Tacit Knowledge
3. Individual Explicit Knowledge
4. Organizational Explicit Knowledge

This can be functionalized as follows:

Organizational Knowledge = F (Knowledge Possessed, Knowledge Need to Have, Time)

The comparison and acquisition process of knowledge is a constant endeavor over the `time`. A knowledge designated as a `need to have knowledge` at time=t, can become a `knowledge possessed` at time=t+1. The other way around, a `knowledge possessed` at time=t, can become a `knowledge need to have` at time=t+1, if the organization cannot sustain it. On the other hand a `knowledge possessed` at time=t can become `obsolete` or `not really useful` for the organization at time=t+1 due to the changing nature of the environment. Ironically, due to the very

same reason, `not really a useful knowledge` might become `a necessary knowledge` over time.

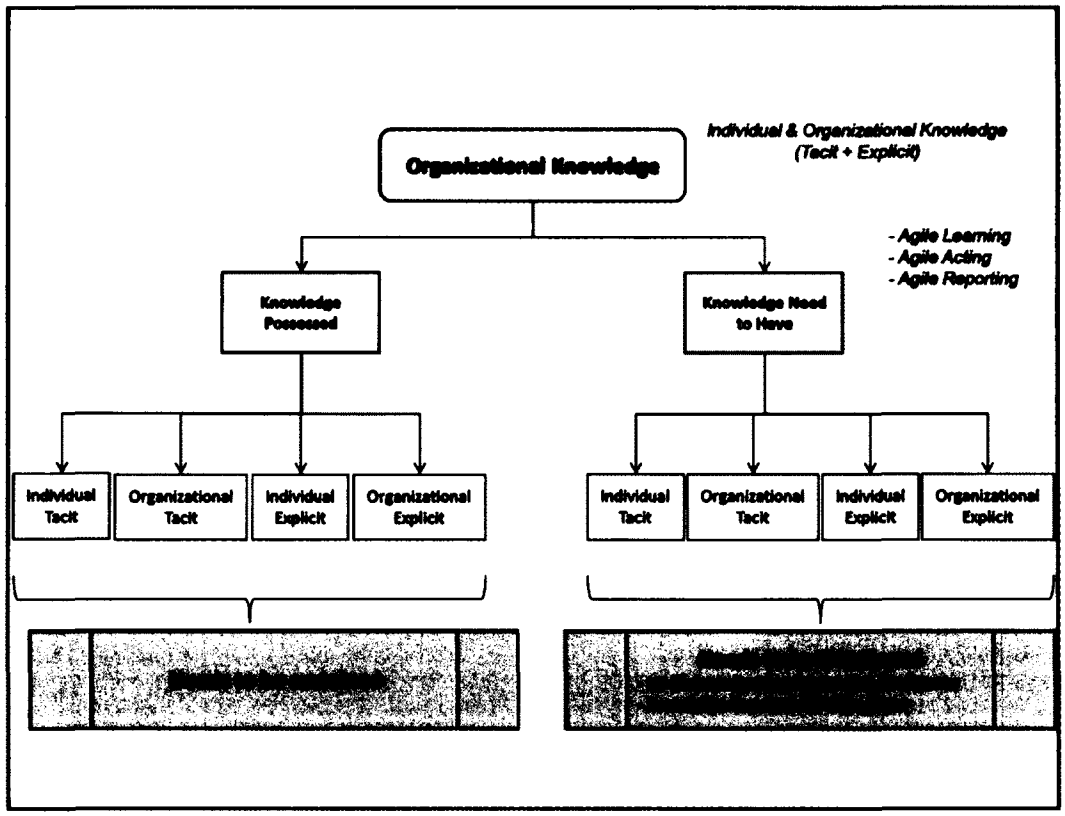

Figure 29. Extension of Organizational Knowledge Landscape WRT COIN Military Environment

5.2.4 Extension of Knowledge Flow

This research proposed an extension of knowledge flow as well. This extension is a consequence of previously claimed knowledge extension, where tacit knowledge was categorized as `individual and organizational tacit knowledge` and explicit knowledge was categorized as `individual and organizational explicit knowledge`.

Accordingly, by using Nonaka's (1991, 1994) philosophy and staying within his articulation of the flow of knowledge, we further proposed to use the expression of `*individual*` for the relevant mode when a transition from individual to individual occurs, and the expression of `*organizational*` for relevant mode when a transition occurs from organizational to organizational. On the other hand, if a flow occurs

from individual to organizational that was claimed to be called as *`popularized`* for the relevant mode, while the flow occurs from organizational to individual that was claimed to be called *`personalized`* for the relevant mode.

The knowledge in the organization was then be described in four steps with different possibilities of 16 different flow of knowledge (according to proposed knowledge flow extension) with respect to extended `knowledge` (see Chapter 2 for details).

5.2.5 Concept of AKM

Although there are couple different steps described for KM process in the literature, the most common one comprises four steps, namely `knowledge creation`, `knowledge storage/retrieval`, `knowledge transfer/share` and `knowledge application` as details of those processes were elaborated in Chapter 2 (Literature Review).

This research proposed to have an additional stage for KM process, in order to comply with the requirement of agility. In accordance with the previously presented background of the agility, this additional process was claimed to be called `adaptation` (Figure 30). Along with some extensive articulation of the other four steps, this additional step leaded us to a new process of AKM.

The input for this process could be any form of knowledge (knowledge, information, data or signal), the output of this process would be 'actionable knowledge`.

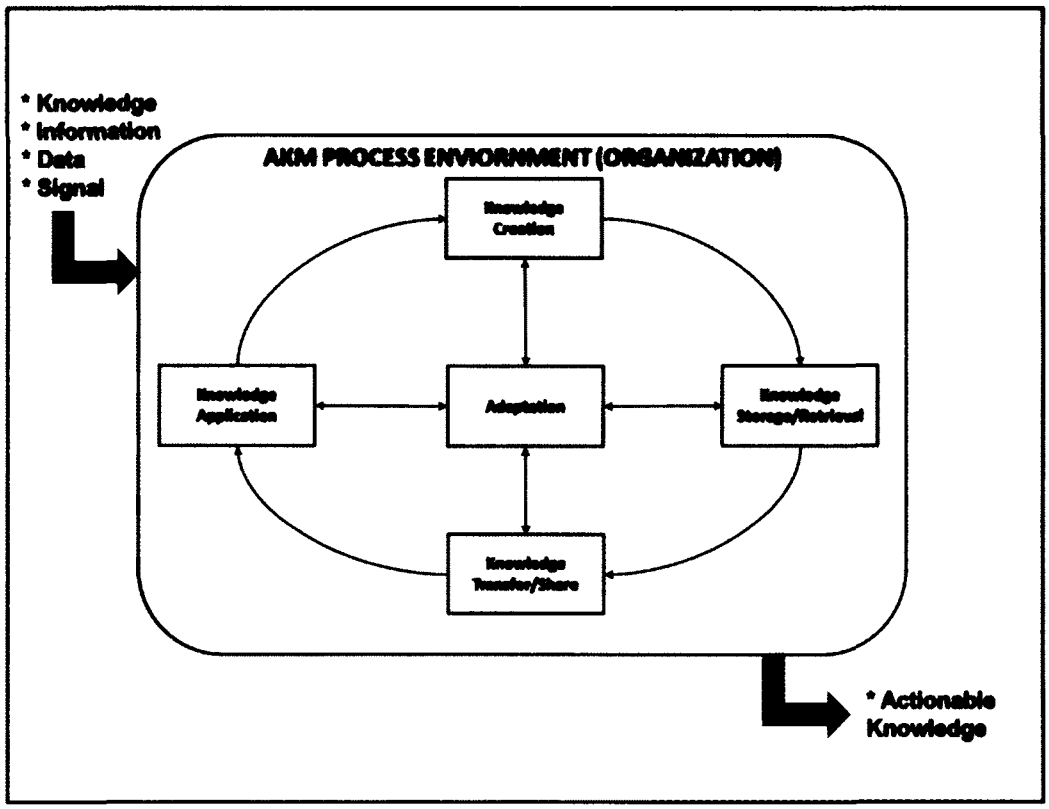

Figure 30. Model of AKM Cycle

5.2.6 Agility

Referring to the basics of the operational definition in this research, relevant variables of agility were denoted as `time` and the `accuracy`:

1. *Time:* should be defined in terms of the rate of the change (mathematically this can be denoted as `Δ State of Environment`).
2. *Accuracy:* Accuracy comprises recognizing the change correctly, then developing and applying correct knowledge and finally adapting to the change as the whole organization.

Figure 31 depicts the basic difference between KM and AKM in terms of agility with respect to the `accuracy` and `time` variables.

- *Knowledge is provided on time, but it is not accurate:* It is not acceptable for neither of them.
- *Knowledge is provided late, and it is not accurate:* It is not acceptable for neither of them.
- *Knowledge is provided late, but it is accurate:* It is partially acceptable for KM but not acceptable for AKM.

- *Knowledge is provided on time, and it is accurate:* It is acceptable for both KM and AKM.

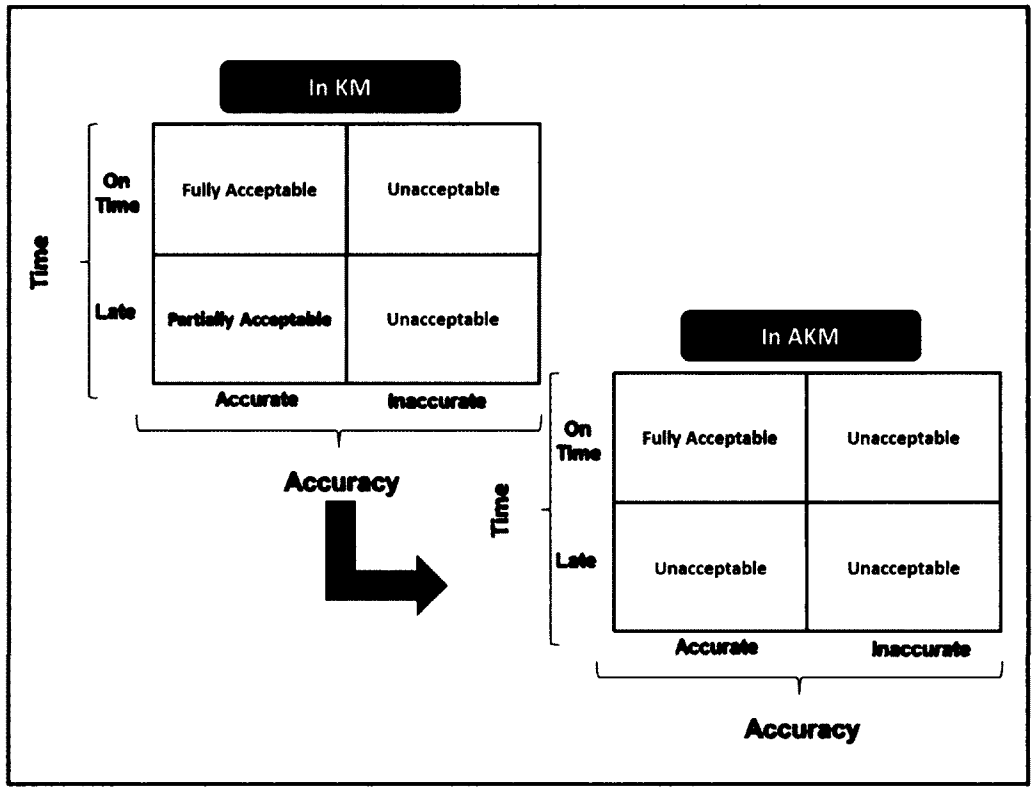

Figure 31. Agility and AKM Variables

5.3 Implications for Theory

While this study was mainly focused on implementing AKM in dynamic, multinational and joint military environment of COIN, conclusions may be applicable in a broader context. The idea of successfully implementing AKM might be universal. But this needs to be proven by further studies.

Nevertheless, specific implications of this research for theory have three aspects.

Two of which are related to the body of knowledge for `KM multidiscipline`:

As it was discussed and concluded in Chapter-2 (Literature Review), KM has reached it maturity, and is expanding to other disciplines. For that reason, it is rightly

denoted as multidiscipline. *This study has the potential of presenting some new directions to the body of knowledge for KM.*

- First, this research introduced new approach of integrating `Agility` to KM. This might open new avenues to contribute to the KM.
- Secondly, a new articulation of KM (which is actually AKM) is introduced to the military scholarship. Currently, as discussed in Chapter 2, military scholars who study KM are more interested in adopting the KM into military environment. In the meantime, apart from the KM studies, some other scholars are working about agility needs of the military organizations. Hence, this research might initiate a collaborative study of these two distinct areas.

The others are related to the construct of `Agility`

As it has been already discussed and has been identified that agility is an imperative to be achieved. Such requirement urges to discuss, study and analyze possible ways of reaching to the desired level of agility for any organization including military.

- By exactly addressing this need (gap), this research articulated the process of AKM towards realizing `agility`. The AKM model and its relevant attributes propose possible implications for the scholars of agility as well.
- Additionally, the analysis of `agility as an attribute` implicates possible extension to the body of knowledge about agility.

And the last and the most important one is related to the re-conceptualized AKM.

- A new construct called `AKM` is re-conceptualized and introduced to the literature. This concept and model is developed based on the foundation of KM by integrating `agility` and `military (with special focus on COIN) context` in it. The implications of this new model and concept might most probably be reflected in KM multidiscipline.

5.4 Implications for Practice

This study described and articulated application of an extended process of KM (or a new process of AKM) across the military with a special focus on COIN.

Complex, changing, ambiguous, dynamic and even chaotic nature of the COIN environment is recognized by every level of the organizations in the military. The military might use the AKM model in order to increase its agility in the COIN environment.

Along with further studies or practical trials (trial-error-improve), other military organizations might adopt and use the AKM model for their organizational purposes as well.

Additionally, other organizations striving to be agile (governmental, commercial etc.) might also modify and adopt this model for their benefits. However, this will need to be performed based on some extensive studies about this AKM model and concept.

Finally, other disciplines might partially or totally adopt this model in their own processes, where it might contribute to efficiency and effective of their practices.

5.5 Limitations of the Study

The limitations to this study are related to three major areas.

Limitations of the Literature

Literature research has a special importance in this study. The theory was inductively built based on the literature research. The researcher used systematic approach to conduct his literature research as explained in Chapter 2. He studied `Knowledge and KM`, `AKM`, Agility` and `Applications and Reflections of them in the Military`.

- The purpose of the `Knowledge and KM` literature study was to understand these thoroughly in order to establish a good foundation for the AKM re-conceptualization. The researcher does not claim to cover every single study about knowledge and KM that was published.
- The researcher conducted rather an extensive research about AKM since the goal was to come-up with a new perspective towards the AKM and develop a new concept. The researcher put most of his efforts to investigate the AKM with all its breadth and depth. For that he used couple lines of efforts:
    - *Research of the scholarly publications*: The researcher used ODU Library, ODU online library database search engine, and the

Google Scholar search engine in order to find any relevant topics related to AKM.

- *Research of the books*: In addition to the tools of the previous one (scholarly publications), the researcher used regular `Google Search` engine as well, in order to increase the possibility of finding the AKM related sources.
- *Research of the dissertations and theses*: The researcher used the same tools as he used for the one before (scholarly publications). Additionally he used Naval Postgraduate School theses/dissertations database along with US DoD publications database (www.dtic.mil).
- *Research of the products those are not proved to be scholarly scientific*: The researcher used the same tools as he used for the one before (books).
- *Practical Use of the AKM in the real world*: The researcher used the same tools as he used for the previous one.

- The research of `agility` was even more limited that the researcher investigated significant aspects of it. These aspects were limited to only the ones related to KM and military context. For that reason, this study does not claim to cover every aspect of agility.
- For the research about Military understanding of KM, Agility and possibly AKM, the researcher searched the `US` and `NATO` unclassified network web/wise pages along with the above mentioned search tools. The research was mainly focused on the US sources. For that reason, it reflects the documents and applications of `KM, AKM and Agility` in the US military. Other militaries were not rigorously investigated other than screening some nations' applications and products (like Turkey, France, England etc...).
- During the whole literature search period the researcher used only the English language. He did not conduct any of his searches in any other languages.

The precision and accuracy of the findings from the investigations about AKM are directly bounded with the capabilities of the search engines (used in the Library of ODU, in the electronic ODU Library database, and Google Scholar). For that reason,

the limitations of the tools used in the literature review are the limitations of this research as well.

Limitations of the Scope of the Study

The subject of the study is actually a broad area. The researcher needed to narrow down the study by specifying the scope of the study while keeping the idea of introducing a newly conceptualized AKM. This was realized by specifying the military context with COIN environment, and focusing on only one attribute (agility) of the AKM Model and Concept, while comprehensively articulating the AKM Model.

- Based on that, this research does not claim to cover every type of military organizations. However, since most of the military organizations have similar structures in different contexts, the findings may be applied to other military organizations as well. Nevertheless, such conclusions can only be verified via further studies.
- Similar approach is valid for the other (civilian) organizations as well. They are out of the scope of this study, but they might make use of the AKM model and concept.
- The scope of the research was only limited to analyze the attribute of `agility` for the AKM Model. This research did not analyze other attributes of the AKM Model.
- The researcher utilized the examples, applications, and products related to `KM, AKM and Agility` in the US and NATO (which consists 28 member and 19 partner nations) military structures. Although, it may not be significantly different, this research does not claim to cover all the military applications of COIN (both in terms of other militaries, and some COIN examples in the history).
- This research qualitatively developed its theory with the idea of better complying with the purpose of the study. Afterwards, it also used qualitative techniques for assessing the theory. Based on that, the limitations and critiques about the qualitative analysis and its techniques apply to this research as well.
- In the assessment phase, the researcher used different types of qualitative interview methods. These interviews were realized based on

availability and willingness of the participants. The researcher could not have interview with everyone he intended to. That might have caused overlooking some data or aspects for the research.

Limitations of the Researcher

One of the major contributors for the inductive literature-based theory development and then deductive assessment of the theory is related to the researcher. As explained in Chapters 3 and 4, the researcher contributed to the study in couple ways,

1. The Researcher's View
2. Colligation of the Researcher,
3. Super-induction of the Researcher,
4. Interpretation.

In that respect, it is rather important to give a look with a little more detail about the researcher that will elaborate the pros and cons of his background to the research, as well as identifying some limitations to the research.

The researcher has both military and academic background related to the study as detailed in Appendix F. His background provided him to have a body of knowledge and opportunity of interpreting the literature and inductively developing the theory. However, some of his background (especially counter terrorism experience) might have caused some biases in his research. For that reason, it was crucially important to assess and validate his studies via different qualitative methods.

The researcher did not have significant academic background about KM and agility. Although the researcher spent quite amount of his time for literature review of knowledge, KM and agility, his knowledge about KM is limited to the extent of his literature research. He does not have extensive experience in practice about any of these areas. This might have limited his interpretations for the theory and relating them to the real life. In order to reduce the risk of this, different qualitative methods were used in the research.

Additionally, the academic background of the researcher indicates that he has quantitative analysis background along with some skills of software programs. That is a good indication that the reason for conducting qualitative analysis in this research is not a result of his hesitation towards quantitative analysis or software package usage. However, the researcher did not really have experience about qualitative analysis in practice. He diminished this limitation by theoretically exploring and

scrutinizing the qualitative analyses along with making very best of use of other qualitative studies as good examples.

5.6 Recommendations for Future Studies: Research Agenda

The results of this research provide rich and fruitful avenues for future researches.

Because of different underlying disciplines (constructs) of this research, the future research area recommendations will be related to three different areas:

In the Area of KM

This dissertation aims to contribute to the KM body of knowledge. For that reason, first area will be KM related future researches:

- This research introduced the `re-conceptualized AKM model and process` to the body of knowledge of KM with qualitative analysis. This new model and process can be improved via some quantitative or mixed (qualitative and quantitative) analyses.
- This study provides theoretical articulation of AKM model and process. Some further studies can be conducted for practical articulation of this process. Such articulations in practice might even open new avenues for some further studies to improve AKM model and process.
- This study provides overall understanding about the AKM model and its sub-processes to a certain extent of detail. Further details of each process can be studied separately. Such detailed studies might also promise some further studies of improving the AKM model and process.
- Possible attributes of AKM process have been superficially studied in the research. Some further studies can clarify the attributes of the AKM model and process as well. Furthermore, the idea of using those attributes as the measurement factors of the AKM and/or KM process might be investigated. Possible cap or sub categorizations of those attributes might need additional analyses. Each of the attributes can also be analyzed in detail in separate studies.
- As it was discussed for the agility, measurement of AKM is also very challenging issue that needs to be studied in detail. Possible attributes of

AKM mentioned above might serve as the measurement tools for the AKM as well.

- This study has just mentioned Knowledge Development (KD) in the `Knowledge Need to Have` process, and did not provide the details. Further studies can be conducted to explore the relations of KM and KD.
- Similarly, this study superficially mentioned possible effects of agility over the current understanding of KM and Risk Management (RM) relations. Further studies can provide significant impacts of agility to KM and RM relations.
- `Lessons Learned (LL)` including `Lesson Identified (LI)` and `Best Practices`, needs to be approached as a sophisticated process. Its incorporation into KM needs to be analyzed in further researches.

In the Area of Agility

This dissertation also made a good use of `agility` and claim to contribute to the construct of `agility`.

- Depending on the area of his/her interest, any researcher who investigates to succeed and improve the agility can study AKM model or process (as a whole or partially) for agility purposes in his/her research. He/she might also provide feedback from his perspective to improve the AKM model and process as well.
- Extending the functional areas list (DOTMLPFI) with respect to capability development with inclusion of agility can be investigated.

In the Area of Organizational Studies

This dissertation conducted its analysis across the military organizations (with a special focus on COIN environment). The third area will be related to military and civilian organizations related.

- AKM model is qualitatively validated to be used for the military organization in the COIN environment. The study can be extended to other military organizations. Additionally, this study can be extended to the civilian organization as well. All of those possibilities indicate new directions to conduct additional research.

- Possible effects of using AKM model in the military and/or civilian organization can be studied. The findings might recommend conducting some further studies about structural changes in the organizations.

5.7 Conclusion

The most important conclusion of this research is that it provides a newly conceptualized AKM model.

To best knowledge of the researcher, this study is the first theoretical and empirical work to articulate the AKM with extension of KM process in the literature, as well as applying it to the military.

This research developed the re-conceptualized AKM and its model for the use of the military organizations (especially for the COIN environment). For that reason, the model itself is not isolated from the goals and the activities of the organization.

By referring to the details of this AKM model and concept to Chapter 4, its significant aspects can be summarized as follows.

The literature review performed in this study suggests that most significant phenomena that agility sheds lights on are the change and to adapt in order to cope with the change.

Actually, this derivation provides an overall perspective about how an ideal organization should be. It consists two primary parts:

1. To recognize the change (or we can call it detect/sense the change)
2. To adapt the organization to cope with the change.

In general Figure 32 below is established upon this idea along with necessary actors (entities), interactions and processes.

The organization needs to constantly evaluate the `knowledge need have` and decide the `knowledge that is valuable for the organizational use`.

Otherwise as Nissen (2006) states the organization might wander between the dilemma of having inadequate knowledge, or excessive and unnecessary knowledge that causes confusion and additional storage/retrieval costs.

On the other hand, the organization needs to continuously control the knowledge that is possessed. It will need to compare the `need to have knowledge` with the `possessed knowledge` in order not to invent the wheel again and of course to identify what knowledge to create (Nonaka, 1991).

The knowledge has a dynamic nature. Additionally, the environment of the organization in this age has a very dynamic, volatile, complex and changing nature as well. In that context, the `knowledge possessed` of an organization also needs to go through a process in order to remain `knowledge possessed` over time.

The knowledge in this research is classified into four categories (as mentioned in the knowledge extension section), by inspiring from the most common taxonomy of knowledge as `tacit` and `explicit` (Nonaka, 1995; Polanyi, 1969) and the term `organizational knowledge` phrased by Alavi and Liedner (2001).

1. *Organizational Tacit Knowledge:* This knowledge is embodied and embraced by the whole organization. Organizational tacit knowledge still has the `cognitive` and `technical` dimensions that enable the whole organization to act as appropriate. This type of knowledge is the ultimate stage that the organization aims. But still this type of knowledge needs to be sustained by the organization. We have denoted this as `0 Step` Process. In this process the organization will take the necessary precautions and actions in order to sustain this knowledge to remain organizationally tacit. Otherwise this knowledge can easily become obsolete or transform into other forms of knowledge. As the environment changes, knowledge will continue to change as well. Additionally, the organization itself also changes. The changes might stem from both minor or major transformation of the organization or simply from regular rotation of the personnel (retirements, newcomers, job changes etc..). The known of the current state of organization might easily become an unknown for the latter state of the organization.
2. *Organizational Explicit Knowledge:* This knowledge is the codified and sharable form of the knowledge created via various means. It is basically combinations of the individual explicit knowledge of various individuals inside and/or outside organization. This state of the knowledge in the organization means that the knowledge is available to the use of the whole organization and most importantly it is ready to be learned by the whole organization. This type of knowledge needs to be embodied and embraced by the whole organization and become `organizational tacit knowledge`. As depicted in the Figure 32 this type of knowledge needs to have transition process of transforming it to the `organizational tacit knowledge`. Then as

explained in the previous step, it will need to be sustained. This research has denoted this step as `1 Step` Process.

3. *Individual Explicit Knowledge:* Individual explicit knowledge is knowledge of a person in the organization that is codified and made available to the use of public. The organization needs to first transform this knowledge with many other individuals' knowledge inside and/or outside the organization into one combination of explicit knowledge which becomes ready to the use of whole organization. Nonaka (1991) calls this as the `combination of knowledge` in his eminent spiral of knowledge theory. Then it will follow the process as explained in the previous steps. This research has denoted this as `2 Step` Process.

4. *Individual Tacit Knowledge:* Individual tacit knowledge is knowledge that is embodied in one individual technically and/or cognitively. The organization needs to first externalize, codify and make sharable it by the others. This process is called as `externalization` by Nonaka (1991). Then it will follow the process as explained in the previous steps. We have denoted this as `3 Step` Process.

The organization needs to put some effort on the `need to have knowledge` even more, as it spends for the `possessed knowledge`. This type of knowledge can be acquired by using three subsequent processes:

1. *Detection:* The organization will only be able to decide which type of knowledge it needs, depending on its recognition towards the environment (including the stakeholders) and the continuous comparison with the possessed knowledge. For that the organization needs to observe/study the environment, the stakeholders and the others in order to detect the change which will require a new knowledge to be created or acquired. In the military organization the others are generally categorized as the `friend`, `foe` and `neutral`. For the military this process is actually the intelligence itself. A newly used term of `Knowledge Development` is becoming more popular in the military literature for this specific process. This stage is very important for the survival and competence of the organization. Because if the organization recognizes the change it will have the opportunity to adapt itself, if not then it will not be able adapt itself and become obsolete even if it might have very good adaptation abilities.

2. *Diagnosis:* Once the change and need is detected, the organization needs to `analyze` it. The results of the analysis will require a decision process in order to do what with this specific information. The decision level depends on the level and value of the information. In some cases it might need a tactical level (low level) decision, while in other cases it might need middle level (operational level), and in some cases it might even need high level (strategic level) decisions. We can denote this process as the `institutionalization of the change`. Note that, it does not mean that it has been adapted; it has just been recognized by the institution/organization.

3. *Generation/Acquisition:* The last stage is initiated based on the decision. If the decision is to take an action and create knowledge, then the organization does so, and finally adopts the acquired knowledge.

The types of the `possessed knowledge` and `need to have knowledge` consist constant interactions. Those interactions do not have to be sequential. Those processes should also need to be verified with the aspects of agility in terms of `accuracy` and `punctuality`. Otherwise any stage of these processes might carry the risk of losing the knowledge, mistaking the knowledge or becoming obsolete.

All stages of the processes form the intellectual capital of the organization, which is knowledge. The important aspect of the knowledge is to transfer it into actions. The organizational knowledge can only be embraced and turn into action in the light of the organization's end state via `adaptation` coupled with `learning` and `transformation`.

It is generally suggested that the abilities of knowledge and learning constitute significant domains for agility. While individual knowledge and learning would rather be assumed as a manageable process, organizational aspects of learning and knowledge requires significant management capability.

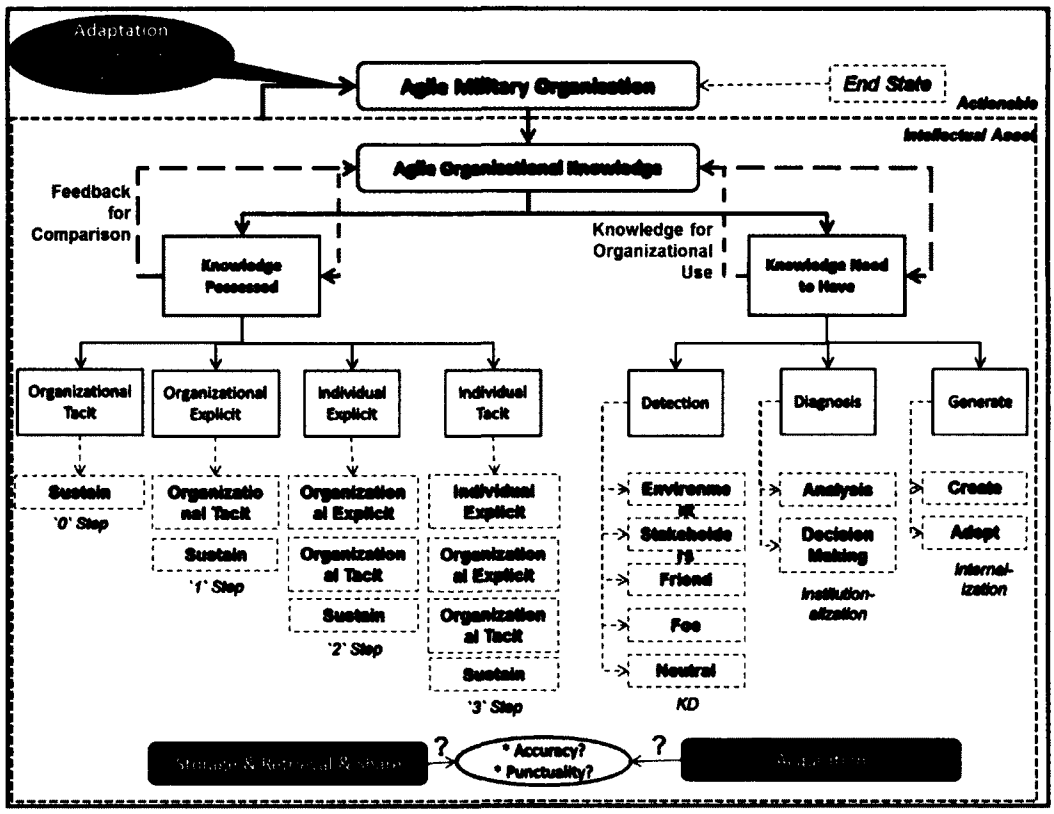

Figure 32. An Ideal (Military) Agile Organization

The idea is to integrate the AKM model in the organization where it is supposed to play the amalgamation role in whole process of an organization. As it is depicted in Figure 33, a military organization which integrates AKM into its structure and operations will simply operate as follows:

1. It starts with detecting and sensing the change in the environment via appropriate capabilities (in the military that capability could be Intelligence, Surveillance and Reconnaissance - ISR and newly introduced Knowledge Development - KD).
2. Then, the conveyed information out of `sense/detection phase` needs to be incorporated and processed through the decision process at the appropriate level by using the relevant decision support systems (in the military those levels can be tactical, operational or even strategic).
3. The last phase is the execution of the decided task which is conveyed to the action bodies (in the military those are the troops). These acting units need to learn, adapt, act and report faster than the change in the environment in order to ensure the success of the mission.

4. Whole process should also have a LL cycle that will include the 'best practices' as well as the 'lessons identified' in order to improve the agility of every entity taking place in this process.

5. While the outcomes of `detection/sense` proceed to the decision making process in the second phase or the` decision` is conveyed to the troops or the LL feeds into the whole process, the organization needs to have appropriate channels (in the military those channels are C4ISR and NEC capabilities) to ensure the transfer of information/knowledge back and forth.

The AKM should be the overarching concept that needs to be constantly used during the whole process in the military organization.

Respectively, Agile Military Organization needs to:

- Do the right thing (whatever is needed)
- At the right time (not late/ not early)
- With the right scope (in terms of duration, terrain, stakeholders, boundaries etc..)
- With the right resources (cost effective, right unit, right weaponry, right amount of money)
- With the right knowledge.

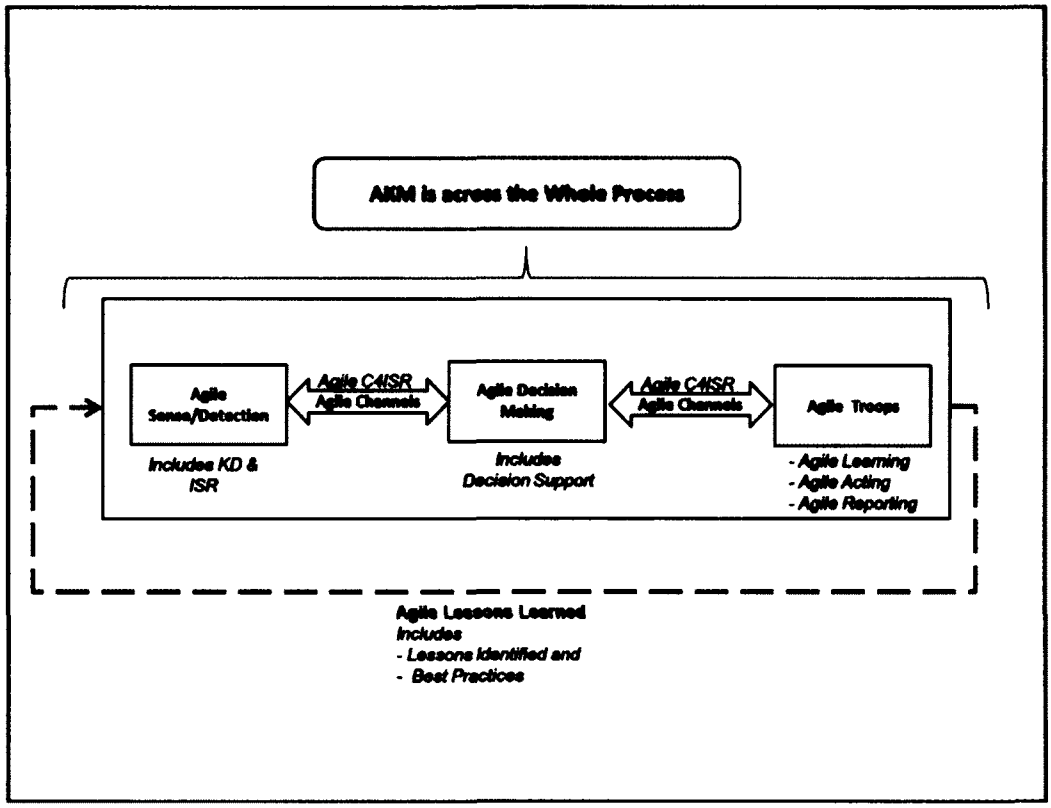

Figure 33. The Role of AKM in a Military Organization and Model of Its AKM Process

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APPENDICES

APPENDIX A: MILITARY AS A SYTEM IN THE COIN ENVIRONMENT

Introduction

It is obvious that one who endeavors to overcome the challenges against KM should recognize that dynamic environments are not repeatable, and there is no single magic correct answer of KM implementation that is applicable to all types of environment.

The military environment itself also needs a closer look in order to reach a robust application of AKM and KM. The military operations taking place today are significantly different than they were twenty years ago. The nature of war twenty years ago is also significantly different than the one sixty years ago during the period of World War II. That is also a good indication that the nature of the war most probably will not be the same ten years from now.

With a broader perspective, we can see the trend that the form of the war has transformed into irregularity from the state of regularity. Current irregular warfare has significantly different aspects from regular activities or operations. Additionally, current military forces mostly have multinational structure. Current threats to military forces have international and interagency aspects as wells as being infused with different actors and organizations in the theatre of operations. Military conduct can hardly be immune from civilian intervention. Today, the participants or the perpetrators of the war include other government agencies, international actors and even civilians. It is widely accepted that future threats would even be more complicated.

Similarly, the NATO - the only military and political international organization in the world - describes its perspective over the current security environment within the framework of a comprehensive approach. Where, it is stated that, within a complex operational environment there is a need to proactively coordinate the activities of a wide range of actors. A comprehensive approach seeks to stimulate a cooperative culture within a collaborative environment, while facilitating a shared understanding of the situation (NATO COIN Doctrine, 2011).

According to Kilcullen: In all war, but particularly in COIN, the environment is in flux. All sides engage in an extremely rapid, complex, and continuous process of competitive adaptation. Insurgents and terrorist evolve rapidly in response to countermeasures, so that what works once may not work again, and insights that are valid for one area or more one period may not apply elsewhere...(Kilcullen, 2010, p.2)

The dimensions of projected AKM concept and model can be constructed with induction of literature studied in Chapter 2, and rigorously interpreting it with the 'lens' of the systemic approach. According to Checkland's (1990) perspective this research applies `system's thinking` towards the use of AKM in the COIN related military organizations, where thinking by means of concept of wholeness with the system perspective is used.

In that respect, the focus area of this research is the multinational military organization (NATO) in the counterinsurgency (COIN) environment.

However, one should notice that this research does not claim to present a thorough systems analysis of a military organization in the COIN environment, which is out of the scope this study.

Accordingly, following sections provide overall systemic foundation of this research.

The System Elements and the Process

Set of Entities of the System and Stakeholders

COIN has large number or entities due to many actors' involvement in and outside the system. Nevertheless, by and large, the elements of such a complicated system can be itemized into following elements (Figure 34). Obviously the quantity of the elements can easily be outnumbered in the real life.

1. NATO

NATO is the political and military international organization which is formed with participation of the nations. Currently, NATO has 28 nations. It has a structure with the combination of the troops (NATO force structure) and the headquarters (NATO command structure) hosted in different countries. Based on the consideration above, sub-systems of NATO can be categorized into three different sub-systems: (NATO Handbook, 2006)

- Member Nations
- NATO Command Structure (NCS)
- NATO Force Structure (NFS)
- Partner Nations

Context of NATO System: Interaction of these members has some uniqueness in the context of the system. Any action that needs a decision has to be submitted to the nations, it needs to be approved by every one of the nations. That causes in a sense significant delay for the actions to be conducted urgently, which is an important challenge to the agility of strategic decision level of NATO. NCS has the overall commanding authority over the NFS and both the NCS and the NFS have their personnel from 28 different nations.

2. Host Nation (HN)

HN is actually the place where the core of conflict takes place. It is the nation which has the authority, security and stability problem (NATO COIN Doctrine, 2011). Currently Afghanistan can be assumed as the HN for the NATO ISAF Operations. The sub-systems of the Host Nation are:

- Host Nation Government
- Host Nation Police Forces
- Host Nation Armed Forces

Context of the HN System: The Host Nation is actually rather a symbolic government where even basic governmental services cannot be provided. The personnel of the government, police and military are not necessarily well educated.

3. Insurgents

Insurgency is defined as `the actions of an organized, often ideologically motivated, group or movement that seeks to effect or prevent political change of a governing authority within a region, focused on persuading on coercing the population through the use of violence and subversion` (NATO COIN JOG, 2010, p.3-1). Parallel to that definition, insurgents are the group of people who perform those insurgency actions. Insurgents also have different sub-systems.

- Leaders
- Armed Elements
- Cadre

Context of the Insurgent System: Insurgency has generally ideological initiators. They have quite a good support from the public. The number of violent events shows their efficiency in the country. For that reason, they prefer to have any activity that they perform to be publicly viewed and heard.

4. Public

The public is actually the target audience for every party taking place in the conflict. They are the ones who represent the country and their public opinion. They are normally the people of the HN.

- Neutrals: People of HN who have tendency towards neither side of the conflict.
- Positive to NATO Forces: People of HN who have positive considerations about NATO forces and their activities.
- Negative to NATO Forces: People of HN who have positive considerations about insurgents.

Context of the Public System: In reality, public system constitutes the core of the conflict and the `COIN system`. Ultimate success of the COIN initiatives is directly related to the perception of the public. Whoever wins the crowd (public) most probably will move one step forward to its purpose.

5. Non-NATO Governments and Governmental Organizations

The HN is a country where many different organizations have interest in the country.

- Non-NATO Nations' Armed Forces: NATO forces are not the only armed forces in the HN country. There are also some other nations' armies those have active contribution (sometimes) and interferences (some other times).
- Non-NATO Nations' Governmental Organizations: In addition to the military organizations, most of the countries provide some public and some other types of services for the HN in order to provide them a secure and well developed country.

Context of the System: Some nations have some perceived interests on the HN with different purposes. That in some cases might help and contribute to the NATO efforts. In some other times, it might cause undesired events.

6. International Organizations (IOs)

In addition to that many different governmental organizations, some other international organizations also involve in the HN activities and in HN country.

- United Nations (UN): The UN has international legitimacy to act, support and even decide about HN. All of the NATO nations are also members of UN.
- European Union (EU): The EU has certain interests in the region. But more importantly, 25 member nations of the NATO are also EU members. For that reason they actually have the common interest.
- Non-Governmental Organizations (NGOs): For many reasons, numerous nongovernmental organizations take place in the era of HN insurgent environment.

Context of IO Systems: These organizations intensely work with people of HN. They do not act under the command of any military or civilian authority. Other than some generic regulations they have pretty much their autonomy in order to achieve whatever their purposes are.

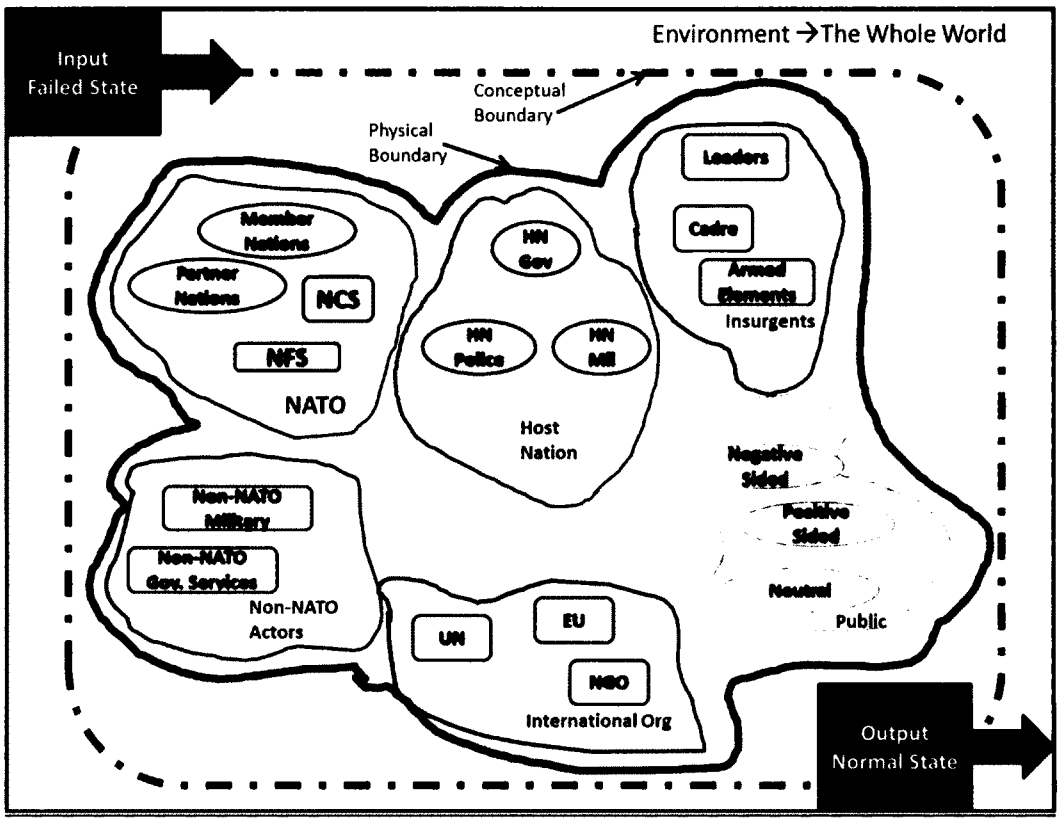


Figure 34. 'COIN System'

Stakeholders: For the system to have the potential to be optimal or to succeed, it has to be developed based on stakeholders' needs.

Number of Elements: NATO led COIN operations are conducted with the units those include multinational forces. Although, having different branches of forces (army, air force, marine corps etc.) cause some coordination, collaboration and harmonization problems, having more than one nation's troops make it even harder. And, of course with its unique environment, COIN operations provide some additional actors into the theatre such as civilian governmental organizations, non-governmental organization, international organizations, host nation agencies, etc.

Context of the COIN (Whole) System

Both insurgents and counterinsurgents employ varied tactics and methods. These include political, military, economic, social, information and infrastructure activities, in an attempt to reach a favorable outcome (ends) and within the resources available including time (means) (NATO COIN Doctrine, 2011).

If the methods were categorized as political and military considerations, political considerations are of much greater importance than military considerations in a struggle for the consent of the population.

Boundary of the System (Figure 34)

The boundary of the COIN system could be described with two different aspects.

- Since the activities are taking place in the land of the HN, the boundary of the system can be considered as the HN borders. This boundary lines will rather be physical, for that reason it can be clearly identified.
- But with the effects of the insurgent activities, it would be more realistic and comply with holism systems principle to draw a conceptual line for the COIN System. For that reason the conceptual boundary of the system can be described as the area where the direct relations of the system take place.

Pattern of Relationships

The relationships in the COIN environment are very complicated, sophisticated and dynamic. The extent and the nature of the relations might change really fast. Figure 35, which is a real diagram drafted by NATO ISAF Command and US Army in Afghanistan in order to depict their goal of Afghan Stability in COIN dynamics, indicates complicated relations among various actors in the theatre.

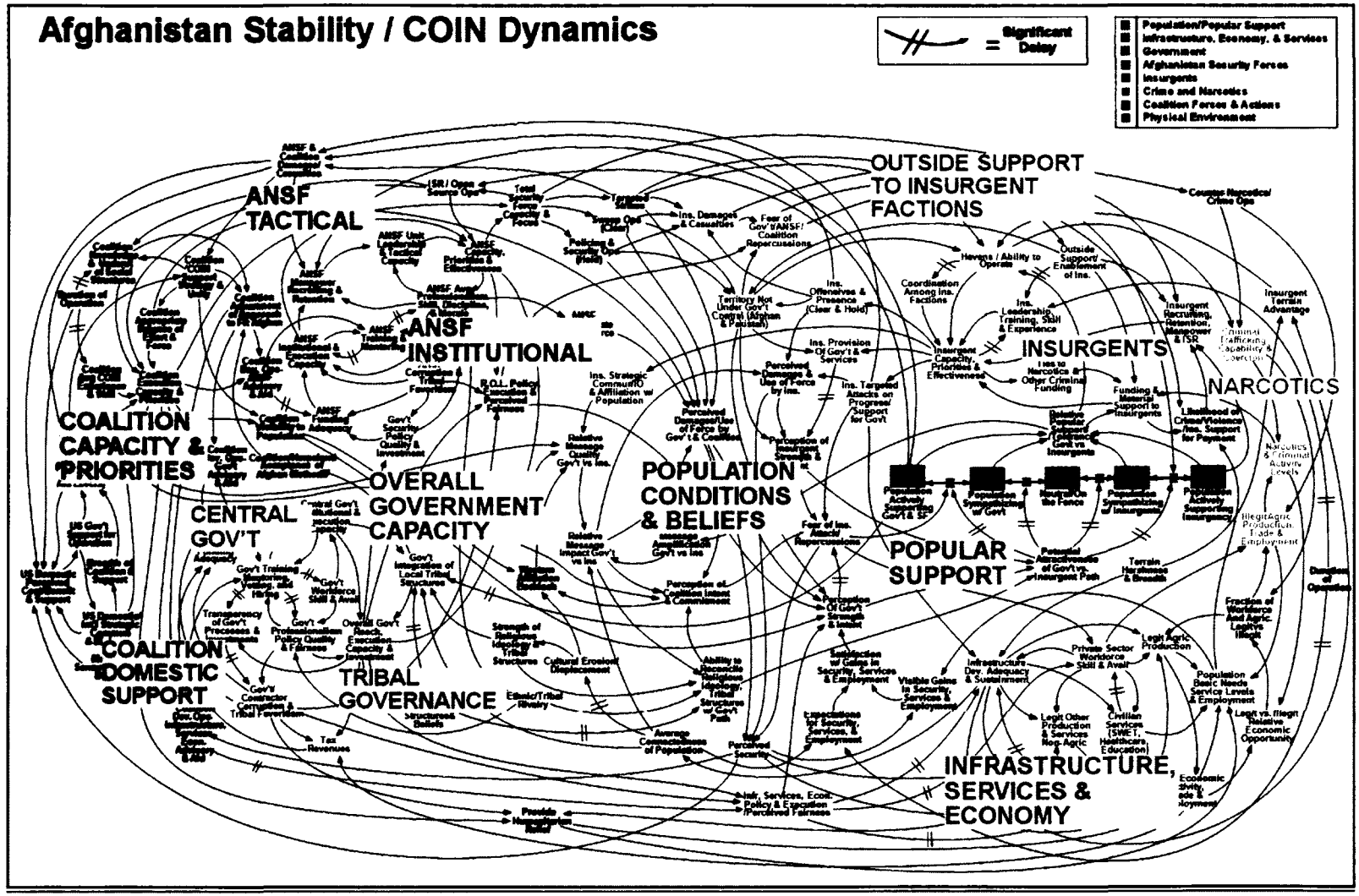


Figure 35. Afghanistan Stability/COIN Dynamics

Feedback

- Extrinsic Feedback: NATO can get the feedback from the environment of the COIN system via observing and considering the actors and relations other than the entities of the system itself. The reflections of HN activities and the perceptions of the public in some other entities of the world (such as Al Jazera TV, an Asian country, an Arabic Company, etc). That feedback provides an unbiased approach for the NATO.

- Intrinsic Feedback: On the other hand, it might be very important and necessary to gather the feedback from the entities of the system. For that, NATO can put all of its effort to only one facilitator. The feedback from its structure would be gathered via the lessons learned (LL) body of the NATO. Additionally, the feedback from other entities (such as the UN, the EU) could be gathered by assigning point of contacts or liaison offices/officers in that specific entity.

- Feedforward: Statistical analysis could be used to estimate and foresee the future of the COIN system.

Upon this generic perspective of the COIN system, it is beneficial to specify the feedback for the AKM process as well. The sources of the AKM process feedback remain the same as mentioned above. The content of those feedbacks should of course be in the form of signal, data, information or knowledge.

Input and Output

With the broad perspective:

- The COIN system mainly takes `system state` as an input. In our particular case the `failed structure of the state and the situation of this country and its people` are the inputs for the COIN system.

- The output of the system is also a `system state` where it also complies with the goal of COIN operation for the NATO. The output for the system is a `normally functioning state` which can operate and functions by itself as a `stable state`.

But with the AKM perspective, the input of the system is any form of the knowledge. Inputs can be in the form of signal, data, information or knowledge. On the other hand, the output should be `actionable knowledge`.

Environment (Figure 34)

"The imperative is to understand each environment, in real time, in detail, in its own terms, in ways.....and not by analogy with some other conflict, some earlier war, or some universal template or standardized rule-set" (Kilcullen, 2010, p 2)

If the HN subject to insurgency is in the area of interest for the world's big actors (NATO, UN, EU, other big nations such as Australia, China, etc). then naturally the environment of this system would be considered as the whole world.

But with a more specific perspective, the environment of the system could be treated as the audience of the COIN operations of NATO. *From the perspective of NATO, the environment will have the `friends`, `opponents` and `neutrals`.*

Additionally, the COIN has rapidly changing complex environment. In such volatility, an organization cannot use the earlier methods and ways of conducting the operations. It needs to adapt to the changes and create new techniques to defeat the enemy. This requires organizational learning and adaptation as critical success factors. "Counterinsurgency is never static, always evolving. Because 1. We can never know more than a tiny amount about complex environment in which we operate, 2. The environment changes so rapidly that even if we could know it fully, our knowledge would be mere snapshot that would be immediately out of date." (Kilcullen, 2010, p.3)

For that reason, we should recognize that `dynamic` environment, and hence the change of environment is not negotiable and questionable. We have to admit it, and react upon this admission. Along with the environment the threat in the security environment also constantly changes. The key issues are `uncertainty` and `complexity`. For the military in COIN environment, there is little or no warning time (especially in terms of threat).

Transformation (the Process) in the System

The definition of COIN gives clues for the process. According to the NATO COIN JOG (2010), COIN is described as `the set of political, economic, social, military, law enforcement, civil and psychological activities` with the aim to defeat insurgency and address any core grievances`.

Obviously, the COIN system process is a combination of efforts which can be conducted by different entities of the system (or with their collaboration) that has wide span of applications (political, economic, social, military, law enforcement, civil and psychological activities).

This type of combined activities also defines the sophisticated and complicated interactions and relations among the members of the system.

With this broad perspective, specifically with respect to the knowledge where we have identified it as the input and output of the system, then the process will naturally be the AKM Process.

The End State

Mainly, the purpose of the COIN is not to destroy the insurgents. It is basically to establish the stability and security all around the HN country. A success in a certain terrain of that nation's land may not necessarily mean the overall success against insurgency. For that reason, it definitely needs an overarching (holistic) view and analysis approach.

Complexity of the System:

By its nature COIN reflects very complicated and complex structure. Accordingly, among its various definitions, Kilcullen's definition is one them to show complexity of COIN: COIN is an umbrella term that describes the complete range of measures that governments take to defeat insurgencies. These measures may be political, administrative, military, economic, physcological, or informational and are almost always used in combinations. (Kilcullen, 2010, p.33)

Ackoff (1974) denotes the simple and complex systems as `machine-age` and `systems-age`, where simple to be machine-age and complex to be systems-age. He then further delineated the complexity of the systems with introducing the term `mess` and `messy situations`. He describes the messes as the systems of problems. He further claims that the managers manage messes rather than solving the problems (Ackoff, 1979).

Every system (as long as an open system) contains a certain extent of complexity in it. Most of the scholars admittedly highlights the significance of the complex systems with `larger amount of its elements/entities (systems size)` and their complicated, sophisticated and non-simple interactions (Simon, 1962; Sommer & Loch, 2004).

Williams (1997) describes the complexity with dynamical behavior of many independent agents' interactions. The complexity is generally characterized with a large number of rich interconnections among them, a high degree of uncertainty and constant change over time.

Note the similarity of the definition and the characteristics of COIN environment, COIN reflects above mentioned specifications of complexity. We need to realize that complexity is the property of a real world system (Ferreira, 2001). And, COIN is also the reality of the world.

Figure 36 depicts the extent to which the COIN environment reflects the items of complexity. The description and identification of the complexity with regard to each characteristic has been denoted with a scaling rather than assigning yes/no answers for each characteristic. The scale has been divided into ten equal portions and each of the characteristic is designated with regard to context of the system for the particular COIN environment. The red boxes denote the status of the COIN system with respect to corresponding characteristics. With that snapshot presented in the Figure 35, we can see the complexity of the system.

- *Number of Elements:* There are a large number of entities in the COIN system as some of them (clearly not all of them) itemized before in Figure 34.
- *Interaction between Elements:* The system and its subsystems have very dynamic nature. Parallel to the dynamic structure of the system, the system tends to change with regard to the change in its environment. All of those along with the large number of entities indicate very complicated and sophisticated interactions in the COIN system as shown in Figure 35.
- *Predetermined Attributes:* Despite the volatility of the COIN environment, the nature of the military sometimes dictates some predetermined attributes. Nevertheless, by and large the attributes cannot be pre-determined.
- *Interaction Organization:* As explained before, there are many different organizations in the COIN environment, and they interact with each other. However, the military regulations might sometimes limit interaction with some organizations.
- *Laws Governing Behavior:* Although the environment mandates the opposite, the structure of NATO and the military force the COIN system to stay and act by the governing laws, which is actually criticized by the operators in the COIN field.
- *System Evolution over Time:* As stated before, the changing nature of COIN leads to high rate of evolution.

- *Subsystem Pursue own Goals:* In the military structure, the units do not act upon their own purposes. Generally their tasks are aligned with the purpose of the high level strategic guidance.
- *System Affected by Behavioral Influences:* Stemming from both outside and the inside system effects, the COIN system and its entities are mainly event (result of the behaviors) driven.
- *Predominantly Closed or Open to the Environment:* On the contrary of the military regulations tendency, the nature of the COIN dictates the system to be open to the environment, otherwise being unsuccessful is inevitable as asserted in the NATO COIN Doctrine (2011).

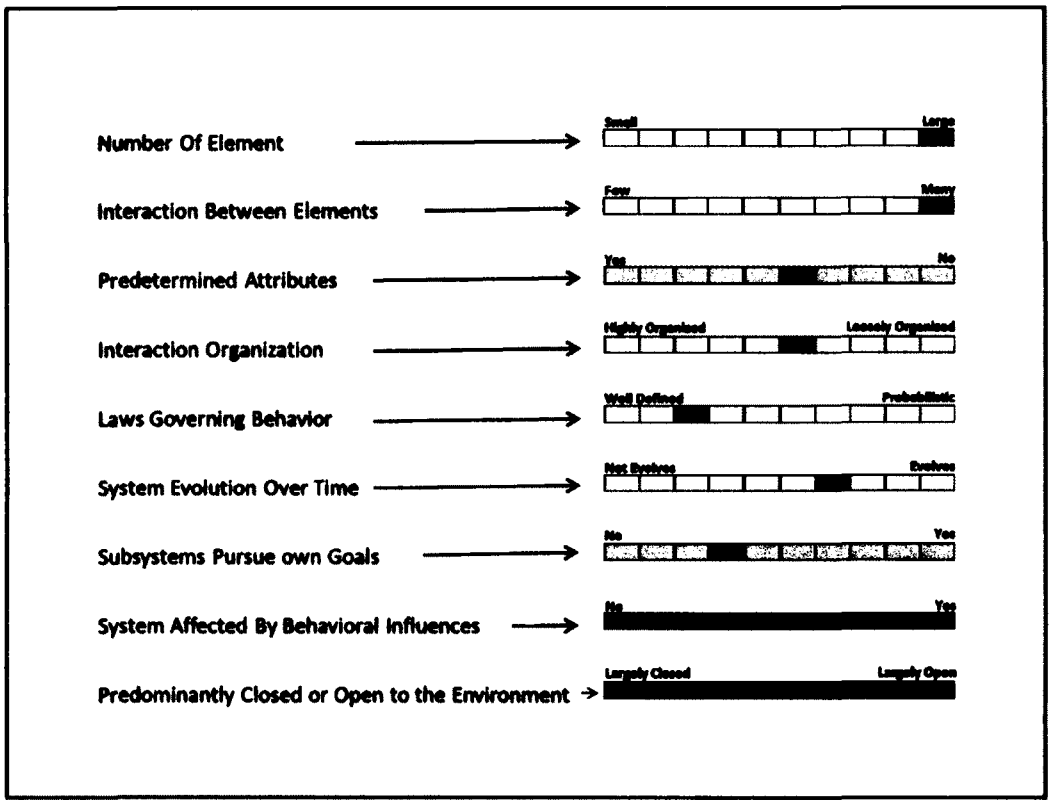


Figure 36. Complexity Analysis of the COIN system

Uniqueness of COIN

The COIN operations (the operations in the COIN environment) have significantly different aspects from regular activities or operations. As a category, COIN warfare differs fundamentally from conventional warfare (or intergovernmental warfare). In contrast to conventional warfare, COIN warfare always involves a non-governmental and –usually- militarily weak actor. Current threats to NATO forces in the insurgency environment have international and interagency aspects as wells as being infused with different actors and organizations in the theatre of operations. It is widely accepted that future threats would even be more complicated.

What differs a military environment from a civilian environment? For one aspect, in the military environment there is the enemy and hostility, whereas in the markets there is rivalry. David Morrisa writer and a former Marine- says "In order to learn the lesson, you had to lose somebody!" (Kilcullen, 2010, p. 2). This is a very good phrase which summarizes the difference with the civilian environment.

Specifying the COIN as a System

The military organizations are approached to be complex adaptive systems in this research. But, this approach embodies the aspects from the open, complex systems, socio-technical systems and systems of systems based on the discussions presented above.

Complex Systems Understanding

A complex system can be simply described as a system comprised of a large number of entities that display a high level of interactivity. The nature of this interactivity is mostly nonlinear, containing manifest feedback loops (Richardson, et al., 2001).

Basically, whether we deal with the system or the problem related to the system, the important part of the system is its integration to the real life. Generally a system which has humans in it, and which dwells in a huge social environment could hardly be denoted as simple system. The more sub-systems it has and the more sophisticated relations those sub-systems interact, the more complicated the system becomes.

Nonaka (1991) describes a company as a living organization rather than being a machine, which reminds a simple perspective towards the complex systems

approach. He thinks this living organization is much like an individual, that has its own knowledge, has collective sense of identity and fundamental purpose.

Socio-Technical System Understanding

Based on Ackoff's (1979) messy situations idea, Adams (2007) claims the bottom line of real world complex systems problems to include a definition of `human activity` in his research. The problems in the real world which includes the human factor can only be recognized and resolved with clear understanding of the complexity of the system and its socio-technical structure. While Quade and Miser (1985) shed the lights over the processes of the systems associated with structures that combine people and natural environment, Keating, Kauffman and Dryer (2001), highlight the social and technical elements of the systems and interrelations.

Socio-technical Systems (STS) has essentially two major subsystems in them (Adams, 2007): Those are admitted to be the 'technical subsystems' including (facilities, tools, equipment, and `knowledge`) necessary for the systems process and a 'social subsystem' which contains the human factor and people in it (Adams, 2007).

Although it has a high level of military engagement, COIN needs the contribution of all governmental agencies, non-governmental, and international organizations, etc... And the center of those interactions is the public, which contains human factor in it. This interrelation with intense human factor in it transforms the environment of the COIN into a very sophisticated and complicated socio-technical system.

Systems of Systems (SoS) Understanding

The many entities and sub-systems of the COIN system, which are also huge systems by themselves. Those huge systems, have some other sub-systems, and even those subsystems also have sub-subsystems in them. And this sub-entity cascading would continue until the very last unit operating in the field. Such a nested structure is a good example of SoS.

Open System Understanding

The nature of the COIN requires any entity in its environment to interact with other system. More importantly, the AKM process in the COIN system requires receiving the input from the outside of the system as well as acquiring from the inside of the system.

Complex-Adaptive System

Based the considerations above, a military system endeavors in such `complex`, `socio-technical`, `uncertain` and `constantly changing` environment has to be adaptive in order both to achieve its goals and to survive.

Summary of Findings

In this Appendix, the entities, sub-entities, interrelations/interactions, stakeholders and especially the dynamic (in a sense chaotic) environment of the huge system of COIN are analyzed based on the *researcher's colligation* and the results of the *personal reviews* (one-on-one reviews) in Appendix E.

Based on the findings of those analyses and additional qualitative data rendered from the personal reviews, along with the perspective of `literature-based `Knowledge, KM, Agility and AKM` understanding, the following coding and correlations are reached:

Scope and Limitation: The focus area of this research is the multinational military organization (NATO) in the counterinsurgency (COIN) environment. However, this research does not claim to present a thorough systems analysis of a military organization in the COIN environment, which is out of the scope this study. The findings of the analysis provide overall systemic foundations for this research.

The Environment, Stakeholders and Entities and Subsystems: COIN has large number of entities due to many actors' involvement in and outside the system. Obviously the quantity of the elements can easily be outnumbered in the real life. COIN has very complicated and changing environment. From the perspective of NATO, the environment has the parties of the `supporters`, `opponents` and `neutrals`. For that reason, COIN environment requires AKM more than any other military environment due to its very fast changing nature, highly adaptive threat, involvement of many actors and the ambiguity.

Boundary: Depending on the specific COIN environment, it is hard to draw the boundaries of the system. Although, the physical boundaries of the system could be assumed as the borders of the HN, the reality of the COIN mandates to take into account every possible effect into environment. In that case, the conceptual boundary of the system becomes the whole world.

Inputs and Outputs: With the AKM perspective, the input of the system is any form of the knowledge. Inputs can be in the form of signal, data, information or knowledge. On the other hand, the output should be `actionable knowledge`.

The dimensions of the AKM concept are constructed with the view of literature studied in Chapter 2 and scrutinizing it with the 'lens' of the systemic approach in this Appendix. Respectively, integrating the systems related findings with the dimension of AKM drive forward important aspects for reconceptualization. Those aspects are denoted as `element` in this research as follows:

- End State (Objective): What is needed? Why is it needed?
- Environment (with stakeholders): Where are we operating? Who has perceptual interest?
- Organization and Structure (CAS) (Planning, Execution and Decision): What is it for? Who is conducting the process?
- Process (Procedures): How can we do it?
- Input-Output (Knowledge as an Asset, Intellectual Capital) : What is used?
- Capability (Tools) (Technology, channels, innovation): With what we can do it? What do we affect?
- The Human Factor: For whom it is needed? With whom it will be realized?

As a conclusion, the military of the COIN environment with respect to AKM/KM as a system is depicted in Figure 37 and explained as follows:

- End State: The `end state` is the primary factor in the military system. No matter what the scale and the responsibility of the military organization is, it should have a clear `end state`. The end state affects the whole KM process as well as other activities.
- The process: The system employs a KM/AKM process with its all steps. The asset processed in KM/AKM is naturally the knowledge. This process will directly affect the capabilities of the system. It will also affect the human factors in the system as well as being affected by the human factors.
- Input of the System: The organization gets `any form of knowledge` in the system. The inputs of the KM/AKM process could be:
    - Knowledge

- Information
- Data, or
- Signal

The first three forms have already been explained in the literature review (Chapter 2). The definitions of those three terms also apply to the military organization. But, especially the COIN environment highlights an additional form of knowledge. Occasionally, especially at lower levels, *signal* would also need to be processed. The signal is not really data yet, but it is rather some symptoms that the units can sense from the environment.

Example: A patrolling unit in the HN land can see some people are unusually gathering. Normally, this might not really mean anything security wise. There could be a lot of reasons for the people to gather: it could be a game, it could be celebration, it could be sales event etc.. However, the experience and the knowledge that this particular unit have, could trigger a sense for this unit. By observing and noticing to the very little details of gathering, the unit can sense a signal of a security issue, or a threat. Similar examples are very common in the COIN environment.

Note that the LL generated from the system will also feed into the AKM/KM process.

Output of the System: Output of the KM/AKM process would also naturally be the knowledge. But, there is a unique aspect of the military COIN organizations that the result of this knowledge should sooner or later turn into an action. If the knowledge acquired cannot be transformed into action, and stays as an asset of the organization, with very fast changing environmental conditions this knowledge will most probably become useless.

Environment and Stakeholders: The environment of the COIN has various and highly influencing differences from regular warfare environment. Related to complexity of the environment, the COIN has very large number of entities and stakeholders. In this research relevant stakeholders and entities can be categorized as `friend`, `foe` and `neutral` in accordance with the NATO COIN Doctrine (2011).

Feedback: The feedback for the process is institutionalized in most of the military organization as the LL process. This process is actually using the `Lessons Identified` (LI) as well as using the `best practices`. Common critics about the real effect of this LL process are that, there are more `lessons unlearned` than `lessons

learned` in the COIN operations. This is also a good indication of a better KM process requirement for the COIN military organizations.

Type of the system: Based on the above mentioned considerations, such a COIN military organization can be described as:

- An open system, because of its various interactions in the environment with different entities and the stakeholders
- A system of system, because of embodying a large number of entities in it, which are also complex systems
- A socio-technical system, because of its combinative structure of consisting technical subsystem (including facilities, tools, equipment, and knowledge) and social subsystem (including human factors and the population)
- And finally, a Complex Adaptive System (CAS), because of the complexity of the COIN environment and military organization as well as the need for adapting to fast change in the environment.

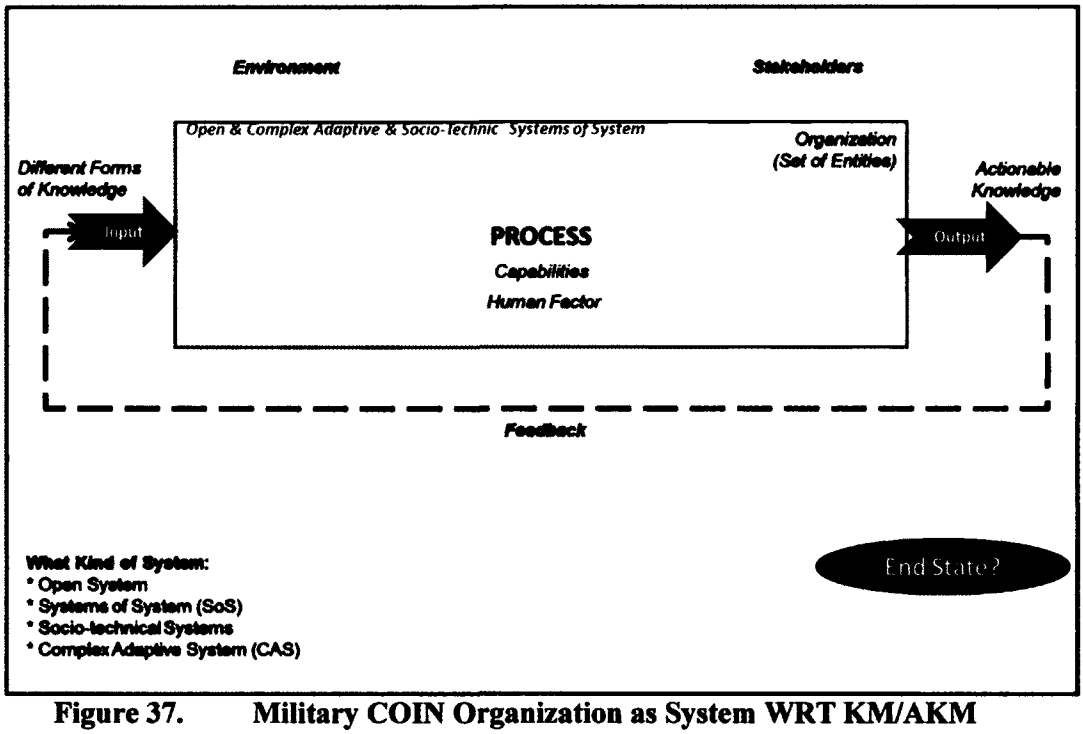


Figure 37. Military COIN Organization as System WRT KM/AKM

APPENDIX B: OUTSIDE EXPERT REVIEW

Scope of the Expert Review

This review is used for the `Agility` aspects of the research, where the studies are related and proposing solutions to agility as well as using various sources in the literature about agility.

The `expert review` is conducted as a one-time feedback loop (Adams, 2007), after development of `literature-based inductive theory` in the research.

The expert used in this research is a researcher who is external to this research and Old Dominion University in order to keep his impartially. He has Ph.D. and numerous academic publications along with published books. His special area of expertise is `agility`. His two books are about agility issues. Additionally, he has good level of understanding about military context and NATO with regard to his expertise area due to his collaborative studies with them.

The expert provided his review based on his training, education, experience and personal expertise (Adams, 2007) about `agility` and its roles in the multinational/national military context.

Theoretical Background

Adams (2007) synthesized the definition of expert for his research as "an individual with extensive education or training, possessing acute and relevant knowledge, longevity, and has risen to the top in their domain or field of specialization" (p.340) by driving from couple scholars.

There is disagreement about designating who is expert and who is not (Goodman, 1987). "Simply because individuals have knowledge of a particular topic does not necessarily mean that they are experts" (Keeney, Hasson & McKenna, 2001, p. 196).

Role of the Expert Reviewer

During the inductive development of the `AKM model` and the concepts related to it, the observed and collected facts serve as the empirical data.

According to Sutherland (1973) the validity of the research primarily depends on the quality of the database from which the inductive inferences were derived. The

observation and collection of empirical data have direct effect on the validity (Adams, 2007) of the inductively developed concepts of AKM model and its attributes.

The use of an expert within the scope as explained above intends to decrease the research risk of deviating the research with possible biases of the researcher, as well as ensuring the adequacy of the information gathered by the researcher that it provides good foundation for the researcher's literature-based induction.

The Purpose of the Review

Primary purpose for the `expert review` is to:

1. Verify that the captured literature related to `agility` contains relevant information and comprehensive enough for the research.
2. Validate the interpretations of the researcher with regard to `agility`.
3. Validate the developed model in terms of `agility` (while getting his insights about the overall AKM model as well).
4. Validate the analysis about `agility as an imperative` and `agility as an attribute`.

Based on the feedback from the expert, the researcher intends to receive the comments about the `inductively developed AKM model and concept`, and recommendations to improve them.

Interview Guide

For the review of expert the researcher used the guide for `agility` itemized below. The guide was not disclosed to the expert in order not to constrain the interview. However, in order not to skip important parts of his study and not to risk the validity/verification of some parts of this study, the researcher used an `interview guide` as advised by (Byres &Wilcox, 1991) for personal use of the researcher.

The review is used for testing and generating Hypotheses: 1.1. & 1.2; 7.1 & 7.2.

<u>Agility Interview Guide</u>

* Agility
  - What is agility?
  - Why agility?
  - What are the main factors in the agility?
* Agility in the Organization

- What is the importance of knowledge in the agility?
- How can we improve agility?
- How can we measure agility?
- What are the components of agility?
- What is the importance of agility in the military?
- Relate KM with Agility?

Accordingly, in the unstructured conversation the expert did not see the following specific outline either, which was used for organizing the comments and inputs of the expert.

The outline was framed with the following threads:

1. Generic Thread:
   - Literature Gap identified by the Researcher
   - Research Method
   - Research and Dissertation Concept
2. Agility related Thread:
   - Definition of agility with the perspective of KM (AKM).
   - Agility as an imperative
   - Agility as an attribute
   - Dimensions and Attributes
3. KM related Thread:
   - Extension of Knowledge
   - AKM and Military Organization
   - Agile Military Organization

Feedback provided by the expert is itemized in Table 20. This content and consistency of the feedback was provided by using two different peer reviews.

Table 20. Results of the Expert Review

The Threads Discussed	Expert Comment	Remarks of the Researcher
1.a. Literature Gap identified by the Researcher	No comment.	*This was mainly explained by the researcher and the expert did not object to what has been said.*
1.b. Research Method	No comment.	*This was mainly explained by the researcher and the expert did not object to what has been said.*

Table 20. Continued

The Threads Discussed	Expert Comment	Remarks of the Researcher
1.c. Research and Dissertation Concept	No comment.	*This was mainly explained by the researcher and the expert did not object to what has been said.*
2.a. Definition of Agility	Different perspectives would create different definitions of agility. Your definition does not sound wrong.	*The expert did not reject or criticize the proposed operational definition of `agility` in this research, which can be assumed as a support for the definition.*
2.b. Agility as an imperative	No specific comments (other than supporting the explanations provided by the researcher).	*The expert provided supportive comments about what the researcher explained. Especially about the change in the environment. The need for adaptation, learning and transformation.*
2.c. Agility as an attribute	The agility and KM/AKM relation can be studied with respect to time change. Rather than having the snapshot at a certain time, we can move towards the timeline. The dimensions in terms of Relevance could be `Accurate: Knowledge+Action`, `Relevant: Knowledge` and `Inaccurate`. The dimension in terms of time could be `on time`, `late` and `1<`.	*The expert recommended the researcher to evaluate the `agility` with respect to `KM` not only at a certain time (discreet value), but over the time (continuous value). This is a detected `**anomaly**` in the inductive theory which needs to be reflected in the analysis part.*
2.d. Dimensions and Attributes	What does ACAP mean? It is understandable (after explained by the researcher). Interoperability and Agility are very important attributes.	*The expert did not criticize the attributes depicted, and attached importance on agility and interoperability delineations.*
3.a. Extension of Knowledge	Liked the idea that the `knowledge is actionable`. This makes sense especially in the military.	*The expert supported the actionable aspect of the knowledge.*
3.b. AKM and Military Organization	No comment.	*This was mainly explained by the researcher and the expert did not object to what had been said.*
3.c. Agile Military Organization	If the line means that the military organization is a closed system. That needs to be corrected.	*The researcher explained that it does not mean closed system. This line was just used to depict the distinction between the knowledge as an asset, (then the expert nodded) and the actionable knowledge.*

Table 20. Continued

The Threads Discussed	Expert Comment	Remarks of the Researcher
Overall Comments	* Knowledge that is not needed at a certain time can be needed in the future for an organization. The organization should take that into account as well. * Use of KM/AKM to realize or improve the agility is something that we did not really think about. This sounds like a very good idea (then the expert invited the researcher for a multinational military panel, which is working on future capabilities, in order to share the ideas and get feedback about the AKM concept).	** This idea of `the possibility of needing the knowledge in the future` contributes to the AKM process in the stage of `knowledge storage/retrieval`. This also an `**anomaly**` to improve the theory.* ** The expert's expression of being impressed with the AKM/KM concept for agility encourages the researcher about validity and credibility of his research. Also his invitation, provided and additional verification and validation platform for the research.*

Outcome of the Review

Overall design and concept of the research was found sound by the expert.

The agility aspects were perceived to be relevant to the body of `agility` knowledge.

Agility definition was found relevant, noting that it is used in the context of KM/AKM.

The issues elaborated for the agility as an imperative have been shared by the expert as well.

The preposition of the researcher with regard the agility as an attribute has been mentored to be revised and modified by taking into account the continuous aspect of time.

Use of AKM/KM to reach and improve `agility` for an organization found to be reasonable and worth for further studies.

The `knowledge storage/retrieval` stage of the AKM process needs to be modified based on the experts feedback (which stresses on the validity of knowledge over time).

To discuss the AKM concept with another `panel of experts` who are focused on `agility` provided another validation and improvement opportunity for the research.

The need for correcting possible misunderstandings regarding the `agile military organization` figure was identified, with the purpose of not giving a wrong impression that the system is closed.

Anomaly Detected

Evaluation with respect to time change: The variables related to agility needs to be defined `over time`. The time is continuous, and agility should be reflected respectively.

Validity of knowledge: Once the knowledge is designated as `not valid/not necessary`, should it be discarded or could it be valid/necessary in the future?

Remedial/Improvement Action Items

- *Evaluation with respect to time change:* Modified `agility as an attribute` as discussed above.
- *Validity of knowledge:* Modified `knowledge storage/retrieval stage` of the AKM process as discussed above.
- *Conduct a new Panel of Experts:* Conducted another panel of experts for validation/verification of agility aspects of the research.

APPENDIX C: PANELS OF EXPERTS REVIEW

Scope of the Panels of Experts Reviews

Three different panels of experts conducted for this research. Each of them aimed to validate and verify different aspects of the research.

- *Panel of Experts Review for `KM/AKM`:* This review was used for AKM concept and model (which is actually core of the study) of the research.
- *Panel of Experts Review for `Generic Understanding of the Research in the NATO Environment`:* This review was used in order to get generic insights of the participants based on their experience and broader perspectives.
- *Panel of Experts Review for `Agility`:* This review was used for the `Agility` aspects of the research, where the studies are related and proposing solutions to agility as well as using various sources in the literature about agility.

The `panel reviews` are conducted as a one-time feedback loop (Adams, 2007), after development of `literature-based inductive theory` in the research. The experts in the panels provided their inputs based on their training, education, experience and personal expertise (Adams, 2007).

Role of the Reviews

These panels increased the validity of the inductive concept development, the stability and applicability of the model, and the external validity and transferability of the research (Adams, 2007). Inspiring from the study of Adams (2007), this research will also try to evaluate three key features of this proposed theoretical study:

- Boundaries of the model and concept:
- Utility of the model and concept
- Pragmatic factors of the model and concept

Boundaries of the Model and Concept

This feature addresses the boundaries of the concept and model, where the research intends to be effective (Adams, 2007). Adams (2007) calls it as the domain of the research. Adopting from Adam's (2007) study, this study investigated the boundary conditions of;

1. The theoretical strategies upon which the concept and model is developed (namely KM, Agility and Military Context)

2. The methodology of constructing the concept and model (inductive literature-based theory development, and deductive validation and verification).

3. A position on the theoretical continuum of KM.

4. The military context (especially COIN) within which it will be applied.

The intent here is first to realize validity check regarding Content Validity which defined as "the degree to which an empirical measurement reflects a specific domain of content" (Carmines & Zeller, 1979, p. 20). Secondly to get the Face Validity which concerns "the extent to which an instrument looks like it measures what it is intended to measure" (Nunnally, 1967, p.99).

Utility of the Model and Concept

Adams (2007) denotes this feature to address the question `what makes this concept and model useful?`.

We expect this concept and model to explain and articulate the facts concerning the knowledge and agility phenomena in the military environment.

Based on Bacharach's (1989) tabulation, aligned with Adams' (2007) characterization, this research also used characteristics of utility as follows:

- Variables: The scope of the variables should cover the domain in which the constructs or concepts are being developed.
- Constructs: The scope of the constructs should cover the domain in which the phenomenon is related.
- Explanatory Potential: It should establish substantial meaning between constructs, variables and their linkages.
- Predictive Adequacy: It should validate the constructs and the variables by comparing them with the empirical evidence.

Pragmatic Factors and the Concept and Model

Adams (2007) denotes this feature as the `usefulness`. For this research, it is usefulness of the concept and model. Adams (2007) further claims that, the usefulness should be able to answer the question of `why is this concept more useful than the other one?` But in order to ask such question there needs to be more than one alternative of the concepts and models.

Although this research claims to have unique concept and model, this feature also needs to be validated.

The Method of Conducting the Panels

1. Panel of Experts with KM Experts and Practitioners:

This panel was formed with different KM experts and practitioners from all round the US Army organizations during they were having a seminar. This panel was realized face to face (the panel members were aware of the study and have been informed about this research).

2. Panel of Experts with the Agility Related Experts and Capability Developers:

This panel was formed with different attendees from different countries. This panel was realized via web-mail communication (the panel members were not fully, but partially aware of the study, mostly about the agility aspects of the study). The panel has been provided with briefing slide and a description of the studies placed in this research via a POC for the panel. The panel members (other than the POC and the mentor of the panel) do not know the researcher and did not communicate with the researcher.

3. Panel of Experts with the Military Doctrine Experts:

This panel was formed with different attendees from different countries, doctrine related representatives. The panel members were not aware the content and the scope of the study. The panel members were just presented a short introduction of the dissertation outcome mainly related to the AKM using military organization, its attributes and then the relevance of this with the multinational military environment.

Theoretical Background:

There are various examples of using panels of experts in order to verify the studies after the development of the theory. Ahire and Devraj (2001) use panel of experts as the external verification process in their work where they used both content and face validation criteria. Similarly, by referring to Ahire and Devraj(2001), Adams (2007) also uses panel of experts verification process after he developed his framework.

Specifications for selecting individuals for membership exist in the literature. Silva (2007) suggests three specifications: knowledge, practical engagement, and their inclination to contribute to the subject matter under exploration and evaluation. Hsu and Sandford (2007) suggest being both highly trained and competent within the specialized area of knowledge.

There are multiple viewpoints in the literature on the size of the expert panel. Powell (2003) questions the effect of the number of participants on the reliability or validity of the process. Some scholars claim that the size of an expert panel would be variable (Linstone &Turoff, 2002; Ziglio, 1996) While some scholars suggest the panels to consist 5-10 experts (Delbecq, Van de Ven & Gustafson, 1975); Clayton (1997) suggests to have 10-15 experts for heterogeneous populations (experts from varying professional stratifications). Okoli and Pawlowski (2004) suggest the optimum size to be 10-18 individuals.

The Purpose of the Reviews

Ultimately the expectation from those panels of experts is to get their judgments about the model and the concept, and provide recommendations which will help to improve the study and add clarity as well as avoiding possible mistakes that might stem from the researcher's biases.

In general, the purpose of the all three panels was to verify that the proposed concept and model are really measuring what they have been intended to measure (Adams, 2007; Nunnally, 1967).

Additionally they were intended to verify the relevance of the concept and model with the context of real military environment (especially COIN environment).

The ultimate points with these reviews are:

1. Verify the boundaries of the concept and model:
    - The model and the concept were appropriately developed inductively out of the literature with contribution of Knowledge, KM, Agility and Military Context.
    - Development of the concept has basis on the KM discipline with respect to military understanding.
    - Development of the concept and model used a generalizing theory along with adequate generalizability and transportability.
    - Model and concept proposed is applicable to the full-range of KM discipline in practice.
    - The concept and model can be applied to the subject matter military environment.

2. Verify the Utility of the Concept and Model:
   - o The measurement objects in the model and concept support the domain of the constructs of Knowledge, KM and Agility.
   - o These constructs relate to the military context.
   - o The substantial connection and meaning between the constructs, measurement and the context.
3. Validate the Pragmatic factors of the concept and model:
   - o The usefulness of the model and concept.

Interview Guides

In order not to skip important parts of his study and not to risk the validity/verification of some parts of this study, the researcher used an `interview guide` as advised by (Byres & Wilcox, 1991) in order to utilize for unstructured interviews.

Military Context Interview Guide

* Military Context?
  - How do you define the change in the military environment?
  - How do you describe the COIN environment?
* Effects of Military Context?
  - What do you understand from `agility` in the military context?
  - What is knowledge for the military?
  - What does KM mean for the military?
  - What are the key aspects of the military?
  - If the military is a system how would you describe it?
  - What are the components of this military system?

Knowledge Management Interview Guide

* Knowledge and Knowledge Process
  - What are the key factors in the knowledge for an organization/ military organization?
  - What do we understand with the knowledge flow in the organizations/ military organizations?
* KM
  - How can we extend the KM with agility perspective?

- Do we need to extend the process for agility? Or is it adequate to respond the agility needs?
- How can we review the KM processes? Specify for each process `Knowledge generation`, `knowledge storage`, `knowledge share` and `knowledge application`.
- How can relate agility to KM processes?
- If we need an additional process for the AKM, what could it be?
- Relation of the findings with the military?

Agility Interview Guide

* Agility
  - What is agility?
  - Why agility?
  - What are the main factors in the agility?
* Agility in the Organization
  - What is the importance of knowledge in the agility?
  - How can we improve agility?
  - How can we measure agility?
  - What are the components of agility?
  - What is the importance of agility in the military?
  - Relate KM with Agility?

Empirical Facts of the Panels of Experts

Each Panel was held with different methods.

AKM/KM Panel of Experts

a. Number of Participants: 19 (but the respondents were nine).

b. Background/Profession of the Participants:

The participants were the Information/Knowledge Managers of the US Army who are stationed all around the country. They are the actual IM/KM practitioners in the US Army. One of the participants was also the instructor of the participants.

c. Execution of the Interview:

The researcher informed participants about the concept and its components, dimensions and the attributes. Thereafter the participants were directed with their

ideas regarding the details of the concept presented to them. The participants provided their inputs in two sections (those sections were realized concurrently, not as one at a time).

First, they provided inputs by writing on the papers and by commenting in the conversations. In the second section, the participants were allowed to provide open-ended contribution, critics, opinion about the concept of AKM. This part was verbal conversation.

In general, only nine of the panelists provided input. The ten of the panelists did not provide any comments (in the results, ten `no comment` responses denotes those ten panelists`). Since no feedback is received from the same ten participants, the researcher took into account the nine responding participants' feedback.

The content and face validities of the research were provided by a member check (with a Ph.D. student studying on KM who participated to the panel) and a peer review (a masters student studying Systems Engineering).

Hypotheses tested and generated in this panel were: 3.1 & 3.2; 4.1; 5.1 & 5.2 & 5.3 & 5.4; 6.1.

Outcome of the Review

Refer to the Table 21 for the details.

Overall design and concept of the research was found sound by the panel.

Organizational knowledge taxonomy found sound and practical (especially in the military) by the panel.

Elaborating the organizational tacit with `mentorship, training and shared group knowledge` is a contribution to the second and last dimensions of the AKM model.

Knowledge flow extension found reasonable by the panel.

The AKM process found applicable and sound to respond the needs of changing environment. But the extent of the questions advised the researcher to clarify the `adaptation` phase of the process.

An indigenously used term, `signal`, made a good sense and very much appreciated by some attendees, especially for the ones who had COIN experience (the researcher comes up with a term which can describe a type of input especially in the COIN environment that is not knowledge, information or data but something else that can initiate the AKM process).

The extended definition of `knowledge creation` was supported by the panel.

The use of the term `virtual memory` attracted some of the participants' special attentions, and they have expressed that it is a very good finding.

`Knowledge Storage/Retrieval` process of the model was supported by the panel.

`Knowledge Transfer/Share` process of the model was supported by the panel.

`Knowledge Application` process of the model was supported by the panel.

`Adaptation` process of the model was supported by the panel.

The attributes related to the model was found sound by the panel. Additional feedback about the responsiveness, by elaborating it with the speed and positive response effects was provided.

Agility aspect of the model did not get much attention by the panelists. Although they have agreed on the need, the panelists did not provide comments as desired (which can be assumed as their agreement on the `agility as requirement`, but could not get comments on the `agility as an attribute`). That might be because of the topic that it is not really in the area of the panelists' expertise. Nevertheless, this advises the researcher to put additional effort on explaining the `agility as an attribute`.

The Agile Military Organization structure which uses the AKM Model across the organization was supported by the panelists.

A couple panelists expressed the study as `an excellent job` which encouraged the researcher to improve the study.

One of the panelists insistently rejected the whole theory and the processes, where he recommended to read some other scholars who are questioning and denying the theory of knowledge management. This required the researcher to read through those researchers and add those to the Literature Review.

Anomaly Detected

1. *Clarification between `Application` and `Adaptation` Processes:* The results recommended that the researcher need to clarify the distinction between the processes of `knowledge application` and `adaptation` in the model.

2. *More elaboration on `Agility as Attribute`:* The results recommended that the researcher need to put some more effort for providing additional explanations on the `agility as an attribute`.

3. *Additional Literature Research:* The researcher needed to make additional literature review for the ones who oppose the construct of KM.

Remedial Action by the Researcher

1. Additional contribution of `mentorship, training and shared group knowledge` added to the `Knowledge Storage/Retrieval` and `Adaptation` processes.

2. More clarification about each of the processes of `Knowledge Application` and `Adaptation` and clear distinction between them have been realized.

3. Additional feedback about the attribute of `responsiveness` has been incorporated.

4. `Agility as an attribute` has been explained in more detail.

5. Additional literature recommended by one of the panelist has been gone through and incorporated to the Literature Review. But the researcher preferred to continue to be in favor of `KM multidiscipline understanding` and its relevant scholars' ideas.

Table 21. Results of the Panel of Experts for KM/AKM

#	Question	Responses	Remarks of Researcher
1.	What is your opinion about the ` organization knowledge` preposition of the Researcher?	* 6 of the participants agreed on the preposition. * 2 of the participants agreed with reservation: - One of the Participants proposed to categorize the Knowledge into three `1. Knowledge Possessed (as proposed by the researcher), 2. Knowledge to Give, 3. Knowledge to Gain`. He propose to substitute the `Knowledge Need to Have (proposed by the researcher) with `Knowledge to Give and Knowledge to Gain`. He/She further proposed that the `Knowledge to Give should have taxonomy of 1. Individual Tacit and 2. Individual Explicit` while `Knowledge to Gain should have taxonomy of 1. Organization Tacit and 2. Organizational Explicit`. - The other Participant proposed additional explanation about the `Organizational Tacit of Knowledge Possessed` to be denoted as `mentorship, training, and shared group knowledge`. He/She further claimed that the same idea for `Organizational Tacit for Knowledge Need to Have could be questionable`. * 10 of the participants provided no comment. * 1 of the participants did not agree on the preposition. - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* Most of the participants agreed on the taxonomy prepositioned by the researcher. * The idea of putting the `Knowledge to Give` and `Knowledge to Gain` could be understandable in terms of `Knowledge Flow`, where the ideas would be to make the individual knowledge available to the use of whole organization and to be embraced by the organization. In that respect the individual knowledge would be in the position of giving, while the organization knowledge would be in the position of gaining. But the idea in prepositioned taxonomy by the researcher is rather organizational perspective to focus on the position of the especially a military organization strives to gain knowledge from the changing environment. The knowledge flow is internal process in the organization. * The idea of elaborating the organizational tacit with `mentorship, training and shared group knowledge` is a contribution to the second and last dimension of the AKM model. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
2.	What do you think about the `extension of the knowledge flow` prepositioned by the Researcher?	* 7 of the participants agreed on the preposition. * 1 of the participants agreed with reservation: - One of the participant proposed to put the `End State` on the right with respect to military style of drawing the organizational chart, and further proposed to put the `Goal` for the Organization on the left of the chart. He further prefers to call `Knowledge Gained` rather than `Knowledge Need to Have`. * 10 of the participants provided no comment. * 1of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* Most of the participants agreed upon the extension of knowledge flow prepositioned by the researcher. * The idea of putting `End State` on the right in the chart is good corrective feedback, which is incorporated into the results of the analysis. But, we prefer not to put the `goal` in the chart. Because this study does not claim to every aspects of a military organization, we would prefer to use the terms those are closely related to KM. Additionally, we will prefer to use `Knowledge Need to Have`. Because, `Knowledge Gained` does not really reflect the intention of this model of responding the need of change in the environment. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
3.	What do you think about the `AKM Model and the terms used in the model`?	* 4 of the participants agreed on the preposition. * 2 of the participants agreed with reservation: - One of the participants agreed on the idea of having the input for the KM process as `knowledge, information, data and signal`, he/she further elaborated the input `signal` as `sense, intuition and hunch`, he further agrees on the `four steps of the KM process including `knowledge creation, knowledge storing, knowledge transfer and knowledge acquisition`, he also agreed on the output of this process being `actionable knowledge`. He/she further questioned the fifth prepositioned step of AKM process, namely `adaptation`, he/she claimed further discussions needed for the `new adaptation` step in the AKM model. - Another participant agreed on the idea of inputs/outputs of the model and AKM model itself. He/she only questioned one of the input which has been explicitly prepositioned by this research, namely `signal`. * 12 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 6 of the participants agreed upon AKM model prepositioned by the researcher, while 10 did not declare any comment (neither rejecting, nor accepting the idea) and did not agreed upon the proposed model. * It is rather noticeable that the participants less agreement on the `AKM` process. That needs to be taken into account for the process model that the fifth step of `Adaptation` should be explained in detail and a clear distinction with the `application` should be provided. * Additional elaborations on the term of `signal` enriches the understanding of this term. Nevertheless the researcher tries to come up with a term which can describe a type of input especially in the COIN environment that is not knowledge, information or data but something else that can initiate the AKM process. The researcher can still use the term 'researcher` along with the provided additional elaborations in order to give more clear explanation for this term. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
4.	What to think about the `Knowledge Creation Process in the AKM Model` prepositioned by the Researcher?	* 3 of the participants agreed on the preposition. * 4 of the participants agreed with reservation: - One of the participants agreed upon the approach of the researcher to the `knowledge generation` process, but he/she further claimed to add `gut feeling` and `environmental awareness` into the `internal process` explained in the model. - Another participant agreed upon the approach of the researcher to the `knowledge generation` process. Additionally, he/she expressed his opinion that the term `signal` as newly introduced by the researcher for both `internal and external processes` in the AKM is `very good term for what the researcher has describing them`. - Another participant agreed upon the approach of the researcher to the `knowledge generation` process but, he/she proposed to put the `end state` to the right hand side of the chart, and name `knowledge to capture` rather than calling `knowledge need to have`. He/she has first questioned the term `signal` but apparently after further listening the researcher and thinking about it he/she support the idea with a note which says `signals are fine, sorry was lost first`. - Another participants agreed upon the approach of the researcher to the `knowledge generation` process and he/she further elaborated the term `signal` as `indicator of the situational awareness based on experience and knowledge flow`. * 11 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 7 of the participants agreed upon AKM model prepositioned by the researcher, while 11 did not declare any comment (neither rejecting, nor accepting the idea) and 1 did not agreed upon the proposed model. * The noticeable thing in this part is the attention of some participants on the term `signal`. We can identify those inputs as supporting additional ideas rather than questioning the term, its usage and description in the process. * The feedback about putting `end state` to the right will be reflected in the research. But the researcher would prefer to stick to the term `knowledge need to have` rather than using `knowledge to capture`. Because, the idea in here is to identify the need of the organization by observing, analyzing and working on the whole aspects of the environment. Capturing would be one aspects of this process. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
5.	What do you think about the `Knowledge Storage/Retrieval Process in the AKM Model` prepositioned by the Researcher?	* 5 of the participants agreed on the preposition. * 2 of the participants agreed with reservation: - One of the participants expressed his/her additional support to the idea of `virtual memory` explained by the researcher, with denoting it `good`, in addition to agreeing on the prepositioned approach of the researcher to this process. - Another participant agreed on the approach of the researcher to the `knowledge storage/retrieval process`, but provided additional feedback that `end state` should be on the right side of the chart. He additionally proposed to call `intangible memory` to the researcher's `virtual memory` usage, and `tangible memory` to the researcher's `physical memory` usage. He/she additionally proposed the idea of `used memories as sources of triggering generation of knowledge` instead of `used both memories as sources of new knowledge`. * 11 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 7 of the participants agreed upon AKM model prepositioned by the researcher, while 11 did not declare any comment (neither rejecting, nor accepting the idea) and 1 did not agreed upon the proposed model. * The noticeable thing in this part is the some attention of some participants on the term `virtual memory`. * The feedback about putting `end state` to the right will be reflected in the research. But the researcher would prefer to stick to the term `virtual memory` rather than using `intangible` and `physical` rather than using `tangible` due to the fact that the aim is to convey the meaning correctly. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
6.	What do you think of the process of `Knowledge Transfer/Share in the Model AKM` prepositioned by the Researcher?	* 5 of the participants agreed on the preposition. * 2 of the participants agreed with reservation: - One of the participants agreed on the approach of the researcher to the `knowledge transfer/share process in the AKM Model`, and he/she further provided feedback of researchers claim of `C4ISR` is a good idea, perfectly fits in this process. - Another participants agreed on the approach of the researcher to the `knowledge transfer/share process in the AKM Model` and her/she further proposed `End Sate` on the right hand side, use the term `Knowledge to Capture/Release` instead of `Knowledge Need to Have` and the term `intangible memory` instead of `virtual memory` and `tangible memory` instead of `physical memory`. * 11 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 7 of the participants agreed upon AKM model prepositioned by the researcher, while 11 did not declare any comment (neither rejecting, nor accepting the idea) and 1 did not agreed upon the proposed model. * The feedback about putting `end state` to the right will be reflected in the research. But the researcher would prefer to stick to the term `virtual memory` rather than using `intangible` and `physical` rather than using `tangible` due to the fact that the aim is to convey the meaning correctly. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
7.	What do you think about the `Process of Knowledge Application in the Model AKM` prepositioned by the Researcher?	* 3 of the participants agreed on the preposition. * 3 of the participants agreed with reservation: - One of the participants agreed on the approach of the researcher. He/She further proposed to use `right time + right info` instead of `punctuality/accuracy` term. - Another participant agreed on the approach of the researcher, but he also proposed to put `end state` on the right hand side of the chart. He/she further claimed to call `Knowledge Need to Have` as `Knowledge to Gain`. He also proposed to put the `boundary of the knowledge` explanation out of the box. - Another participant agreed on the approach of the researcher, and he further provided additional feedback on couple items. One of which was to denote the `knowledge application` as the `knowledge application in context`. Additionally, he also proposed to call the `knowledge need to have` as `knowledge stored`. * 12 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 6 of the participants agreed upon AKM model prepositioned by the researcher, while 12 did not declare any comment (neither rejecting, nor accepting the idea) and 1 did not agreed upon the proposed model. * The feedback about putting `end state` to the right will be reflected in the research. To enrich the` punctuality` and `accuracy` terms with `right time + right info` is a contribution to the analysis. We will prefer to continue to use `knowledge need to have` in terms of consistency in all phases of the analysis. To put the `boundary of the knowledge` out of the box will be reflected in the analysis. The expansion of knowledge application is a good feedback, but we need to take it a step forward and use to clarify the distinction between the `knowledge application` and `knowledge adaptation`. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
8.	What do you think about the `Process of Adaptation in the Model of AKM` prepositioned by the Researcher?	* 3 of the participants agreed on the preposition. * 2 of the participants agreed with reservation: - One of the participant agreed on the preposition of the researcher, but also proposed to but the `end state` on the right hand side of the chart, and name `Knowledge to Gain` instead of `Knowledge Need to Have`. - Another participant also agreed on the preposition of the researcher, but also questioned the term `punctuality` used in the process for testing the agility of the system. He questions to use `speed` rather than the `punctuality`. He further asserts `punctuality implies that you could anticipate you were going to be responsive at a predetermined time`. * 13 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 5 of the participants agreed upon AKM model prepositioned by the researcher, while 13 did not declare any comment (neither rejecting, nor accepting the idea) and 1 did not agreed upon the proposed model. * The feedback to this question and the previous shows that the participants have a sort of difficulty of understanding the differences between the processes of `knowledge application` and `adaptation`. That advises the researcher his explanation and his understanding about these two processes. The researcher will put additional attention in these two parts. * The feedback about putting `end state` to the right will be reflected in the research. To question the `punctuality` and comparing it with the `speed` is another area that the researcher should look into. But we should not forget the aim. To be `speedy` is relative construct. The aim is having right thing at the right time. We should not forget that, the expedite the time and become more speedy is a matter of allocating resources, those would be money, manpower and the time. If the speed is not necessary we do not need to be speedier then needed and allocate those resources for another area. On the other hand, we could think that on one occasion we are very speedy but if it the knowledge is needed very abruptly, even if it is really fast, if it does not reach at the right time, no matter its speed is, it will be useless. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
9.	What do you think about the idea of the Researcher about the `attributes with respect to AKM Model`?	* 4 of the participants agreed on the preposition. * 1 of the participants agreed with reservation: - One of the participants agreed on the idea about the different attributes with respect to the AKM model, but he/she additionally asserted that `measure speed and your attempt to be responsiveness`, and `positive how much impact did you have on the situation`. * 13 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 5 of the participants agreed upon attributes on the model prepositioned by the researcher, while 13 did not declare any comment (neither rejecting, nor accepting the idea) and 1 did not agreed upon the proposed attributes. * Less feedback to this question advices the researcher to put additional efforts for more clarification about the attributes. * The feedback about more explanation with regard to the responsiveness will be taken into account by the researcher. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.
10.	What do you think about the agility as an attribute idea of the researcher?	* 7 of the participants agreed on the preposition. * 11 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 7 of the participants agreed upon the idea of the agility in the AKM, while 11 did not declare any comment (neither rejecting, nor accepting the idea) and 1 did not agreed upon the proposed agility attribute. * High number or agreement (compared to the other) advises that agility attribute make sense to the participants. On the other, no feedback to this question advices the researcher to put additional efforts for more clarification about the attributes. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
11.	What do you think about the `agile military organization` approach of the researcher?	* 6 of the participants agreed on the preposition. * 1 of the participants did not agree on the preposition: - This participant agreed on the idea of the `agile military organization`, he further advised to use `agile knowledge management flows through the whole process` rather than using `agile knowledge management across the whole process`. * 11 of the participants provided no comment. * 1 of the participants did not agree on the preposition: - This participant expressed his view that he does not support the idea of knowledge management. He thinks that the knowledge is not manageable.	* 7 of the participants agreed upon the idea of the agile military organization, while 11 did not declare any comment (neither rejecting, nor accepting the idea) and 1 did not agreed upon the proposed agile military organization. * High number or agreement (compared to the other) advises that agile military organization make sense to the participants. On the other, only one feedback to this question advices the researcher to put additional efforts for more clarification about the organizational chart. * The discussion of the managing the knowledge is rather a philosophical/epistemological debate, which out of the scope of this research.

Table 21. Continued

#	Question	Responses	Remarks of Researcher
	Additional Comments	* One of the participants commented on the way the chart was drown he/she specifically advised the `end state` box to the left of the organization box. * One of the participants commented that `this is an excellent work` for the whole concept and the research. * One of the participants commented that `in fairness to your research application: - The opposite trains of thought!! - See: Deconstructing `knowledge management` by Dr. T.D. Wilson, - Also see: knowledge management in Organizations, L, Donald Hilsop, 2005.` Upon additional discussions with this specific participant, he claimed that the knowledge is something stored in the minds of the people and the minds of the people cannot be managed. He claims that the minds of the people can only be influenced with proper leadership. * A couple of the participants (3) strongly supported the idea of the `signal` as an input into the AKM process which is somewhat different from data, information or knowledge. He thinks this especially makes sense for the military organization in the conflict area. * One of the participants strongly supported the idea identifying `virtual memory` for the organization.	- In order to align with the military drawing, the advice of putting the `end state` to the left of the organization box will be reflected to the studies. - The complementary comment of one participant encourages and motivates the researcher to proceed towards to end of this job. - Apparently one of the participants was against the idea of knowledge management, which clearly helps this research to improve. The participants' recommendation for additional resources those provide different perspective to the knowledge management will be investigated and will be incorporated in the research. - Additionally, we would prefer to stay out of the discussion of whether to manage the knowledge, or make leadership over the knowledge owners. We think this is rather a semantic and philosophical debate that is considered to be out of scope of this research. * The support to the use of `signal` as an input encourages and motivates the researcher for further studies.

Generic Issues Panel of Experts

a. Number of Participants: 28

b. Background/Profession of the Participants:

The participants were from 24 different nations, and experts on doctrine development, standardization and interoperability issues. They were mid-level managers of the issues, that they have the advantage of knowing both the policy level and product level with regard to doctrine, interoperability and standardization.

Three of the participants were also direct practitioners of doctrine development issues.

c. Execution of the Interview:

This panel of experts was not aware of the study. They have only been approached to comment on a specific issue, depending on their broader perspective and their expertise on NATO doctrine and standardization issues.

The researcher intended to get their comments and feedback in order to see the applicability of the concept in the other areas.

The content and face validities of the research were provided by peer reviews (with a Ph.D. student studying on KM and Masters student studying Systems Engineering).

The hypotheses tested and generated in this panel were: H 1.1 & H.1.2; H 2.1 & H 2.2.; H 4.1; H 5.1&5.2 & 5.3 & 5.4; H 6.1.

The interview was framed with the following threads (Table 22):

- Generic Thread
- Agility Related Thread
- KM Related Thread

Table 22. The Results of Panel of Experts for Generic Issues

The Threads Discussed	Expert Comment	Remarks of the Researcher
1.Generic Thread	* Most of the threats are in the form of hybrid and they are beyond the military.	** Hybrid threat idea definitely matches with the idea of COIN environment. Denoting the hybrid threat beyond the military can be interpreted as to highlight the level of other organizations involvement and political connotations.*
2. Agility Related Thread	* Agile way of dealing with the doctrine development by having the other higher level organization is a need. This process seems to be useful in this perspective. * Agility, very much like interoperability looks like an additional aspect needs to be taken into account for the DOTMLPFI in the capability development. It could either be a criterion, or like interoperability an attribute which is across the whole functional areas.	** This proves that agility is a need for organization for different aspects of it. And, AKM seems to have promising specifications for the organizations any agility needs.* ** Placing the agility in the DOTMLPFI seems to be very good idea, which needs to be analyzed and validated. It seems to be a very good future research area. Based on the results of the studies, DOTMLPFI could become DOTMLFPI+A.*
3. KM Related Thread	* Lessons Learned (LL) needs better organizational aspects to feed into the process. * Lessons Learned denote a process as well. It starts with the lessons identified (LI), and goes through a process and at the end it becomes lesson identified. This process needs to be correlated with the process that you have mentioned here. * As we have always been discussing the doctrine development and review process is very long process especially in NATO environment. We always question whether we are meeting the requirements of the troops in the field. Are we developing the doctrine agile enough?	** LL (LI +best practices) seems to be a process which needs to be incorporated in the AKM process. Although it has been depicted in the organizational structure in the analysis, the researcher should mention the possible future study areas LL related AKM issues.* ** As it could be very helpful in any activity of an organization, AKM could improve the responsiveness and agility aspects of the doctrine development process as needed. But this needs to be analyzed, may be part of the studies about DOTMLPFI.*
Additional Comments	* This study should be provided to other boards and working groups.	** This is out the scope of this research.*

Outcome of the Review

Overall, the need for agility (especially COIN environment), usefulness of a KM process in the military organizations and the significance and specifications of the military context have been agreed by the panelists.

The idea of `hybrid threat` which is being used extensively in the military (political military) area is a good initiative for the description of military context.

`Lessons Learned (LL)` along with `Lesson Identified (LI)` and `Best Practices`, needs to be approached as a sophisticated process and its incorporation into KM needs to be analyzed in the future studies.

The contribution of `agility` to the capability development needs further analysis where it can be added in the DOTMLPFI functional areas as an attribute across the whole functional areas, like `interoperability`. Note that this idea might support categorization of different attributes related to AKM model.

Anomaly Detected

No anomaly has been detected, other than supportive contributions of the panel.

Remedial Action by the Researcher

1. *Future Study Areas:* Incorporation of LL process into the AKM model and concept and adding `agility` as an attribute to the DOTMLFPFI in the capability development for the military organizations have been placed in the research .

2. *Hybrid Threat:* This issue strengthens the interpretation of the researcher for the COIN environment being complex. For that reason, it is useful to mention that in the appropriate place of systems thinking in the analysis.

Agility Panel of Experts

This panel was partially aware of the study. They have been informed mostly about the agility aspects of the research. The panel was realized via POC who was present at the panel. Since the panel was held in Rome/Italy the researcher did not have the chance to attend the panel, although he had been personally invited by the outsider expert. The researcher sent his ideas and study related to agility to the POC via mail. And the POC spread these issues in the panel, where they have allocated a period of time to discuss.

The panelists included nine people from different countries.

Their responses were provided to the researcher via the POC.

The content and face validities of the research were provided by a member check (with the POC) and two peer reviews (with a PhD student studying on KM and a Masters student studying Systems Engineering).

The hypotheses tested and generated in this panel were: 1.1. & 1.2; 6.1; 7.1 & 7.2.

The outline was framed with the following threads (Table 23):

1. Generic Thread (systems related)
   - o Military Organization as System with respect to KM
   - o Elements of the Military Organization System
2. Agility related Thread:
   - o Definition of agility with the perspective of KM (AKM).
   - o Agility as an imperative and Means for Agility
   - o Agility as an attribute
   - o Dimensions and Attributes
3. KM related Thread:
   - o AKM and Military Organization
   - o Agile Military Organization

Table 23. Results of the Panel of Experts for Agility

The Threads Discussed	Expert Comment	Remarks of the Researcher
1.a. Military Organization as System	* No comments.	*Since the researcher did not personally engaged with the panelist, the researcher prefers this `no comment` neither as an `agreement` nor a `disagreement` for the information provided about the systemic representation of the Military Organization.*
1.b. Elements of the Military Organization System	* No comments.	*With the same rationale above, the researchers prefers this `no comment` neither as an `agreement` nor a `disagreement` for elements of the military organization presented.*

Table 23. Continued

The Threads Discussed	Expert Comment	Remarks of the Researcher
2.a. Definition of Agility	* The panelists questioned the definition of agility in the research? The main question was about your definition of agility and source which is different from the one adopted by their specific panel *(The POC specified the name of the panel, but in order to keep the panel anonymous the name of the panel is intentionally omitted).* "Agility is the capability to successfully effect, cope with and/or exploit .changes in circumstances."	*The critics about the definition are understandable. The researcher referred the detailed supporting paper to look into for the rationale of having different definition of Agility. Where, the researcher actually used the some of the well-known definitions from different areas, including the expert's definition mentoring this panel. However, the intent of this research is to redefine agility with the perspective of KM and AKM. This has already been reviewed by the expert of Agility and found to be reasonable based on the area of interest of the research. For that reason the researcher prefers to use the operational definition of Agility in the study.*
2.b. Agility as an imperative and Means for Agility	No specific comments other than supporting the need for the agility.	*The idea is supported by the panel, since that is also the reason they are convening and putting effort to have better capability.*
2.c. Agility as an attribute	No comments.	*Since, this was their specific area of interest, although the researcher did not have face-to-face communication with the panelists, from what he got via his POC this idea was not objected by the panel members.*
2.d. Dimensions and Attributes	No comments.	*Since the researcher did not personally engaged with the panelist, the researcher prefers this `no comment` neither as an `agreement` nor a `disagreement` about dimensions and the attributes about AKM.*
3.a. AKM and Military Organization	The panelists expressed that they did not really get the idea what the idea about this topic.	*The researcher had to explain this with additional supportive papers for the panel. This also provided a feedback for the researcher that this part needed to be elaborated more.*
Additional Comments	* The POC did not provide any additional comments from the panelist.	*No action required.*
3.b. Agile Military Organization	No comment.	*Since the researcher did not personally engaged with the panelist, the researcher prefers this `no comment` neither as an `agreement` nor a `disagreement` about agile military organization idea.*
Additional Comments	* The POC did not provide any additional comments from the panelists.	*No action required.*

Outcome of the Review

The feedback from the panel was not as much as expected. This might be because of two reasons: First, since the researcher could not personally engaged with the panelists, the interaction with the panel members via POC and by giving some documents and asking their feedback in response were not really good way of conducting the interview. Secondly, the panel members were aware of mostly positive feedback provided by the expert, who was also mentoring the panel. They might have thought not to provide additional ideas in addition to the expert's views.

Anomaly Detected

Better explanation for the `AKM and Military Organization` is needed.

Remedial Action by the Researcher

The researcher provided some additional explanations about the `AKM and Military Organization` in order to clarify what the research intends to convey.

APPENDIX D: FOCUS GROUP INTERVIEW

Scope of the Focus Group

This interview was used for all three aspects of the research. But special focus was on the AKM and KM model, since this group was actually the practitioners of the `Information Knowledge Management (IKM)` in NATO. After development of `literature-based inductive theory`, the `focus group` interview was conducted three times (with varying participants) due to the availability constraints of the personnel.

This Focus Group was conducted as the last iteration, after the `expert review` and three `panel s of experts`. The number of focus group attendees were five (two of them very actively participated, one of partially participated, two of them more with minor participations). Due to the number of participants, this interview was rather a mini focus group application.

The face and content validities were provided by using peer reviews (with one Ph.D. student studying KM and one Masters student studying Systems Engineering).

The Specifications of the Group

The panel members are the IKM users and administers at NATO. The participants were the manager (branch head), IKM systems administrator, technicians, and an IKM teacher. Some of them had only technical/practical experiences while some others (especially the higher ranks) have both theoretical background and the practical experience about the IKM usage and the applications across the NATO.

Role of the Focus Group

This Focus Group was conducted for the validity of the inductively developed concepts of AKM model and its attributes.

The use of the Focus Group within the scope as explained above intends to decrease the research risk of deviating the research with possible biases of the researcher, as well as ensuring the adequacy of the information gathered by the researcher that it provides good foundation for the researcher's literature-based induction, and previous iteration of the concepts.

The special part of this Focus Group is to get the insights of the practitioners who are dealing with KM issues to a certain extent based on the scope of their capabilities.

The Purpose of the Focus Group

Primary purpose for the `Focus Group` is to verify validity and applicability of the development of AKM and KM and the need originating such conceptual development.

For that reason the purpose of the Focus Group was:

- To verify existence of the need for `agility` in the organization,
- To validate the interpretations of the researcher with regard to `AKM and KM`,
- To validate the developed model, especially in terms of applicability,
- To validate the processes in the AKM model, especially the `adaptation` process,
- To validate the analysis about `agility` attribute of the Model,

Based on the feedback from the group, the researcher intends to receive the comments about the `inductively developed AKM model and concept`, and recommendations to improve and validate the concepts.

Interview Guide

In order not to skip important parts of his study and not to risk the validity/verification of some parts of this study, the researcher used an `interview guide` as advised by Byres and Wilcox (1991) in order to utilize in the unstructured interviews.

Military Context Interview Guide

* Military Context?
  - How do you define the change in the military environment?
  - How do you describe the COIN environment?
* Effects of Military Context?
  - What do you understand from `agility` in the military context?
  - What is knowledge for the military?
  - What does KM mean for the military?
  - What are the key aspects of the military?
  - If the military is a system how would you describe it?
  - What are the components of this military system?

Knowledge Management Interview Guide

* Knowledge and Knowledge Process
  - What are the key factors in the knowledge for an organization/ military organization?
  - What do we understand with the knowledge flow in the organizations/ military organizations?
* KM
  - How can we extend the KM with agility perspective?
  - Do we need to extend the process for agility? Or is it adequate to respond the agility needs?
  - How can we review the KM processes? Specify for each process `Knowledge generation`, `knowledge storage`, `knowledge share` and `knowledge application`.
  - How can relate agility to KM processes?
  - If we need an additional process for the AKM, what could it be?
  - Relation of the findings with the military?

Empirical Facts for the Research

The review was held as an unstructured conversation where the researcher or the group members did not need to follow specific agenda of question-and-answer session. However the interview was tried to comply with a plan and guide.

The guide was framed with the following threads (Table 24):

1. Generic Thread:
   - Military context of NATO and KM
2. Agility related Thread:
   - Agility as an attribute
   - Dimensions and Attributes
3. KM related Thread:
   - Extension of Knowledge
   - Extension of Knowledge Flow
4. AKM Model
   - Knowledge Creation Process
   - Knowledge Storage/Retrieval Process
   - Knowledge Transfer / Share Process

- Knowledge Application Process
- Adaptation Process
- AKM and Military Organization

Table 24. Results of the Focus Group Interview

The Threads Discussed	Group Comments	Remarks of the Researcher
1.a. Military Context of NATO and KM	* IKM at NATO (think more or less similar in the US Armed Forces) is mostly related to `knowledge storage/retrieval` and `disposition`. * The previous structure of the NATO effects current members of the NATO. For example, couple decades ago some nations in NATO were the members of the Soviet Bloc. Some members of NATO might have an unexplained habit of being suspicious which needs to be overcome. * No additional comments about the researcher's explanations with respect to this topic.	* *The observation of the group, pretty much matches with the deductions of the researcher after the literature review about the military in the US an NATO.* * *The group seemed to be convinced by the information and assertions of the researcher.*
2.a. Agility as an Attribute	* No additional comments about the researcher's explanations with respect to this topic.	* *The group seemed to be convinced by the information and assertions of the researcher.*
2.b.Dimensions and Attributes	* No additional comments about the researcher's explanations with respect to this topic.	* *The group seemed to be convinced by the information and assertions of the researcher.*
3.a. Extension of Knowledge	* Lifecycle of the knowledge/information is birth, use, re-use and death of it. * There is the logic of job for an individual in this organization. He has also his responsibilities. There is also the context that he is involved in. Then there is his skills that make it his tacit knowledge and the last there is the hand out in the organization those are explicit knowledge. We need the integration of all for a better knowledge management. * No additional comments about the researcher's explanations with respect to this topic.	* *Most probably the reason of such a lifecycle understanding is because of the limitations of their IKM applications.* * *The group gave a good practical perspective of need for KM process.* * *The group gave a good practical perspective of need for KM process.*

Table 24. Continued

The Threads Discussed	Group Comments	Remarks of the Researcher
3.a. Extension of Knowledge	* Lifecycle of the knowledge/information is birth, use, re-use and death of it. * There is the logic of job for an individual in this organization. She/he has also his responsibilities. There is also the context that she/he is involved in. Then there are her/his skills that make it her/his tacit knowledge and the last there is the hand out in the organization those are explicit knowledge. We need the integration of all for a better knowledge management. * No additional comments about the researcher's explanations with respect to this topic.	** Most probably the reason of such a lifecycle understanding is because of the limitations of their IKM applications.* ** The group gave a good practical perspective of need for the Km process.* ** The group gave a good practical perspective of need for the KM process.*
3.b. Extension of Knowledge Flow	* For us the knowledge life-cycle is also a knowledge flow process. It comprises the knowledge production, knowledge development, using the technology. * No additional comments about the researcher's explanations with respect to this topic.	** This again is rather internal organization knowledge process which may not be useful for the AKM model.* ** The group seemed to be convinced by the information and assertions of the researcher.*
3.c. AKM Model	* Currently the system that we are trying to use is not really fully functioning in accordance with KM or AKM as you describe. * No additional comments about the researcher's explanations with respect to this topic.	** The feedback of the groups about having lack of a fully functioning KM does also verify the deduction of this research, about the military KM applications.* ** The group seemed to be convinced by the information and assertions of the researcher.*
3.d. Knowledge Creation Process	* Responsibility over the information and knowledge is to create the knowledge for us. Need to make use of social network, increase the number of smaller community of interests. * No additional comments about the researcher's explanations with respect to this topic.	** Knowledge creation is not really applied in their IKM process. This rather acquiring knowledge form another source in the organization.* ** The group seemed to be convinced by the information and assertions of the researcher.*

Table 24. Continued

The Threads Discussed	Group Comments	Remarks of the Researcher
3.e. Knowledge Storage/Retrieval Process	* No additional comments about the researcher's explanations with respect to this topic.	* *The group seemed to be convinced by the information and assertions of the researcher.*
3.f. Knowledge Transfer / Share Process	* Generally, the personnel in NATO hesitate to share knowledge, I think for two reasons: One of them is a bad habit inherited from the Cold War Era, where knowledge sharing was not really necessary and it was even not really desired because of the conspiracies of spying and counter-intelligence etc...The other thing is the security issues. People do not want to have problem with sensitive information. If they are in debate whether information is classified or not, they prefer not to share it, in order not have any problem against the security measures. * No additional comments about the researcher's explanations with respect to this topic. * Some personnel or units might have the tendency of hoarding the knowledge or keeping it for them. Because they think that this knowledge is the reason making them valuable. It they share it, they will share their value. This scares them that they lose their importance in the organization. * We really want to encourage to share information and knowledge. * No additional comments about the researcher's explanations with respect to this topic.	* *The interpretations for not sharing the information or hoarding the information are good unique reasons those cannot be exemplified in the civilian life, even in some national military organizations.* * *Second reasoning of knowledge is pretty common and has been mentioned in the literature.* * *Encouraging sharing the knowledge is also a common issue mentioned in the literature.*
3.g. Knowledge Application Process	* No additional comments about the researcher's explanations with respect to this topic.	* *The group seemed to be convinced by the information and assertions of the researcher.*
3.h. Adaptation Process	* No additional comments about the researcher's explanations with respect to this topic.	* *The group seemed to be convinced by the information and assertions of the researcher.*

Table 24. Continued

The Threads Discussed	Group Comments	Remarks of the Researcher
AKM and Military Organization	* No additional comments about the researcher's explanations with respect to this topic.	** The group seemed to be convinced by the information and assertions of the researcher.*
Additional Comments	* What you are explaining are making a lot sense to us that we have always been talking about these issues. We have been discussing what we need and how we can do them. Our thoughts were not as comprehensive and good articulated as you have described. It really applies to what we are thinking and looking for. * Currently we are just trying to communicate better with different NATO entities, have better technological infrastructure, have a better storage system, and trying to have the most knowledge/information available to the others in the NATO organization. But the ultimate point of having KM process is what we want to have. And, your model definitely fits to our desires. * Very good examples of using the social network are the examples of the Encarta and Wikipedia. Encarta put a lot of resources for having a live encyclopedia system, where the Wikipedia is just an anonymous system. Encarta had to cancel their project, and Wikipedia is one of the largest social encyclopedia sources. Social media would actually be helpful for education. The documents developed are first of all takes time to read, secondly they get longer and longer and longer.	** The feedback of sharing the need of such AKM process and supporting the model for both the ability of responding to the needs and its applicability.* ** The researcher and the focus group have the same idea that the KM process is not fully applied in the IKM system of NATO, it is still being developed and improved. The supporting view of the practitioners that the model could fit their needs is very valuable for this research.* ** The Encarta and Wikipedia example is a very good example about investing the efforts on the process by observing the change and trend in the environment, rather than just spending a lot of money.*

Outcome of the Interview

Overall design and concept of the research has been found sound to the focus group. They did not really extend critics upon the proposed study results. This should not mislead the readers that the focus group was unresponsive or not willing to provide feedback. They were really interested in the topic and provided a lot of inputs as can be seen in Table 23.

They found the process very understandable in terms of their theoretical and practical background.

Their mostly compliance with the AKM model and concept could be for a couple reasons. First, the researcher gained a fairly good understanding about the information/knowledge management applications in NATO. He also works in the similar environment as the members of the focus group do. Most probably, being member of the same organizations the group and the researcher had a very good level of communication which might have the led the participants to feel like they have the same ideas. Secondly this interview is the latest one. The researcher conducted four other interviews along with the 14 personal reviews before realizing this interview. After every single interview based upon the feedback he got, the researcher reviewed his analysis and improved it. As a normal result of these iterations, the questionable parts of the concept and model have been reduced after each interview.

The agility need of the military organization and the military context were found reasonable to the group.

Newly proposed AKM model and concept was found reasonable by the group.

The attributes of the model and agility as an attribute were supported by the group.

Extension of Knowledge and Knowledge Flow were supported by the group.

The group supported the AKM model and its processes.

The group also provided good examples in terms supporting the idea of AKM. They also seemed to have common perception of limited use of KM in the military and hence NATO.

Anomaly of the Interview:

No anomalies were detected in the interview.

Remedial Action Items

No remedial action was needed.

APPENDIX E: PERSONAL INTERVIEWS (ONE-ON-ONE)

Scope of the Personal Interviews

The reviews were conducted with 14 different participants on one-on-one personal conversation basis. The researcher conducted face-to-face conversation with five of the participant, telephone interview with two of them, and mail correspondence with seven of them.

All of the participants were military personnel. They were from different countries. The researcher did not ask the ranks or the gender of the participants.

All the participants have either COIN or counter-terrorism experience (the researcher deliberately accepted the inputs for the participants who had counter-terrorism experience, due to the fact that the environment with both irregular warfare are similar).

The interviews were unstructured an open-ended conversations.

The interviews were conducted as one-time feedback loop, before, during and after the development of the inductive theory. In that respect these interviews are different from the other interviews, that all of the others were conducted after development of the theory.

Face and content validities of the interviews were provided by two peer reviews (with one Ph.D. Student studying KM, and with one Masters student studying Systems Engineering).

Role of the Personal Interviews

The inputs provided by the participants were used for inductive/grounded theory development coded data. The researcher used the inputs in all three major areas of the researcher, those are `Agility, KM and AKM and of course COIN Military Context`.

These interviews were used both inductively generating hypotheses and testing them. Investigation of the military context related to COIN operations/theater with respect to systems approach, agility and knowledge management issues were planned to be discussed in detail.

The Purpose of the Personal Interviews

The primary purpose for the `personal interview` was:

- To generate hypothesizes, about military context, agility need and knowledge management requirements,
- To validate the colligation of the researcher about military context and military organization as a system,
- To validate the colligation of the researcher about the agility as an attribute,
- To validate the colligation of the researcher about the Knowledge and Knowledge Flow,
- To validate the colligation of the researcher about the KM and AKM,
- To validate the colligation of the researcher about the agility as an attribute.

Interview Guide

Although the interview is designed to be unstructured; the researcher used a guide in order not to skip some necessary issues to be discussed with the respondent. The guide is used based on the assertion of Byres and Wilcox (1991).

With these 14 personal interviews the researcher intended to test hypotheses: 1.1.&1.2; 2.1 & 2.2; 3.1 & 3.2; 4.1; 6.1; 7.1 & 7.2.

Knowledge Management Interview Guide

Introduction

1.1. What is your experience related to COIN or counter-terrorism: (did you participate in or work about?)

1.2. How do you describe the difference between the COIN (or counter terror) warfare against regular warfare (or the warfare in the cold war era)?

Systems Related

2.1. Would you consider the military organizations in the COIN (or counter terror) environment as a system? If so how would you describe this system?

2.2. How would you describe the complexity of operations of the military organizations in the COIN (or counter terror) environment? Why?

2.3. Who are the parties (friend, foe, neural etc.) And the stakeholders in the coin (or counter terror) environment?

2.4. How would you describe the coin (or counter terror) environment?

2.5. What are the key aspects of the coin (or counter terrorism) environment and operations that makes it unique compared to the civilian environment?

Agility Related

3.1. How do you describe the speed of change in the coin (or counter terror) environment?

3.2. How do you describe your or your units' (please specify the level-tactical-operational or strategic) ability to cope with the change in the coin (or counter terror) environment?

3.3. Which of the following would be more effective for a military unit to cope with the change? Why?

KM Related

4.1. What is the importance of experience/knowledge/talent in the COIN (counter terror) operations and environment?

4.2. How would you rate the knowledge/experience/talent transfer and share? Both in terms of culture and organizational procedures?

4.3. What does `knowledge` mean to you in coin (or counter terror) environment?

4.4. What does `knowledge management` mean to you in coin (or counter terror) environment?

Empirical Facts for the Research

Open Ended Qualitative Analysis Questions for One-on-One Interviews were used in the conversations (Table 25).

Generic

1.1. Experience of the Participant

1.2. Difference of COIN and Regular Warfare

Systems Related

2. 1. Military COIN Organizations as system

2.2. Complexity of the COIN environment and the military organizations in it

2.3. The Parties and Stakeholders in the COIN Environment

2.4. The description of COIN Environment

2.5. Key aspects of the COIN Environment, Unique Aspects of the COIN Environment

Agility Related

1. Change in the COIN Environment
2. The Ability to cope with the Change in the Environment
3. Effective means to cope with the Change (quick adaptation, learning with training and education, organizational transformation)

KM Related

1. Importance of Experience, Knowledge and Talent
2. Knowledge Transfer and Share
3. Meaning of Knowledge in the COIN Environment
4. Meaning of KM in the COIN Environment

Table 25. Results of the Personal Interviews

The Threads Discussed	Personal Interview Responses	Researcher's Comment
1.1. What is your experience related to COIN or counter-terrorism: (did you participate in or work about?)	***Participant 1:*** I have read some documents regarding COIN and worked for a short time in a HQ responsible for COIN operations. ***Participant 2:***I dealt with COIN in Afghanistan. ***Participant 3:*** No, I Have Ever Work On COIN Before ***Participant 4:*** Yes, Partially. (COIN) ***Participant 5:*** I made myself familiar with this topic during my preparation for the current ISAF mission. I was also tasked to conduct a briefing concerning COIN. ***Participant 6:*** Yes, I have experience for about 1 year. (COIN) ***Participant 7:*** Both. (COIN and Counter-Terror) ***Participant 8:*** I participated as a team and company leader and shortly worked as G3. (Counter-Terror) ***Participant 9:*** I worked 2 years at an operational environment as an operations planner staff officer (G-3).(Counter-Terror) ***Participant 10:*** Three years participation and some educational (sometimes as a student or instructor) (Counter-Terror) ***Participant 11:*** I worked in COIN operations as a platoon and company leader for two years. ***Participant 12:*** Yes, I have worked more than 2 years.(Counter-Terror) ***Participant 13:*** Military transition team (MiTT), East Baghdad, ***(Some special information has been deleted by the researcher)***. (COIN) ***Participant 14:*** I participated in COIN operation as a Platoon and Company Leader and a staff officer in different times.	*9 of the participants declared that they have COIN experience.* *4 of the participants declared that they have the Counter-Terror experience* *1 of the participants declared that he has experience of both.* *(NVIVO did not catch the term COIN, because the participants sometimes implicitly expressed their experience, without even using the terms COIN).*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
1.2. How do you describe the difference between the COIN (or counter terror) warfare against regular warfare (or the warfare in the cold war era)?	***Participant 1:*** The success for the regular warfare depends mostly on the kinetic actions, but for the COIN both kinetic and non-kinetic actions have to be implemented. The objectives in regular warfare are usually either to destroy an enemy or seize/control a critical territory, but in COIN the main objective has to be to gain the support of the population. ***Participant 2:*** COIN is an irregular warfare having no rules, laws etc. It is asymmetric and much more complex than regular warfare. COIN is mainly executed by special forces although regular warfare is conducted by regular units. ***Participant 3:*** First you have to abide by the law of humanitarian law mutually in a regular war, but in a COIN you have to but they do not have to. And in a regular war you can use the conservative means and capabilities but in a COIN always you have to develop new methods. As a third point in a regular war it is enough to defeat the enemy, but in a COIN defeating the enemy may have a worse effect on common citizens, and the main purpose is not to defeat the insurgents but to gain the population. ***Participant 4:*** First, I think there is meaning difference between terrorist and insurgent. Therefore the wars to those groups are also different. But both of them are irregular wars and there is no specific environment, time and force level to combat and it is complex, however regular warfare is a specific war which occurs in specific environment, time and force level. ***Participant 5:*** COIN is population centric. The key to success it to win the support of the population and to isolate the insurgents. That often means that it might contradict to more traditional military objectives. For example to kill as many enemies as possible can be harming the COIN objectives more than it do good. Often the enemy is not clearly recognizable because he is not wearing a uniform but just a weapon. ***Participant 6:*** COIN is the war between illegal unseen terrorist and formal forces within legal boundaries. ***Participant 7:*** Completely different. Leadership and small-unit operations make up the core of COIN Operations whereas the latter is about huge-scale operations. COIN requires a long-term effort whereas regular warfare takes place within a time frame. ***Participant 8:*** COIN cannot be ended by regular means even if you are using same tactics they engage against you. And terror has no standards of way conducting their attacks. ***Participant 9:*** Although a great amount of study have been done over the past 2 decades on COIN it is relatively new and the amount of historical data for events/war is very limited. Regular warfare has a very detailed and historical data. And the studies over it go back to BCs. Generally COIN happens in urban environment and at a limited area, due to that reason it is more complex and has more dimensions than regular one. Have international and interagency aspects.	*The coded terms in this part:* *COIN is asymmetric, not bounded by the law (for the insurgents), population centric, complex, uncertainty/ambiguity for the environment and the threat, duration is unknown, urban environment, no clear boundaries, different actors/stakeholders,* *Induction 1: The COIN has is significantly different from the irregular warfare.* *Induction 2: The COIN environment has CAS, Socio-technical, SoS and open systems specifications, in terms of environment, number of entities, the boundaries and the stakeholders, and human-factor.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
1.2. Continued	***Participant 9 (cont'd).*** Regular Warfare due to war ethics opponents avoid battles at urban environment and more simple that COIN. COIN, at least on opponent do not obey/accept the international Law. That increases the complexity. Irregular, both sides agree and obey the international rule of war and ethics. COIN is not a whole nation or sovereign power. One or more smaller groups with in a country. Irregular Warfare is between at least Two countries or nations which have an authority/sovereign power. COIN is conducted with the units those include multinational forces. Regular Warfare is one nation or Coalition. COIN is military and Non Military stakeholders, no unique power who controls everything (failed nation, multiple interest of stakeholders). ***Participant 10:*** Difference are mainly related with ambiguity of COIN's there is no specific boundary especially at engagement rules, relation and participation of civilians are. The other point is time. You can't define or restrict operations duration. In regular war you can define and see your enemy but in COIN generally you can't see the terrorists you can just feel so HUMINT is more important in COIN. So intelligence activities and collection tools are mainly different. Law is at the same very restrictive domain for soldiers. In regular war you don't too much care at tactical level about targets and enemies. <in regular war you can declare an operational area and destroy targets with massive guns but in COIN target management is very important terrorist are not wearing a uniform so it can be very dangerous to destroy target without exact identification of it. War with terrorist need to perform at cultural, government, security and economic domain but for us to perform at these domains requires working with civilians but soldiers are not accustomed to work with civilians. ***Participant 11:*** Irregularity, insufficiency of pure tactical knowledge, more encounter with civilians, uncertainty of the environment and enemy are the main differences. ***Participant 12:*** In COIN warfare, uncertainty and emergent threats are more pervasive. The enemy is not as easily detectable as in regular warfare. Final success is highly susceptible to degree of human centric implications. ***Participant 13:*** Counter-insurgency (COIN) is police and military actions intended to defeat an internal organization from opposing the government. Counter-terror (C-T), however, is not necessarily against an organization inside your own country. Regular warfare I consider the clash between the professional military of two nations. Not all warfare in the Cold war was regular warfare. Very often the conflicts were proxy wars, rather than direct conflict between the America and the Soviet Union. These proxy wars were more often the support by the USA or USSR for insurgent elements in a third nation with the intent of installing a democratic or communist government. ***Participant 14:*** The main difference is that the enemy is clear in regular war with uniform, the war is among two or more regular armies but in the COIN warfare the enemy is hiding behind the innocent people, it is almost impossible to find the terrorists unless they open fire. There can be found many differences between the COIN and regular warfare but they are all linked or originated from this reason, I believe.	

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
2.1. Would you consider the military organizations in the COIN (or counter terror) environment as a system? If so how would you describe this system?	***Participant 1:*** Yes, a military organization could always be described as a system. It has different branches or functions that fulfill a specific part of the mission. The products or actions of some branches or units establish the inputs for some others. Intelligence and knowledge provided by some branches helps the planners to create Operation Plans. Different types of troops, assets, and tools have to be used in a harmony. ***Participant 2:*** Yes, it is system. It is a intermingled system of politics and military. ***Participant 3:*** First you determine the end state and after that you should establish a system. And this system includes not only soldiers but also governmental and non-governmental organizations. If your main effort is not an umbrella on all environments, it is not possible to defeat the enemy or earn the citizens. ***Participant 4:*** Yes, we consider them as a system. Simply, it has special operation branch, staff level operations, government level organization ***Participant 5:*** The military organization is just one element in the COIN, maybe not even the most important one. To really defeat the insurgent you have to take away his cause and isolate him. That often can just be achieved by political, social and economic means. So, what is needed is a comprehensive system of tools and elements to enduringly consolidate the military gains. ***Participant 6:*** Yes but not limited to military organizations. This system should include also civilian organizations. I could describe military as the system that needs re-organization and new policies which will able it to achieve against terror. ***Participant 7:*** Yes, it is a system of various organizations and agencies which should coordinate the effects, objectives and results in a collective way. ***Participant 8:*** Yes, as a disabled body which has no legs and a head on its shoulder. ***Participant 9:*** Yes like many other things we can consider it as a system: Entities of the System would be: Member nations: the core elements of the NATO structure where they provide the money, personnel and other resources; NATO : the political and military international organization which is form with participation of the nations; NATO Command Structure (NCS): This sub-system is the body which plans and manages the activities of the NATO bodies. Partners: they do not have voting privileges as the other member nations of the NATO. But they do provide particular aspects and experiences to the NATO. But additionally there are other systems which operate in the same environment and should be included in the boundary of a greater system. Those are insurgents, non-military organizations (IOs NGOs, private international companies, national entities (host).	*1. All of the participants assert that the military organizations in COIN environment can be assumed as systems.* *2. The coded terms in this part are: knowledge and intelligence, system, Population, number of entities, different actors/stakeholders, end state, environment, no boundary, sub-systems, other organizations, flexibility, complexity, friends and neutrals.* *Induction 1: The military organizations in the COIN environment can be assumed as systems.* *Induction 2: COIN system, has many entities, different types of entities/sub-systems, complexity, ambiguity and change in the environment, importance of knowledge/information in the COIN system, human factor/population-centric.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
2.1. Continued	***Participant 10:*** There are high level commands they are mainly responsible with source and organization. And there are low level tactical units for operations. There are some guarding units in and around the operation area. Also people in AO some are supporter of Terrorist Organization and others are government. Also in the system terrain is very important it has high level importance to determination of operations and terrorists' behaviors. In the system also some units (MIT, UAV etc.) trying to develop intelligence. ***Participant 11:*** I would consider the terrorist organizations as a more flexible system. Apart from the basic logistic support and general directions there is more autonomy for action. The level of flexibility differs among different terrorist organizations. Sometimes, it is a relative independence in operations though acting under a chain of command, sometimes it is self-directing in a loosely connected network where general declarations are the forms of communication. ***Participant 12:*** The COIN environment imposes more complexities to the systems existing within its boundaries. Too many explicit and implicit interactions between stakeholders pose a dynamic nature which consists of challenges to be tackled. The balances between system tensions are fragile and easily changeable. ***Participant 13:*** In order to defeat an insurgency the COIN forces must have a command structure to ensure unity of effort. However, COIN elements are more varied than traditional military units. Additionally, the overall structure of a COIN force should include police, military, as well as other government agencies in order to both fight the insurgent organization and influence the general civilian public to support the government. Military organizations designed for C-T are not as varied and will be more focused on military campaigns to defeat terrorist leaders and influence/support the government of other nations to fight these some terrorist elements. ***Participant 14:*** A system perspective of the military organizations can be defined by focusing on the potential adversaries, friendly and neutral actors as well as other aspects of the strategic and operational environment relevant to the potential security risks and threats. Basic encyclopedic information about the countries and other non-state actors in the area should allow us to develop an initial systems perspective across Political, Military, Economic, Social, Infrastructure and Information (PMESII) domains.	

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
2.2. How would you describe the complexity of operations of the military organizations in the COIN (or counter terror) environment? Why?	***Participant 1:*** The operational environment is very complex. There are innocent civilians, fighting parties or insurgents, military organizations, non-military governmental organizations, nongovernmental civilian organizations, media, international organizations (if it is an international COIN environment) UN, EU, NATO, international GOs, international NGOs, ***Participant 2:*** It requires multifunctional, multitier and sometimes multinational efforts including civilian and military cooperation. It is hard to identify its boundaries and network. ***Participant 3:*** You always give training according to the conservative war, but use the power to insurgents or terrorists, it is the complexity. Because the insurgents have no limit, but you even do not know your limit. If your main effort is COIN, you should establish your system from employment to training. ***Participant 4:*** I think it is complex because there is no specific environment, time and force level to combat. ***Participant 5:*** Complex. There are no fix rules. What has worked on one day at a specific location doesn't have to work the next day, again. Also COIN has to deal with almost all aspects of the society, not just with the military aspect. ***Participant 6:*** It is more complicated than the regular one. In this environment, the enemy has no insignia, generally no concept and most dangerously mixed with civil population who assists them. So the main problem of military forces is to distinguish the terrorist from the civil population. Since you cannot separate the terrorist line from the civil line, there is a huge/no area of operation. Furthermore, you need to have more precise and timely intelligence than regular warfare in order to refrain collateral damage. ***Participant 7:*** Extremely complex, because the results of one move by one organization can easily affect the efforts/results of another. ***Participant 8:*** Many times with no specific targets. If you lose your comrades in fighting you get sad and demolished. If you are able to kill more insurgents this time you have to be alert for any counter attack of vengeance. ***Participant 9:*** Compared to the regular warfare military operations are much more complex due to nature of COIN explained above. First, physical environment is much more complex; buildings, narrow roads, suitable places for hiding, Basements. Those affect the capability of weapon and intelligent gathering systems. Secondly, the community still lives at the COIN environment and interact both with military system and insurgents. Military forces are includes different national units with different culture, language, rules, and weapon systems.	*1. All of the participants assert that the system of COIN is complex.* *2. The coded terms are complex, population/civilians, different organizations and entities, no boundaries, change, precise and timely (which means agility), the effect of the environment, intelligence and awareness, flexibility, other organizations.* *Induction 1: The COIN system is a complex system.* *Induction 2: The system is complex, no boundaries, importance of the environment and stakeholders.* *Induction 3: Referrals to change, time and accuracy, training, and intelligence issues implies agility and knowledge issue.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
2.2. Continued	***Participant 10:*** Complexity is depend Operations' size and frequency. If a unit do a new kind operation at a different AO with different units or intelligence reliability is higher complexity increase but for routine kind operations complexity decrease. Especially planning procedure differs and get easier from regular warfare because of supportive activities unchanged behavior. For example fire support, rescue, intelligence, logistics don't change so much. ***Participant 11:*** The operations in such an environment require full time awareness despite uncertainty. Also, it is carried out in a civilian dominated area. The effects of mistakes in such an environment have quite high costs. Very often the initiative is on the terrorist side, and the regular units face the challenge of fighting against an indistinct adversary, in an unexpected time, at an unexpected location. The cumulative high level stress of all these factors prevents the military units from succeeding in complicated operations where these are mostly needed. Shortly, COIN requires the highest level of detail in operations; however there are many factors for obstruction. This means the level of professionalism in COIN is more necessary than conventional operations. ***Participant 12:*** The ambiguous characteristics of threat environment are the main source of complexity. The interaction between enemy and local people is not clear good enough to frame the problem. The political coherence between host nation authorities, the players of support nations and local people is decisive to have the final success. Psychological Operations are invaluable for all parties. ***Participant 13:*** COIN requires greater flexibility and variety of units. Success for COIN efforts is not as easy to measure. When developing its COIN units the government must be willing to accept a longer-term effort in order to fully defeat the insurgency as well as prevent its re-emergence. C-T does not require as much flexibility as COIN, but is more flexible than traditional military forces. ***Participant 14:*** Since COIN operations require different types of military organizations and it might be necessary for many occasions to keep the ordinary military structure, the military organizations becomes quite more complex. Even the ordinary military structure is not kept the organizations built against COIN environment would be more complex. The reason for this increased complexity is that the COIN operations demands more involvement with civilian life; and the intelligence and logistics services for the COIN operations are more complex.	

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
2.3. Who are the parties (friend, foe, neutral, etc.) And the stakeholders in the coin (or counter terror) environment?	***Participant 1:*** The government of the host nation and its all civil and military organizations, the insurgents, the population, international security forces and aid organizations (for international COIN). ***Participant 2:*** At least, the parties are incumbent government and its opposition, there may be supporting countries, NGOs, international community in both sides. ***Participant 3:*** In a global era, the entire environment can be assessed as parties and stakeholders. Because a terror organization affects not only your country or friends, but also the world and the world effects the terror organizations. ***Participant 4:*** Friend is the coalition, foe is Taliban, and neutral is population and government. ***Participant 5:*** Internal actors: Government, insurgents, population, Organized Crime, local power brokers, Warlords, religious communities, ethnical groups. External actors: Neighbors, international community. ***Participant 6:*** As discussed in previous part, this is the hardest part of the question. The parties are blurred here. If there is terror in somewhere, most probably civil locals assist the idea that terror sources. In this case, generally there are groups with weapons and attacks government forces and institutions including schools and admin buildings, there are locals who must behave hypocritical way. Since the armed groups are the children of these locals, it is not possible to think this group un-linked to the armed ones. So locals would favor to the terror groups but they need to behave that they are against to them and they are loyal to government. Vice-versa, even they like to be with government, they would be in a danger to be discriminated by other locals as infidels. Moreover, the outsiders like some neighbor countries generally assist the terrorist groups and support them in logistics and education in order to impose their political will on the subject matter country. On the other hand, government forces seem to be alone in this fight. ***Participant 7:*** Friends (our forces and organizations), Foe (insurgents), Neutral (the people living in the area of operation, the people of that country, the NGOs, the citizens of TCNs, intl. organizations) ***Participant 8:*** Especially local public (citizens) is the most important friend while all terrorist groups and their supporters in between public are foe. Generally i do not believe any neutral to be in the COIN environment. While national security and intelligence services and organizations are stakeholders on friendly side, foreign intelligence services on the opposite.	*1. All the participants (except one participant) agree on the parties to be friend, fore or neutral.* *2. The stakeholders are basically anybody, population, NGO's, parties are not clear, international and civilian actors.* *2. Importance of education, intelligence.* *Induction 1: The parties and/or the stakeholders can be categorized as friend, foe and neutral.* *Inductions 2: The stakeholders are numerous and different organizations, some are civilians.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
2.3. Continued	***Participant 9:*** It is not easy to classify the stakeholders in COIN compared to regular warfare. There would be Nations or Coalition forces, international organizations, national organizations which has interest in country where COIN conducted, civilian population, government, ethnic groups, border nations and ethnic groups in border nations. ***Participant 10:*** Supporters or militias generally work like foe. Especially militias are using very active for logistic support, C-IED or in urban activities. At high level sometimes foe can be everybody else than you. For tactical level you don't have friends you have just your units. ***Participant 11:*** The most important parties are the neutral ones (or the civilians in the environment. As in any military operation, friends (in terms of confidence / reliance on each other) make the second degree important party. The enemy's ability and common technique is also important, but the stakeholder that support or manipulate the enemy is more important than the enemy. The enemy's financial, logistical, communicational support very often is provided by the interest group that benefits from the insurgency or terror. ***Participant 12:*** Insurgents, local people, local authorities, collaborators (the people who serve for both insurgents and local authorities), support nation troops or agents, social media actors and tools, clergy of local nation, international organizations. ***Participant 13:*** COIN friends include government elements (police, military and other government agencies) separately, but ultimately collectively, operating to maintain the standing government of a nation. C-T friends include the existing government and the foreign government units where the terrorist organization resides. COIN foes are the insurgent elements who are attempting to defeat the existing government. Terrorist forces are foreign elements. Neutral elements include most of the civilian public which wishes to continue to live and work day to day. Toleration of insurgent forces is not the same as active support of insurgents. Most often toleration by the civilian society is a matter of pragmatism in order to continue to live and work with minimal interference by either insurgent or COIN forces. ***Participant 14:*** FOE: the terrorists. Friends: the military organizations, friendly citizens and civilian organizations and governmental organizations. Neutral: not FOE civilians and the nations that are not participating to any kind of operations.	

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
2.4. How would you describe the coin (or counter terror) environment?	***Participant 1:*** Unstable, changeable, unsecure, fragile, sensitive, uncertain. ***Participant 2:*** Power struggle between two opposite sides to gain population support. Combine of the conditions, circumstances, influences, characteristics and actors which affect the military forces. ***Participant 3:*** Have multiple dimensions and complex cannot be defeated with just power. ***Participant 4:*** The COIN is quite broad, encompassing offensive, defensive, and stability operations such as civil security, civil control, essential services, governance, economic development, and infrastructure improvement. ***Participant 5:*** All comprising, fluent and fast changing, complex and non-liner, interrelating, impacted by political agendas and interest. ***Participant 6:*** Environment is very confusing especially no consensus on the definition of terror. So the terrorist of one country could easily be the democracy hero of another. Legal arrangements help terrorists more than government forces. While regular forces are living in military barracks in uniforms, terrorists live in their villages in local dressings and they grab the weapon (which they hide other times) and they can make an assault to government forces. So a guy who sells you commercial items may attack the night in your dormitories. In this environment, legal pressure of government forces and liberty of terrorist with a lot of unknowns could describe the environment better. ***Participant 7:*** Complex, tangible, open to effects by all parties. ***Participant 8:*** Not clear and risky and difficult to distinguish. The target you chose may be an innocent civilian and no certain enemy in a certain place. ***Participant 9:*** Quickly changing, very adaptive enemy, unpredictable enemy, difficulty of enemy detection, high probability of civilian casualties, effect of media, operating in a different country, difficulty of isolation. ***Participant 10:*** Army is not fighting in urban so this is chance for at least not to worry about civilians. But intelligence collection is not so supportive so I can CT environment for my side as unsafe. ***Participant 11:*** COIN environment is an environment where defense tools are needed / used for law enforcement or security purposes. That requires more knowledge and care. It is like an environment where you very often have emergency surgery tools, but need to do a microsurgery. ***Participant 12:*** COIN is a kind of Stability Operations executed on the ground to establish the law enforcement authority of governmental actors and maintain the public order promoting the rule of law. ***Participant 13:*** The COIN environment can include every aspect of society within a nation because its goal is to maintain the existing government. it can include the public education of a nation's school children to indoctrinate them into supporting the existing government. It includes most aspects of police work in order to provide a secure environment for the civilian population. The C-T environment is narrower in focus but includes the government elements of the targeted and host nations. ***Participant 14:*** Unclear and unexpected, not fitting to the formats -unique-, changing rapidly.	*The coded terms in this part are, complex, uncertain, adaptive threat, unpredictable, population, knowledge and most importantly the change.* *Induction 1: the environment is uncertain, fast changing, complex, and civilian population oriented.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
2.5. What are the key aspects of the coin (or counter terrorism) environment and operations that makes it unique compared to the civilian environment?	***Participant 1:*** Lack of trust among the population towards the government and military, Pressure of the insurgents on the population. ***Participant 2:*** The population, intelligence, technology. ***Participant 3:*** No comment. ***Participant 4:*** In insurgencies, the center of gravity is the population. In support of a population-centric strategy. Because it was very hard to differentiate between population and humans. ***Participant 5:*** To isolate the insurgent from the support of the population. ***Participant 6:*** For me, COIN environment cannot be separated than that of civilian. They use the same environment. ***Participant 7:*** Lack of security, lack of stability, lack of economic efficiency. ***Participant 8:*** Fear, injustice, insecurity, lack of confidence and freedom. ***Participant 9:*** High risk of causalities and strategic effects of tactical or technical level of mistakes, a soldier's action can cause high level political effects. Innocent people can lose their lives. Compensation can be possible for the mistakes and loses but it is not the case in COIN environment. Enemy, friends and the neutrals are mostly clear in the civilian environment and no additional effort is needed for that. This is not the case for COIN environment. ***Participant 10:*** In the CT environment you can't trust anybody, and it can be C-IED's at everywhere so unsafe. In civilian environment you have social activities but in CT your family or daily habits are not available this mean CT environment is isolated from social and real life. This situation making you nervous, diminishing your life expectations. ***Participant 11:*** It is still a civilian environment, but the stress of the battlefield makes security forces forget this fact which leads to the failure of operations. Every single misdeed against the civilians is open to exploitation. More encounters with civilians are needed, but it is more risky than a conventional military operation. It is a civilian environment where military is needed as a supplement to other civilian efforts (education, health, reconstruction). The focus of the military should be on the protection and continuity of these other more important efforts. ***Participant 12:*** In the COIN environment, all the stakeholders are more susceptible to the threats which are emergent in nature. The implementation of rule of law is challenging for local authorities. ***Participant 13:*** No comment ***Participant 14:*** -no comment	*The coded terms in this part are: population, uncertainty, change, political effects, and environment.* *Induction 1: The unique aspects of the COIN is related to environment, being population-centric, uncertainty and change.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
3.1. How do you describe the speed of change in the coin (or counter terror) environment?	***Participant 1:*** Positive changes take long times, but negative changes can spread quickly. It is not easy to gain the heart and minds of the people, but very easy to lose it. ***Participant 2:*** It is hard to predict and perceive the change. It is linked to time, place and conditions. Sometimes it is dynamic, sometimes stationary. ***Participant 3:*** It is in line with the global change and the technologic changing speed. ***Participant 4:*** It is so dynamic. ***Participant 5:*** Fast. Because you have to change between fighting and "win hearts and minds" mission in short time, sometimes also on the same location. ***Participant 6:*** That depends on the country. Nevertheless, for the terrorist they could change the tools and means very quickly. Since these groups act in small numbers, change is fast and effective. But for the government forces, it is very cumbersome especially in some countries where central decision making system is on. This slowness of adapt causes a lot of lives in those centralized countries. ***Participant 7:*** Very slow. (takes many years) ***Participant 8:*** Believed to be so *fast* but not. Un-clarity make it be perfected fast otherwise it is insurgent group and its leader related. ***Participant 9:*** It can be measured by hours sometimes shorter. Those changes affect even the main strategy of the effort. Prediction of those changes nearly impossible before they are seen. ***Participant 10:*** Speed is very low just seasonal. In winter you feel safe and un operational. With the spring operations are starting and for next year this is not changing so much. ***Participant 11:*** Since the COIN operations last much longer than other military operations, the cumulative effect of the past is felt more severely. Whatever mistake is done in the past can hardly be fixed in the future. Once the operation is carried to the second generation of the insurgents / terrorist it is much harder. Speed of change is also related to the global change. ***Participant 12:*** The speed of change cannot be predicted appropriately. Uncertain and ambiguous characteristics of COIN environment also make the speed of change fuzzy. ***Participant 13:*** Generally change occurs most slowly in COIN. However, C-T efforts may be long-term because the terrorist elements generally live outside the targeted nation. This requires support of more than one nation to defeat terrorist organizations. ***Participant 14:*** Agile. Avery small occasion can trigger big and effective problems easily and rapidly.	*1. Most of the participants believe the speed of the change is fast.* *2. Few mentioned the slow rate in the change, but when you read the context, they mean to adapt to the change is slow, not the change.* *3. Most of them mentioned the speed of the change.* *4. Some of them also mentioned the difficulty of detecting/recognizing the change with different words.* *5. The coded terms in this part are: change, fast, uncertainty, environment.* *Induction 1: There is change in the COIN environment and this change is fast.* *Induction 2: Adaptation to the change in COIN environment is slow. This is a significant problem area.* *Induction 3: There is problem of detecting and recognizing the change.* *Induction 4: The specifics of the environment is focused on the change, uncertainty and the speed of change.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
3.2. How do you describe your or your units' (please specify the level-tactical-operational or strategic) ability to cope with the change in the coin (or counter terror) environment?	***Participant 1:*** No comment. ***Participant 2:*** No Comment. ***Participant 3:*** I am not in a unit to wage a war against the insurgents but in my environment it is very fast to adaptation. ***Participant 4:*** No Comment. ***Participant 5:*** HQ ISAF – strategic level. HQ ISAF consists of multiple sections dealing with civil aspects to ensure a comprehensive approach. ***Participant 6:*** For tactical units. Change is slow so adaption is slow. Try and learn model works. So it causes lives before lessons learned. ***Participant 7:*** My unit was of tactical level and its ability to cope with change was limited. ***Participant 8:*** Tactical, they are quite successful when engaging insurgents. ***Participant 9:*** Generally we were trying to adapt ourselves to the new stations. And after a time (6months-1 year) units are getting demotivated about the strategies and losing their faith in success. ***Participant 10:*** In tactical level it is not feeling because mostly you are serving two years in AO so any change in tactics of terrorists giving you high casualty. For fight casualty you need more technologic devices and it is taking time. So at tactical level any change at foe making you un operational. I think recently cope with the change at strategic level is doing more successfully. And this depends on leaders. If they focus on the process, problems and solutions they can cope. ***Participant 11:*** My unit was at a tactical level and did not see very much change in the COIN environment. ***Participant 12:*** The ability of social and cultural empathy makes the actions of troops more reliable. Social and cultural awareness should be enhanced through a series of informative explanatory instructions. ***Participant 13:*** Because change occurs slowly at the tactical level we were able to cope with change easily. However, because change is slow and often hard to measure, it can be hard to maintain momentum and morale within tactical COIN units. ***Participant 14:*** It is more difficult to adapt itself to the changes in the COIN environment for the bigger units. A platoon can more quickly adapt to the changes than a battalion.	*1. The participants approached the reaction of their units to the change differently. That is most probably because of their involvement with in different levels.* *2. Coded terms in this part are: adaptation, change,* *Induction 1: The respond to the change is related to size and level of the units. Smaller units adapt better compared to the larger and high level organizations.* *Induction 2: Change is closely related to adaptation.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
3.3. Which of the following would be more effective for a military unit to cope with the change? Why?	***Participant 1:*** Learning (Training And Education); If the units have a good background, they can easily adapt themselves to the new situation. ***Participant 2:*** Organizational Transformation. Because it includes technological developments that will ensure adaptation of units and meet the threat faced. ***Participant 3:*** Quick Adaptation. ***Participant 4:*** Learning (Training And Education) Because COIN Needs Special Operations. ***Participant 5:*** Quick Adaptation. Because you have to change between fighting and "win hearts and minds" mission in short time, sometimes also on the same location. ***Participant 6:*** Organizational Transformation. For tactical units I believe that is most effective. ***Participant 7:*** Organizational Transformation-first. Learning (Training And Education)-second. Quick Adaptation-third. ***Participant 8:*** Quick Adaptation. ***Participant 9:*** Although it depends the duration of the operation the most important capability would be Quick Adaptation. ***Participant 10:*** Quick Adaptation. The other options take time and terrorist organization can feel it is doing right, so I think quick adaptation is necessary. At the same time because of media effect public reaction has to take into consideration. ***Participant 11:*** Quick adaptation is always necessary. For a change in terms of terrain and the type of enemy (like whether it moves in small groups or big ones, the tactics they use etc.) organizational transformation and learning are needed. But, for the change in overall environment including the civilians and other aspects of the society learning is more important than others. ***Participant 12:*** Organizational transformation should take the priority since it leads `learning` process and `learning` process eventually ensures quick adaptation. But, in theory, all the three have an effect of combined effort. All they have interconnected and interdependent functional relationships. ***Participant 13:*** Learning is most effective. It enables COIN and C-T units to evaluate not only the enemy but also themselves. Adaptation is helpful, but with the requirement for a long-term focus for COIN and C-T units, efforts must be coordinated at the operational and strategic levels to identify where and which tactical efforts are working best. Organizational transformation generally does not occur quickly and would most likely be a product of the long-term learning efforts of a government's collective efforts. ***Participant 14:*** Quick adaptation. Organizational transformation is limited to organization. Learning does not include the changes in attitudes. Therefore quick adaptation would be more effective.	*1. All of the participants agree the importance of either, adaptation, or learning or transformation.* *2. Most of them mention adaptation.* *3. Coded terms in this part are: learning (training and education), quick adaptation, and organizational transformation.* *Induction 1: The important factors the changing environment are, adaptation, transformation and learning.* *Induction 2: These three means have different effects in the environment based on their durations (transformation takes more time, then the learning, adaptation is the quicker one).*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
4.1. What is the importance of experience/knowledge/talent in the COIN (counter terror) operations and environment?	***Participant 1:*** All of them are important, but knowledge should come first. Experience can be built on knowledge. Talent can be enhanced with knowledge. ***Participant 2:*** These are the parts of system that contributes the success. ***Participant 3:*** It is important but there is a more important subject: system. ***Participant 4:*** It is very important because it covers special operations. ***Participant 5:*** Talent counts more than rank. The attitude towards the population is critical. Somebody who doesn't honor the local population will do more harm than good. Cultural awareness is important. ***Participant 6:*** Crucial. History repeats itself so the cases that cost losses in COIN. Lack of transfer of experience/knowledge/talent in troops is one of the main reasons of having loses in COIN operations. ***Participant 7:*** There must be a reliable and quick system of sharing the information/experience. ***Participant 8:*** Knowledge and talent is a must in COIN but not sufficient ***Participant 9:*** Extremely high compared to regular warfare because of rapid change and effects on units. ***Participant 10:*** Three of them have same importance. If you have experience but not others what can do. Or you have knowledge but not experience and talent. ***Participant 11:*** Experience might lead to bias and can be even dangerous. Knowledge is important and should be grasped to the smallest unit level. Social talent is more important than operational talent. ***Participant 12:*** The reliability of Experience/Knowledge Management is vital to the success of procuring necessary intelligence and analysis of existing intelligence as well. In the COIN environment, the personnel who assume necessary `Experience/Knowledge Management` could frame the system problems appropriately and develop necessary measures against possible threats and so employ appropriate tools to gather intelligence which is indispensable for the success of COIN operations. ***Participant 13:*** Experience implies a person has conducted COIN or C-T operations more than once. (But does not necessarily conducted COIN successfully). Knowledge is gained from experience and provides a COIN or C-T the ability to analyze efforts to identify techniques which are success or failures. Talent is a result of experience and knowledge. Consider as a parallel to baseball. A child may learn how to play the game in school. He has learned the rules, and has played a few times, but is not necessarily any good. Increased knowledge would be gained by playing unorganized leagues. Over time the child will adapt his skills and improve his ability. Talent most often occurs after long periods of time due to repetition and practice to hone skills and become proficient. ***Participant 14:*** It is highly important to have experience/knowledge/talent. Because the environment changes rapidly and affects the operations, the level of situational awareness has to be high which is an outcome of the experience/knowledge/talent.	*1. All of the participants agree on the importance of knowledge, experience and talent.* *2. Some already mentioned the need for knowledge/experience sharing.* *3. Some provided good comments on intelligence and analysis of intelligence.* *4. Coded terms are: knowledge, experience, talent, population, experience, ability, adapt, time.* *Induction 1: Knowledge (with its cognitive and technical parts) is very important.* *Induction 2: The need in the COIN environment is the need for knowledge sharing.* *Induction 3: Importance of intelligence is inevitable.* *Induction 4: The COIN environment needs a process for knowledge and its components.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
4.2. How would you rate the knowledge/experience/talent transfer and share? Both in terms of culture and organizational procedures?	***Participant 1:*** Knowledge, Experience, Talent ***Participant 2:*** Experience, knowledge share and transfer, talent. ***Participant 3:*** Knowledge share and transfer, experience, talent. ***Participant 4:*** Knowledge - experience – talent. ***Participant 5:*** COIN often depends on personal relationships with the local population. Such trust isn't built easily or fast. ***Participant 6:*** I believe that latter comes before the former. If knowledge/experience/talent transfer and share is not a part of culture, there is a need to have first organizational procedures to set it up then later wait this transfer and share will be a part of culture. ***Participant 7:*** For both it is weak, slow and insufficient. ***Participant 8:*** Experience/Knowledge/Talent Transfer And Share ***Participant 9:*** In my unit it was not more than preparing lessons learned journals and writing reports to higher commands about important incidents/cases. ***Participant 10:*** I can't rate all of them have equal importance. ***Participant 11:*** Experience is the easiest transferred. Talent is not transferred but may develop by time. Knowledge transfer takes time, and requires a supportive team in addition to the leader of the unit. ***Participant 12:*** It could be rated as medium. I believe that there are still many rooms for the requirement to improve the knowledge/experience transfer in a systematic approach which should be adopted by organizational procedures. ***Participant 13:*** At the tactical level I do not think there was a good deal of sharing. Each MiTT tended to focus on the efforts in their area, but rarely, if ever, interacted with other MiTT soldiers to exchange information (experience and knowledge). ***Participant 14:*** 1. Knowledge 2. Experience 3.Talent	*1. All the participants agreed on the importance of knowledge, experience, and talent.* *2. Some also mentioned the importance of knowledge transfer and share.* *3. Coded terms in this part are: knowledge, experience, talent, transfer and share.* *Induction 1: The knowledge (along with cognitive and technical parts) is very important in the COIN environment.* *Induction 2: Knowledge Share and Transfer is crucially important in the COIN operations.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
4.3. What does `knowledge` mean to you in coin (or counter terror) environment?	***Participant 1:*** Cultural awareness, Understanding of situation, Background of the current crisis/conflict, background about the on-going operations, ***Participant 2:*** Cognitive information gained by experience. ***Participant 3:*** Situational awareness and follow all necessary development and incident and action. ***Participant 4:*** Establish Shared Awareness and Understanding. Coordinate COIN Contracting Issues/ Efforts. Inform / update on initiatives of common interest. ***Participant 5:*** It means knowledge of the human terrain. Local customs and relations, history and ethnical backgrounds. The ability to move between the local population without violating / flaming them. ***Participant 6:*** Knowledge means for me is to know enemy and his techniques and to know yourself as well. ***Participant 7:*** Tactics, Techniques and Procedures (TTPs), reports, orders, plans. ***Participant 8:*** Firstly to have the information of how to survive in COINs. Secondly to have compact intelligence about terrorists, their places and activities including supporters network. ***Participant 9:*** Valuable information which filtered by experienced COIN personnel mind. Purified information, which makes me more efficient during the fight with insurgency. Behavior of the enemy (currently and change during the time) tactics and techniques, values of population in the environment, their view on insurgent and friendly forces, organizational structure of the enemy, national entities and their operations. ***Participant 10:*** Knowledge comes from different areas. You can have some background knowledge about social life, military art, doctrine, weapons and human nature but this is not enough for fight. You need to take special training related with your duty. And every day on duty with experience you increase your knowledge. After duty you judge yourself what you did right and wrong during your service and then you have to develop your concept and share it with others.	*1. All the participants agree on the value of any type of knowledge (experience, talent, background, awareness, information, intelligence).* *2. The participants highlight the cognitive and technical parts and differences of knowledge with different words.* *3. The coded terms are: awareness, background, information, ability, techniques, network, share, environment, learning/training.* *Induction 1: Knowledge has both cognitive and technical aspects in it with respect to COIN environment.* *Induction 2: The COIN environment needs awareness, which means observe and recognize the knowledge needs from the environment.*

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
4.3. Continued	***Participant 11:*** Knowledge means knowing what the enemy can do, how they act, what are the features of the terrain in which i will operate, and more importantly how the people in the environment (enemy, civilians and my own personnel) would feel / act in certain circumstances. Knowledge means empathy for all parties. ***Participant 12:*** Knowledge` means all the necessary information required to manage the system which resides in the boundaries of the environment. It could be contextual, conceptual or methodological. ***Participant 13:*** Experience implies a person has conducted COIN or C-T operations more than once. (But does not necessarily conducted COIN successfully). Knowledge is gained from experience and provides a COIN or C-T the ability to analyze efforts to identify techniques which are successful or failures. Talent is a result of experience and knowledge. It implies the COIN and C-T operations were successful and can be replicated. Consider as a parallel to baseball. A child may learn how to play the game in school. He has learned the rules, and has played a few times, but is not necessarily any good. Increased knowledge would be gained by playing unorganized leagues. Over time the child will adapt his skills and improve his ability. Talent most often occurs after long periods of time due to repetition and practice to hone skills and become proficient. ***Participant 14:*** Situational awareness.	

Table 25. Continued

The Threads Discussed	Personal Interview Responses	Researcher's Comment
4.4. What does `knowledge management` mean to you in coin (or counter terror) environment?	***Participant 1:*** a. Collecting of information, LL, experiences, good/bad examples, etc.; b. Analyzing, categorizing, storing and updating of the collected information/data; c. Making them knowledge in the mind of people dealing with COIN by training and education; d. Maintaining the sources of information and knowledge and making them available for the users. ***Participant 2:*** "Need to know" should be principle. ***Participant 3:*** To share information not according to mission, but share all related people. ***Participant 4:*** Provide a description of COIN strategy and describe the characteristics of CT as component of COIN. ***Participant 5:*** KM means to make "soft" information (HUMINT, social relations, etc.) operational and translate them into military usable information. ***Participant 6:*** I think that means to structure the methods and models to better get benefit from knowledge and eliminate the duplications as well. ***Participant 7:*** Managing the flow of any information both vertically and horizontally. ***Participant 8:*** To be able to have and use the information by conducting COINs against terrorists and eliminating them on the right time and place. ***Participant 9:*** Gathering information from environment and inside the organization. Analyze them into the knowledge, share them, try to get some results for org. changes share them again. ***Participant 10:*** Knowledge comes from different areas. You can have some background knowledge about social life, military art, doctrine, weapons and human nature but this is not enough for fight. You need to take special training related with your duty. And every day on duty with experience you increase your knowledge. After duty you judge yourself what you did right and wrong during your service and then you have to develop your concept and share with others. ***Participant 11:*** To me, knowledge management means to make sure that knowledge (in terms of the definition above) is grasped by all friendly forces operating in the COIN environment, and this knowledge is continuously developed, shared and its level of being shared is controlled. ***Participant 12:*** `Knowledge Management` refers the processing methods or procedures of all available information in the context of organizational management. ***Participant 13:*** Knowledge management is the collective and analytic effort at operational and strategic levels to improve the overall COIN and C-T campaign. ***Participant 14:*** To quickly reach the correct data and influence not only the foe and neutral but also the friend by controlling the knowledge.	*1. All the participants agree on the importance of KM in the COIN environment.* *2. The participant highlights the important process of KM with different terms of `knowledge creation`, `knowledge share and transfer`, `knowledge storage and retrieval`, `knowledge application`.* *3. Some mentioned the requirement of acquiring knowledge in the COIN environment.* *4. Some mentioned the importance of learning and training.* *5. Coded terms in this par are: knowledge, information, experience, store, environment and process.* *Induction 1: COIN environment needs to use effective KM process.* *Induction 2: All four processes (knowledge creation, transfer and share, storage and retrieval and application) should be applied for successful KM.* *Introduction 3: KM process should be fast enough to cope with the changing requirements of the environment.*

Qualitative Analysis of the Interviews

Because of the large number of participants and rather large volume of inputs, the researcher used QSR NVivo9 software package to analyze the data. The results of the analysis constituted additional inputs to the insights of the researcher already induced in Table 25. The results of the NVivo Analysis are used as both verification of the induced insights of the researcher as well as adding new inductions those have not been captured by the researcher.

QSR NVivo is a qualitative data analysis (QDA) computer software package produced by QSR International. It has been designed for qualitative researchers working with very rich text-based and/or multimedia information, where deep levels of analysis on small or large volumes of data are required (QSR International, 2012). The NVivo-9 version is used in this research.

The results of NVivo-9 QDA results are depicted in different formats, in order to provide better visual understanding in Figures 38-41.

The interpretations of the results from the QSR NVivo QDA as follows:

There is significant importance of the environment for the COIN Military Organizations.

There is significant importance of knowledge for the Military Organizations in the COIN environment. The knowledge has its cognitive and technical aspects in it (experience and talent).

Change is an important factor in the COIN environment. Uncertainty and the complexity are the dominant specifications of the environment.

COIN related issues should be recognized with perspective of organizational structure.

COIN military organizations can be assumed as systems. These systems reflect different specifications than the regular warfare. The system embodies large number of entities, sub-systems with different structures (military, government, NGOs, IOs, population, HN etc...).

COIN operations and activities should be population oriented. Hence, the COIN systems should have human factor and social aspects in it.

The knowledge in the COIN environment might be in different forms, depending on the knowledge gathering source. In the tactical level the source of knowledge could even be a signal.

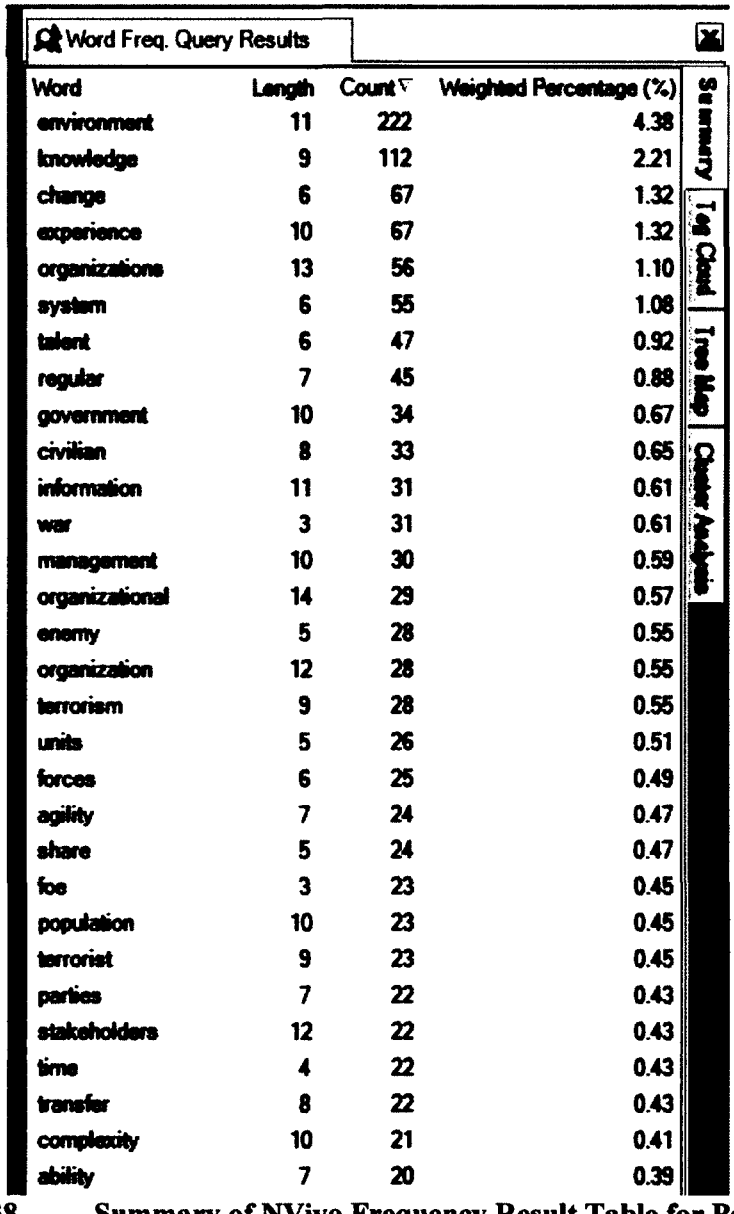
The COIN environment has different parties. These are, by and large, friend, foe and neutrals.

The end state in the COIN does not necessarily need to have war against the insurgents; it is more population centric and focused on winning the population.

Agility is a significant ability to be gained and applied. Time is the most important factor in the COIN environment. The speed of change is something that the leadership in the COIN Military Organization should consider very seriously.

Most of the COIN military organizations suffer from lack of knowledge sharing and transferring.

There are many different types of stakeholders in the COIN environment.



Word	Length	Count	Weighted Percentage (%)
environment	11	222	4.38
knowledge	9	112	2.21
change	6	67	1.32
experience	10	67	1.32
organizations	13	56	1.10
system	6	55	1.08
talent	6	47	0.92
regular	7	45	0.88
government	10	34	0.67
civilian	8	33	0.65
information	11	31	0.61
war	3	31	0.61
management	10	30	0.59
organizational	14	29	0.57
enemy	5	28	0.55
organization	12	28	0.55
terrorism	9	28	0.55
units	5	26	0.51
forces	6	25	0.49
agility	7	24	0.47
share	5	24	0.47
foe	3	23	0.45
population	10	23	0.45
terrorist	9	23	0.45
parties	7	22	0.43
stakeholders	12	22	0.43
time	4	22	0.43
transfer	8	22	0.43
complexity	10	21	0.41
ability	7	20	0.39

Figure 38. Summary of NVivo Frequency Result Table for Personal Interviews

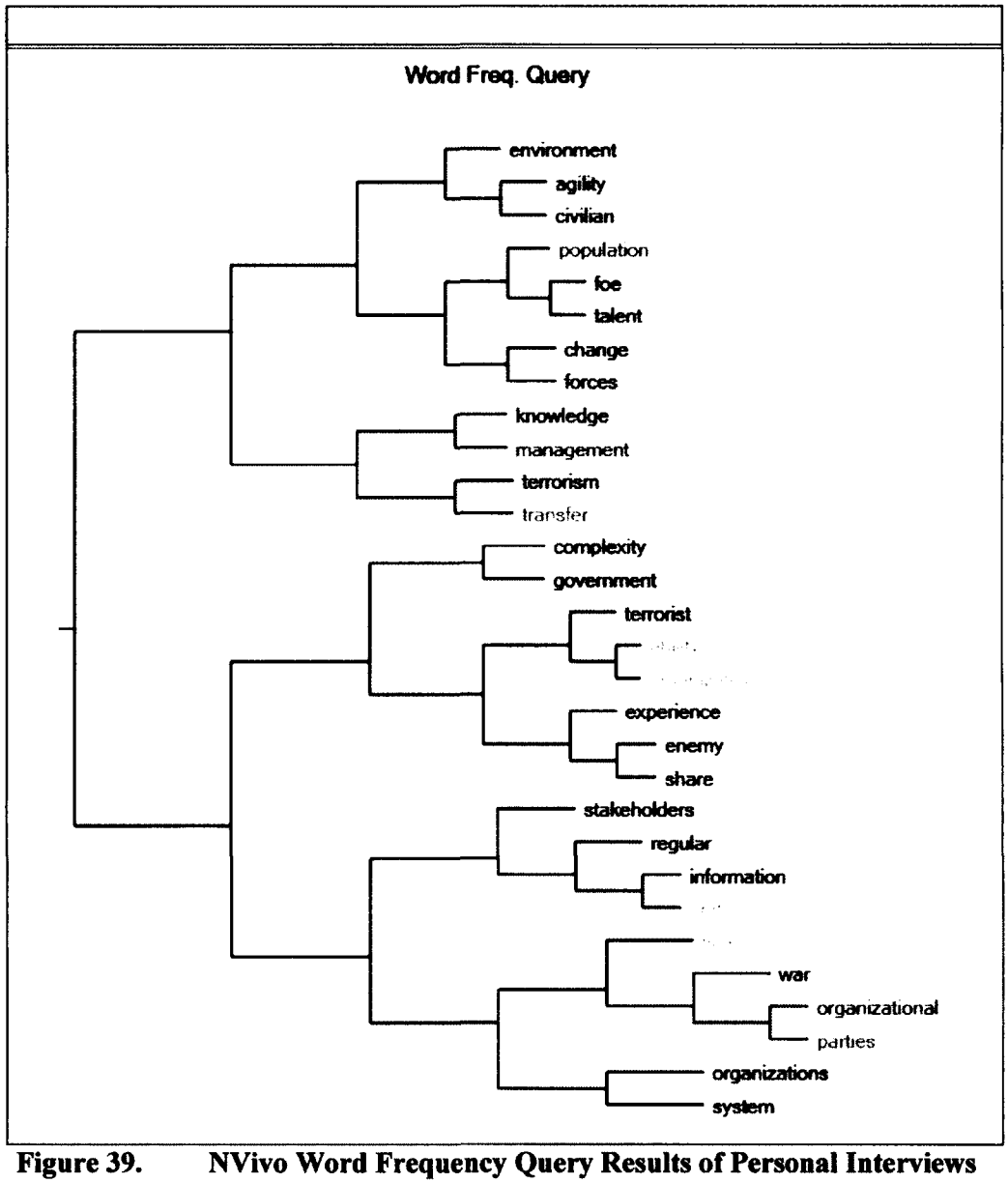


Figure 39. NVivo Word Frequency Query Results of Personal Interviews

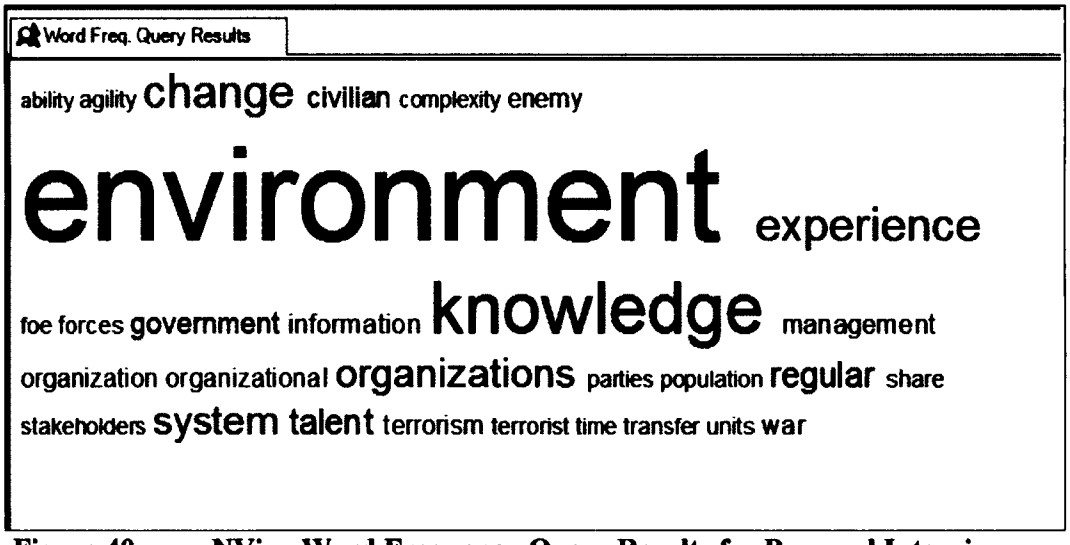


Figure 40. NVivo Word Frequency Query Results for Personal Interviews

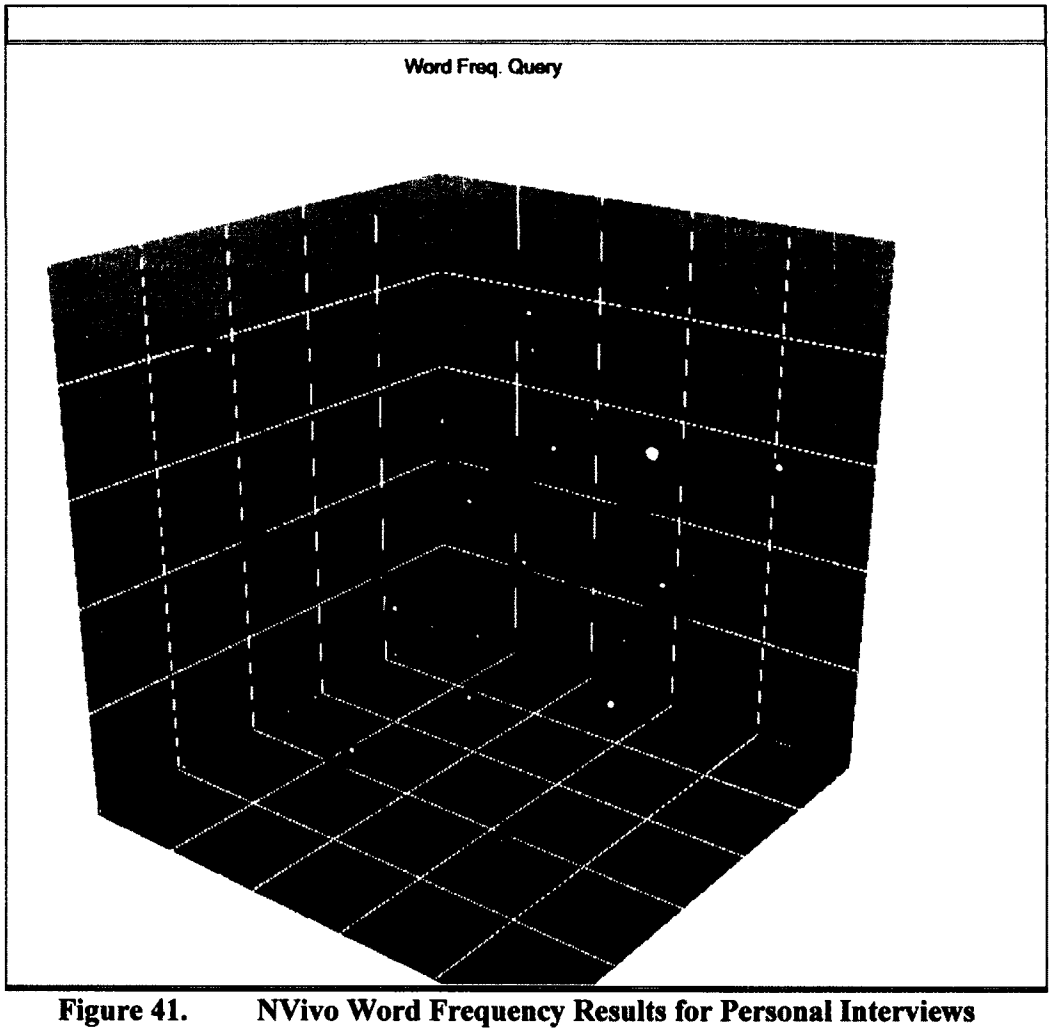


Figure 41. NVivo Word Frequency Results for Personal Interviews

Summary of Findings from the Interviews

The findings induced by the researcher's view (insight) and the findings analyzed through NVivo results are incorporated as follows:

Generic (Military Context) Thread

COIN related issues should be recognized with perspective of organizational structure.

The COIN is significantly different from the irregular warfare.

Systems Related Thread

System: COIN military organizations can be assumed as systems. These systems reflect different specifications than the regular warfare. COIN operations and activities should be population oriented. Hence, the COIN systems should have human factor and social aspects in it. The COIN system is a complex system. The system also has CAS, socio-technical, SoS and open systems specifications, due to the number of entities, the boundaries and the stakeholders, and human-factor in the environment.

Environment: There is significant importance of the environment for the COIN Military Organizations. The environment is fast changing, complex, civilian population oriented and has uncertainty. The COIN environment has different parties. These are, by and large, friends, foes and neutrals. There are many different types of stakeholders in the COIN environment.

End-State: The end state in the COIN does not necessarily need to have war against the insurgents; it is more population centric and focused on winning the population.

Entities: The system embodies large number of entities and sub-systems with different structures (military, government, NGOs, IOs, population, HN etc...).

Agility Related Thread

Agility: Agility is a significant ability to be gained and applied. Respondents' referrals to change, time, accuracy, training, and intelligence issues imply importance of recognizing agility and knowledge issues.

Change: Change is a very important factor in the COIN. There is change in the COIN environment and it is fast. The organizations in the COIN environment have the problem of detecting and recognizing the change. Change is closely related to adaptation. The important factors in the changing environment are adaptation, transformation and learning. These three means have different effects in the

environment based on their durations (transformation takes more time, then the learning, adaptation is quicker).

Variables: Time is one of the important variables in the COIN environment. The speed of change is something that the leadership in the COIN Military Organization should consider very seriously. Some respondents also mentioned the precision.

KM Related Thread

Knowledge: There is significant importance of knowledge for the Military Organizations in the COIN environment. The knowledge has its cognitive and technical aspects in it (experience and talent). The knowledge in the COIN environment might be in different forms, depending on the knowledge gathering source. In the tactical level the source of knowledge could even be a signal. The COIN environment needs awareness, which means observe and recognizing the knowledge needs from the environment.

KM Processes: Most of the COIN military organizations suffer from lack of knowledge sharing and transferring. Importance of intelligence is inevitable. The COIN environment needs a process for knowledge and its components. All four processes (knowledge creation, transfer and share, storage and retrieval and application) should be applied for successful KM. KM process should be fast enough to cope with the changing requirements of the environment.

Adaptation: Adaptation to the change in COIN environment is slow. This is a significant problem area. The respond to the change is related to size and level of the units. Smaller units adapt better compared to the larger and higher level organizations.

In general, the findings of the interviews are of great value that they lead the researcher to inductively generate some hypothesis as well as testing some other inductively generated hypothesis.

The results provide very good insights (and analyzed data) for the researcher especially with regard the phenomena of military context in the COIN and the military system in COIN, the needs of the system and importance of knowledge and KM.

Anomaly Detected:

The format of these interviews was more inductively hypothesis generation and partially hypothesis testing, rather that deductively validating the process of AKM. For that reason, the researcher did not deduce any anomaly from these interviews.

Remedial Action by the Researcher

The interviews do not recommend taking remedial actions, but canalizing the researcher to move forward for generating and testing hypothesis and hence developing the theory.

APPENDIX F: BACKGROUND OF THE RESEARCHER WRT THE STUDY

Military Background Relevant to the Research

He served as a helicopter pilot in different squadrons of Turkish Armed Forces, where he participated counter-terrorism operations (since counter terrorism and COIN have many common aspects, this experience provides him to have some insights from the field).

He served as a staff officer at the Turkish General Staff Headquarters about modernization projects (this provides him to have some practical background about organizational transformation and organizational challenges).

He served as a planning staff officer in a Brigade located in Turkey which had counter-terrorism and border security responsibilities (this provides planning and practical experience for him).

He served as an interoperability staff officer in the Allied Command Transformation Headquarters (HQ SACT) (this provides him the experience of defense planning, interoperability, standardization, capability development and the requirements of agility in the multinational environment).

He worked as the Subject Matter Expert (SME) for doctrinal issues in the COIN Task Force established by NATO with participation of the members from all NATO Bodies as well as willing nations. He also participated in writing the NATO COIN Joint Operational Guidelines where the most credit should be the writer of NATO COIN Doctrine AJP 3.4.4. (this provides him to have good understanding about COIN both theoretically and practically).

He participated in a Symposium at the US COIN Center in Fort Leavenworth as a briefer/speaker about `NATO COIN Doctrine Development` (this provides him to have some insights about the US perspective about COIN).

Academic Background Relevant to the Research:

He has a B.S. degree in Systems Engineering from the Turkish Army Academy (this provides him to study with a systemic perspective).

He has an M.S. degree in Aeronautical Engineering from the Naval Postgraduate School, in his thesis he studied `mkylestad analysis of a helicopter blade design` where he used MATLAB package program (this is a good indication that the researcher has familiarity to the quantitative analysis and computer programming).

He has an M.S. degree in Industrial Engineering from Marmara University, Turkey. In his thesis, he studied `important factors of major wars of the history` where he conducted statistical analysis by using SPSS and SPLUS, as well as Excel Statistical Programming (this also shows his familiarity to the statistical and quantitative analysis).

He has an M.A. degree in National and International Security Strategies Management and Leadership, Turkish Army War College, in his thesis he studied re-organization of the Turkish Helicopter Units (this shows his familiarity to organizational studies).

He also finished the doctoral program classes of Old Dominion University (ODU) (this provided him to have knowledge in depth about systems analysis, research methods, decision analysis etc.).

VITA

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M.A. in National and International Security Strategies Management and Leadership, Turkish Army War College, Istanbul, Turkey, 2007

M.S.in Industrial Engineering, Marmara University, Istanbul, Turkey, 2003

M.S. in Aeronautical Engineering, Naval Postgraduate School, Monterey, CA, 2002

B.S. in System Engineering, Turkish Military Academy, Ankara, Turkey, 1995

Professional Experience:

Supreme Allied Command Transformation HQ Norfolk/VA, NATO Exercises Planning and Programming Staff Officer, 2009-2012

Brigade, Chief of Operations and Training Branch, 2007-2009

Staff Officer, Turkish General Staff HQ, Defense Planning and Resource Management Division, 2002-2005

Helicopter Pilot in Army Aviation Regiments, 1998-2000