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KEY FACTORS DRIVING PERSONNEL DOWNSIZING IN MULTINATIONAL MILITARY ORGANIZATIONS

by

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

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May 2015

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ABSTRACT

KEY FACTORS DRIVING PERSONNEL DOWNSIZING IN MULTINATIONAL MILITARY ORGANIZATIONS

Ilksen Gorkem
Old Dominion University, 2015
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Dr. Resit Unal

Although downsizing has long been a topic of research in traditional organizations, there are very few studies of this phenomenon in military contexts. As a result, we have little understanding of the key factors that drive personnel downsizing in military settings. This study contributes to our understanding of key factors that drive personnel downsizing in military organizations and whether those factors may differ across NATO nations' cultural clusters. The theoretical framework for this study was built from studies in non-military contexts and adapted to fit the military environment.

This research relies on historical data from one of the largest multinational coalition forces worldwide. Time series cross-sectional dynamic panel data from 28 NATO countries over 23 years (1990-2012) were gathered. This data included the following variables: Total Active Duty Personnel number, Military Expenditure as a percentage of GDP, turnover in the Chief of General Staff, and modification of the National Military Strategy Directive. This study measures personnel downsizing as a reduction in Total Active Duty Personnel number in NATO nations' military organizations. A series of analyses using the Arellano-Bond Generalized Method of Moments (GMM) one-step difference method with robust standard errors were conducted in two steps. For the first step, an inspection of the key factors that drive personnel downsizing was performed using Stata *'xtabond'* estimation. For the second step, an

analysis of whether or not the key factors differ across NATO nations' cultural clusters was conducted.

The findings from this research contribute to the discipline of engineering management by providing a model to improve our understanding and ability to predict future personnel downsizing decisions and to increase our understanding of military governance not only NATO wide but also worldwide. Differences found across cultural clusters make this study more noteworthy.

This dissertation is dedicated to the four greatest motivators in my life from whom I receive daily encouragement and strength. They are my beloved wife, Sibel, and my three wonderful daughters, Gökselin, Belgin, and Ceren. Thank you for trusting that you were always first in my heart even when I had to give away much of my time to this project. Without your understanding, patience, and continuous and unwavering support, I would never have been able to complete this endeavor.

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The views expressed in this dissertation are those of the author and do not reflect the official policy or position of the Turkish Armed Forces, the United States Armed Forces, the Department of Defense, the Turkish Government, the U.S. Government, or those of any other NATO Nations and their Armed Forces.

LIST OF ACRONYMS AND ABBREVIATIONS

ANOVA	Analysis of Variance
BRAC	Base Realignment and Closure
CE	Crisis Establishment
CEMFI	Center for Monetary and Financial Studies
CEO	Chief Executive Officer
CHIEFOGS	Chief of General Staff
CHOD	Chief of Defense
CLS	Clusters
DAU	Defense Acquisition University
DCAF	Geneva Centre for the Democratic Control of Armed Forces
DoD	Department of Defense
DOTMLPF	Doctrine, Organization, Training, Material, Leadership, Personnel, Facilities
DPG	Defense Planning / Programming Guidance
FE	Fixed Effect
FY	Fiscal Year
GDP	Gross Domestic Product
GLOBE	Global Leadership and Organizational Effectiveness
GMM	Generalized Method of Moments
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HQ	Headquarters

SACT	Supreme Allied Commander Transformation
HSD	Honest Significant Difference
IT	Information Technology
MILEX	Military Expenditure
MOD	Ministry of Defense
MRE	Meal, Ready to Eat, Individual
MS	Microsoft
N / A	Not Applicable
NATO	North Atlantic Treaty Organization
NCO	Non-Commissioned Officer
NDS	National Defense Strategy
NLRs	National Liaison Representatives
NMS	National Military Strategy
NMSD	National Military Strategy Directive
NSS	National Security Strategy
ODU	Old Dominion University
PE	Peacetime Establishment
PPBE	Planning, Programming, Budget, and Execution
RE	Random Effect
SIPRI	Stockholm International Peace Research Institute
STATA	Statistical Software Package Created by StataCorp
TOTALADP	Total Active Duty Personnel
U.S. ACDA	U.S. Arms Control and Disarmament Agency

U.S. GAO	U.S. Government Accountability Office
VIF	Variance Inflation Factor

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CHAPTER I

INTRODUCTION

Although downsizing has been a topic of research for many years, the literature on downsizing is still developing. There are a few researchers trying to unlock the mystery of what drives downsizing in military organizations (Magán-Díaz & Céspedes-Lorente, 2012). Several theoretical and empirical studies have been conducted to investigate the causes of this phenomenon in the academic realm (McKinley, Zhao, & Rust, 2000). Useem (1993) investigated the factors that drive downsizing and found that a change in leadership was associated to downsizing in personnel numbers. Likewise, Budros (1999) investigated the causes of downsizing. It was estimated that downsizing rates were higher when CEOs had financial backgrounds than when they did not (Budros, 1999). Bernardi (1996) found that downsizing decisions are heavily affected by political guidance.

Researchers have not yet agreed upon one definition for downsizing. Most scholars define downsizing as structural, functional, and personnel reduction aimed at improving the performance of an organization (Cameron, 1994; Cascio, 1993; DeWitt, 1993; Freeman & Cameron, 1993; McKinley, Sanchez, & Schick, 1995). Prior research has argued that an organization's desired performance level is often accomplished through personnel lay-offs (Cascio, 1993).

Armed forces around the world have gone through downsizing to increase performance by reducing functions, changing the work process, or reducing the hierarchical levels of their organizations (Cameron, 1994; DeWitt, 1993; Freeman &

Cameron, 1993). A number of NATO countries began military downsizing at the end of World War II, and the majority of them downsized after the Cold War (Borch & Wallace, 2010; The World Bank, 2014). After experiencing military downsizing during those periods, it is believed that a number of possible key factors that drive personnel downsizing may vary across NATO nations' cultural clusters. As an international alliance, NATO has 28 member nations which fall under different cultural clusters (Chnokar, Brodbeck, & House, 2009). This makes NATO a very appropriate context for studying the phenomenon of personnel downsizing from a multinational and multicultural perspective. The purpose of this study is to investigate key factors that drive personnel downsizing in NATO nations' military organizations (armed forces) and to determine whether those factors may differ across cultural clusters based on quantitative analysis of the data.

1.1 Background of the Problem

Changes in the external environment of military organizations drive the need for organizational change and often result in downsizing (James, 2008). A number of NATO nations' armed forces have been downsizing for several decades. For instance, Canada's number of active military personnel went from 88,000 in 1989 to 69,950 in 1999 and 65,700 by the end of 2010. France's numbers were reduced from 554,000 in 1989 to 332,250 in 2011 (The World Bank, 2014). It appears that there are certain key factors that drive personnel downsizing in NATO nations' military organizations.

1.2 Problem Statement

It is critical for a military organization to provide an efficient workforce while optimizing personnel numbers. It is also imperative to understand that the problem of

balancing resources and requirements is a big challenge (DAU, 2014). Scholars provide evidence of a relationship between an organization's budget (expenditure) and personnel downsizing (Prindle, 2005). The dynamics of downsizing affect all nations worldwide, and multinational coalitions such as NATO are critically affected by downsizing decisions at the national level (The World Bank, 2014). The U.S. defense budget for 2012 was $645.7 billion, and military personnel spending made up 22% ($141.8 billion) of total spending (DoD, 2013c). The U.S. military personnel spending was more than China's total defense budget ($102.4 billion) and twice Russia's total ($59.9 billion) (Heeley, 2013).

Although scholars have investigated some of the factors that drive downsizing in organizations, a systematic literature search did not yield any research study exploring the contextual factors that drive personnel downsizing in military organizations (Ahmadjian & Robinson, 2001; Beaulier, Hall, & Lynch, 2011; Brannen, 2005; Budros, 1999; Cameron & Freeman, 1994 ; Cascio, 1993; Franko, 1994; Magán-Díaz & Céspedes-Lorente, 2012; Useem, 1993). There are very few studies in military contexts, and those that exist generally examine the effects of downsizing in military organizations (Cascio, Young, & Morris, 1997; Castro, 2013; Datta, Guthrie, Basuil, & Pandey, 2010; DeWitt, 1993; Lewis, 2013; Prindle, 2005; Sronce, 2003). As a result, we have little understanding of the key factors that drive personnel downsizing in military settings and whether those factors differ across cultural clusters. The theoretical framework for this study was built on studies conducted in non-military contexts and then adapted to characteristics of the military environment. This research proposes a model to identify the key factors that drive personnel downsizing in military organizations.

1.3 Purpose Statement

The purpose of this quantitative study is to investigate key factors that might drive personnel downsizing in military organizations of NATO nations and whether those factors may differ across cultural clusters. For the purpose of this study, the definition of downsizing is limited to personnel downsizing in the military organizations of 28 NATO nations. Any reduction in Total Active Duty Personnel of a nation was considered personnel downsizing.

The quantitative correlational research design was selected because it allows the researcher to study the relationship between possible key factors and active duty personnel downsizing across multicultural military organizations. The purpose of the research design is to determine to what extent the independent variables (Military Expenditure, turnover in the Chief of General Staff, and modification of the National Military Strategy Directive) predict the dependent variable (Total Active Duty Personnel number).

1.4 Research Questions

The questions for this descriptive research are stated below:

Question 1. What are the key factors that drive personnel downsizing in military organizations of NATO nations?

Question 2. Do those key factors differ across NATO nations' cultural clusters?

1.5 Conceptual Framework

The conceptual model based on the literature review is shown in Figure 1. The model was constructed to investigate the relationship between Personnel Downsizing (Y) and Military Expenditure (X_1), turnover in the Chief of General Staff (X_2), and

modification of the National Military Strategy Directive (X_3). It was also constructed to determine whether those relationships differ across NATO nations' cultural clusters.

$$Y = f(X_1, X_2, X_3)$$

where (Y) is personnel downsizing in military organizations, (X_1) is Military Expenditure, (X_2) is turnover in the Chief of General Staff, and (X_3) is modification of the National Military Strategy Directive.

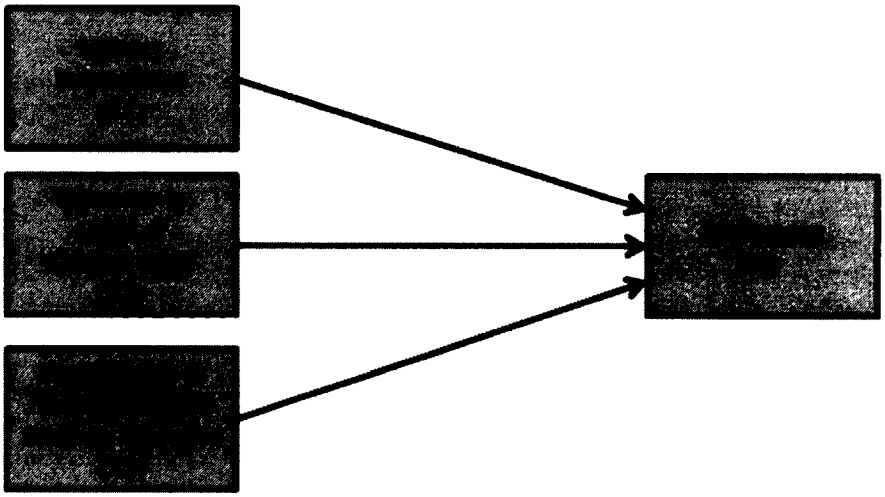

Figure 1. Conceptual Model

1.6 Operational Definitions

Operational definitions used throughout this study are provided below:

- **Downsizing:** This study defines downsizing as a percentage of active duty personnel reduction in the military organizations of 28 NATO nations

within a given period. Any reduction in the number of Total Active Duty Personnel qualifies as personnel downsizing.

- **Total Active Duty Personnel:** Total Active Duty Personnel is the total number of personnel in a given national military organization (armed forces) within NATO. The number includes only those that have a "full-time occupation as part of a military organization, including paramilitary forces if the training, organization, equipment, and control suggest they may be used to support or replace regular military forces" (The World Bank, 2014, p. 1).
- **Military Expenditure (% of GDP):** "Military Expenditure is all costs incurred as a result of current military activities of a NATO nation" (SIPRI, 2014, p. 1). Military Expenditure is the percentage of GDP (Gross Domestic Product) of each NATO nation.
- **Chief of General Staff:** The Chief of General Staff is the person in command/lead of all the forces in a NATO nation's military organization (DoD, 2010).
- **Turnover in Chief of General Staff:** Turnover in the Chief of General Staff is the year when transfer of authority takes place from the current Chief of General Staff to his/her successor.
- **Tenure of Chief of General Staff:** Tenure of the Chief of General Staff is the number of years that the Chief of General Staff has been on duty.
- **National Military Strategy Directive (NMSD):** The National Military Strategy Directive is an official document used for allocating military

power to reach a level of ambition directed by a national security strategy (DoD, 2010). NMSD is published periodically by each nation in the coalition. Publication frequency differs across NATO nations (e.g. annually, bi-annually, etc.).

- **Modification of National Military Strategy Directive (NMSD):** Modification of NMSD stands for the year when a newer version of NMSD is published.
- **National Military Strategy Directive Maturity:** National Military Strategy Directive maturity is the period of time that the NMSD has been in effect.
- **Cultural Clusters:** Cultural cluster is a group of countries with similar cultural characteristics (House, 2004; Russo, 2000). In this study, 28 NATO countries are grouped according to their cultural clusters.
- **Military Organization:** Military organizations in this study include the Army, Marine Corps, Navy, Air Force, and Coast Guard (DoD, 2010). Military organizational structure may change from nation to nation. The term 'Military Organization' is synonymous with the term 'armed forces,' and it includes organizations from each of the 28 NATO nations.
- **NATO:** North Atlantic Treaty Organization (NATO) is an international alliance that consists of 28 member states from North America and Europe founded in 1949. These member states include the twelve founding members of the alliance: Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, the United

Kingdom, and the United States (NATO, 2013, August 20). The remaining members and their membership dates are: "Greece-Turkey (1952), Germany (1955), Spain (1982), the Czech Republic-Hungary-Poland (1999), Bulgaria-Estonia-Latvia-Lithuania-Romania-Slovakia-Slovenia (2004) and Albania-Croatia (2009)" (NATO, 2013, August 20, p. 1).

- **Gross Domestic Product (GDP):** Gross domestic product (GDP) is defined as the overall market value of all the final goods and services produced by a nation within a given year (Argandoña, 2008, p. 1043).
- **Year:** Data collected for this study was acquired from 28 NATO countries from 1990 through 2012 (for a total span of 23 years).

1.7 Assumptions

The data gathered for this study reflects the true value for NATO nations' military organizations. The modified cultural clusters of NATO nations reflect reality. This study assumes that the data collected is accurate. Several sources were utilized for triangulation with the aim to reduce possible errors in data sources.

1.8 Significance of the Study

There are very few published studies of military downsizing, and no prior studies were found that investigate the key factors that might drive personnel downsizing in NATO nations' military organizations and whether those factors may differ across NATO nations' cultural clusters. The findings contribute to engineering management and military governance by providing a model to help leadership in military coalitions understand the critical factors driving strategic human resource decisions. This study is a unique example in military settings that provides a new perspective to military

downsizing. Coalition forces rely on resources from all partnering organizations to accomplish their mission. Human resource management decisions made by each partner have implications for the rest of the coalition. Those decisions are often driven by different factors. In particular, characteristics of the national culture are known to affect the decision making process. This study specifically explores the role that national culture characteristics play on personnel downsizing decisions and whether the factors driving those decisions might differ across cultural clusters. This study makes a significant contribution to our understanding of strategic human resource management in multinational military settings by identifying the most significant antecedents of downsizing.

1.9 Reduction of Gaps

Although some researchers have studied downsizing and its effects on military organizations, there is still a gap in the literature concerning the factors that drive personnel downsizing in military organizations. A systematic review of the literature did not yield any published studies addressing this topic. There could be unpublished studies that address this subject, but no previous research was found in the form of scholarly publications or publicly shared documents. Therefore, a gap remains unfilled in this area. In addition, there is no previous study on how influential factors may differ across NATO nations' cultural clusters. This study reduces the gaps in this area of study by identifying and examining the factors that drive personnel downsizing in military organizations and whether those factors may differ across NATO nations' cultural clusters.

CHAPTER II

LITERATURE REVIEW

2.1 Definition of Downsizing

Downsizing is sometimes used as a synonym for decline, but they are two different terms. Downsizing is typically aimed at improving efficiency while a decline typically is naturally occurring and has no aim of improving efficiency. Decline is the result of a combination of organizational factors and environment (Freeman & Cameron, 1993). Downsizing may be performed by reducing functions, changing the work process, or reducing hierarchal levels without reducing the total number of personnel (Cameron, 1994; Freeman & Cameron, 1993). Downsizing is a set of managerial actions aimed at producing a more efficient, productive, and competitive organization. It may be executed by reducing workers (Cameron, 1994; Freeman & Cameron, 1993). According to Cascio (1993) "downsizing is a popular strategy" (p. 97). It is also a managerial reduction in resources, including human power, to realign and increase the performance level of an organization when it faces a decline in performance (DeWitt, 1993). Downsizing is aimed at gaining economic and organizational benefits (Cascio, 1993; McKinley et al., 1995). It is a tool used by many organizations to remain competitive (McCune, Beatty, & Montagno, 1988). This method results in increased productivity while at the same time utilizing fewer funds. Downsizing aims to be more productive by reducing cost via performing Total Quality Management techniques such as reengineering the logistics process. In this content, the logistics system of an organization is inspected, and cost-increasing sub-phases are omitted by reengineering to reduce overall logistics related cost

(Thomchick, Young, & Grenoble, 1999). Downsizing is a firm's reaction to a changing business environment (Thomchick et al., 1999). It is an intentional action executed proactively, reactively or creatively (Cameron, 1994; Freeman & Cameron, 1993; Mishra & Mishra, 1994). Downsizing is a radical change in an organization since it may also change the processes or activities employees were accustomed to (Budros, 1999).

Downsizing means not only a reduction in resources, including the total number of employees but also a redesigning and restructuring of an organization to be more effective and productive. For many companies, downsizing means a reduction in personnel quantity rather than a systemic organizational redesign and may include a modification of the organization to improve its efficiency (Cascio, 1993). During the period from 1989 through 1991, around 1,000 American companies eliminated 212,598 jobs reportedly saving $8 billion per year (Cascio, 1993). It is likely that downsizing will continue in American companies in the foreseeable future (Hanaoka, 1997).

Downsizing is not without consequences. The findings of a research study conducted among Fortune 100 companies that downsized between 1987 and 1998 showed that downsized companies were worse in economic performance than the 35 companies that did not downsize (De Meuse, Bergmann, Vanderheiden, & Roraff, 2004). Consequently, after a downsizing action, the remaining personnel must assume the responsibilities of the personnel that were let go, which generally leads to overload (Prindle, 2005). The effects and consequences of downsizing are out of the scope of this study.

2.2 Military Downsizing

With the understanding that military organizations can become more effective and productive, it is possible for downsizing to be implemented in almost the same manner in military as in non-military organizations. Downsizing approaches are thought to increase performance by reducing functions, changing the work process, or reducing the hierarchical levels of a military organization (Cameron, 1994; DeWitt, 1993; Freeman & Cameron, 1993). Military downsizing is largely driven by changes in the security environment (Thomchick et al., 1999). After World War II, the United States Army downsized from 8,267,958 to 1,070,000 by mid-1947 (Taylor, Olson, & Schrader, 1981). As a reaction to the changing security environment during the Cold War, the United States' total active duty personnel number reached 1,459,000 in 1950. During the Korean War (June 25, 1950-July 27, 1953), in which the United States was involved, the number of active duty personnel reached 3,636,000 in 1952 (Daggett & Belasco, 2002). During the period following the Korean War, the United States armed forces downsized to 2,600,000 by 1958. Although the aforementioned examples are referring to military downsizing as personnel downsizing, there are other examples of restructuring efforts in military organizations. For instance, the U.S. Department of Defense (DoD) closed more than 60 bases during the 1960s (Beaulier et al., 2011). During the period from 1988 to 2001, the U.S. Commission on Base Realignment and Closure (BRAC) closed 125 major military facilities, 225 minor facilities, and then realigned 145 other bases (Beaulier et al., 2011). Due to these closures, 15,874 civil service employees would have been fired, but by implementing several types of transition programs (Job Placement Programs, the Voluntary Early Retirement Authority, Voluntary Separation Incentive Payments,

Transfer of Function, etc.) fewer employees were affected by the BRAC program (Brass, 2006). Turkey inactivated four of its Army Brigades in 2004 (Gurel, 2004). Starting in 2011, Germany reorganized its military organization into response forces and stabilization/support forces to be able to manage the need to be more deployable (Business Monitor International, 2011).

Military downsizing is a strategic redesign to adapt to a changing security environment aimed at increasing readiness for foreseeable missions, optimizing the entire organization, and increasing performance levels by reducing personnel numbers, bases, facilities, or by enhancing the hierarchical organization, the work process, equipment, and weapon systems (Cameron, 1994; Cameron & Freeman, 1994 ; Cascio, 1993; McCune et al., 1988; McKinley et al., 1995; Thomchick et al., 1999).

2.3 Downsizing Theory

There are three theoretical perspectives on downsizing: the economic, the institutional, and the sociocognitive, as shown in Table 1 (McKinley et al., 2000, p. 229). The economic theory states that economic reasons drive downsizing, while the institutional theory suggests that sociological reasons are responsible for downsizing. The sociocognitive theory posits that managerial decisions are the major driving forces behind downsizing decisions. Each theory describes the phenomenon of downsizing from a different perspective and identifies the key factors influencing it.

2.3.1 The Economic Theory

The key assumptions of the economic perspective are that "firms are rational, self-interest seeking, and efficiency driven. Managerial actions and their outcomes are tightly connected, and managers understand those connections" (McKinley et al., 2000, p.

229). The economic theory states that the need to be more productive and efficient results in downsizing (Freeman & Cameron, 1993).

Table 1. Theories on Organizational Downsizing [Adapted from (McKinley et al., 2000, p. 229)]

	Economic Perspective	Institutional Perspective	Sociocognitive Perspective
Key Assumptions	Firms are rational, self-interest seeking, and efficiency driven. Managerial actions and their outcomes are tightly connected, and managers understand those connections.	Organizational change arises from conformity to institutional rules, as well as from an internal impetus for efficiency. Managerial actions and their outcomes are loosely connected, and managers experience uncertainty about those connections.	Boundedly rational managers impose schemas on information environments. Managers make decisions based on those schemas, which often become reified through social construction processes.
Major Arguments	Firms downsize in order to reduce costs and improve efficiency and profitability.	Firms downsize in order to gain legitimacy and reduce uncertainty. Downsizing is driven by coercive, mimetic, and normative isomorphism.	Managers' decisions to downsize are based on shared mental models that define downsizing as effective. These mental models are social interaction and connected enactment processes.

2.3.2 The Institutional Theory

Researchers in opposition to the economic theory think that the needs originating from social life drive downsizing. They call this perspective the institutional theory (DiMaggio & Powell, 2003). They refer to it as "coercive isomorphism," (p. 157) which

means managers see downsizing decisions as their legitimate rights. In this theory, career rewards and professional interaction drive downsizing (McKinley et al., 1995). The institutional theory supposes that society considers downsizing an institutional norm that leads them to downsize in order to achieve so-called legitimacy (Magán-Díaz & Céspedes-Lorente, 2012).

The key assumptions of the institutional perspective are that "organizational change arises from conformity to institutional rules as well as an internal impetus for efficiency. Managerial actions and their outcomes are loosely connected, and managers experience uncertainty about those connections" (McKinley et al., 2000, p. 229). According to the institutional theory, "firms downsize in order to gain legitimacy and reduce uncertainty. Downsizing is driven by coercive, mimetic, and normative isomorphism" (McKinley et al., 2000, p. 229).

2.3.3 The Sociocognitive Theory

The key assumptions of the Sociocognitive Perspective are that "boundedly rational managers impose schemas on information environments. Managers make decisions based on those schemas, which often become reified through social construction processes" (McKinley et al., 2000, p. 229). According to the Sociocognitive Theory, "managers' decisions to downsize are based on shared mental models that define downsizing as effective. These mental models are social interaction and connected enactment processes" (McKinley et al., 2000, p. 229). The sociocognitive perspective focuses attention on managerial mental models. Based on this theory socially constructed shared schemas emerge among managers leading them to believe that downsizing will lead them to better economic performance (McKinley et al., 2000). They choose to

downsize because they believe that this strategy will be successful. In addition, cultural diversity may affect organizations, since organizations might have managers from different cultures (O'Neill, Pouder, & Buchholtz, 1998).

2.3.4 Other Theories

There are a number of more recent theoretical studies in the downsizing literature such as the Resources Theory, which suggests that changes in resources (budget, human power, etc.) lead to downsizing (Fisher & White, 2000). According to another theory called the Agency Theory, downsizing is heavily affected by "industry-specific factors and downsizing is positively associated with outside, non-institutional shareholding" (Filatotchev, Buck, & Zhukov, 2000, p. 300). Finally, Bhattacharyya and Chatterjee (2005) classified the reasons behind organizational downsizing by looking at it from different perspectives, including "economic, institutional, strategic, ideological, and arational perspectives" (p. 65).

2.4 Military Structures

The ever-changing security environment of the world is requiring new kinds of missions and new military organizations to fulfill these new requirements (Krepinevich, 1996). With this in mind, almost every NATO nation possesses a military structure to execute missions that need to adapt to fulfill a dynamic purpose. For instance, the structure of the U.S. Department of Defense (DoD) is approximately a combination of the Office of the Secretary of Defense, the Department of the Army, the Department of the Navy (The Navy, The Marine Corps), the Department of the Air Force, the Joint Chiefs of Staff, and nine Combatant Commands. The Secretary of Defense is the head of the DoD while the Secretaries of the Army, Navy, Marine Corps, and Air Force function as

senior leaders for those organizations (DoD, 2014). Therefore, in the United States, politicians and civilians are heavily involved in the organizational structure and decision-making process.

The Turkish military has a different structure directed by generals rather than by politicians and/or civilians. There is no civilian senior leader in the Turkish General Staff. The General acts as the chief of the Turkish armed forces and reports directly to the Prime Minister rather than the Secretary of Defense. Under the command of the Turkish General Staff, there are the Army, the Navy, the Air, the Gendarmerie, and the Coastguard commandants (Turkish Armed Forces, 2014, May 22).

The German Federal Defense is a combination of two parts, which are military and civilian. A general commands the military branch (the General is also the chief of staff and the military advisor to the government), which consists of the Army, the Navy, the Air Force, the Joint Support Service, and the Joint Medical Service. The Federal Minister of Defense leads the civilian branch and also acts as the commander-in-chief of the German armed forces (Bundeswehr, 2011).

As an example of the detailed organizational structure of a military organization, a diagram of the U.S. Army operational unit is illustrated in Figure 2.

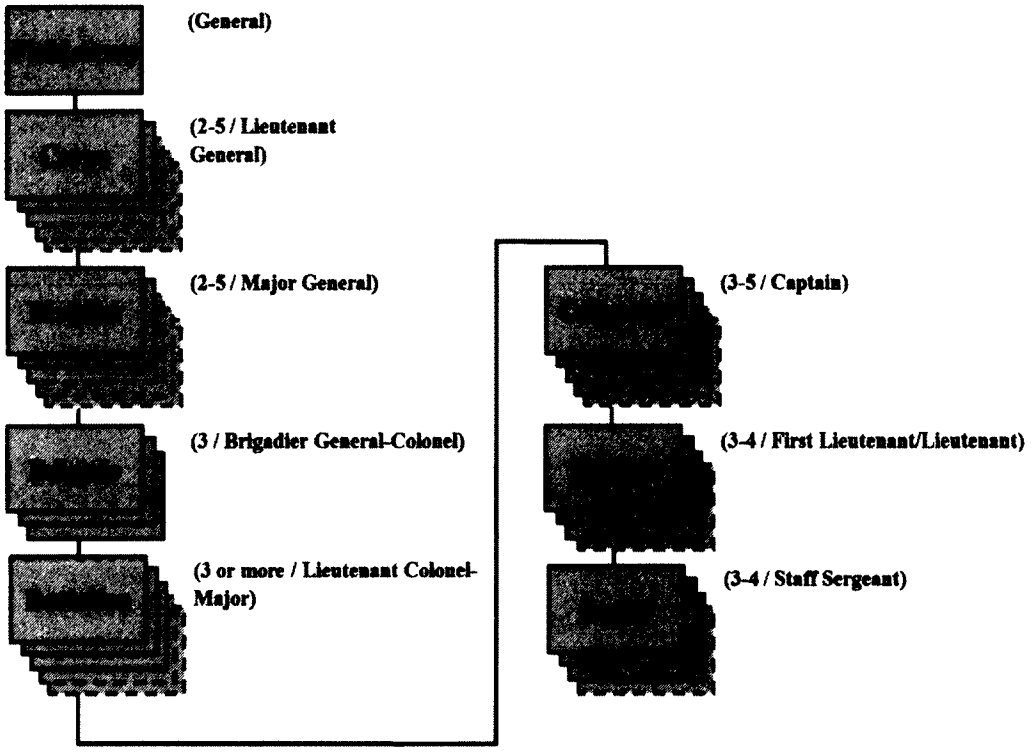

Figure 2. The U.S. Army Organizational Structure [Adapted from (US Army, 2014)]

A general (four star / ★★★★) commands a field army, which consists of two to five corps. A lieutenant general (★★★) commands a corps, which consists of two to five divisions. A major general (★★) commands a division, which consists of three brigades (10,000-18,000 soldiers). A brigadier general (★)/colonel commands a brigade, which consists of three or more battalions (3,000-5,000 soldiers). A lieutenant colonel/major commands a battalion, which consists of three to five companies (500-600 soldiers). A captain commands a company, which consists of three to four platoons (100-200 soldiers). A first lieutenant/lieutenant commands a platoon, which consists of three to four squads (16-40 soldiers). A staff sergeant commands a squad, which has four to ten soldiers (US Army, 2014).

2.5 Defense Planning

Military organizations must decide on the right design concerning missions, structure, budget, personnel, and all other resources. A NATO member nation's armed forces use many different kinds of defense systems. For example, the United States' weapon systems are classified into 12 main branches: space systems, aircraft, land systems, ships, smart weapons, aircraft systems, dumb bombs, naval combat systems, missiles, nuclear systems, missile defense, and intelligence systems. Each branch has many different sub-branches. For instance, Land Warfare Systems consists of direct fire, indirect fire, command, combat support, and combat service support sub-branches. Sub-branches are separated by the specifications of the systems, which include tracked, wheeled, towed, crew served, individual, munitions, defense/countermeasures, communications, command, control, intelligence, and other equipment. Finally, they are labeled by names such as M1 Abrams tank, M998 Truck-HMMWV (High Mobility Multipurpose Wheeled Vehicle), M115 (8 in / 203 mm) howitzer, FIM-92A stinger weapons systems, M12A2 5.56 mm semiautomatic rifle, hand grenades, uniforms, radiological defense systems, joint tactical radio system, and MRE (Meal, Ready to Eat, Individual) (Federation of American Scientists, 2014). As in land systems, aircraft and aircraft systems, as well as navy and all other warfare systems, have sub-branches down to the system names. Some of the United States' aircraft warfare systems are: A-10A, F-15C, F-16C, B-52H, C-130H, and HH-60G.

All warfare systems are subject to the effects of aging, and they need to be replaced by newer models by using military funds. Some of the United States' aircraft

with average ages between 18.2 (HH-60G) and 46.7 years (B-52H) needed to be replaced (Data as of 30 August 2008) (Coggins, 2010).

Military organizations, along with their organizational structures and defense systems, are located on bases and other facilities. The U.S. military has almost 550,000 buildings and facilities that support its operations and combat readiness (Miles, 2013). The U.S. DoD announced the closing of 21 minor or non-operational military facilities in Europe hoping to save $60 million annually (Tilghman, 2014, May 23). Buildings and facilities also age, and they need to be replaced or renovated via the military budget.

2.6 Military Expenditure

Keeping combat ready military organizations for a nation is an expensive necessity. Nations are training their militaries to protect their population, homeland, resources, and their national honor. In order to be able to execute the aforementioned missions, governments allocate money as part of their defense budgets or military expenditures (Coggins, 2010). There is no agreed international definition for military expenditure. According to Heeley (2013), world nations spent approximately $1,582.8 billion ($1.58 trillion) in 2012 as military expenditure. According to the Stockholm International Peace Research Institute (SIPRI) (2013), world military spending in 2012 was estimated to be $1,756 billion. The U.S. defense budget for 2012 was $645.7 billion (4.12% of its GDP), which was two times more than all of the countries in Asia, six times more than China (1.24% of its GDP), and 11 times more than Russia (3.06% of its GDP). The U.S. accounted for 41% of worldwide military spending. On the other hand, Iraq spent 11.28% of its GDP, which was $14.7 billion, and Afghanistan spent 10.54% of its

GDP ($2.1 billion) while some NATO nations spent less. For example, Canada spent only 1.04%, Italy spent 1.19%, and Germany spent 1.20% of their GDPs (Heeley, 2013).

National instabilities may have an effect on military expenditures. The United States military expenditure remarkably increased during the Korean War, the Vietnam War, and the First Gulf War (Coggins, 2010). However, the possible effects of national instability periods on the data were out of the scope of this study.

With so many requirements and missions, defense budgets need to be allocated efficiently. The U.S. defense budget allocation for 2012 is shown in Table 2. The defense budget must be allocated to military personnel spending, operation, maintenance, procurement, research, development, military construction, family housing, testing, evaluation, etc. Operation and maintenance together with military personnel spending make up more than half (52.5%) of total spending.

Table 2. The U.S. DoD FY2012 Defense Budget Allocation [Adapted from (DoD, 2013c)]

US DoD FY2012 Spending: Discretionary Base Budget Authority	In Million Dollars	Percent (%)
Military Personnel	141,819	*22*
Operation and Maintenance	197,198	*30.5*
Procurement	104,464	16.2
Research, Development, Test and Evaluation	71,375	11.1
Military Construction	11,367	1.8
Family Housing	1,683	0.3
Revolving and Management Funds	2,641	0.4
Subtotal, Discretionary base budget authority	**530,547**	**82.2**
Discretionary Cap Adjustment / Overseas Contingency Operations (OCO)	115,083	17.8
Total, Discretionary budget authority (Base and OCO)	**645,630**	

It is difficult to decide how to allocate a defense budget. A model for the defense budget allocation process is illustrated in Figure 3. Ammunition, fuel, and contracted services are considered disposable; warfare systems, infrastructures, and research/development/testing/evaluation are considered an investment. The main goal of allocation is to maximize military capabilities by considering budget constraints and expenditures in order to maintain a military strength that is capable of executing current and foreseeable missions (Stone, 2004).

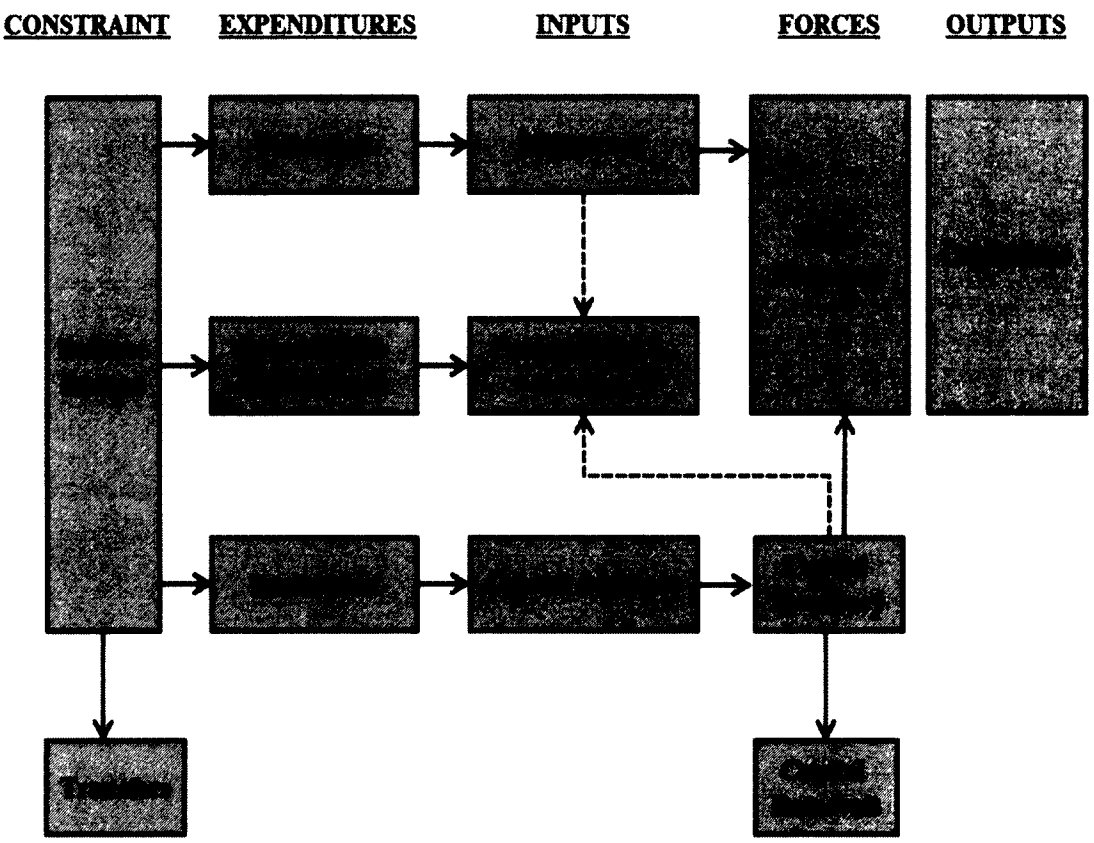

Figure 3. Defense Budget Allocation Process [Adapted from (Stone, 2004, p. 126)]

Keeping in mind that U.S. operation, maintenance, and personnel spending are 52.5% of total spending, allocation must be optimized in order to have a modernized and mission-ready military power. If a military budget is not enough to reach the desired capabilities, which is also called the 'Level of Ambition' in military terms, then a reduction in personnel, investment, operations and maintenance expenditures may be needed. One of the ways to reduce expenditures is through downsizing. The U.S. DoD estimated a savings of $200 billion between FY2012 and FY2017 by "paring back excess staff, headquarters structures (including a 4-star 'combatant command'), General and

Flag Officers, senior civilian executives, and duplication in information technology, intelligence, public affairs, and facilities" (DoD, 2013a, p. 2). The U.S. DoD planned to save $1.9 billion by cancelling 'the precision tracking space sensor' in FY2014. They also estimated that if the sequestration continues as planned, they would save $50 billion each year through FY2021 (DoD, 2013a). The U.S. DoD saved $17 billion by closing 125 major and 225 minor military facilities from 1988 to 2001 (Beaulier et al., 2011).

2.7 Chief of General Staff

The Chief of General Staff is the person in overall command of all forces in a NATO nation's military organization (DoD, 2010). NATO countries have different command structures, but almost every nation has a commander who leads its armed forces or national military organization. Turkey uses the title the chief of general staff (Turkish Armed Forces, 2014, May 22), the U.S. uses the title chairman of the joint chiefs of staff (Feickert, 2014), Germany uses the title chief of federal armed forces staff or general inspector of the Bundeswehr (Bundeswehr, 2011), and France uses the title chief of the defence staff (French MOD, 2013). In Latvia, the chief of defense leads the armed forces (DCAF, 2003). There is no common name for the aforementioned top commanders, but in this study, the term 'chief of general staff' is used to refer to the highest-ranking officer of a nation's armed forces. The chief of general staff makes strategic decisions for redesign/restructuring during his/her tenure. His/her critical role changes from nation to nation. The Turkish Chief of General Staff, General Yasar Buyukanit (2006-2008), announced in 2006 that the Turkish land forces would gradually shrink by 20-30% as a part of a strategic force plan called Kuvvet-2014 (Force-2014). Kuvvet-2014 successfully began its execution by disbanding the 15th Corps (Hurriyet

Daily News, 2006). Nevertheless, during the command of his successors, the implementation of the plan had lost its momentum. The U.S. Chairman of the Joint Chiefs of Staff from 1993 to 1997, General John Shalikashvili, established the 'Joint Vision 2010' transformation program, which aimed to increase the effectiveness of the digitalization of the U.S. military (Shalikashvili, 1997). The U.S. Chairman of the Joint Chiefs of Staff from 2007 to 2011, Admiral Michael Glenn Mullen, stated his views on the use of military force in a speech at Kansas University (Chu-Jeff, 2010, May 1). According to the economic and sociocognitive perspectives of downsizing, managers play a prominent role in downsizing decisions (McKinley, 2000). As a result, replacement of top military leadership is expected to have a significant impact on downsizing. This research examines whether changes in the Chief of General Staff might be a factor that drives downsizing in military organizations.

2.8 National Military Strategy Directive

The National Military Strategy Directive (NMSD) is an official paper for distributing and applying military power to attain national security strategy and national defense strategy objectives (DoD, 2010). It is often used to turn the National Security Strategy into a directive from which the armed forces could develop their defense program including redesigning, enhancing, digitizing, and modernizing (Fast, 2010). The NMSD is published periodically. Publication periods across NATO countries differ from nation to nation (e.g. annually, bi-annually and so on). The NMSD generally describes the security environment while outlining details regarding what the armed forces should do to accomplish their mission in that environment. It also defines military capabilities and the means necessary to reach those capabilities (DoD, 2010). The U.S. National

Military Strategy is reviewed February 15th of every even-numbered year (US GAO, 1993). The national military strategy directives lead the way in restructuring, which may end in downsizing decisions. The U.S. national military strategy directive that was published in 1997 directed the U.S. forces to begin a transformation process to be more capable and flexible (Metz, 2006). Norway changes its national military strategy every four years (Global Security, 2014c). Modification to the National Military Strategy Directives might be a factor that drives downsizing in military organizations.

2.9 Total Active Duty Personnel

Total Active Duty Personnel is the total number of personnel in the armed forces of a nation who have "full-time occupation as part of a military organization, including paramilitary forces if the training, organization, equipment, and control suggest they may be used to support or replace regular military forces" (The World Bank, 2014, p. 1). The number of Active Duty Military Personnel determines how much a government should pay out of its military budget for military personnel. In 2007, the U.S. active duty military personnel cost 23% of the defense budget with a total of $96.761 billion spent (Peccia, 2008). In 2012, it was 22% with a total of $141.819 billion (DoD, 2013c). Some of the active duty personnel expenditures are for social security, Medicare, Medicaid, etc. (Peccia, 2008). This takes into consideration that high cost military organizations frequently reduce the number of active duty personnel. The U.S. Army reduced its personnel number from 790,000 to 520,000 from 1990 through 1995; this reduction included officers, non-commissioned officers (NCOs), and junior enlisted soldiers (Evans, 1995). Germany reduced its active duty personnel from around 250,000 to 180,000 in 2010 (Business Monitor International, 2011).

2.10 Needs for Downsizing

In 2013, the U.S. Congress prompted the military to reduce military expenditures over the next 10 years with the potential for further cuts in the future (Blechman & Eaglen, 2013). When an organization begins downsizing, it may continue for many years. For instance, Kodak redesigned its structure four times in 10 years, Honeywell downsized two times in four years, and many other major companies acted similarly through the 1990s (Cascio, 1993). Environmental factors are major drivers of organizational change often leading to redesign and downsizing initiatives (James, 2008). If the goal of an organization is to increase its efficiency and competitiveness, it will shrink the level of managerial structures to try to be more productive with fewer resources, and the organization often performs downsizing to achieve this goal (Gandolfi, 2014). Some firms prefer to downsize to reduce cost and to gain economic efficiency (Magán-Díaz & Céspedes-Lorente, 2012). Sometimes a change in market conditions, such as a reduced customer demand for certain products, might lead to personnel downsizing (Conway, 2004). Surprisingly, personnel downsizing has been performed by firms in a healthy state, such as Frito Lay and GTE, in addition to firms in a fragile state, such as General Motors and IBM (Bruton, Keels, & Shook, 1996). Preemptive strategic thinking might also result in personnel downsizing in organizations even if such companies are at their economic peaks (Budros, 2000).

In non-military contexts, causes of personnel downsizing can also be categorized as external (macro-environmental factors) and internal (organizational factors). In order to identify potential key factors that drive personnel downsizing in military settings, the factors in civilian contexts were used and adapted to military settings. The last columns

of Table 3 and Table 4, state the possible military key factors derived from Cooper, Pandey, & Quick's (2012) study. External factors of personnel downsizing and possible external military key factors are shown in Table 3.

Table 3. External Factors of Personnel Downsizing and Possible External Military Key Factors [Adapted from (Cooper et al., 2012, p. 66)]

External – Civilian Factors	External – Military Factors	Possible External Military Key Factors
Declines in customer demands	Declines in level of ambition	*National Military Strategy Directive*
Industry deregulation / privatization	Anticipated changes in the security environment	*National Military Strategy Directive*
Anticipated changes in the economic environment	Anticipated changes in military expenditure	*Military Expenditure*
Downsizing among competitors (cloning response)	Successful downsizing among other NATO nations	*Imitating successful examples*
Abandonment of institutionalized practices	Abandonment of institutionalized practices	*National Military Strategy Directive*
Globalization / global competition	Changes in the security environment	*National Military Strategy Directive*
Differences in regional labor costs	Differences among NATO nations' cultural clusters, differences in costs	*Military Expenditure (Factors may differ across cultural clusters)*
Industry conditions	Having modern equipment, facilities, information technologies	*Modernization*
Workforce demographics	Differences among NATO nation's cultural clusters	*N / A*
Investments in technology	Using information technology in office works, modernization, buying new warfare systems	*Material (Modernization, New Warfare Systems and Information Technologies)*

Internal factors of personnel downsizing and possible internal military key factors and internal factors are displayed in Table 4.

Table 4. Internal Factors of Personnel Downsizing and Possible Internal Military Key Factors [Adapted from (Cooper et al., 2012, p. 66)]

Internal – Civilian Factors	Internal – Military Factors	Possible Internal Military Key Factors
Horizontal mergers / acquisitions	Structural, hierarchical order acquisitions of military organization	*Organization (Structure / Hierarchy of a Military Organization)*
Corporate governance practices	Corporate governance practices	*Military Expenditure*
CEO demographic characteristics	Chief of General Staff demographic characteristics	*Chief of General Staff*
Human resources practices	Active Duty Personnel practices	*N / A (Related to Total Active Duty Personnel)*

2.11 Downsizing Decisions and Roles

Downsizing typically consists of a top-down driven set of managerial actions (Cameron, 1994; Freeman & Cameron, 1993). However, it has been observed that interventions are more effective when lower and mid-level employees are involved in the implementation initiative (Cameron, 1994). Downsizing decisions are affected by environmental (external) and organizational (internal) factors (Datta et al., 2010). Building consensus on downsizing decisions with stakeholders is important (Pratzel &

Morton, 2009). However, downsizing decisions are generally unilateral and stand on the shoulder of the leaders, managers, CEOs, or Chiefs of General Staff (Prindle, 2005). According to Gardner (2002), "budgets and politics have directly contributed to downsizing decisions of the Post-Cold War period" (p. 41). In NATO nations' armed forces, the Chief of General Staff is thought to play a key role in downsizing decisions. The role of the Chief of General Staff might also have different prominence depending on the country under consideration.

As illustrated in Figure 4, the U.S. National Security Strategy addresses the geo-political/geo-economic space of the U.S. Government, and it considers national interests, goals, and priorities (Hesterman, 2014). The U.S. National Defense Strategy outlines the political military space from the perspective of the U.S. Department of Defense - for how the United States will accomplish objectives.

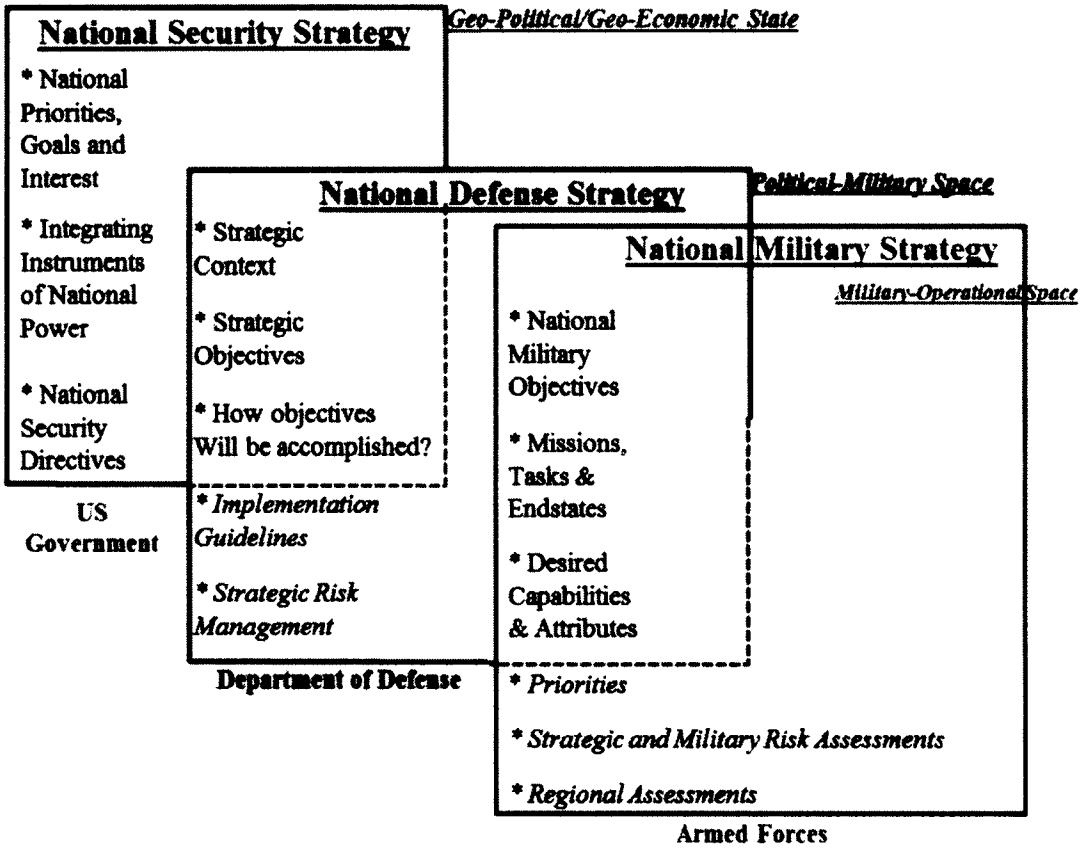

Figure 4. Linking National Security Strategy to National Military Strategy [Adapted from (Hesterman, 2014, p. 3)]

The U.S. national military strategy, prepared for military-operational space by the U.S. armed forces, consists of national military objectives, missions, tasks and end states, desired capabilities and attributes, priorities, strategic and military risk assessments and regional assessments (Hesterman, 2014).

In the United States, Defense Planning/Programming Guidance (DPG) directs the planning phase of the Planning, Programming, Budget, and Execution (PPBE) Process

(AcqNotes, 2014; DAU, 2014). The DPG is guided by the National Security Strategy, the National Military Strategy, and the National Defense Strategy (AcpNotes, 2014). The PPBE process declares how to distribute the resources of the U.S. DoD (DAU, 2014). In the planning phase, strategic priorities and capabilities are defined. In the programming phase, priorities and capabilities are matched with the resources needed in order to achieve the strategic priorities. During the budgeting phase, funding for the programs is planned and justified, and an execution plan is created. In the execution phase, the approved plan is implemented (AcqNotes, 2014; DAU, 2014).

In 2012, the United States spent 22% of the U.S. DoD budget on military personnel. Spending on operation and maintenance accounted for 30.5%, procurement accounted for 16.2%, and research development/testing/evaluation accounted for 11.1% (DoD, 2013c). The difficulty of the decision regarding how to allocate the defense budget in the armed forces has been largely acknowledged.

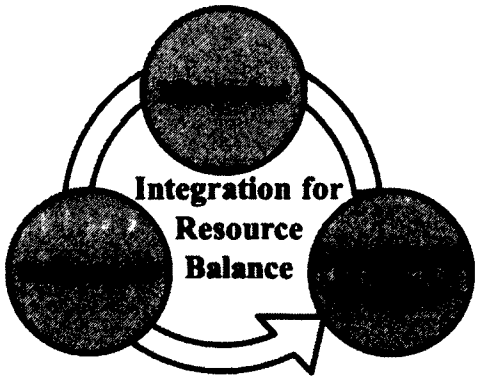

Figure 5. Resource Balancing [Adapted from (AcqNotes, 2014, p. 19)]

As illustrated in Figure 5, being able to achieve the correct level of resources, the correct prioritization, and program tradeoffs with the correct amount of risk can be reached by balancing among and between manpower, investments, and military readiness (AcqNotes, 2014). If there are not enough resources to reach the planned capabilities, a cut-off point is needed in accordance with the priorities. Figure 6 illustrates the difficulty of allocating a budget while trying to decide courses of action in the programming phase. Since the budget is limited but requirements are not, the requirements need to be prioritized in order to use the budget wisely. Prioritization of the requirements and alternative solutions are called courses of action.

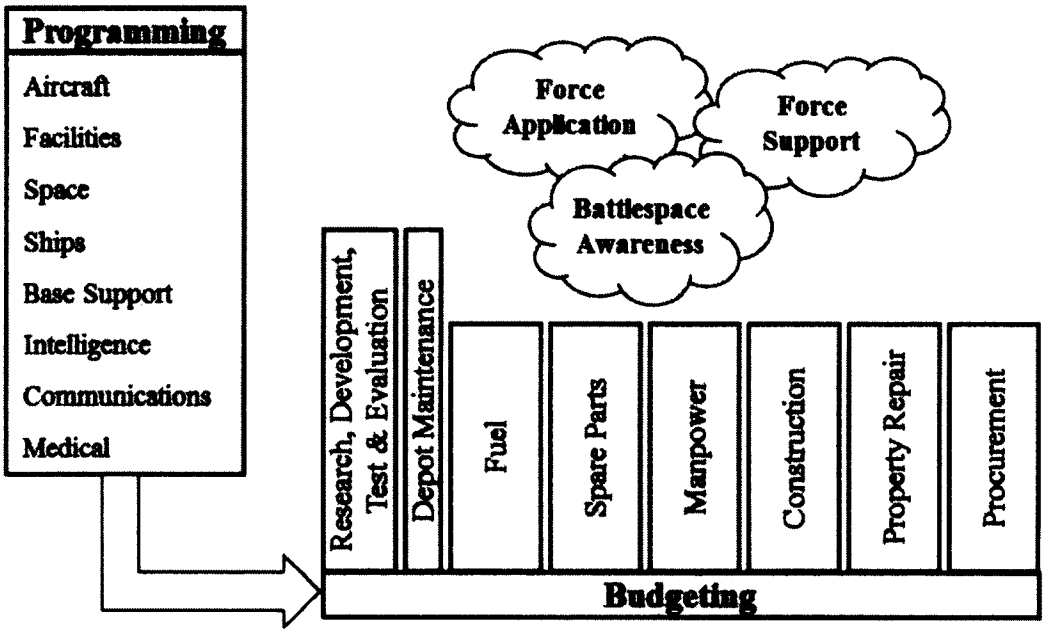

Figure 6. From Programming to Budgeting [Adapted from (AcqNotes, 2014, p. 15)]

Some possible courses of action include: cancelling a warfare system project in force application, force support, and battlespace awareness echelons; cancelling the purchase of newer fighter jets, tanks, warships, helicopters, etc.; cancelling planned construction; and reducing the number of Total Active Duty Personnel (AcqNotes, 2014). Outputs to the programming phase are reconsidered for optimal budget planning.

A nation must perfectly align its requirements and match them with the available resources based on the budget and national military strategy. If the military organization of a nation with shrinking economies continues to ask for a larger military budget, then the nation's economy may be severely damaged. For instance, during the mid-1980s, Brazil increased its expenditures in military power despite a shrinking economy, resulting in reduced economic growth (Franko, 1994).

According to previous studies, personnel downsizing is typically considered a reduction in the number of permanent employees of five percent or more compared to the previous year (Ahmadjian & Robinson, 2001; Cascio et al., 1997). In military organizations, a reduction of 5% can result in great vulnerability. The impact in terms of actual reduction in personnel numbers can be huge in countries with a large military force. For instance, in 2012 China had 2,993,000 active duty military personnel (5% equals to 149,650), India had 2,728,700 (5% equals to 136,435), Russia had 1,364,000 (5% equals to 68,200), and the United States had 1,492,200 (5% equals to 74,610) (The World Bank, 2014). In the same year, several NATO nations had fewer active duty military personnel than 5% of China's total (149,650). For example, the Netherlands had 43,300, Belgium had 30,700, Czech Republic had 26,750, and Norway had 25,800 total active duty personnel (The World Bank, 2014). For the purpose of this study, any

reduction in the number of Total Active Duty Personnel is considered personnel downsizing.

2.12 Key Factors That Drive Personnel Downsizing

Military downsizing is often used as a strategic redesign strategy in order to adapt to a changing security environment. Downsizing decisions are typically aimed at increasing readiness for foreseeable missions, optimizing the entire organization, and increasing performance levels by reducing personnel numbers, bases, and facilities, or by enhancing the hierarchical organization, the work process, equipment, and weapon systems. The possible key factors that drive personnel downsizing were borrowed from previous studies done in non-military contexts and adapted to fit a military environment.

2.12.1 Chief of General Staff

The personality traits and backgrounds of CEOs have been found to influence downsizing in personnel numbers (Useem, 1993). It has been found that downsizing rates were higher when CEOs had financial backgrounds than when they did not (Budros, 1999). Additionally, changes in top military management (Chiefs of General Staff) might also drive downsizing in military organizations depending on the leader's personality, background, and experience. In academic literature, it has been proposed that CEO turnover may cause organizational dislocation and instability in personnel structure (Li, 2012). Thus, the Chief of General Staff could be a key factor that drives personnel downsizing in military organizations.

2.12.2 National Military Strategy Directive

The National Military Strategy Directive is linked to the national defense strategy and the national security strategy (Hesterman, 2014). Any political guidance coming

through that connection initiates action in real life during the years of implementation. In 1993, the United States DoD defined its objective as diminishing its active duty force by over 446,000 positions (US GAO, 1993): "By the end of FY1993, DoD expects to have reduced its active duty force levels by over 446,000 positions, which is a reduction of nearly 21 percent over fiscal year 1987's end-strength levels" (US GAO, 1993, p. 0.4.1). In 1994, a public law (No. 101-510) established in the United States directed a reduction of over 30% of the United States' military personnel by 1996 (Cameron, 1998). Based on these examples, the National Military Strategy Directive could be another key factor.

2.12.3 Military Expenditure

In most cases, a military organization's total personnel number, force structure, equipment, and weapon systems directly affect military expenditure. For instance, in 1994, the United States estimated a savings of 40% in military expenditure by reducing over 30% of its total active military personnel (Cameron, 1998). In military organizations, a reduction in the defense budget generally results in downsizing. As Figure 7 shows, the United States' military expenditures fell from 5.32% to 3.02% of its GDP (Gross Domestic Product) from 1990 through 1999. During that same period, the total number of active duty personnel was reduced by 1.38% (from 2,180,000 to 1,575,000 personnel) (The World Bank, 2014). Thus, military expenditures are thought to be a key factor driving personnel downsizing in military organizations.

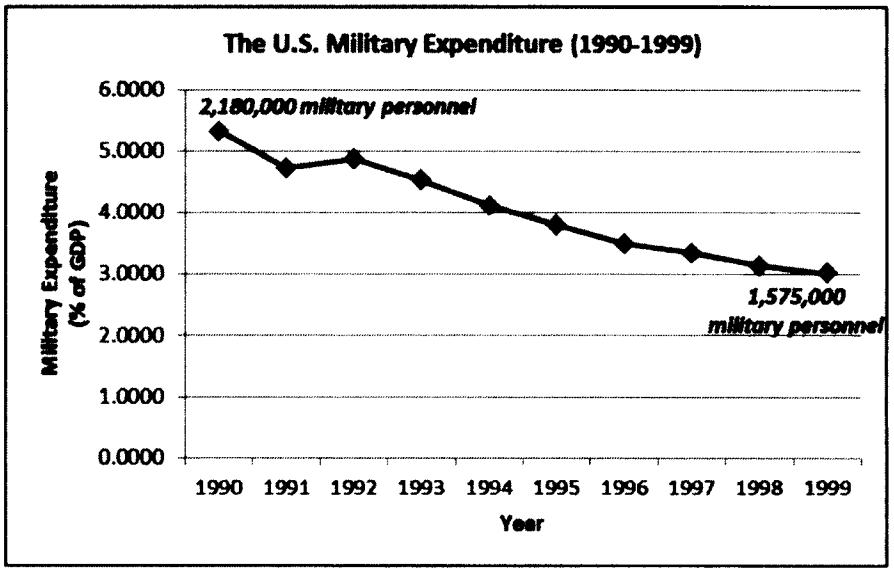

Figure 7. The U.S. Military Expenditure (% of GDP)

2.13 Other Possible Key Factors

There might be several other factors that drive personnel downsizing, but this study attempts to determine only the most influential factors. Before analyzing other possible key factors, it is important to know more about the military organization's force management model. Figure 8 depicts the Force Management Model.

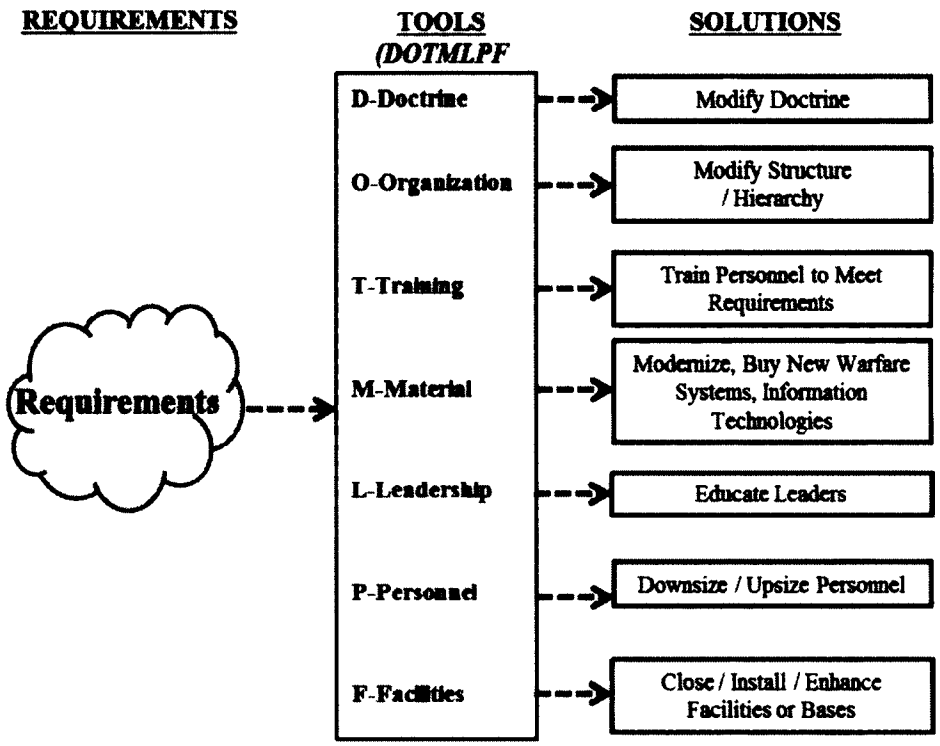

Figure 8. Force Management Model [Adapted from (Army Force Management School, 2014)]

In order to meet requirements, solutions are created by using DOTMLPF tools, namely Doctrine, Organization, Training, Material, Leadership, Personnel, and Facilities. To be able to meet the requirements, one or more of the solutions can be used. Possible solutions are modifying doctrine modifying the structure or hierarchy of the military organization; training personnel; modernizing equipment by buying new warfare systems or new IT; educating leaders; downsizing or upsizing the Total Active Duty Personnel number; and closing, installing, or enhancing facilities or bases. The National Military Strategy Directive and the Chief of General Staff can directly influence requirements.

Some requirements may also be created through implementation, capability analysis, and gap analysis in military organizations.

2.13.1 Doctrine

Doctrine is defined as the "fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application" (DoD, 2010, p. 78). National objectives are declared through the National Military Strategy Directive; therefore, the NMSD is a dominant factor and more influential than the doctrine. As a result, even though the doctrine might play a role in downsizing decisions, the National Military Strategy Directive is considered more influential.

2.13.2 Organization (Structure / Hierarchy of a Military Organization)

In military organizations, structural or hierarchical changes are common. However, they are driven by the National Military Strategy Directive, military expenditure, or the Chief of General Staff decisions. One of those three factors might be a trigger to eliminate or to create a structural unit that could lead to personnel downsizing or upsizing.

Peacetime positions are called peacetime establishment (PE) (Chairman Of The JCOS Instruction, 2013). Positions during crises and war are called crisis establishment (CE) (Chairman Of The JCOS Instruction, 2013). Therefore, military organizations may position some of their personnel in new PE posts rather than taking them out of the system.

Military organizations are non-profit governmental organizations. Their mission is concerned with fulfilling the requirements for operational readiness and deterrence.

They have to be ready when their nations need to be defended. In the operational readiness system, not all units of the armed forces are expected to be combat ready. There might be some units working with only 5% or less of their personnel during peacetime. Some of the units may not even have a handful of personnel during peacetime. Weapon systems are in hibernation mode in customized long-term depots. In case of a crisis, reserves are called for duty, and they get the remaining positions to make the unit 100% full in positions. Weapon systems in hibernation mode are also ready to be used by reserves where needed. All those actions are guided by the NMSD and ordered or approved by the Chief of General Staff. Hence, NMSD and Chief of General Staff are considered to be more influential factors than downsizing in the structure or hierarchy of a military organization that drive personnel downsizing in armed forces.

2.13.3 Personnel and Leadership Training

Each military employee has to be trained very well. For instance, in an infantry squad, there are nine personnel and the staff sergeant is the squad leader. Each member in the squad has to be trained very well. If one of them is better trained, it does not necessarily cause downsizing in the squad personnel number. In military organizations, everyone has a certain job description for peacetime (PE – Peace Establishment) and wartime (CE – Crises Establishment). The squad leader has to know how to use a rifle, how to lead the squad, how to use a grenade, and so on. Military personnel are multi-tasked. The staff sergeant can also work in the office as a staff member in a NATO headquarters. Every team member should be as well trained as possible. Military organizations work with the philosophy implemented by General Hans Von Seeckt: "Train better, fight best" (McLennan, 2012, p. 69).

When a new warfare system joins the military, personnel that use the new warfare system also need additional training. Military organizations have unique specifications that are almost impossible to observe in civilian organizations. In a civilian organization with better training and expert personnel, it might be possible to reduce some job positions; however, in most military organizations, positions are created for a certain role to conduct a mission during a crisis or war. Thus, personnel training is not considered a key factor that drives downsizing in military organizations.

2.13.4 Material - Modernization, New Warfare Systems, and IT

Modernization and technological innovations such as new warfare systems could play a role in personnel downsizing decisions, but this research posits that military expenditure is a more influential factor. Modernization efforts are reflected on military expenditure. Procurement (16.2% of military budget), research, development, testing, and evaluation (11.1% of military budget) phases, which help to create modernized armed forces, are included in the United States DoD FY2012 military expenditure (DoD, 2013c). Also, modernization of the industry has been known to influence downsizing decisions (DeWitt, 1998). In addition, in military organizations, buying new warfare systems for the purpose of modernization due to technological improvements might also drive personnel downsizing. For example, classic artillery guns required two times more personnel than the modern self-propelled artillery guns. The M115, 8 in (203 mm) towed howitzer needs a 14-person crew to operate, while the modern Turkish T-155 Firtina (155-mm self-propelled howitzer) needs only five crew members to operate with better precision, a longer range, and a faster firing speed than the previous model (Global Security, 2014a; Military Today, 2014). If armed forces decide to use the modern Firtina

howitzer instead of the towed howitzer, they would need to downsize nine personnel per gun. Therefore, buying new warfare systems can affect personnel downsizing. However, military expenditure is more influential because it is not possible for a military organization to be modernized without expending enough money for new and technologically improved warfare systems.

Information technologies (IT) used in military organizations are continually improving (Catanio & Catanio, 2010). Military organizations are allocating their resources to buy new hardware and software. In addition, they are training their personnel to meet the requirements of the new information technology (Catanio & Catanio, 2010). Developments in IT might help improve effectiveness by supporting task completion with fewer personnel. On the other hand, the nature of military missions might require additional tasks and personnel. When computers were not so heavily involved in the military, it was hard and time-consuming to make changes in policies, procedures, documents, and presentations. Therefore, commanders were careful not to give additional corrective orders to the staff. As a result of the development and heavy involvement of IT in the military, commanders are very comfortable repeatedly ordering their staff to modify documents and presentations. In addition, staff officers working at HQs during peacetime are multi-tasking, and they have a role as warriors as well. For civilians and contractors, development in IT might be a downsizing factor, but in previous years when military organizations were not so heavily involved in the system, there were fewer civilians and contractors. In contrast, the development in IT caused more civilian personnel involvement in military posts as subject matter experts. In addition, in order to have up-to-date IT, software, and hardware, military organizations need a budget.

Thus, since military expenditure already encompasses investments in modernization, new warfare systems, and IT systems, those individual factors will not be considered separately in this study.

2.13.5 Personnel (Downsize / Upsize Personnel)

In order to meet the requirements directed by NMSD, the Chief of General Staff uses downsizing or upsizing of the Total Active Duty Personnel number as one of the tools. The purpose of this study is to investigate the key factors that drive personnel downsizing in military organizations. The Total Active Duty Personnel number is the dependent variable, and it is affected by the key factors that drive personnel downsizing in this study rather than being a factor itself.

2.13.6 Facilities (Close / Install / Enhance Facilities or Bases)

Military organizations need facilities and bases. Driven by the directives from NMSD and the Chief of General Staff, facilities or bases of a military organization might be closed or enhanced, or brand new ones might be installed. After closing facilities or bases there might be excess personnel working in the facilities. Depending on the nation and situation, the excess personnel might be assigned to another base or facility or remain jobless once out of the military organization. Base or facility closure directives come through the National Military Strategy Directive and/or the Chief of General Staff; therefore, NMSD and the Chief of General Staff are considered more influential. As a result, facilities (Close / Install / Enhance Facilities / Bases) are not considered to be one of the most influential factors in this study.

2.13.7 Imitating

Based on socio-cognitive theory, the successful downsizing of competing companies in a sector has been known to influence personnel downsizing in an organization (Magán-Díaz & Céspedes-Lorente, 2012). Some organizations are imitating the success stories of others. If the most successful organization declared that the reason behind their achievement was personnel downsizing by giving certain data and evidence, then some other organizations might try to do the same thing. However, in military organizations, every country has its own specific requirements and vulnerabilities. Even though one country's military organization wants to follow the strategy of the top military organization, which announced that its increased effectiveness was a result of personnel downsizing, it may decide not to perform personnel downsizing. The country might refrain from personnel downsizing because of guidance from the country's National Military Strategy Directive and the possible vulnerabilities that could come from personnel downsizing. In addition, the Chief of General Staff might not consider imitating more successful examples. Therefore, imitating the success stories of other nations was not chosen as a factor that drives personnel downsizing in this study. Contrary to civilian organizations, even though a military organization earned surplus personnel during the post-modernization period, due to the nature of the military organizations, it does not lay-off the relatively spare personnel. Military organizations have a structure for a possible defense action; however, they cannot fill all of the positions during peacetime.

2.14 Cultural Clusters of NATO Countries

A cultural cluster is a group of countries with similar cultural characteristics (House, 2004; Russo, 2000). In this study, 28 NATO countries are grouped according to their cultural clusters as displayed in Table 5. Cultural clusters' groups are named Cultural Cluster 1, 2, 3, 4, 5, and 6.

Table 5. Cultural Clusters of NATO Countries [Adapted from (Chnokar et al., 2009)]

Cultural Clusters	NATO Countries (28 Nations)
1 Anglo	USA, Canada, United Kingdom (3 nations)
2 Germanic Europe	Germany, Netherlands (2 nations)
3 Latin Europe	Italy, Spain, Portugal, France (4 nations)
4 Eastern Europe	Poland, Greece, Hungary, Albania, Slovenia (5 nations)
5 Middle East	Turkey (1 nation)
6 Nordic Europe	Denmark (1 nation)
Not listed	*Belgium, Bulgaria, Croatia, Czech Republic, Estonia, Iceland, Latvia, Lithuania, Luxemburg, Norway, Romania, Slovak Republic (12 nations)*

The Global Leadership and Organizational Effectiveness (GLOBE) project studied 62 nations worldwide (House, 2004). A later study examined 25 of those 62 nations (Chnokar et al., 2009). The GLOBE project investigates the cultures by nine dimensions including "power distance, performance orientation, uncertainty avoidance, assertiveness, humane orientation, future orientation, in-group collectivism, institutional collectivism, and gender egalitarianism" (Chnokar et al., 2009, p. 58). However, none of the two aforementioned studies included 12 NATO nations, namely Belgium, Bulgaria, Croatia, Czech Republic, Estonia, Iceland, Latvia, Lithuania, Luxemburg, Norway, Romania, and the Slovak Republic.

2.14.1 Modified Cultural Clusters

Further research was conducted to determine whether the aforementioned 12 nations can be associated to the existing cultural clusters as defined in prior research. Denmark, Finland, Iceland, Norway, and Sweden are considered Nordic countries (Chhokar, Brodbeck, & House, 2013). The Nordic Council was founded by Denmark, Sweden, Norway and Iceland in 1952 (Randburg, 2014). Therefore, Iceland and Norway are considered members of the Nordic Europe cluster in this study.

According to Bakacsi, Sandor, Andras, & Viktor, Poland, Russia, Ukraine, Latvia, and Slovenia are considered Central-eastern European countries (2002). Another study found that Bulgaria, the Czech Republic, Greece, Hungary, and former Yugoslavia are considered eastern countries (Hampden-Turner & Trompenaars, 2000). Yet another found that Croatia and Slovenia are former Yugoslav states (Laurent, 2011). In addition, the Romanian culture falls under the Central and Eastern Europe cultural cluster (Essays UK, 2013c). The Slovak Republic (Slovakia) has been identified with cultural

characteristics similar to the Czech Republic and Hungary (Essays UK, 2013a). Therefore, Bulgaria, Latvia, the Czech Republic, Croatia, and Romania are grouped under the Eastern Europe cluster in this study.

The Baltic countries are Latvia, Lithuania, and Estonia, which have very similar cultures (Bunkśe & Tietze, 1994). Latvia is in the Eastern Europe cluster. Therefore, Latvia and Estonia are considered a part of the Eastern Europe cluster.

According to a cultural connection study on social media usage behaviors, the Netherlands and Belgium are in the same cultural cluster (Kohl, 2008). Hence, Belgium is considered a part of the Germanic Europe cluster. Taking into account its shared political, religious, and demographic history, as well as other similarities between Luxemburg and in particular Belgium – such as the same language, traditions, and economic structure – and in view of a common set of broad values, it can be stated that Luxemburg belongs to the same cultural cluster as Germany, the Netherlands, and Belgium (e-Luxembourg, 2007). Modified cultural clusters of NATO countries are shown in Table 6.

Table 6. Modified Cultural Clusters of NATO Countries [Adapted from (Chnokar et al., 2009)]

Cultural Clusters	NATO Countries (28 Nations)
1 Anglo	USA, Canada, United Kingdom (3 nations)
2 Germanic Europe	Germany, Netherlands, *Belgium, Luxemburg* (4 nations)
3 Latin Europe	Italy, Spain, Portugal, France (4 nations)
4 Eastern Europe	Poland, Greece, Hungary, Albania, Slovenia, *Czech Republic, Latvia, Croatia, Bulgaria, Estonia, Lithuania, Romania, Slovak Republic* (13 nations)
5 Middle East	Turkey (1 nation)
6 Nordic Europe	Denmark, *Iceland, Norway* (3 nations)

Italics indicate nations that were not originally part of the cultural clusters in the Globe research (House, 2004).

2.14.2 What Might Change Across Cultural Clusters?

The Chief of General Staff, the National Military Strategy Directive, and military expenditures are considered the most influential key factors that drive personnel downsizing across NATO nations' military organizations. The cultural characteristics of a military organization might also affect the decision making process. For instance, in one nation, a commander's decision to downsize might be enough for his subordinates to implement the decision, while in another nation subordinates might ask for the rationale

behind the decision and might look for alignment to the National Military Strategy Directive before deciding to obey orders. They might request permission to work on risks, mitigations, and opportunities in order to prepare a comprehensive approach.

CHAPTER III

METHODOLOGY

This chapter describes the research design and context of the study. This research utilizes a deductive approach through a quantitative research methodology in an effort to investigate key factors that might predict personnel downsizing in military organizations and whether those factors differ across NATO nations' cultural clusters. The aim of this study was to investigate the relationships between one dependent variable and three independent variables by using longitudinal data. The population under study is multinational military organizations, and the research was conducted based on a sample of 28 NATO nations' military organizations. Longitudinal data covering a 23-year period (1990-2012) was collected from 28 NATO nations' military organizations (armed forces).

The analyses in this study were broken down into two main steps. In the first step (overall analyses), an inspection of the key factors that drive personnel downsizing in the overall sample of 28 nations was conducted. In the second step (cultural clusters analyses) analyses to investigate whether the key factors differ across cultural clusters were performed. Analyses were conducted to determine to what extent the independent variables Military Expenditure, turnover in the Chief of General Staff, and modification of the National Military Strategy Directive related to the dependent variable, which is Total Active Duty Personnel number. This chapter provides details of the research design and methodology of the study.

3.1 Research Design and Methodology

The purpose and goal of this study were accomplished by applying a quantitative research design, by collecting data that helped to investigate key factors that drive personnel downsizing in military organizations, and by determining whether those factors differ across NATO nations' cultural clusters.

3.1.1 Research Questions

The research questions that the study addresses were:

Question 1. What are the key factors that drive personnel downsizing in military organizations of NATO nations?

Question 2. Do those key factors differ across NATO nations' cultural clusters?

3.1.2 Hypotheses in Null Form

The hypotheses were grounded from previous studies' findings.

$H_0$1: Military Expenditure (% of GDP-Gross Domestic Product) has no relationship with personnel downsizing.

$H_0$2: Turnover in the Chief of General Staff has no relationship with personnel downsizing.

$H_0$3: Modification of the National Military Strategy Directive has no relationship with personnel downsizing.

$H_0$4: The relationship between Military Expenditure (% of GDP) and personnel downsizing does not differ across NATO nations' cultural clusters.

$H_0$5: The relationship between the Chief of General Staff and personnel downsizing does not differ across NATO nations' cultural clusters.

$H_0$6: The relationship between the National Military Strategy Directive and personnel downsizing does not differ across NATO nations' cultural clusters.

3.1.3 Hypotheses in Alternative Form

H_A1: Military Expenditure (% of GDP) has a statistically significant relationship with downsizing.

H_A2: Turnover in the Chief of General Staff has a statistically significant relationship with downsizing.

H_A3: Modification of the National Military Strategy Directive has a statistically significant relationship with downsizing.

H_A4: The relationship between Military Expenditure (% of GDP) and personnel downsizing differs across NATO nations' cultural clusters.

H_A5: The relationship between the Chief of General Staff and personnel downsizing differs across NATO nations' cultural clusters.

H_A6: The relationship between the National Military Strategy Directive and personnel downsizing differs across NATO nations' cultural clusters.

3.1.4 Population and Rationale

This research considers the overall multinational military organization (NATO) as the unit of analysis and NATO as the unit of generalization.

Data was collected for 23 years (1990-2012) annually from all 28 NATO nations. Each data point is a line in the data set. For each data point, there are six MS Excel data cells as shown in Table 7. There are 23 data points per country. The total number of data points in this study is 644. In addition, the cultural cluster associated with the data point was also included. There were missing data during certain periods for some of the NATO

nations. Missing data which can be summarized by nation and time period as follows: Albania 1990-1991, Croatia 1990-1991, Czech Republic1990-1992, Estonia 1990-1991, Iceland 1990-1994, Latvia 1990-1992, Lithuania 1990-1992, Slovak Republic 1990-1992, and Slovenia 1990-1991 (The World Bank, 2014).

Table 7. Data Points and MS Excel Data Cells

Nation	Year	Total Active Duty Personnel #	Military Expenditure (% of GDP)	Tenure of Chief of General Staff	National Military Strategy Directive Maturity	Cultural Cluster	Excel Data Cells
Belgium	1990	110,000	2.3924	1 (Turnover)	1 (Modification)	2	7 cells
Belgium	1991	106,000	2.2895	2 (Second year of duty)	2 (Second year in effect)	2	7 cells
Belgium	1992	101,000	2.2240	3	3	2	7 cells
...	...	...	...	...	...	...	7 cells
United States	2012	1,520,100	4.7454	2	1	1	7 cells
Total 28 nations for 23 years 28*23 = 644 data points							4508 Total excel data cells.

A data point related to the United States in 2012 is highlighted as a sample in the data set. Data points in this study include Nation, Year, Total Active Duty Personnel number, Military Expenditure (% of GDP), turnover in the Chief of General Staff, and modification of the National Military Strategy Directive.

3.2 Data Collection

A variety of data sources were used for data triangulation. Data related to the Total Active Duty Personnel number and Military Expenditure (% of GDP) was mainly collected from the Word Bank and SIPRI (SIPRI, 2013, 2014; The World Bank, 2014). Data related to the Chief of General Staff was collected from NATO's official site and the NATO nations' armed forces official webpages. Data related to the National Military Strategy Directive (NMSD) was collected from the National Liaison Representatives (NLRs) of 28 NATO nations working collaboratively with Headquarters Supreme Allied Commander Transformation (HQ SACT), NATO's official site, and the NATO nations' armed forces official webpages. Data related to NATO nations' cultural clusters was mainly collected from the NATO nations' official webpages and the GLOBE study (Chnokar et al., 2009; House, 2004). The lists of the data sources are detailed in the appendix.

3.3 Statistical Tool

The Stata 13.1 (Serial number: 301309290450) statistical tool was used in this research. Stata offers great possibilities for programming, and it makes it possible to perform time series cross-sectional dynamic panel data analyses. Stata also makes it possible to use the Arellano-Bond Generalized Method of Moments (GMM) technique for this research.

3.4 Data Analysis Technique

3.4.1 Time Series Cross-Sectional Analysis Technique

This method has been previously suggested as appropriate for longitudinal research designs that involve repeated measures taken on the same subject overtime at regular intervals (Salkind, 2010).

This study used time series cross-sectional dynamic panel data analysis, which provides mathematically rigorous theory and techniques. This study uses multivariate time series analysis that accounts for a dependent variable (Y_{ti}) and its lagged values ($Y_{(t-1)i}$) as well as several independent (X_{ti}) variables and their lagged values. The research data was in a linear time series model for all the dependent and independent variables for the period of 1990-2012. It describes the relationship between dependent variable and independent variables with lagged values. Time series cross-sectional dynamic panel data is typically characterized by time series data collected at the same time or during the same time period for all the dependent and independent variables (Holtz-Eakin, Newey, & Rosen, 1988).

The time series cross-sectional dynamic panel data analyses presented the challenge of analyzing data from different time periods. As shown in Figure 9, there was an incomplete data set, including all the indicators over the entire period (Cuevas & Quilis, 2012). Hence, analyzing that kind of data required advanced statistical methods.

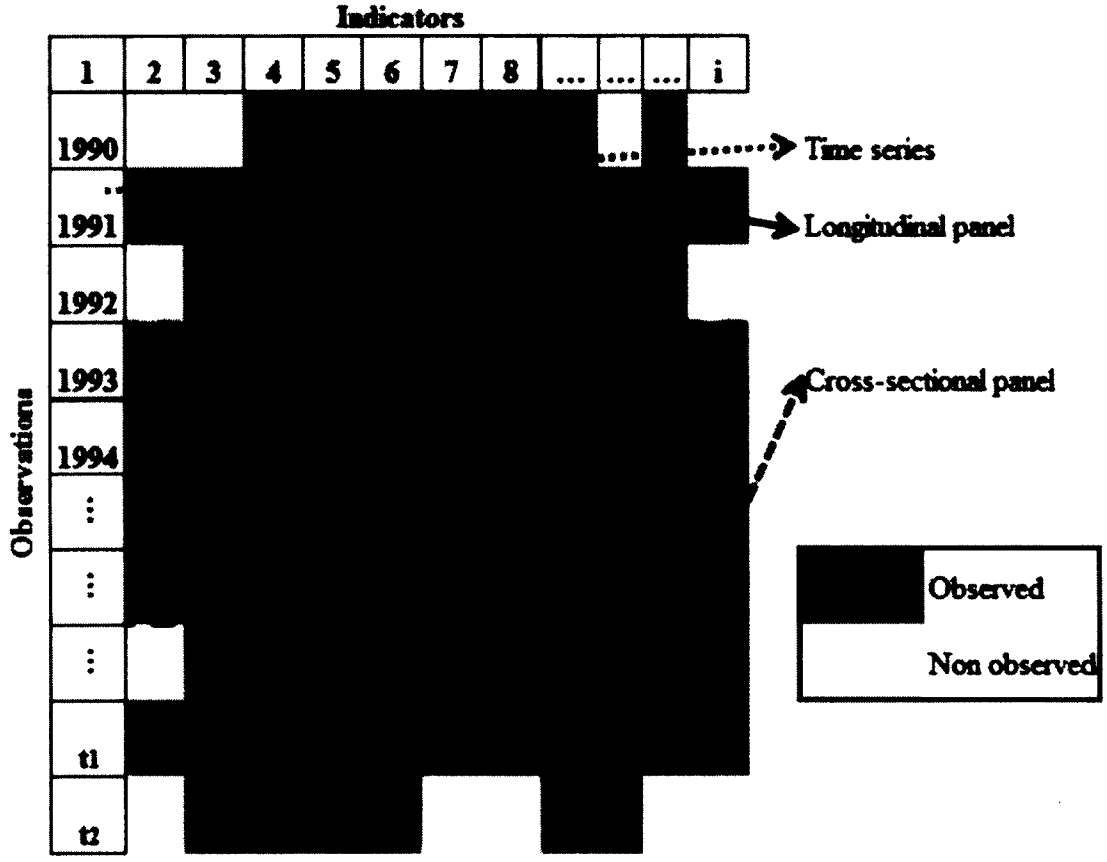

Figure 9. Time Series Cross-Sectional Dynamic Panel Data Design

In Figure 9, indicators from 28 NATO nations contain different sections that embody cross-sectional data. Each nation can be considered a different panel, and collectively the data set can be considered panel data. Since data was collected over 23 years for each country, it constitutes time series dynamic data. The combination of the aforementioned data types created the time series cross-sectional dynamic panel data for this study.

3.4.2 Arellano-Bond Generalized Method of Moments Model and Rationale

In search of a model to analyze time series cross-sectional dynamic panel data, different possible statistical models were investigated, and trial runs were performed with sample data. As Pollock (2006) states, "Regression analysis produces a statistic, the regression coefficient, that estimates the effect of an independent variable on a dependent variable" (p. 137). The Arellano-Bond Generalized Method of Moments (GMM) model is a regression model used to analyze the causal relationship between dependent and independent variables that conform with time series cross-sectional dynamic panel data. This statistical method can model both unit heterogeneity (between-subject) and time heterogeneity (within-subject) (Alvarez & Arellano, 1998). The Arellano-Bond GMM model suggests using a lag of two or more periods as instruments of estimation in order to gain efficiency (Arellano, 2003; Bilgicer, Jedidi, Lehmann, & Neslin, 2014). The Arellano-Bond GMM model assumes that there is no serial correlation in the idiosyncratic errors but that they are dependent over time periods (Arellano & Bond, 1991).

One of the advantages of using Arellano-Bond GMM in the time series cross-sectional dynamic panel data was that the model increased the degrees of freedom due to the higher amount of individual observations. Another advantage was that the model reduced collinearity among explanatory variables, which provided a better estimation precision. Another advantage of the model was the enhancement of estimator precision by eliminating time-variant individual covariates. Yet another advantage was that due to the model characteristics, it was possible to investigate heterogeneity by gathering

information about previous time periods (Ejzykowicz, 2013; Hsiao, 2003; Wooldridge, 2010).

A type of regression analysis is used to create "a mathematical model that adequately described Y as a function of the X's, or that predicted Y from the X's" (Porta, 2008, p. 53). Correlation and regression analysis are related in the sense that both deal with relationships among variables (Porta, 2008). The purpose of this study was to investigate the relationship between personnel downsizing (Y) and Military Expenditure (X_1), turnover in Chief of General Staff (X_2), and modification of the National Military Strategy Directive (X_3). As a result, the study was particularly suited for the use of a multi regression. The initial model was formulated as:

$$Y = f(X_1, X_2, X_3).$$

This study assessed independence by firstly testing the null hypothesis ($H_0 : \rho = 0$) by subtracting the fitted values from the actual values using a regression analysis, and secondly by calculating the values of the autocorrelations among the data points (each line point on a data set). The time series cross-sectional dynamic panel data analysis formula was applied to the data set using the following equation:

$$"Y_{ti} = X_{ti} + \rho_i + \theta_i + e_i$$

$$Y_{(t-1)i} = X_{(t-1)i} + (\rho_i + \theta_i - \rho_i - \theta_i) + e_{(t-1)i}"$$ (Drukker, 2008, p. 3).

In this equation, (ρ) and (θ) are unknown parameters, (i) is the number of independent variables and the equation number in (t) year; (Y_{ti}) is the value of personnel downsizing (dependent variable), (X_{t1}) is Military Expenditure, (X_{t2}) is turnover in the Chief of General Staff, (X_{t3}) is modification of the National Military Strategy Directive, (e_i) is the error term (noise), $Y_{(t-1)i}$, $X_{(t-1)i}$ and $e_{(t-1)i}$ are the values of (Y), (X) and (e), in

the previous year (t-1). In this case, $Y_{(t-1)i}$, $X_{(t-1)i}$ and $e_{(t-1)i}$ are called lagged values of (Y), (X) and (e).

To continue the calculations, the Δ (Delta) (slope) value was needed. The change in data was calculated by using the formula $\Delta_i = [(X_{ti}) - (X_{(t-1)i})] / (X_{(t-1)i})$. In the formula, Δ stands for slope of the calculation, (X_{ti}) stands for value of current year, $(X_{(t-1)i})$ stands for value of the previous year (lagged value). The slope value may be either positive or negative, where a positive value means there is an incline and a negative value means there is a decline between current and previous values.

(ρ) and (θ) are unknown parameters that symbolize any unknown correlation, that can't be measured and/or observed. After running the equation by using first lagged values of the dependent variable, in (t-1) year:

$$Y_{(t-1)i} = X_{(t-1)i} + (\rho_i + \theta_i - \rho_i - \theta_i) + e_{(t-1)i}$$

the unknown parameters $(\rho_i ; \theta_i)$ are gone.

$$Y(t-1)i = X(t-1)i + e(t-1)i$$

There is still noise (the error term) in the equation. With the assumption that "the difference of the second lag of a dependent variable is strictly exogenous [Strict exogeneity requires that (e_{ti}) be unrelated to dependent variable for $(_t) > (_{t-1})$]" (Drukker, 2008, p. 7) a second value is calculated: "GMM uses lags as instruments to give unbiased and consistent estimates of the coefficients. The first lag equation removes fixed household effects and creates variables as instruments to create moments for estimation" (Bilgicer et al., 2014, p. 6). After calculating the second lag values, the error term (e_i) is gone.

$$\Delta iYi = \Delta Xi + (eti - e(t-1)i)$$

This practice removes unobserved entities as well as bias estimates (Arellano & Bond, 1991). This model uses lags of exogenous variables at (t-2) time. GMM estimation enhances efficiency by applying deeper lagged values (two or more) to use them as instruments (Arellano & Bond, 1991). In order to get unbiased and consistent estimates the resulting equation shouldn't have second or higher order autocorrelation (Bilgicer et al., 2014).

Autocorrelation and heteroskedasticity tests were performed during the analyses. The presence of heteroskedasticity and lack of autocorrelation yields enhanced estimates in GMM models(Greene, 2003). Arellano-Bond GMM controls the dependent variable's previous values for the previous years (Arellano & Bond, 1991). When an analysis with three lags is performed to assess the dependent variable's value in (t) time, the GMM model can control values in (t-3, t-2, t-1) time. This is a very important estimation method used to assess the correlation between the Total Active Duty Personnel number (Y) and Military Expenditure (X_1), turnover in the Chief of General Staff (X_2), and the modification of the National Military Strategy Directive (X_3). This is because an ascending or descending change in Military Expenditure, a turnover in Chief of General Staff, or a modification in the National Military Strategy Directive in (t-3) time might drive an ascending or descending change in the Total Active Duty Personnel number in (t-3, t-2, t-1, t, t+1) time and so on (Arellano & Bond, 1991).

Analyses were conducted by using the Generalized Method of Moments (GMM) estimator of the Arellano-Bond time series cross-sectional dynamic panel data model (Arellano, 2003). During the analysis phase, the model was tested for being strictly

exogenous; this determined whether the data used in this study meets the requirements of the Arellano-Bond Generalized Method of Moments model (Drukker, 2008).

3.4.3 Variables, Indicators and Metrics

There are one dependent and three independent variables in this study. The Total Active Duty Personnel number was considered the dependent variable. Military Expenditure, the Chief of General Staff, and the National Military Strategy Directive were considered independent variables. Year and Nation were considered dummy variables. Cultural Clusters was considered a categorical variable.

3.4.3.1 Dependent Variable, Indicator and Metric

Total Active Duty Personnel: The Total Active Duty Personnel number was considered the dependent variable. Any reduction in Total Active Duty Personnel quantity was considered an indicator of personnel downsizing, whereas an increase was considered upsizing. Total Active Duty Personnel is to show numbers as they were for each NATO nations' armed forces (e.g. 1,520,100).

3.4.3.2 Independent Variables, Indicators and Metrics

Military Expenditure (% of GDP): This variable represents the annual military expenditure of a NATO nation as the percentage of its GDP (Gross Domestic Product). In the data set, military expenditure is to show 14 decimal places (e.g. 1.56352950795231%).

Chief of General Staff: This variable represents the number of years the Chief of General Staff of a NATO nation was on duty. In other words, it is tenure of the Chief of General Staff. The first year of tenure was coded as '1', the second year was coded as '2', and the third year was coded as '3' and so on (e.g. 1, 2, 3, 4, 5, 6).

National Military Strategy Directive (NMSD): This variable represents the number of years the National Military Strategy Directive of a NATO nation was in effect. In other words, it is NMSD maturity. The first year of NMSD maturity was coded as '1'; the second year was coded as '2' and so on (e.g. 1, 2, 3, 4, 5, 6).

3.4.3.3 Dummy Variables, Indicators and Metrics:

Year: The years from 1990 through 2012 were considered. Years were coded by their number.

Nation: 28 NATO nations were considered. Nations were coded by their name.

3.4.3.4 Categorical Variable, Indicator and Metric:

Cultural Clusters: Cultural clusters were considered a categorical variable. The groups of Cultural Clusters were coded as group '1, 2, 3, 4, 5, and 6' as shown in Table 8.

Table 8. Cultural Clusters of NATO Countries by Group Codes [Adapted from (Chnokar et al., 2009)]

Group Codes	NATO Countries (28 Nations)
1	*Anglo* (USA, Canada, United Kingdom)
2	*Germanic Europe* (Germany, Netherlands, Belgium, Luxemburg)
3	*Latin Europe* (Italy, Spain, Portugal, France)
4	*Eastern Europe* (Poland, Greece, Hungary, Albania, Slovenia, Czech Republic, Latvia, Croatia, Bulgaria, Estonia, Lithuania, Romania, Slovak Republic)
5	*Middle East* (Turkey)
6	*Nordic Europe* (Denmark, Iceland, Norway)

3.5 Measurement

The data set was created in accordance with the Stata tool requirements. The Arellano-Bond Generalized Method of Moments (GMM) model in robust type was performed in the Stata by importing data from the data set. The relationship between Total Active Duty Personnel and Military Expenditure (% of GDP), tenure of the Chief of General Staff and the National Military Strategy Directive maturity was tested in accordance with the hypotheses.

If the slope value of the change in Total Active Duty Personnel number is negative, there is personnel downsizing; if the change is positive, it is considered upsizing. When there is active military personnel downsizing and the slope of Military Expenditure is negative, it means there is a positive correlation between them. When

more personnel downsizing occurs as tenure of the Chief of General Staff increases, it means there is a positive correlation between them. When military personnel downsizing increases as NMSD maturity does, it means there is a positive correlation between them.

In the overall analyses (Step 1 analyses), data derived from 28 NATO nations was used for calculations. When the results were statistically significant, it indicated that the related independent variable is a key factor that drives personnel downsizing in military organizations.

3.5.1 Measurement for the Cultural Clusters Analyses

In the Cultural Clusters analyses (Step 2 analyses), the same analyses were conducted within each of the Cultural Clusters. Each cluster's results were compared to the output of the overall analyses (Step 1 analyses), and the difference was investigated to determine whether related key factors differed across Cultural Clusters. Operational Definitions, Indicators, and Metrics are synthesized in Table 9.

Table 9. Variables, Operational Definitions, Indicators and Metrics

Variable	Operational Definition	Indicator	Metric
Dependent variable: Total Active Duty Personnel	Total Active Duty Personnel is the total number of armed forces personnel of each NATO nation that has "full-time occupation as part of a military organization, including paramilitary forces if the training, organization, equipment, and control suggest they may be used to support or replace regular military forces" (The World Bank, 2014, p. 1).	Any amount of reduction in Total Active Duty Personnel quantity was considered an indicator of personnel downsizing.	Three lagged values of Total Active Duty Military Personnel were calculated in the model. Total Active Duty Personnel number is to show numbers as it was for each NATO nations' armed forces (e.g. 1,520,100).
Independent Variable: Military Expenditure (% of GDP)	"Military Expenditure is all costs incurred as a result of current military activities of a NATO nation" (SIPRI, 2014). Military Expenditure is the percentage of GDP (Gross Domestic Product) of each NATO nation.	This variable represents the annual Military Expenditure of a NATO nation as the percentage of its GDP (Gross Domestic Product).	Two lagged values of Military Expenditure were calculated in the model. Military Expenditure was to show 14 decimal places (e.g. 1.56352950795231%).
Independent Variable: Chief of General Staff	The Chief of General Staff is the person in command / lead of all the forces in a NATO nation's military organization (DoD, 2010).	This variable represents the number of years the Chief of General Staff of a NATO nation was on duty. In other words, it is tenure of the Chief of General Staff.	Two lagged values of the Chief of General Staff were calculated in the model. The first year of tenure was coded as '1', the second year was coded as '2', the third year was coded as '3' and so on. (e.g. 1, 2, 3, 4, 5, 6).

Table 9. Continued

Independent Variable: National Military Strategy Directive (NMSD)	The National Military Strategy Directive is an official paper for distributing and applying military power to attain national security and defense strategy objectives (DoD, 2010). NMSD is published periodically. Publication periods across NATO countries differ from nation to nation (e.g. annually, bi-annually).	Modification of NMSD stands for the year when a newer version of NMSD is published. In other words, it is NMSD maturity.	Two lagged values of NMSD were calculated in the model. The first year of NMSD maturity was coded as '1', the second year was coded as '2' and so on. (e.g. 1, 2, 3, 4, 5, 6).
Categorical Variable: Cultural Clusters	Cultural cluster is a group of countries with similar cultural characteristics (House, 2004; Russo, 2000). In this study, 28 NATO countries are grouped according to their cultural clusters.	Data was calculated by Cultural Clusters.	Cultural Clusters of NATO nations were grouped by numbers from '1' through '6'.
Dummy Variable: Year	Year was considered dummy variable.	The years from 1990 through 2012 were considered.	Years were coded by their number.
Dummy Variable: Nation	Nation was considered dummy variable.	28 NATO nations were considered.	Nations were coded by their name.

CHAPTER IV

ANALYSES AND FINDINGS

The purpose of this quantitative study was to investigate key factors that drive personnel downsizing in military organizations of NATO nations and whether or not those factors differ across NATO nations' cultural clusters. This chapter provides details of the analyses and findings of the study. The questions for this descriptive research are stated below:

Question 1. What are the key factors that drive personnel downsizing in military organizations of NATO nations?

Question 2. Do those key factors differ across NATO nations' cultural clusters?

In order to find the answers to these research questions, analyses were conducted in two main steps. For the first step (Step 1: overall analyses), an inspection of the key factors that drive personnel downsizing in these NATO nations' military organizations was analyzed. For the second step (Step 2: cultural clusters analyses), whether or not the key factors differ across cultural clusters was analyzed.

4.1 Hypotheses in Null Form

The null hypotheses are stated below:

$H_0$1: Military Expenditure (% of GDP-Gross Domestic Product) has no relationship with personnel downsizing.

$H_0$2: Turnover in the Chief of General Staff has no relationship with personnel downsizing.

$H_0$3: Modification of the National Military Strategy Directive has no relationship with personnel downsizing.

$H_0$4: The relationship between Military Expenditure (% of GDP) and personnel downsizing does not differ across NATO nations' cultural clusters.

$H_0$5: The relationship between the Chief of General Staff and personnel downsizing does not differ across NATO nations' cultural clusters.

$H_0$6: The relationship between the National Military Strategy Directive and personnel downsizing does not differ across NATO nations' cultural clusters.

Analyses were conducted to test the hypotheses by determining to what extent the independent variables Military Expenditure, turnover in the Chief of General Staff, and modification of the National Military Strategy Directive related to the dependent variable, the Total Active Duty Personnel number.

4.2 Data Description

The unit of analyses was nations' military organizations. Data was collected for 23 years (1990-2012) annually, with the size of the panels [N = 28 (28 NATO nations) and T= 23 (23 years)]. Each data point (each line in the data set) in this study represented Nation, Year, Total Active Duty Personnel number, Military Expenditure (% of GDP), turnover in the Chief of General Staff, and modification of the National Military Strategy Directive. Except for grouping and converging some data points under Cultural Clusters 1, 2, 3, 4, 5, and 6, the same data set was used in the Cultural Cluster analyses.

If this study was strongly balanced, it could have a total of 2576 observations; however, due to a lack of data, the number of total observations was 2423 (only 153 missing, 5.94%). The number of observations for Year was 644 (28 nations * 23 years),

for the Total Active Duty Personnel number it was 621, for Military Expenditure (% of GDP) it was 608, for turnover in the Chief of General Staff it was 622, and for modification of the National Military Strategy Directive it was 572. The reasons behind the missing data were that some NATO nations gained independence after 1990, so there were no established armed forces or no recorded data for some nations for a certain period of time. Some of the missing data by nation and time period were as follows: Albania 1990-1991, Croatia 1990-1991, Czech Republic 1990-1992, Estonia1990-1991, Iceland 1990-1994, Latvia 1990-1992, Lithuania 1990-1992, Slovak Republic 1990-1992, and Slovenia 1990-1991 (The World Bank, 2014). Iceland had no records of Active Duty Personnel until 1995, and there was no recorded military expenditure until 2009. Luxemburg had no records for the national military strategy directive until 2000. The data collected from 28 NATO nations for 23 years is represented by the graphs in Figures 10-13.

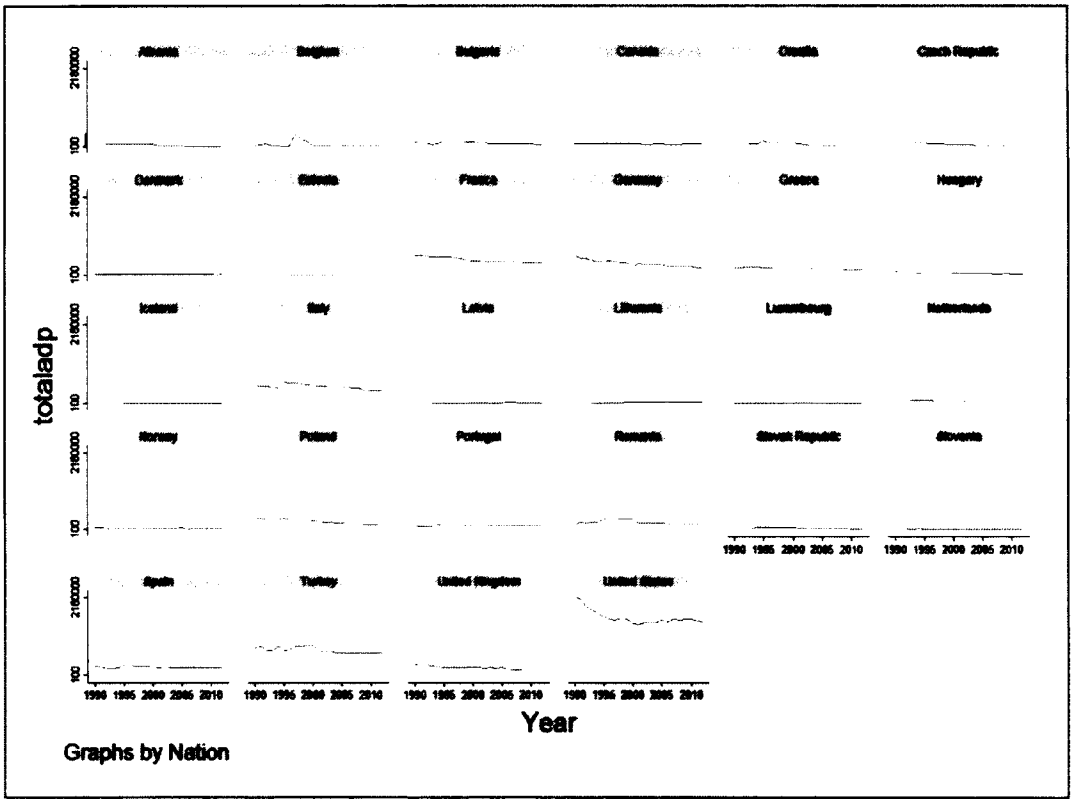

Figure 10. Total Active Duty Personnel Numbers by Nation

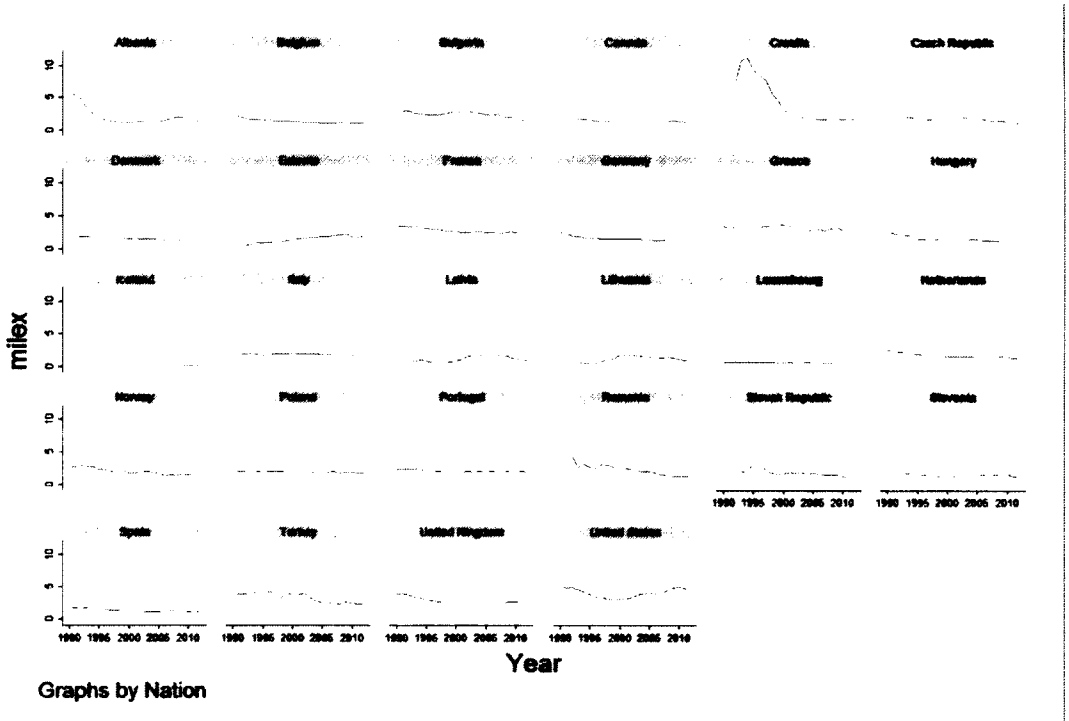

Figure 11. Military Expenditures (% of GDP) by Nation

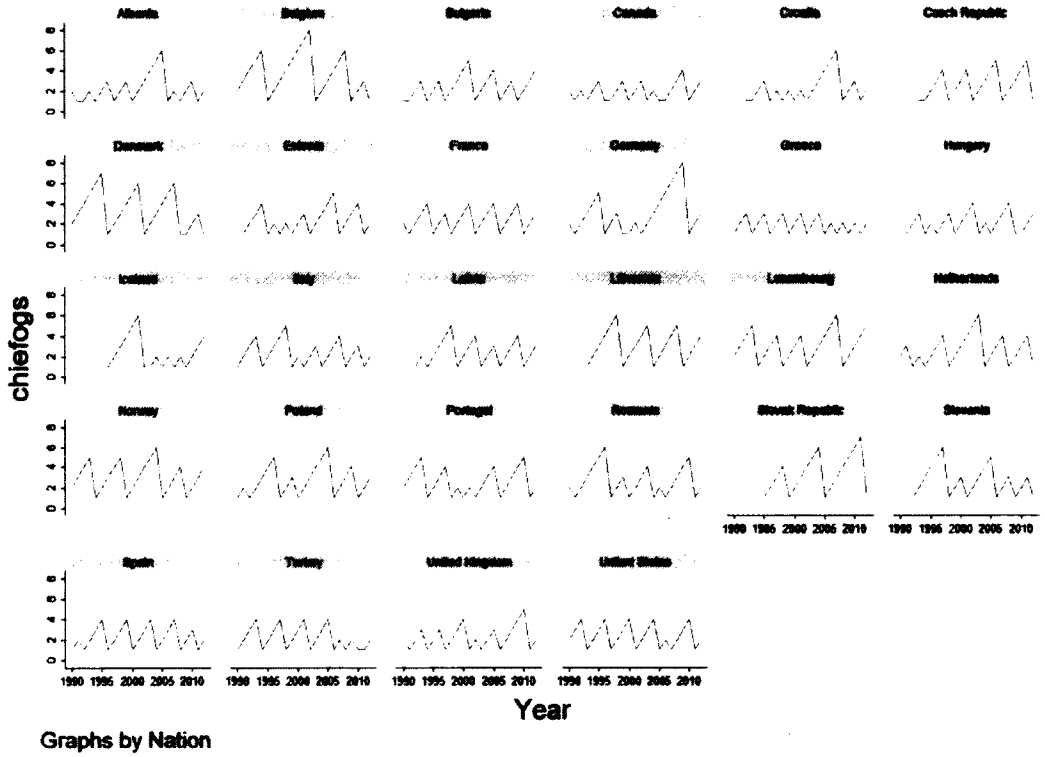

Figure 12. Tenure of Chief of General Staff by Nation

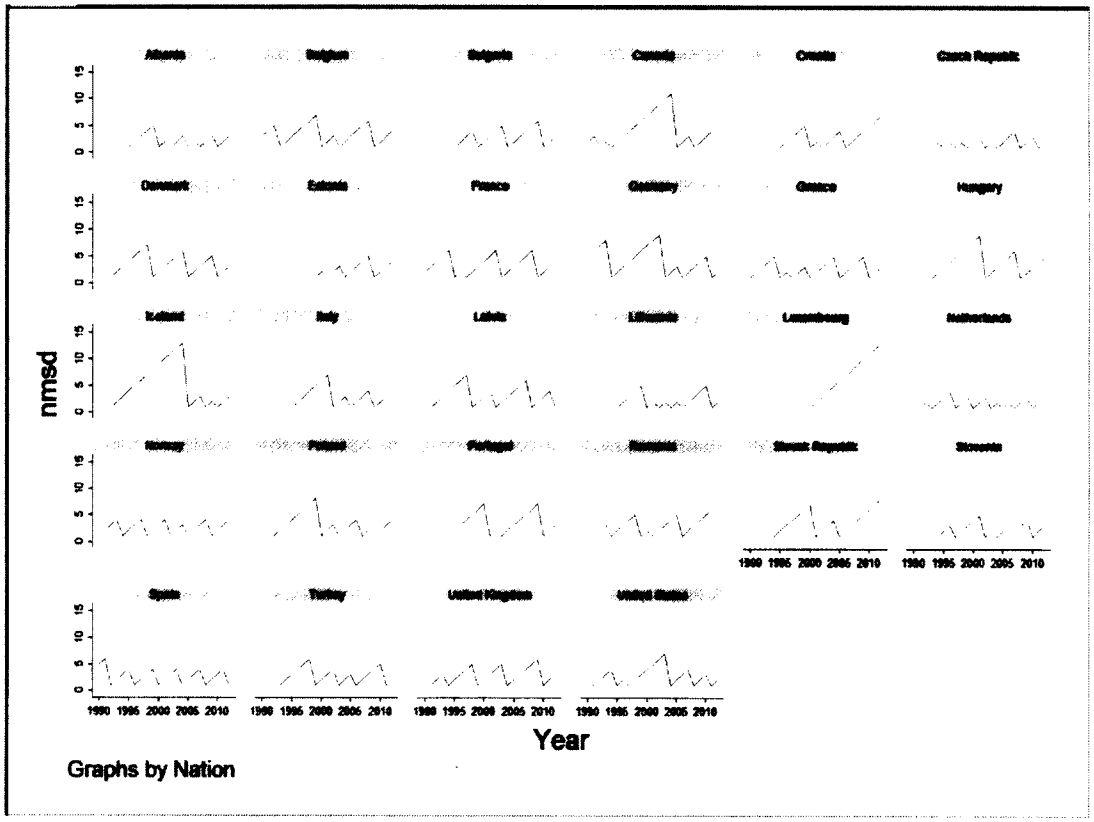

Figure 13. National Military Strategy Directive Maturity by Nation

The tenure of the Chief of General Staff changes from nation to nation. In order to visualize the overall distribution, a histogram for the 28 NATO nations is displayed in Figure 14.

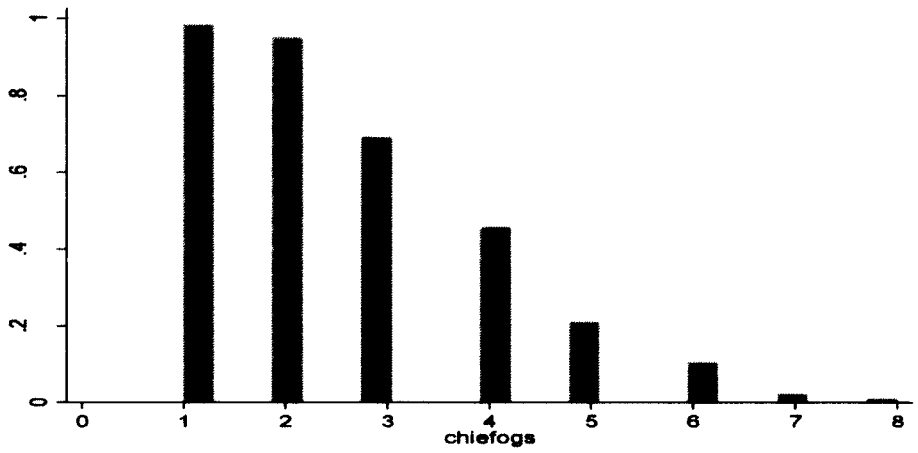

Figure 14. Tenure of Chief of General Staff Comprehensive Histogram

The National Military Strategy Directive maturity also changes from nation to nation. The comprehensive histogram for the 28 NATO nations is displayed in Figure 15.

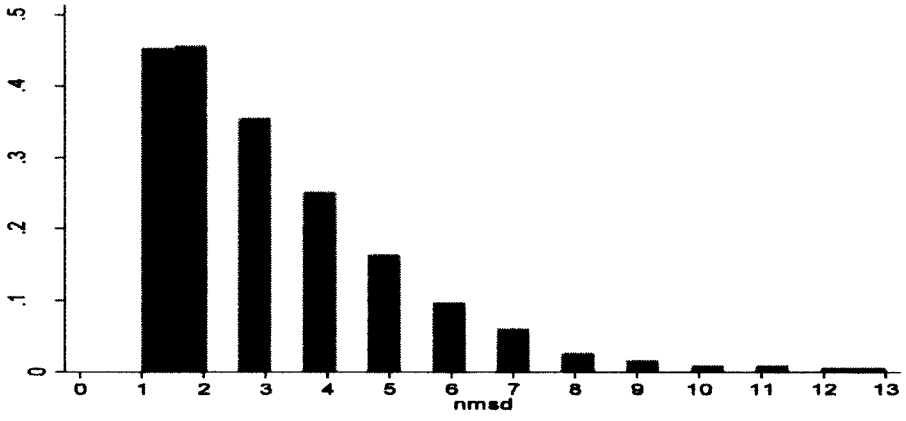

Figure 15. National Military Strategy Directive Maturity Comprehensive Histogram

The Arellano-Bond Generalized Method of Moments (GMM) estimation (multivariate regression) model was used to analyze the time series cross-sectional dynamic panel data in this study (Alvarez & Arellano, 1998). Variables and their defined labels in Stata are stated in Table 10. The data set was unbalanced since there were missing data for some NATO nations.

Table 10. Variables and Their Stata Labels

Type	Variable Name	Stata Labels
Dependent	Total Active Duty Personnel	Totaladp
Independent	Military Expenditure (% of GDP)	Milex
Independent	Chief of General Staff	Chiefogs
Independent	National Military Strategy Directive	Nmsd
Categorical	Cultural Clusters	CulturalCls
Dummy	Year	Year
Dummy	Nation	Nation

The data set was created by using MS Excel and imported into Stata by coding. A sample of the data set used in the analyses is shown in Table 11.

Table 11. A Sample from Data Set

Nation	Year	totaladp	milex	chiefogs	nmsd	CulturalCls
Albania	1990		5.88830083200000000	2		4
Albania	1991			1		4
Albania	1992	65000	4.64945888260734000	1		4
Albania	1993	65000	3.19929790315127000	2		4
...	...	...	...	...	...	...
United States	2010	1569417	4.84264948610899000	4	3	1
United States	2011	1520100	4.74543235076344000	1	1	1
United States	2012	1492200	4.21542916415301000	2	2	1

4.2.1 Pre-estimation Diagnostic Tests

In order to ensure that the data set fits with the requirements of the Arellano-Bond GMM model, several pre-estimation diagnostic tests were performed before the analyses. Firstly, a random/fixed effect test was performed. Secondly, the Arellano-Bond for zero autocorrelation in the first-differenced errors test was performed to check for

overidentification that helped to clarify whether variables were correlated with residuals or not and to test for the presence of exogeneity (Roodman, 2009). Thirdly, the White heteroskedasticity test was performed to ensure that error terms did not exhibit constant variance (Arellano & Bond, 1991).

4.2.1.1 Random Effect / Fixed Effect Test

In order to determine if the data set has Random Effect or Fixed Effect, the Random Effect (RE) / Fixed Effect (FE) estimation test was performed. The Random Effect estimation assumes that "the variation across entities is random and uncorrelated with the predictor or independent variables" (Torres-Reyna, 2007, p. 25). On the other hand, in the Fixed Effect model "each entity is different therefore the entity's error term and the constant (which captures individual characteristics) should not be correlated with the others" (Torres-Reyna, 2007, p. 9). The Random / Fixed Effect Test Results are shown in Table 12.

Table 12. Random / Fixed Effect Test Results

	Coefficients			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
milex	38457.03	39392.87	-935.8378	266.1941
chiefogs	-287.6966	-292.6547	4.958102	25.39243
nmsd	1931.627	1958.296	-26.6688	35.44969
chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 12.38				
Prob>chi2 = 0.0062				

Note. b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic.
Significant at Prob < 0.05 level.

The null hypothesis for the test defines the Random Effect as consistent (Torres-Reyna, 2007). In Table 12, (*Prob* > *chi2* = 0.0062) means that there was enough evidence to reject the null hypothesis suggesting that the model is appropriate for the Fixed Effect estimation.

4.2.1.2 Arellano-Bond Zero Autocorrelation Test

The Arellano-Bond GMM requires exogeneity, which means unobserved instruments should not be correlated with other covariates in the data set (Drukker, 2008). The Arellano-Bond GMM model assumes that there is no serial correlation in the idiosyncratic errors but does not assume independence over time periods (Arellano & Bond, 1991). Table 13 displays the Arellano-Bond Zero Autocorrelation Test results.

Table 13. Arellano-Bond Zero Autocorrelation Test Results

Arellano-Bond test for zero autocorrelation in first-differenced errors		
Order	z	Prob > z
1	-2.0733	0.0381
2	.07433	0.9407

Note. Ho: no autocorrelation
Significant at $p < 0.05$ level.

In Table 13, it was expected that the first differences in the first row usually reject the null hypothesis (H_0 = there is no autocorrelation), since the differences include the errors (Wooldridge, 2010). The second row was more important since it was designed to detect autocorrelation in lagged values. In the second row, the (*Prob* > *z* 0.9407) supports H_0 = no autocorrelation with a value above the significance level of (*Prob* < 0.05) (Torres-Reyna, 2007). The test showed that H_0 cannot be rejected (*z* = 0.07433).

Therefore, the data set used in this study had no autocorrelation, and it was strictly exogenous. The data set met the requirements of the Arellano-Bond GMM model.

4.2.1.3 White Heteroskedasticity Test

The White Test has a null hypothesis, which states that the variance is constant and there is homoskedasticity (Chen, 2003; Greene, 2003). The White Heteroskedasticity Test results are shown in Table 14.

Table 14. White Heteroskedasticity Test Results

White's general test statistic

Number of obs = 553
F(3, 549) = 10.78
Prob > F = 0.0000
R-squared = 0.3286
Root MSE = 2.8e+05

totaladp	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
milex	200438.8	37338.93	5.37	0.000	127094.1	273783.4
chiefogs	978.1836	6826.96	0.14	0.886	-12431.98	14388.34
nmsd	9907.811	4732.28	2.09	0.037	612.2197	19203.4

White's general test statistic : 315.5751 Chi-sq(9) p-value = 1.3e-62

Note. Significant at $p < 0.05$ level.

With respect to heteroskedasticity, the *p*-value ($Prob > F = 0.0001$) indicates that H_0 was rejected. The White Heteroskedasticity Test results showed strong evidence that the data was heteroskedastic.

4.3 Step 1: Overall Analyses

The Arellano-Bond Generalized Method of Moments (GMM) one-step difference method with robust standard errors was performed in order to test the hypotheses in two

steps: Step 1: Overall Analyses and Step 2: Cultural Clusters Analyses. Stata *'xtabond'* estimation was used during the analyses (StataCorp, 2013).

4.3.1 Step 1 Analyses

In Step 1, the data derived from 28 NATO nations was used to analyze the relationship between the Total Active Duty Personnel number and Military Expenditure (% of GDP), turnover in the Chief of General Staff, and modification of the National Military Strategy Directive. The first three hypotheses out of the six were tested in this step. The results for Step 1 are displayed in Table 15.

Table 15. Results of Step 1: Overall Analyses

Arellano-Bond dynamic panel-data estimation						
Group variable : nation_n				Number of obs	=	458
Time variable : Year				Number of groups	=	28
Number of instruments = 256				Obs per group: min	=	1
One-step results				avg	=	16.35714
				max	=	19
(Std. Err. adjusted for clustering on nation_n)				Wald chi2 (27)	=	6169.16
				Prob > chi2	=	0.0000
totaladp	Coef.	Robust Std. Err.	z	p>|z|	[95% Conf.	Interval]
totaladp						
L1.	.5555217	.0642885	8.64	0.000	.4295184	.6815249
L2.	.0645083	.0412745	1.56	0.118	-.0163883	.1454048
L3.	.0209928	.037129	0.57	0.572	-.0517787	.0937642
milex						
--.	13649.99	8502.788	1.61	0.108	-3015.172	30315.14
L1.	3686.282	5205.689	0.71	0.479	-6516.682	13889.25
L2.	-6967.631	4258.892	-1.64	0.102	-15314.91	1379.644
chiefogs						
--.	-378.5935	861.85	-0.44	0.660	-2067.788	1310.602
L1.	900.1036	811.9682	1.11	0.268	-691.3248	2491.532
L2.	-2306.316	1115.754	-2.07	0.039	-4493.154	-119.4789
nmsd						
--.	1843.424	484.3892	3.81	0.000	894.0383	2792.809
L1.	-622.8125	672.3626	-0.93	0.354	-1940.619	694.9941
L2.	1679.392	783.8299	2.14	0.032	143.1135	3215.67
_IYear_1993	3946.233	8628.54	0.46	0.647	-12965.39	20857.86
Instruments for differenced equation						
GMM-type: L(2/.).totaladp						

Note. Significant at $p < 0.05$ level.

The interpretation of the results is detailed in Table 16. In the table, Only the Chief of General Staff *(chiefogs)* lines were interpreted; the other lines *(milex, nmsd)* were likewise interpreted but not displayed in Table 16. The Total Active Duty Personnel number *(totaladp)* was calculated with three lagged values. L1 displays the first lagged values, L2 the second, and L3 the third in *totaladp* lines. Year as a dummy variable

displays *totaladp* values, and since it was calculated in three-lagged order, the results begin with 1993 where 1990 was the first year of the observations.

Table 16. Interpretation of the Step 1: Overall Results

Expression	Interpretation
Number of obs = 458	Total number of data cell used was 458.
Number of groups = 28	Total number of groups used was 28 NATO nations.
Wald chi2 (27) = 6169.16	The probability of results by chance was extremely unlikely.
Prob > chi2 = 0.0000	The probability of results by chance, in statistical term 0.0000 is assumed as 0.0001.
Degrees of freedom = Wald chi2 (27) = 27	There are 27 pieces of independent information.
Chiefogs L2.Coef = (-2306.316)	One unit change in Chief of General Staff drives personnel downsizing of 2306 military personnel for the second lagged calculations.
Chiefogs L2.Robust Std. Err. = 1115.754	The robust standard error for the second lagged calculations was 1115.754.
Chiefogs L2.z = -2.07	z-values test the hypothesis that each coefficient was different from zero. To reject this, the absolute z-value has to be higher than 1.96 (for a 95% confidence). The z-value for second lagged calculations was (-2.07).
Chiefogs L2. P>|z| = 0.039	The relationship between the Total Active Duty Personnel number and Chief of General Staff was significant with a value of 0.039 for the second lagged calculations, where ($p < 0.05$) rejects the H_0. (H_0 = There is no significant relationship).
Chiefogs L2. [95% Conf.Interval] = [-4493.154 / -119.4789]	95% Confidence Interval was the range of values with 95% certainty that contain the population mean. The range for Chief of General Staff second lagged calculations was between [-449393.154 and -119.4789].

4.3.2 Step 1: Overall Hypotheses Test

In order to test the hypothesized relationships between the Total Active Duty Personnel number and Military Expenditure, the turnover in the Chief of General Staff, and modification of the National Military Strategy Directive, the Arellano-Bond Generalized One Step-Difference Method of Moments technique with robust standard errors was performed by using three lagged values (Arellano & Bond, 1991). Table 17 displays the details from Step 1: Overall hypotheses test results.

Table 17. Step 1: List of Hypotheses and Summary of Findings

H_A#	Hypothesis in Alternative Form	Coefficient Value	Summary of Findings
H_A1	Military Expenditure (% of GDP-Gross Domestic Product) has a statistically significant relationship with personnel downsizing.	(-6967.631) One percent change in Military Expenditure (% of GDP) drives personnel downsizing of 6967 military personnel.	($p = 0.102$) Not significant with a negative value *Not Supported*
H_A2	Turnover in Chief of General Staff has a statistically significant relationship with personnel downsizing.	(-2306.316) A one-year of additional tenure of Chief of General Staff drives personnel downsizing of 2306 military personnel.	($p = 0.039$) Significant with a negative value *Supported*
H_A3	Modification of the National Military Strategy Directive has a statistically significant relationship with personnel downsizing.	(1679.392) A one-year of additional maturity in the National Military Strategy Directive drives personnel upsizing of 1679 military personnel.	($p = 0.032$) Significant with a positive value *Supported*

Modification of the National Military Strategy Directive and change in Military Expenditure was not found to relate significantly to the Total Active Duty Personnel number in the overall analysis of 28 NATO nations from 1990 through 2012. Turnover in the Chief of General Staff and modification of the National Military Strategy Directive were found to be significant at the 0.05 level. A one-year of additional tenure of the Chief of General Staff drives 2306 active duty personnel downsizing on average, and one year

of additional maturity in the National Military Strategy Directive drives personnel upsizing of 1679 military personnel on average. In light of these findings, H_0 was not supported at a 95% level of confidence; there was enough evidence to conclude that turnover in the Chief of General Staff was significant with a negative value, and modification of the National Military Strategy Directive was significant with a positive value related to the Total Active Duty Personnel number.

4.3.3 Post-Hoc Tests

4.3.3.1 Interaction Between Independent Variables Tests

Acock (2010) states, "Multicollinearity happens when a combination of variables makes one or more of the variables largely or completely redundant" (p. 262). Multicollinearity occurs when there is a high level of correlation between an independent variable and another independent variable or a set of independent variables (Wooldridge, 2010). The Variance Inflation Factor (VIF) is used to assess whether multicollinearity is a problem or not for independent variables and, if so, to what extent. VIF is equal to $1/(1-R^2)$ (Acock, 2010). The results for the interaction test appear in Table 18.

Table 18. The Results of the VIF Test

Variable	VIF	1/VIF
milex	1.05	0.953296
nmsd	1.03	0.973278
chiefogs	1.02	0.979021
Mean VIF	1.03	

If VIF is more than 10 for any variable, there is a multicollinearity problem (Acock, 2010). The mean VIF value for independent variables was 1.03, which is less than 10, so there was no implicitly high correlation between an independent variable and another independent variable or a set of independent variables. The VIF test results displayed no indication of multicollinearity problems. There was enough evidence to conclude that there was no interaction between one independent variable and another independent variable or a set of independent variables.

4.3.3.2 Pesaran's and Frees' Cross-Sectional Independence Test

In order to test cross-sectional independence (to determine if the residuals are correlated across nations), Pesaran's and Frees' cross-sectional independence tests were performed (De Hoyos & Sarafidis, 2006). The Pesaran cross-sectional dependence test, also called contemporaneous correlation, investigates the presence of a correlation between the residuals and different entities that can yield biased results (Torres-Reyna, 2007). The data set hosts for (N=28) NATO nations and (T=23) years. The null hypothesis (H_0) is that residuals are not correlated (H_0 = cross-sectional independence) for ($N \rightarrow \infty$) and T is sufficiently large (De Hoyos & Sarafidis, 2006). In order to implement the Pesaran cross-sectional dependence test, adequate number of cross-sectional units with common points in time is needed (De Hoyos & Sarafidis, 2006).. The test results are displayed in Table 19.

Table 19. Cross Sectional Independence Test Results

Pesaran's Test of Cross Sectional Independence		
Pesaran's test of cross sectional independence = 15.573, Pr = 0.0000		
Average absolute value of the off-diagonal elements = 0.420		
Frees' Test of Cross Sectional Independence		
Frees' test of cross sectional independence = 1.544		
Critical values from Frees' Q distribution		
alpha = 0.10	0.5822	
alpha = 0.05	0.8391	
alpha = 0.01	1.4211	

Note. Pesaran's Test H_0 = cross-sectional independence
Frees' test α value: Significant at $\alpha < 0.05$ level.

The Pesaran's test strongly rejected the null hypothesis (H_0 = cross-sectional independence) with the results of ($Pr = 0.0001$) and an average absolute correlation value of 0.420. Results showed enough evidence to assess that there was cross-sectional dependence. Therefore, there were enough common units to implement analyses. Frees' test also rejects (for $\alpha = 0.05 : 0.8391$) the null hypothesis. However, "for small values of (T= 23) the normal approximation to the Q distribution is poor" (De Hoyos & Sarafidis, 2006, p. 7). On the other hand, for T as large as 30, the approximation does well. There was enough evidence to suggest that the model had enough cross-sectional units with common points in time to be able to implement the analyses (De Hoyos & Sarafidis, 2006). The Pesaran's test strongly rejected the null hypothesis (H_0 = cross-sectional independence) and "rejecting the null hypothesis in all subsets would serve as an indication that there is cross-sectional dependence in the disturbances that needs to be taken into account" (De Hoyos & Sarafidis, 2006, p. 490). In conclusion, there is cross-sectional dependence in data and the size of the panels ($N = 28$ and $T = 23$) demonstrate that cross-sectional dependence is not a problem in the study.

4.3.3.3 R-Squared Test

In this study, the time series cross-sectional dynamic panel data was used. R-squared (R^2) is the coefficient of determination and shows how much of the variance of the dependent variable is explained by the correlation of independent variables. It is between [0 and 1]; the larger the number means the correlation is stronger (Pollock, 2006). Table 20 shows the results for R^2.

Table 20. Results of R^2 Test

Fixed-effects (within) OLS regression						
Fixed-effects (within) regression				Number of obs	=	553
Group variable: nation_n				Number of groups	=	28
R-sq: within = 0.1513				Obs per group: min	=	4
Between = 0.4225				avg	=	19.8
overall = 0.3285				max	=	23
				F(3,522)	=	31.02
corr(u_i, Xb) = 0.4989				Prob > F	=	0.0000
totaladp	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
milex	38457.03	4004.509	9.60	0.000	[30590.1	46323.96]
chiefogs	-287.6966	1723.159	-0.17	0.867	[-3672.876	3097.483]
nmsd	1931.627	1338.45	1.44	0.150	[-697.7834	4561.038]
_cons	124301.6	11011.01	11.29	0.000	[102670.3	145932.9]
sigma_u	305331.16					
sigma_e	55490.782					
rho	.96802675	(fraction of variance due to u_i)				
F test that all u_i=0: F(27, 522) = 498.34				Prob > F = 0.0000		

The overall R-sq (R^2) value is 0.3285 meaning approximately 33% of variation in the Total Active Duty Personnel number was explained by Military Expenditure, turnover in the Chief of General Staff, and modification of the National Military Strategy Directive. The remaining 67% is unexplained by the independent variables. The errors are

correlated with the independent variables with a value of *corr (u_i, Xb)* = 0.4989. The Chief of General Staff (p = 0.867) and the National Military Strategy Directive (p = 0.150) have significant influence on the Total Active Duty Personnel number. "*Sigma_u* is the standard deviation of residuals within groups u_i; *sigma_e* is the standard deviation of residuals (overall error term) e_i" (Torres-Reyna, 2007, p. 19). In this study, *sigma_u* value was 305331.16 and *sigma_e* value was 55490.782. A fraction of the variance due to *u_i* (*rho* / Pearson's Correlation Coefficient) is also known as the interclass correlation (Torres-Reyna, 2007). In this study, the *rho* value is 0.97, which means that 97% of the variance is due to differences across the panels. However, "In the presence of heteroskedasticity, the R-squared from an OLS (fixed effect) regression is meaningless" (Wooldridge, 2010, p. 81). In addition, the R-square measure is not valid for all panel data regression techniques (Buse, 1973). Since the dynamic panel data was used in this study, R^2 test result was not able to justify explicitly how much of the variation in the Total Active Duty Personnel number was explained by Military Expenditure, turnover in the Chief of General Staff, and modification of the National Military Strategy Directive. In order to test goodness-of-fit of the data set and the Arellano-Bond GMM model a series of tests were performed. First, the Arellano-Bond zero autocorrelation test result proved that there is no autocorrelation, and the data set was a good to fit the Arellano-Bond GMM model. Second, the data set needed to be heteroskedastic to fit the Arellano-Bond GMM model and the White heteroskedasticity test result proved that the data set was a good fit with the model. Third, there should be no interaction between one independent variable and another independent variable or a set of independent variables, and the VIF test results proved the data set to fit this requirement. Finally, "There must be

enough cross-sectional units with common points in time to be able to implement the test" (De Hoyos & Sarafidis, 2006, p. 490). Pesaran's and Frees' cross-sectional independence test proved that the data set had enough cross-sectional units to implement the test.

4.4 Step 2: Cultural Clusters Analyses

In Step 2, the data derived from 28 NATO nations was grouped in accordance with NATO nations' cultural clusters as shown in Table 21.

Table 21. NATO Nations' Cultural Clusters

CulturalCls	Cultural Clusters	NATO Countries (28 Nations)
1	Anglo	USA, Canada, United Kingdom
2	Germanic Europe	Germany, Netherlands, Belgium, Luxemburg
3	Latin Europe	Italy, Spain, Portugal, France
4	Eastern Europe	Poland, Greece, Hungary, Albania, Slovenia, Czech Republic, Latvia, Croatia, Bulgaria, Estonia, Lithuania, Romania, Slovak Republic
5	Middle East	Turkey
6	Nordic Europe	Denmark, Iceland, Norway

Step 2 evaluated whether the relationship between the Total Active Duty Personnel number and Military Expenditure (% of GDP), turnover in the Chief of General Staff, and modification of the National Military Strategy Directive differs across

cultural clusters. The last three hypotheses out of six were tested in Step 2. Hypotheses for Step 2: Cultural Clusters analyses in null form are stated below.

4.4.1 Step 2: Cultural Clusters Hypotheses

$H_0$4: The relationship between Military Expenditure (% of GDP) and personnel downsizing does not differ across NATO nations' cultural clusters.

$H_0$5: The relationship between the Chief of General Staff and personnel downsizing does not differ across NATO nations' cultural clusters.

$H_0$6: The relationship between the National Military Strategy Directive and personnel downsizing does not differ across NATO nations' cultural clusters.

4.5 Step 2 Analyses

In order to understand the relationship in the six different Cultural Clusters, each cluster was tested individually. Cultural Cluster 1, 2, 3 and 4 had enough data to test the hypotheses. However, Cultural Clusters 5 and 6 did not have enough data to run the test. Stata *'xtabond'* command cannot execute with that amount of data. Cluster 5 contains only Turkey as a NATO nation, and the data type turns into time series cross-sectional dynamic data. Since there was only one nation, there was no panel data specification in Cluster 5. Cluster 6 consists of Denmark, Norway, and Iceland. Iceland had no records of Active Duty Personnel until 1995, and there was no recorded military expenditure until 2009. It was expected that Cluster 6 would have 276 MS Excel data cells to create a balanced data set; however, due to missing data, there was only 246 MS Excel data cells. In order to estimate the test results for Cultural Cluster 5, 6 ANOVA (Analysis of variance), and Tukey's HSD (Honest Significant Difference) tests were performed.

Test results for Cultural Cluster 1 (Anglo - USA, Canada, and United Kingdom) are displayed in Table 22. The Stata *'xtabond'* estimation was able to run for Cultural Cluster 1, since there was enough data, and it was still a time series cross-sectional dynamic panel data. The number of observations was 57, and the number of groups (nations) was three. Three lagged values of the Total Active Duty Personnel number were used to observe changes in three consecutive years. Since the Arellano-Bond GMM model runs with two lagged values of independent variables to be free from unobserved parameters and error terms, *milex, chiefogs,* and *nmsd* variables were run with their two lagged values.

Table 22. Test Results for Cultural Cluster 1 (Anglo)

Arellano-Bond dynamic panel-data estimation						
Group variable : nation_n				Number of obs	=	57
Time variable : Year				Number of groups	=	3
Number of instruments = 57				Obs per group: min	=	19
One-step results				avg	=	19
				max	=	19
				Wald chi2 (3)	=	2.98e+08
(Std. Err. adjusted for clustering on nation_n)				Prob > chi2	=	0.0000
Totaladp	Coef.	Robust Std. Err.	z	p>|z|	[95% Conf.	Interval]
Totaladp						
L1.	.8172105	.0630378	12.96	0.000	[.6936587	.9407623]
L2.	-.3024334	.0577592	-5.24	0.000	[-.4156394	-.1892274
L3.	.1817346	.0410879	4.42	0.000	[.1012038	.2622654]
Milex						
--.	-5246.058	30105.82	-0.17	0.862	[-64252.37	53760.26]
L1.	79280.59	51395.66	1.54	0.123	[-21453.05	180014.2]
L2.	-60678.35	33721.35	-1.80	0.072	[-126771	5414.281]
Chiefogs						
--.	-7834.966	4087.043	-1.92	0.055	[-15845.42	175.4903]
L1.	-605.4976	2965.388	-0.20	0.838	[-6417.551	5206.555]
L2.	-1534.895	1306.054	-1.18	0.240	[-4094.713	1024.924]
Nmsd						
--.	1667.653	1362.833	1.22	0.221	[-1003.451	4338.756]
L1.	-4411.167	832.2207	-5.30	0.000	[-6042.29	-2780.044]
L2.	3078.029	1018.964	3.02	0.003	[1080.897	5075.161]
Instruments for differenced equation GMM-type: L(2/.).totaladp						

Note. Significant at $p < 0.05$ level.

In Cultural Cluster 1 (Anglo – USA, Canada, and United Kingdom), the National Military Strategy Directive proved to be statistically significant ($p = 0.03$). It was found that one-year of additional maturity in the National Military Strategy Directive drives an average 3078 Active Duty Personnel upsizing in this cultural cluster. Military Expenditure was not significant ($p = 0.072$) with a negative value. The Chief of General Staff was not significant ($p = 0.240$) with a negative value.

As displayed in Table 23 there was no autocorrelation in data in the second order with the value of 0.0895 in Cultural Cluster 1 (Anglo).

Table 23. Cultural Cluster 1 Arellano-Bond Zero Autocorrelation Test Results

Arellano-Bond test for zero autocorrelation in first-differenced errors		
Order	z	Prob > z
1	-1.5096	0.1312
2	-1.6982	0.0895

Note. Ho: no autocorrelation
Significant at $p < 0.05$ level.

The test results for Cultural Cluster 2 (Germanic Europe - Germany, Netherlands, Belgium, and Luxemburg) are displayed in Table 24.

Table 24. Test Results for Cultural Cluster 2 (Germanic Europe)

Arellano-Bond dynamic panel-data estimation						
Group variable : nation_n				Number of obs	=	67
Time variable : Year				Number of groups	=	4
Number of instruments = 67				Obs per group: min	=	10
One-step results				avg	=	16.75
				max	=	19
				Wald chi2 (3)	=	425.56
(Std. Err. adjusted for clustering on nation_n)				Prob > chi2	=	0.0000
totaladp	Coef.	Robust Std. Err.	z	p>|z|	[95% Conf.	Interval]
totaladp						
L1.	.3327424	.042139	7.90	0.000	[.2501515	.4153333]
L2.	.0093578	.0145992	0.64	0.522	[-.0192561	.0379716]
L3.	.0789563	.0442532	1.78	0.074	[-.0077783	.165691]
milex						
--.	-242040.3	38722.91	-6.25	0.000	[-317935.8	-166144.8]
L1.	220080.8	49143.89	4.48	0.000	[123760.6	316401.1]
L2.	-75676.41	64770.1	-1.17	0.243	[-202623.5	51270.66]
chiefogs						
--.	238.9902	1252.785	0.19	0.849	[-2216.422	2694.403]
L1.	1544.531	1883.863	0.82	0.412	[-2147.772	5236.834]
L2.	-7379.043	2602.25	-2.84	0.005	[-12479.36	-2278.726]
nmsd						
--.	6642.279	2813.488	2.36	0.018	[1127.943	12156.61]
L1.	-2176.853	2578.506	-0.84	0.399	[-7230.632	2876.925]
L2.	-356.8232	235.6388	-1.51	0.130	[-818.6669	105.0204]
Instruments for differenced equation						
GMM-type: L(2/.).totaladp						

Note. Significant at $p < 0.05$ level.

In Cultural Cluster 2 (Germanic Europe - Germany, Netherlands, Belgium, and Luxemburg) the Chief of General Staff was significant ($p = 0.05$). It was found that one year of additional tenure of the Chief of General Staff results in, on average, 7329 Active Duty Personnel downsizing in this cultural cluster. Military Expenditure was not significant ($p = 0.243$) with a negative value. The National Military Strategy Directive was not significant ($p = 0.130$) with a negative value.

As displayed in Table 25 there was no autocorrelation in data in the second order with the value of 0.1999 in Cultural Cluster 2 (Germanic Europe).

Table 25. Cultural Cluster 2 Arellano-Bond Zero Autocorrelation Test Results

Arellano-Bond test for zero autocorrelation in first-differenced errors		
Order	z	Prob > z
1	-1.5113	0.1307
2	-1.2818	0.1999

Note. Ho: no autocorrelation
Significant at $p < 0.05$ level.

The test results for Cultural Cluster 3 (Latin Europe - Italy, Spain, Portugal, and France) are displayed in Table 26.

Table 26. Test Results for Cultural Cluster 3 (Latin Europe)

Arellano-Bond dynamic panel-data estimation

Group variable : nation_n				Number of obs	=	69
Time variable : Year				Number of groups	=	4
Number of instruments = 69				Obs per group: min	=	15
One-step results				avg	=	17.25
				max	=	19
				Wald chi2 (3)	=	20.96
(Std. Err. adjusted for clustering on nation_n)				Prob > chi2	=	0.0000
totaladp	Coef.	Robust Std. Err.	z	p>|z|	[95% Conf.	Interval]
totaladp						
L1.	.7363868	.0338695	21.74	0.000	[.6700038	.8027699]
L2.	.1888252	.0334795	5.64	0.000	[.1232065	.2544439]
L3.	-.1333005	.0364787	-3.65	0.000	[-.2047975	-.0618035]
milex						
--.	90157.08	32409.49	2.78	0.005	[26635.65	153678.5]
L1.	-90597.82	45198.19	-2.00	0.045	[-179184.7	-2010.989]
L2.	35330.57	16930.96	2.09	0.037	[2146.499	68514.63]
chiefogs						
--.	224.151	947.4665	0.24	0.813	[-1632.849	2081.151]
L1.	476.0159	918.4827	0.52	0.604	[-1324.177	2276.209]
L2.	-1698.778	988.5652	-1.72	0.086	[-3636.33	238.774]
nmsd						
--.	2087.101	749.535	2.78	0.005	[618.0396	3556.163]
L1.	-756.451	532.3849	-1.42	0.155	[-1799.906	287.0043]
L2.	93.69936	460.5669	0.20	0.839	[-808.9952	996.3939]

Instruments for differenced equation
GMM-type: L(2/.).totaladp

Note. Significant at $p < 0.05$ level.

Results suggest that the relationship between Military Expenditure and the Total Active Duty Personnel number was significant ($p = 0.037$) with a negative value in Cultural Cluster 3 (Latin Europe - Italy, Spain, Portugal, and France). It was found that a one percent change in Military Expenditure results in 35,330 Active Duty Personnel upsizing in this cultural cluster. The Chief of General Staff was not significant ($p = 0.086$) with a negative value. The National Military Strategy Directive was not significant ($p = 0.839$) with a positive value.

As displayed in Table 27, there was no autocorrelation in data in the second order with the value of 0.1634 in Cultural Cluster 3 (Latin Europe).

Table 27. Cultural Cluster 3 Arellano-Bond Zero Autocorrelation Test Results

Arellano-Bond test for zero autocorrelation in first-differenced errors		
Order	Z	Prob > z
1	-1.8393	0.0659
2	-1.3937	0.1634

Note. Ho: no autocorrelation
Significant at $p < 0.05$ level.

Test results for Cultural Cluster 4 (Eastern Europe - Poland, Greece, Hungary, Albania, Slovenia, Czech Republic, Latvia, Croatia, Bulgaria, Estonia, Lithuania, Romania, and Slovak Republic) are displayed in Table 28.

Table 28. Test Result for Cultural Cluster 4 (Eastern Europe)

Arellano-Bond dynamic panel-data estimation

Group variable : nation_n				Number of obs	=	210
Time variable : Year				Number of groups	=	13
Number of instruments = 207				Obs per group: min	=	11
One-step results				avg	=	16.15385
				max	=	19
				Wald chi2 (14)	=	3.30e+09
(Std. Err. adjusted for clustering on nation_n)				Prob > chi2	=	0.0000
totaladp	Coef.	Robust Std. Err.	Z	p>|z|	[95% Conf.	Interval]
totaladp						
L1.	.8582053	.0462585	18.55	0.000	[.7675403	.9488704]
L2.	.1089189	.0669068	1.63	0.104	[-.022216	.2400539]
L3.	-.189825	.0284155	-6.68	0.000	[-.2455183	-.1341316]
milex						
--.	412.7615	3253.354	0.13	0.899	[-5963.696	6789.219]
L1.	5386.039	2211.943	2.43	0.015	[1050.711	9721.367]
L2.	-1792.693	2030.217	-0.88	0.377	[-5771.844	2186.459]
chiefogs						
--.	753.9073	565.9253	1.33	0.183	[-355.2859	1863.1]
L1.	1189.473	587.4175	2.02	0.043	[38.15557	2340.79]
L2.	-564.5364	402.2602	-1.40	0.160	[-1352.952	223.8792]
nmsd						
--.	1211.686	618.25	1.96	0.050	[-.0618884	2423.434]
L1.	-733.7705	683.0098	-1.07	0.283	[-2072.445	604.9041]
L2.	748.5398	707.6295	1.06	0.290	[-638.3885	2135.468]

Instruments for differenced equation
GMM-type: L(2/.).totaladp

Note. Significant at $p < 0.05$ level.

In Cultural Cluster 4 (Eastern Europe - Poland, Greece, Hungary, Albania, Slovenia, Czech Republic, Latvia, Croatia, Bulgaria, Estonia, Lithuania, Romania, and Slovak Republic), there was no significant *p* value for any of the independent variables. Military Expenditure was not significant ($p = 0.377$) with a negative value. The Chief of General Staff was not significant ($p = 0.160$) with a negative value. The National Military Strategy Directive was not significant ($p = 0.290$) with a positive value.

As displayed in Table 29 there was no autocorrelation in data in the second order with the value of 0.9925 in Cultural Cluster 4 (Eastern Europe).

Table 29. Cultural Cluster 4 Arellano-Bond Zero Autocorrelation Test Results

Arellano-Bond test for zero autocorrelation in first-differenced errors		
Order	z	Prob > z
1	-2.2005	0.0278
2	.00935	0.9925

Note. Ho: no autocorrelation
Significant at $p < 0.05$ level.

Since Stata *'xtabond'* estimation cannot test Cultural Cluster 5 (Middle East) and 6 (Nordic Europe) due to missing data, and Cluster 5 for not carrying panel data specifications, a series of comparison tests were performed to investigate any differences in Cultural Clusters 5 and 6. In the Analysis of Variance (ANOVA) technique, "the observations are classified according to their categories for each of the independent variables, and the differences between the categories in their mean values on the dependent variable are estimated and tested for statistical significance" (Porta, 2008, p. 6). However, ANOVA cannot point out the differences within the groups with respect to each other; it can only specify that two groups are different from each other. In order to determine the level of difference between these two groups, Tukey's HSD (honest significant difference) test, as a post-hoc test, was performed (Laerd Statictics, 2013). Due to the fact that "Tukey's HSD uses the difference between the largest and smallest means as a measure of their dispersion; and the number of groups are used as multipliers of the standard deviation" (Porta, 2008, p. 160); it is a powerful tool to find out the

strength of the difference within groups. The Cultural Cluster 5 ANOVA test results for Total Active Duty Personnel are depicted in Table 30.

Table 30. Cluster 5 (Middle East) ANOVA Test Results for Totaladp

	Number of obs = 620			R-squared = 0.3978	
	Root MSE = 256587			Adj R-squared = 0.3929	
Source	Partial Sum of Squares	df	Mean Square	F	Prob > F
Model	(2.6703e+13)	5	(5.3406e+12)	81.12*	0.0000
CulturalCls1	(6.1525e+10)	1	(6.1525e+10)	0.93	0.3341
CulturalCls2	(6.3169e+12)	1	(6.3169e+12)	95.95*	0.0000
CulturalCls3	(2.8541e+12)	1	(2.8541e+12)	43.35*	0.0000
CulturalCls4	(8.1134e+12)	1	(8.1134e+12)	123.24*	0.0000
CulturalCls6	(7.7228e+12)	1	(7.7228e+12)	117.30*	0.0000
CulturalCls5	0	0			
Residual	(4.0424e+13)	614	(6.5837e+10)		
Total	(6.7127e+13)	619	(1.0844e+11)		

Note. Significant at $p < 0.05$ level.

There was a significant ($p = 0.0001$) difference between Cultural Cluster 5 and Cultural Clusters 2, 3, 4, and 6 related to the Total Active Duty Personnel number trends. However, there was no significant ($p = 0.3341$) difference between Cultural Cluster 5 (Middle East) and Cultural Cluster 1 (Anglo) with an F value of 0.93 with regards to the Total Active Duty Personnel number.

The Cultural Cluster 6 ANOVA test results for Total Active Duty Personnel are depicted in Table 31.

Table 31. Cluster 6 (Nordic Europe) ANOVA Test Results for Totaladp

	Number of obs = 620			R-squared = 0.3978	
	Root MSE = 256587			Adj R-squared = 0.3929	
Source	Partial Sum of Squares	df	Mean Square	F	Prob > F
Model	(2.6703e+13)	5	(5.3406e+12)	81.12*	0.0000
CulturalCls1	(1.2594e+13)	1	(1.2594e+13)	191.30*	0.0000
CulturalCls2	(3.0356e+11)	1	(3.0356e+11)	4.61*	0.0322
CulturalCls3	(2.9965e+12)	1	(2.9965e+12)	45.51*	0.0000
CulturalCls4	(1.7379e+11)	1	(1.7379e+11)	2.64	0.1047
CulturalCls5	(7.7228e+12)	1	(7.7228e+12)	117.30*	0.0000
CulturalCls6	0	0			
Residual	(4.0424e+13)	614	(6.5837e+10)		
Total	(6.7127e+13)	619	(1.0844e+11)		

Note. Significant at $p < 0.05$ level.

There was a significant difference between Cultural Cluster 6 and Cultural Clusters 1, 2, 3, and 5 with *p* values under 0.05 in Total Active Duty Personnel number trends. However, there was no significant ($p = 0.1047$) difference between Cultural Cluster 6 (Nordic Europe) and Cultural Cluster 4 (Eastern Europe) with an *F* value of 2.64.

In order to determine the quantity of the difference between Cultural Clusters, Tukey's HSD (Honest Significant Difference) test was performed as ANOVA post-hoc, and the results for Total Active Duty Personnel are depicted in Table 32.

Table 32. Tukey's HSD Test Results for Total Active Duty Personnel

Tukey HSD pairwise comparisons for variable Clusters			
studentized range critical value (.05, 6, 614)	= 4.0427975		
uses harmonic mean sample size	= 60.663		
grp vs grp	group means	mean dif	HSD-test
1 vs 2	[6.36e+05 1.10e+05]	(5.262e+05)	15.9728*
1 vs 3	[6.36e+05 3.02e+05]	(3.341e+05)	10.1422*
1 vs 4	[6.36e+05 7.77e+04]	(5.581e+05)	16.9418*
1 vs 5	[6.36e+05 6.96e+05]	(59721.3768)	1.8128
1 vs 6	[6.36e+05 2.00e+04]	(6.159e+05)	18.6951*
2 vs 3	[1.10e+05 3.02e+05]	(1.921e+05)	5.8306*
2 vs 4	[1.10e+05 7.77e+04]	(31921.3239)	0.9690
2 vs 5	[1.10e+05 6.96e+05]	(5.859e+05)	17.7857*
2 vs 6	[1.10e+05 2.00e+04]	(89681.3145)	2.7223
3 vs 4	[3.02e+05 7.77e+04]	(2.240e+05)	6.7996*
3 vs 5	[3.02e+05 6.96e+05]	(3.938e+05)	11.9550*
3 vs 6	[3.02e+05 2.00e+04]	(2.818e+05)	8.5529*
4 vs 5	[7.77e+04 6.96e+05]	(6.178e+05)	18.7546*
4 vs 6	[7.77e+04 2.00e+04]	(57759.9906)	1.7533
5 vs 6	[6.96e+05 2.00e+04]	(6.756e+05)	20.5079*

Note. Asterisk '*' means that the difference between two group was significant.

Tukey's HSD confirmed that there was no significant difference between Cultural Cluster 1 (Anglo) and Cultural Cluster 5 (Middle East) for Total Active Duty Personnel number trend with a value of 1.8128. The asterisk '*' sign means that the difference between the two groups was significant. However, there were significant differences between Cultural Cluster 5 and Cultural Clusters 2, 3, 4, and 6 for the Total Active Duty Personnel number trend. Likewise, there was no significant difference between Cultural Cluster 6 (Nordic Europe) and Cultural Cluster 4 (Eastern Europe) with a value of 1.7533. In order to visualize that there was no difference between Cultural Cluster 1 (Anglo) and Cultural Cluster 5 (Middle East) in Total Active Duty Personnel, the Total Active Duty Personnel trend for Cultural Cluster 1 vs Cultural Cluster 5 is displayed in Figure 16.

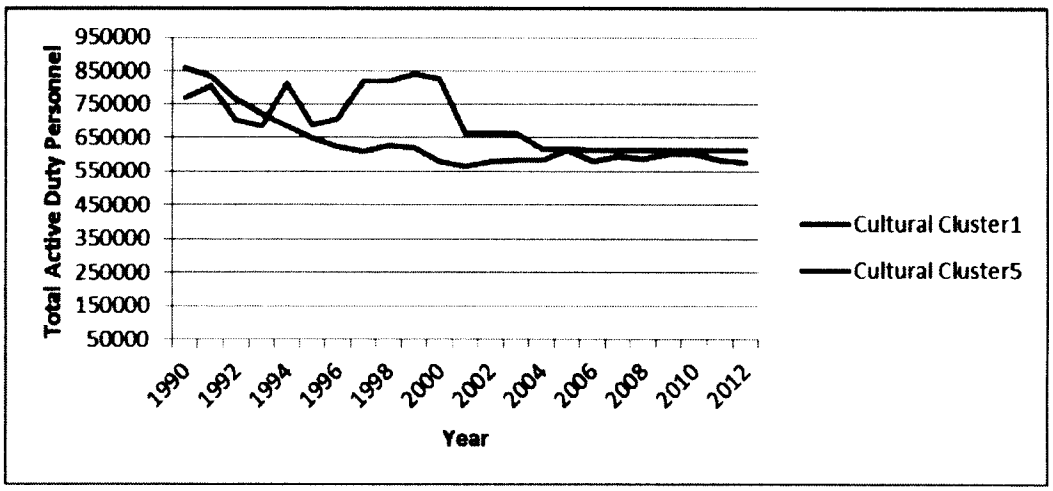

Figure 16. Total Active Duty Personnel Cultural Cluster 1 vs Cultural Cluster 5

Even though there were some peaks in the values, Cultural Clusters 1 and 5 showed similar trends in Total Active Duty Personnel numbers.

In order to show that there was no difference between Cultural Cluster 6 (Nordic Europe) and Cultural Cluster 4 (Eastern Europe) in Total Active Duty Personnel, the Total Active Duty Personnel trend for Cultural Cluster 6 vs Cultural Cluster 4 is displayed in Figure 17.

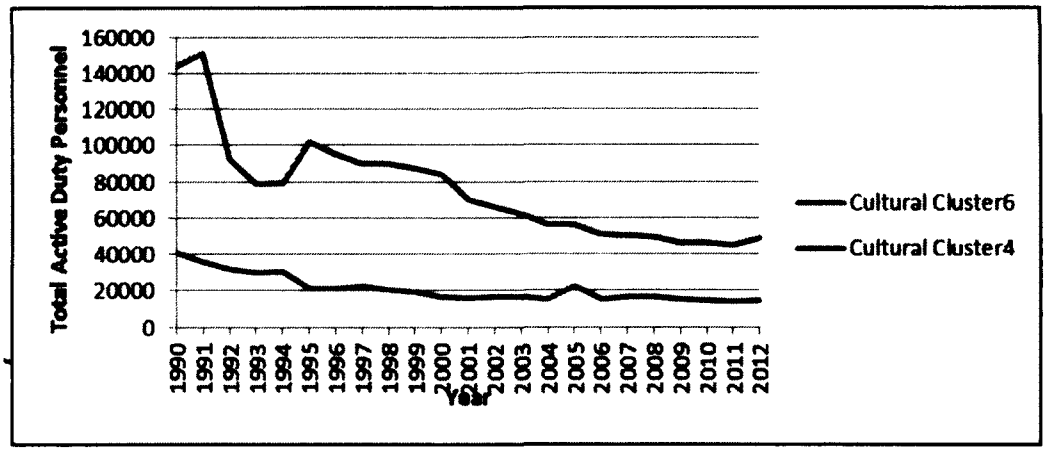

Figure 17. Total Active Duty Personnel Cultural Cluster 6 vs Cultural Cluster 4

Cultural Clusters 6 and 4 show similar trends in Total Active Duty Personnel numbers.

The ANOVA test results for Military Expenditure are depicted in Table 33.

Table 33. ANOVA Test Results for Military Expenditure

	Number of obs = 607			R-squared = 0.1491	
	Root MSE = 1.06921			Adj R-squared = 0.1420	
Source	Partial Sum of Squares	df	Mean Square	F	Prob > F
Model	(120.400683)	5	(24.0801367)	21.06*	0.0000
CulturalCls1	(20.875769)	1	(20.875769)	18.26*	0.0000
CulturalCls2	(19.9711206)	1	(19.9711206)	17.47*	0.0000
CulturalCls4	(.530042774)	1	(.530042774)	0.46	0.4962
CulturalCls5	(30.3458736)	1	(30.3458736)	26.54*	0.0000
CulturalCls6	(3.31064764)	1	(3.31064764)	2.90	0.0893
CulturalCls3	0	0			
Residual	(687.065722)	601	(1.1432042)		
Total	(807.466406)	606	(1.33245281)		

Note. Significant at $p < 0.05$ level.

In Cultural Cluster 3 (Latin Europe), there was a significant relationship between the Total Active Duty Personnel number and Military Expenditure ($p = 0.037$). There was a significant difference ($p = 0.0001$) between Cultural Cluster 3 and Cultural Cluster 5 (Middle East) for the Military Expenditure trend; also, diversity was very strong with an F value of 26.54. However, there was no significant ($p = 0.0893$) difference between Cultural Cluster 3 (Latin Europe) and Cultural Cluster 6 (Nordic Europe) with an F value of 2.90 regarding Military Expenditure.

Tukey's HSD test results for Military Expenditure are depicted in Table 34.

Table 34. Tukey's HSD Test Results for Military Expenditure

Tukey HSD pairwise comparisons for variable Clusters
studentized range critical value (.05, 6, 601) = 4.0430747
uses harmonic mean sample size = 58.101

grp vs grp	group means	mean dif	HSD-test
1 vs 2	[2.7171 1.3305]	1.3865	9.8847*
1 vs 3	[2.7171 1.9895]	0.7276	5.1873*
1 vs 4	[2.7171 2.0769]	0.6402	4.5639*
1 vs 5	[2.7171 3.2737]	0.5566	3.9679
1 vs 6	[2.7171 1.6698]	1.0473	7.4664*
2 vs 3	[1.3305 1.9895]	0.6589	4.6973*
2 vs 4	[1.3305 2.0769]	0.7464	5.3208*
2 vs 5	[1.3305 3.2737]	1.9431	13.8526*
2 vs 6	[1.3305 1.6698]	0.3392	2.4183
3 vs 4	[1.9895 2.0769]	0.0875	0.6234
3 vs 5	[1.9895 3.2737]	1.2842	9.1552*
3 vs 6	[1.9895 1.6698]	0.3197	2.2790
4 vs 5	[2.0769 3.2737]	1.1968	8.5318*
4 vs 6	[2.0769 1.6698]	0.4071	2.9025
5 vs 6	[3.2737 1.6698]	1.6039	11.4343*

Note. Asterisk '*' means that the difference between two group was significant.

Tukey's HSD confirmed that there was a significant difference between Cultural Cluster 3 (Latin Europe) and Cultural Cluster 5 (Middle East) for the Military Expenditure trend with a value of 9.1552. The asterisk '*' sign means that the difference between the two groups is significant. However, there was no significant difference between Cultural Cluster 3 (Latin Europe) and Cultural Cluster 6 (Nordic Europe) with a value of 2.2790 for Military Expenditure.

The ANOVA test results for the Chief of General Staff are depicted in Table 35.

Table 35. ANOVA Test Results for Chief of General Staff

	Number of obs = 621			R-squared = 0.0447	
	Root MSE = 1.40581			Adj R-squared = 0.0369	
Source	Partial Sum of Squares	df	Mean Square	F	Prob > F
Model	(56.8592622)	5	(11.3718524)	5.75*	0.0000
CulturalCls1	(32.0916149)	1	(32.0916149)	16.24*	0.0001
CulturalCls3	(23.673913)	1	(23.673913)	11.98*	0.0006
CulturalCls4	(27.7799823)	1	(27.7799823)	14.06*	0.0002
CulturalCls5	(14.976087)	1	(14.976087)	7.58*	0.0061
CulturalCls6	(.316223647)	1	(.316223647)	0.16	0.6893
CulturalCls2	0	0			
Residual	(1215.42415)	615	(1.97629943)		
Total	(1272.28341)	620	(2.05207002)		

Note. Significant at $p < 0.05$ level.

In Cultural Cluster 2 (Germanic Europe), there was a significant relationship between the Total Active Duty Personnel number and the Chief of General Staff (p = 0.05) . There was a significant (p = 0.061) difference between Cultural Cluster 2 and Cultural Cluster 5 (Middle East) for Chief of General Staff tenure with an F value of 7.58. However, there was no significant (p = 0.6893) difference between Cultural Cluster

2 (Germanic Europe) and Cultural Cluster 6 (Nordic Europe) with an *F* value of 0.16 with regards to the Chief of General Staff.

Tukey's HSD test results for the Chief of General Staff are depicted in Table 36.

Table 36. Tukey's HSD Test Results for Chief of General Staff

Tukey HSD pairwise comparisons for variable Clusters			
studentized range critical value (.05, 6, 615)	= 4.0427767		
uses harmonic mean sample size	= 60.527		
grp vs grp	group means	mean dif	HSD-test
1 vs 2	[2.1739 3.0761]	0.9022	4.9927*
1 vs 3	[2.1739 2.3587]	0.1848	1.0226
1 vs 4	[2.1739 2.4433]	0.2693	1.4906
1 vs 5	[2.1739 2.1739]	0.0000	0.0000
1 vs 6	[2.1739 2.9841]	0.8102	4.4838*
2 vs 3	[3.0761 2.3587]	0.7174	3.9701
2 vs 4	[3.0761 2.4433]	0.6328	3.5021
2 vs 5	[3.0761 2.1739]	0.9022	4.9927*
2 vs 6	[3.0761 2.9841]	0.0920	0.5089
3 vs 4	[2.3587 2.4433]	0.0846	0.4680
3 vs 5	[2.3587 2.1739]	0.1848	1.0226
3 vs 6	[2.3587 2.9841]	0.6254	3.4612
4 vs 5	[2.4433 2.1739]	0.2693	1.4906
4 vs 6	[2.4433 2.9841]	0.5409	2.9932
5 vs 6	[2.1739 2.9841]	0.8102	4.4838*

Note. Asterisk '*' means that the difference between two group was significant.

Tukey's HSD confirmed that there was a significant difference between Cultural Cluster 2 (Germanic Europe) and Cultural Cluster 5 (Middle East) for Chief of General Staff tenure with a value of 4.9927. However, there was no significant difference between Cultural Cluster 2 and Cultural Cluster 6 (Nordic Europe) with a value of 0.5089 related to the Chief of General Staff.

The ANOVA test results for the National Military Strategy Directive are depicted in Table 37.

Table 37. ANOVA Test Results for National Military Strategy Directive

	Number of obs = 621			R-squared = 0.0447	
	Root MSE = 1.40581			Adj R-squared = 0.0369	
Source	Partial Sum of Squares	df	Mean Square	F	Prob > F
Model	(70.7248473)	5	(14.1449695)	3.20*	0.0073
CulturalCls2	(10.8787998)	1	(10.8787998)	2.46	0.1171
CulturalCls3	(.85175607)	1	(.85175607)	0.19	0.6607
CulturalCls4	(8.11003772)	1	(8.11003772)	1.84	0.1759
CulturalCls5	(3.63970588)	1	(3.63970588)	0.82	0.3644
CulturalCls6	(3.70594359)	1	(3.70594359)	0.84	0.3600
CulturalCls1	0	0			
Residual	(2495.34521)	565	(4.41654019)		
Total	(2566.07005)	570	(4.50187729)		

Note. Significant at $p < 0.05$ level.

In Cultural Cluster 1 (Anglo), there was a significant relationship between the Total Active Duty Personnel number and the National Military Strategy Directive ($p = 0.03$). There was no significant ($p = 0.3644$) difference between Cultural Cluster 1 and Cultural Cluster 5 (Middle East) for National Military Strategy Directive maturity with an F value of 0.82. In addition, there was no significant ($p = 0.36$) difference between Cultural Cluster 1 (Anglo) and Cultural Cluster 6 (Nordic Europe) with an F value of 0.82 for the National Military Strategy Directive.

Tukey's HSD test results for the National Military Strategy Directive are depicted in Table 38.

Table 38. Tukey's HSD Test Results for National Military Strategy Directive

Tukey HSD pairwise comparisons for variable Clusters			
studentized range critical value (.05, 6, 615)	= 4.0427767		
uses harmonic mean sample size	= 60.527		
grp vs grp	group means	mean dif	HSD-test
1 vs 2	[3.2353 3.7778]	0.5425	1.9203
1 vs 3	[3.2353 3.0843]	0.1510	0.5344
1 vs 4	[3.2353 2.8465]	0.3888	1.3764
1 vs 5	[3.2353 2.7500]	0.4853	1.7178
1 vs 6	[3.2353 3.5692]	0.3339	1.1821
2 vs 3	[3.7778 3.0843]	0.6934	2.4546
2 vs 4	[3.7778 2.8465]	0.9313	3.2967
2 vs 5	[3.7778 2.7500]	1.0278	3.6381
2 vs 6	[3.7778 3.5692]	0.2085	0.7382
3 vs 4	[3.0843 2.8465]	0.2379	0.8420
3 vs 5	[3.0843 2.7500]	0.3343	1.1835
3 vs 6	[3.0843 3.5692]	0.4849	1.7164
4 vs 5	[2.8465 2.7500]	0.0965	0.3414
4 vs 6	[2.8465 3.5692]	0.7228	2.5585
5 vs 6	[2.7500 3.5692]	0.8192	2.8999

Note. Asterisk '*' means that the difference between two group was significant.

There was enough evidence in Tukey's HSD test to estimate that there was no significant difference in average maturity of national military directive between Cultural Cluster 1 (Anglo) and Cultural Cluster 5 (Middle East) based on the p-value of 1.7178. In addition, there was no significant difference in average for the National Military Strategy Directive between Cultural Cluster 1 (Anglo) and Cultural Cluster 6 (Nordic Europe) with a p-value of 1.1821.

In order to show that there was no difference in average maturity of National Military Strategy Directive between Cultural Cluster 1 (Anglo) and Cultural Cluster 5 (Middle East), the trends for Cultural Cluster 1 vs Cultural Cluster 5 are displayed in Figure 18.

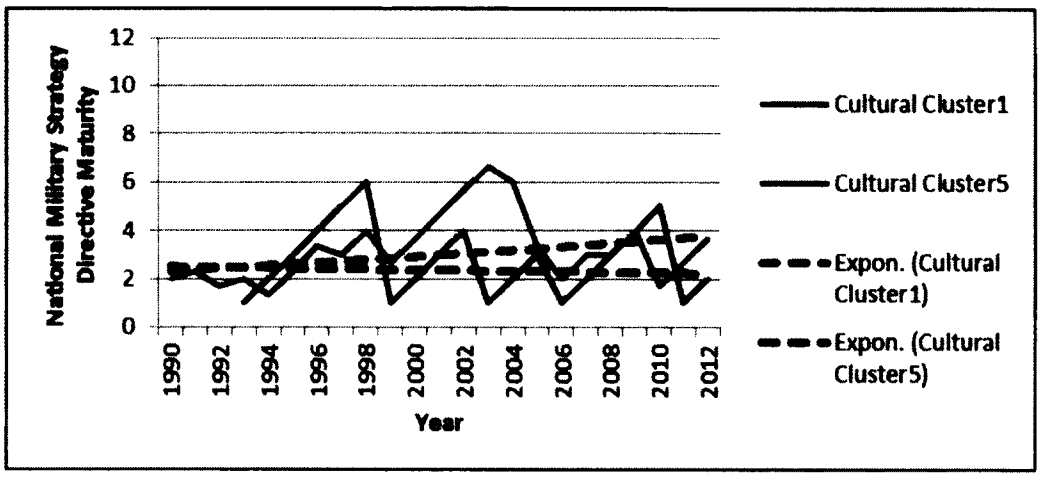

Figure 18. National Military Strategy Directive Cultural Clusters 1 vs 5

In Cultural Cluster 1 (Anglo), there was a significant relationship between the Total Active Duty Personnel number and the National Military Strategy Directive (p = 0.03). In Cultural Cluster 2 (Germanic Europe), the Chief of General Staff was significant (p = 0.05). In Cultural Cluster 3 (Latin Europe), Military Expenditure was significant (p = 0.037). In Cultural Cluster 4 (Eastern Europe), there was no significant p value for any of the independent variables. In order to better understand the ANOVA & Tukey's HSD test results investigating the diversity between the dependent variable and the independent variables across Cultural Cluster 5 (Middle East) and Cultural Cluster 6 (Nordic Europe), overall outputs are depicted in Table 39.

Table 39. Overall ANOVA & Tukey's HSD Test Results

	Cluster Number & Significant Variable	ANOVA *F*	ANOVA *Prob > F*	Tukey's HSD-test	Differs
Cultural Cluster 5 (Middle East)	# 3 & Military Expenditure	26.54**	0.0001	9.1552**	Yes
	# 2 & Chief of General Staff	7.58**	0.0610	4.9927**	Yes
	# 1 & National Military Strategy Directive	0.82	0.3644	1.7178	No
	# 1 & Total Active Duty Personnel	0.93	0.3341	1.8128	No
Cultural Cluster 6 (Nordic Europe)	# 3 & Military Expenditure	2.90	0.0893	2.2790	No
	# 2 & Chief of General Staff	0.16	0.6893	0.5089	No
	# 1 & National Military Strategy Directive	0.84	0.3600	1.1821	No
	# 4 & Total Active Duty Personnel	2.64	0.1047	18.6951	No

Note. ** Related variable is significantly different.

Cultural Cluster 5 (Middle East) had similar trends to Cultural Cluster 1 (Anglo) regarding the National Military Strategy Directive and the Total Active Duty Personnel number. Cultural Cluster 6 (Nordic Europe) had similar trends to Cultural Cluster 3 (Latin Europe) related to Military Expenditure. Cultural Cluster 6 (Nordic Europe) had similar trends to Cultural Cluster 2 (Germanic Europe) with regards to the Chief of General Staff. Cultural Cluster 6 (Nordic Europe) had similar trends to Cultural Cluster 1 (Anglo) related to the National Military Strategy Directive. Cultural Cluster 6 (Nordic Europe) had similar trends to Cultural Cluster 4 (Eastern Europe) with regards to the Total Active Duty Personnel number.

The findings of Step 2 of the analyses performed so far lead to further our understanding of differences across cultural clusters. Cultural Cluster 6 (Nordic Europe) Military Expenditure trend in comparison with the other Clusters is displayed in Table 40.

Table 40. Cultural Cluster 6 Military Expenditure Trend Comparison

	Number of obs = 607			R-squared = 0. 1491	
	Root MSE = 1. 06921			Adj R-squared = 0. 1420	
Source	Partial Sum of Squares	df	Mean Square	F	Prob > F
Model	(120.400683)	5	(24.0801367)	21.06*	0.0000
CulturalCls1	(31.8004731)	1	(31.8004731)	27.82*	0.0000
CulturalCls2	(3.72761819)	1	(3.72761819)	3.26	0.0715
CulturalCls3	(3.31064764)	1	(3.31064764)	2.90	0.0893
CulturalCls4	(7.03599741)	1	(7.03599741)	6.15	0.0134
CulturalCls5	(40.5260641)	1	(40.5260641)	35.45*	0.0000
CulturalCls6	0	0			
Residual	(687.065722)	601	(1.1432042)		
Total	(807.466406)	606	(1.33245281)		

Note. Significant at $p < 0.05$ level.

The Cultural Cluster 6 (Nordic Europe) Military Expenditure trend showed differences from Cultural Cluster 1 (Anglo) with a *p* value of 0.0001, Cultural Cluster 4 (Eastern Europe) with a *p* value of 0.0001, and Cultural Cluster 5 (Middle East) with a *p* value of 0.0134.

Cultural Cluster 6 (Nordic Europe) Chief of General Staff data trend in comparison with the other Clusters is displayed in Table 41.

Table 41. Cultural Cluster 6 Chief of General Staff Data Trend Comparison

	Number of obs = 621			R-squared = 0.0447	
	Root MSE = 1.40581			Adj R-squared = 0.0369	
Source	Partial Sum of Squares	df	Mean Square	F	Prob > F
Model	(56.8592622)	5	(11.3718524)	5.75*	0.0000
CulturalCls1	(21.6179811)	1	(21.6179811)	10.94*	0.0010
CulturalCls2	(.316223647)	1	(.316223647)	0.16	0.6893
CulturalCls3	(14.6270231)	1	(14.6270231)	7.40*	0.0067
CulturalCls4	(15.0642541)	1	(15.0642541)	7.62*	0.0059
CulturalCls5	(11.0603624)	1	(11.0603624)	5.60*	0.0183
CulturalCls6	0	0			
Residual	(1215.42415)	615	(1.97629943)		
Total	(1272.28341)	620	(2.05207002)		

Note. Significant at $p < 0.05$ level.

Cultural Cluster 6 (Nordic Europe) Chief of General Staff data trend proved to be different from Cultural Cluster 3 (Latin Europe) with a *p* value of 0.0067, Cultural Cluster 4 (Eastern Europe) with a *p* value of 0.0059, and Cultural Cluster 1 (Anglo) with a *p* value of 0.0010.

Cultural Cluster 6 (Nordic Europe) National Military Strategy Directive data trend in comparison with the other clusters is displayed in Table 42.

Table 42. Cultural Cluster 6 National Military Strategy Directive Data Trend Comparison

	Number of obs = 571			R-squared = 0.0276	
	Root MSE = 2.10156			Adj R-squared = 0.0190	
Source	Partial Sum of Squares	df	Mean Square	F	Prob > F
Model	(70.7248473)	5	(14.1449695)	3.20*	0.0073
CulturalCls1	(3.70594359)	1	(3.70594359)	0.84	0.3600
CulturalCls2	(1.56838778)	1	(1.56838778)	0.36	0.5515
CulturalCls3	(8.57081883)	1	(8.57081883)	1.94	0.1641
CulturalCls4	(27.0371883)	1	(27.0371883)	6.12*	0.0136
CulturalCls5	(10.2644796)	1	(10.2644796)	2.32	0.1279
CulturalCls6	0	0			
Residual	(2495.34521)	565	(4.41654019)		
Total	(2566.07005)	570	(4.50187729)		

Note. Significant at $p < 0.05$ level.

Cultural Cluster 6's (Nordic Europe) National Military Strategy Directive data trend was found to be different from Cultural Cluster 4 (Eastern Europe) with a *p* value of 0.0136.

4.5.1 Step 2 Hypotheses Test

In order to test whether the hypothesized relationships between the Total Active Duty Personnel number and Military Expenditure, turnover in the Chief of General Staff, modification of the National Military Strategy Directive differs across NATO nations' cultural clusters, Step 2: Cultural Clusters analyses were performed. Table 43 displays details about Step 2: Cultural Clusters hypotheses test results.

Table 43. Step 2: List of Hypotheses and Summary of Findings

H_A#	Hypothesis in Alternative Form	Coefficient Value	Summary of Findings
H_A4	The relationship between Military Expenditure (% of GDP) and personnel downsizing differs across NATO nations' cultural clusters.	*In Cultural Cluster 3 (Latin Europe)* (35330.57) One percent change in Military Expenditure (% of GDP) drives personnel upsizing of 35330 military personnel.	($p = 0.037$) Significant with a positive value *Supported*
H_A5	The relationship between Chief of General Staff and personnel downsizing differs across NATO nations' cultural clusters.	*In Cultural Cluster 2 (Germanic Europe)* (-7379.043) A one-year of additional tenure of Chief of General Staff drives personnel downsizing of 7379 military personnel.	($p = 0.005$) Significant with a negative value *Supported*
H_A6	The relationship between the National Military Strategy Directive and personnel downsizing differs across NATO nations' cultural clusters.	*In Cultural Cluster 1 (Anglo)* (3078.029) A one-year of additional maturity in the National Military Strategy Directive drives personnel upsizing of 3078 military personnel.	($p = 0.03$) Significant with a positive value *Supported*

In Cultural Cluster 4 (Eastern Europe), there was no significant p value for any of the independent variables. Cultural Cluster 5 (Middle East) and Cultural Cluster 6 (Nordic Europe) findings were discussed in Chapter 5.

4.6 Validity and Reliability

Validity is the extent to which the measurement and estimation process fits with the concept and the purpose of the study (Fawcett & Garity, 2009; Handley, 2014; Last,

2001). There are two main types of validity. Internal validity determines if the study is free from systematic error or bias and to what extent (Porta, 2008). It also determines if the construct and the data lead the researcher to accurate conclusions based on the relationships being investigated (Leedy & Ormrod, 2010). External validity determines whether or not the study can be generalized to other populations out of the scope of the present research (Porta, 2008).

Reliability is having dependable results with repeated measurements or assessments using the same initial conditions (Handley, 2014; Last, 2001).

4.6.1 Validity

In order to gain validity in this study, a draft version of the research was shared with experienced colleagues, and their feedback and suggestions were received. Trial runs were conducted to determine if the model was working properly. During the trial runs, possible weaknesses of the research model were tested. The model was modified subsequently in accordance with the trial performances. Data was collected for 23 years (1990-2012) annually from 28 NATO nations with the size of the panels ($N = 28$ and $T = 23$) from several data sources. Data triangulation was conducted by verifying data from different sources. Analyses were performed with a 95% confidential level and a p value of 0.05. The Arellano-Bond Generalized Method of Moments (GMM) model was used to analyze causal relationships between dependent and independent variables by using a time series cross-sectional dynamic panel data. The Arellano-Bond GMM one-step difference method with robust standard errors was performed in order to test the hypotheses in two steps: 'Step 1: Overall Analyses' and 'Step 2: Cultural Clusters Analyses.' To ensure that this method was appropriate, a random effect/fixed effect test

was first performed, and the data proved to fit the fixed effect. Second, the Arellano-Bond for zero autocorrelation in first-differenced errors test was performed to check for overidentification that helps to clarify whether variables were correlated with residuals or not and to test for the presence of exogeneity (Roodman, 2009). There was enough evidence to conclude that there was no autocorrelation and that independent variables were exogenous. Third, the White heteroskedasticity test was performed to ensure that error terms did not exhibit constant variance (Arellano & Bond, 1991), and the model proved to be heteroskedastic.

The effects of a change in Military Expenditure, the Chief of General Staff or the National Military Strategy Directive on the Total Active Duty Personnel number of NATO nations' armed forces could be observed in the current year, one year later, two years later, three years later, and so on. The mean value for the turnover in the Chief of General Staff was 2.54 years, and for the modification NMSD, it was 3.13 years. Hence, the lagged values for three (3) years of the Total Active Duty Personnel number were calculated (Hamilton, 2006). The Arellano-Bond Generalized Method of Moments (GMM) model uses two lagged values of independent variables (Arellano & Bond, 1991). In the first lag, the unobserved parameters were gone. In the second lag, the error terms (the noise) were taken out of the equation (Drukker, 2008). Hence, two lagged values of independent variables were used in the study.

With respect to generalization, the methodology of this study can be used with other non-NATO nations for different time intervals, even with different quantitative independent variables.

4.6.2 Reliability

In order to gain reliability in this study, expert (advisors and subject matter experts) opinions were received during the whole process. During the analysis phase of the study, four statistic experts' opinions were received, and when they all agreed with the calculations and outputs of the current analyses, the following phases were conducted. Triangulation was performed to check data consistency during data collection by gathering data from different sources. Even though there was no similar study in military contexts, the study methodology was compared with similar civilian studies.

Pre-estimation diagnostic and post-hoc tests were performed to test whether the data set and model match. The same tests were conducted to check for output consistency. As for the pre-estimation diagnostic tests, a random effect/fixed effect test, the Arellano-Bond for zero autocorrelation in first-differenced errors test and the White heteroskedasticity test were conducted to ensure that the data set fit with the requirements of the Arellano-Bond GMM model. As for the post-hoc tests, the interaction between independent variables test, the Pesaran's and Frees' cross-sectional independence test, and the R-squared test were conducted. The Variance Inflation Factor (VIF) test was performed to assess whether multicollinearity was a problem or not for independent variables and, if so, to what extent. There was no implicitly high correlation between an independent variable and another independent variable or a set of independent variables.

CHAPTER V

CONCLUSION

The purpose of this study was to investigate key factors that drive personnel downsizing in military organizations of NATO nations and whether those factors differ across NATO nations' cultural clusters. This chapter provides details on the conclusions of the study.

The questions for this description are as stated below:

Question 1. What are the key factors that drive personnel downsizing in military organizations of NATO nations?

Question 2. Do those key factors differ across NATO nations' cultural clusters?

To answer the research questions, a series of analyses were conducted in two steps. For the first step (Step 1: overall analyses), an inspection of the key factors that drive personnel downsizing in NATO nations' military organizations was analyzed. For the second step (Step 2: cultural clusters analyses), an analysis was performed to determine if the key factors differ across NATO nations' cultural clusters.

5.1 Step 1: Overall Analyses

Table 44 depicts the results of Step 1: Overall Analyses.

Table 44. Step 1: Overall Analyses Results

H_A#	Hypothesis in Alternative Form	Coefficient Value and Inference	Summary of Findings and Inference
H_A1	Military Expenditure (% of GDP) has a statistically significant relationship with personnel downsizing.	(-6967.631) One percent change in Military Expenditure (% of GDP) drives personnel **downsizing** of 6967 military personnel.	($p = 0.102$) Not significant with a negative value *Not Supported*
H_A2	Turnover in Chief of General Staff has a statistically significant relationship with personnel downsizing.	(-2306.316) A one-year of additional tenure of Chief of General Staff drives personnel **downsizing** of 2306 military personnel.	($p = 0.039$) **Significant with a negative value** ***Supported***
H_A3	Modification of the National Military Strategy Directive has a statistically significant relationship with personnel downsizing.	(1679.392) A one-year of additional maturity in the National Military Strategy Directive drives personnel **upsizing** of 1679 military personnel.	($p = 0.032$) **Significant with a positive value** ***Supported***

Turnover in the Chief of General Staff was found to be significant, and one year of additional tenure of the Chief of General Staff proved to drive 2306 Active Duty Personnel downsizing. This finding showed that turnover in the Chief of General Staff is a key factor that drives personnel downsizing in 28 NATO nations' military organizations. Modification of the National Military Strategy Directive was found to be significant; however, one year of additional maturity in the National Military Strategy

Directive proved to be driving personnel upsizing of 1679. Hence, it was determined that NMSD is not a factor that drives personnel downsizing in military organizations.

Scholars provide evidence of a relationship between an organization's budget and personnel downsizing (Prindle, 2005). According to Gardner (2002), "budgets and politics have directly contributed to downsizing decisions of the Post-Cold War period" (p. 41). In 1994, the United States estimated a savings of 40% in military expenditure by reducing over 30% of its total active military personnel (Cameron, 1998). The United States' military expenditure fell from 5.59% to 3.02% of its GDP (Gross Domestic Product) from 1989 through 1999. The total number of active duty personnel declined by 2.97% (from 2,240,000 to 1,575,000 personnel) during the same period (The World Bank, 2014). Likewise, daily newspapers generally relate military personnel downsizing with cuts in military expenditure (Chu, 2010, December 5; France-Presse, 2013, November 5; Thom & Christopher, 2011, January 7; Times-Herald, 2014, May 2). Even though the aforementioned facts point to military expenditure as one of the key factors that drive personnel downsizing in military organizations, when it comes to NATO nations, the findings of this study disagree. Military Expenditure (% of GDP-Gross Domestic Product) was found to be statistically non-significant as a factor driving personnel downsizing in the study. Contrary to general belief and local findings, when 28 NATO nations were considered altogether, Military Expenditure was not a factor that drives downsizing in military organizations.

All those findings lead the researcher to investigate whether Step 1's results differ across NATO nations' cultural clusters.

5.2 Step 2: Cultural Clusters Analyses

NATO nations were grouped under cultural clusters with the findings from the literature as shown in Table 45.

Table 45. NATO Nations by Cultural Clusters

Cultural Clusters #, Name	28 NATO Nations
1, Anglo	USA, Canada, United Kingdom (3 Nations)
2, Germanic Europe	Germany, Netherlands, Belgium, Luxemburg (4 Nations)
3, Latin Europe	Italy, Spain, Portugal, France (4 Nations)
4, Eastern Europe	Poland, Greece, Hungary, Albania, Slovenia, Czech Republic, Latvia, Croatia, Bulgaria, Estonia, Lithuania, Romania, Slovak Republic (13 Nations)
5, Middle East	Turkey (1 Nation)
6, Nordic Europe	Denmark, Iceland, Norway (3 Nations)

The same method of statistical analysis was applied to Cultural Clusters 1, 2, 3, and 4. Cultural Cluster 5 (Middle East) only contained Turkey, while Cultural Cluster 6 (Nordic Europe) included Denmark, Iceland, and Norway. However, Iceland was missing

data necessary to the use of the model. In other words, from a data perspective, Cultural Cluster 6 had only two nations. The model was constructed to measure time-series cross-sectional dynamic panel data, and it was not possible to measure Cultural Clusters 5 and 6 in the model. A series of comparison tests were performed to investigate the factors that drive personnel downsizing in Cultural Clusters 5 and 6. Table 46 depicts the results of Step 2: Cultural Clusters Analyses for Cultural Clusters 1-4.

Table 46. Step 2: Cultural Clusters Analyses Results (CulturalCls 1-4)

H_A#	Hypothesis in Alternative Form	Coefficient Value and Inference	Summary of Findings and Inference
H_A4	The relationship between Military Expenditure (% of GDP) and personnel downsizing differs across NATO nations' cultural clusters.	*In Cultural Cluster 3 (Latin Europe)* (35330.57) One percent change in Military Expenditure (% of GDP) drives personnel **upsizing** of 35330 military personnel.	(p = 0.037) **Significant with a positive value** ***Supported***
H_A5	The relationship between Chief of General Staff and personnel downsizing differs across NATO nations' cultural clusters.	*In Cultural Cluster 2 (Germanic Europe)* (-7379.043) A one-year of additional tenure of Chief of General Staff drives personnel **downsizing** of 7379 military personnel.	(p = 0.005) **Significant with a negative value** *Not Supported* *(Similar result to 28 NATO nations)*
H_A6	The relationship between the National Military Strategy Directive and personnel downsizing differs across NATO nations' cultural clusters.	*In Cultural Cluster 1 (Anglo)* (3078.029) A one-year of additional maturity in the National Military Strategy Directive drives personnel **upsizing** of 3078 military personnel.	(p = 0.03) **Significant with a positive value** ***Supported***

In Cultural Cluster 3 (Latin Europe), Military Expenditure had a strong relationship with the Total Active Duty Personnel number; however, it did not prove to drive personnel downsizing. On the contrary, it proved to be driving personnel upsizing. This was more likely to happen if Military Expenditure was rising in Cultural Cluster 3, and the Total Active Duty Personnel number was either rising in parallel or not changing significantly. In Cultural Cluster 2 (Germanic Europe), turnover in the Chief of General Staff was found to be significant, and one year of additional tenure of the Chief of General Staff drives 7379 active duty personnel downsizing. This finding showed that turnover in the Chief of General Staff was a key factor that drives personnel downsizing in Cultural Cluster 2 (Germanic Europe) nations' military organizations. It yielded similar results to Step 1: Overall analyses and means that the Chief of General Staff as a key factor in 28 NATO nations did not differ in the Germanic Europe cluster. In Cultural Cluster 1 (Anglo), the National Military Strategy Directive had a strong relationship with the Total Active Duty Personnel number; however, it did not drive personnel downsizing. On the contrary, it proved to drive personnel upsizing. In Cultural Cluster 4 (Eastern Europe), there was no significant p value for any of the independent variables. One potential explanation for the non-existent relationship between the Total Active Duty Personnel number and the independent variables was that Cultural Cluster 4 was either missing some identifying data or was not homogenous as a different culture. This cluster might have some more sub-clusters, or some of the nations might be members of other Cultural Clusters.

In order to make an estimation of Cultural Clusters 5 and 6, ANOVA and Tukey's Honest Significant Difference tests were performed and displayed in Table 47. The aim was to find unknown parameters by comparing known parameters.

Table 47. Overall ANOVA & Tukey's HSD Test Results for Clusters 5 and 6

	Cluster Number & Significant Variable	ANOVA *F*	ANOVA *Prob > F*	Tukey's HSD-test	Differs
Cultural Cluster 5 (Middle East)	# 3 & Military Expenditure	26.54**	0.0001	9.1552**	Yes
	# 2 & Chief of General Staff	7.58**	0.0610	4.9927**	Yes
	# 1 & National Military Strategy Directive	0.82	0.3644	1.7178	No
	# 1 & Total Active Duty Personnel	0.93	0.3341	1.8128	No
Cultural Cluster 6 (Nordic Europe)	# 3 & Military Expenditure	2.90	0.0893	2.2790	No
	# 2 & Chief of General Staff	0.16	0.6893	0.5089	No
	# 1 & National Military Strategy Directive	0.84	0.3600	1.1821	No
	# 4 & Total Active Duty Personnel	2.64	0.1047	18.6951	No

Note. ** Related variable is significantly different.

It was found that there was no significant difference between Cultural Cluster 5 (Middle East) and 1 (Anglo) with respect to values of modification of the National Military Strategy Directive and the Total Active Duty Personnel number. However, it did not necessarily mean that the relationship between the National Military Strategy Directive and the Total Active Duty Personnel number was almost identical in Cultural Cluster 1 (Anglo) and 5 (Middle East).

The Total Active Duty Personnel trend was very similar for Cultural Cluster 6 (Nordic Europe) and Cultural Cluster 4 (Eastern Europe). Cultural Cluster 6 was a

divergent cluster because its Military Expenditure trend was similar to Cluster 3 (Latin Europe), its trend for turnover in the Chief of General Staff was similar to Cluster 2 (Germanic Europe), and its trend for modification of the National Military Strategy Directive was similar to Cluster 1 (Anglo). However, Cultural Cluster 6 Total Active Duty Personnel trend was found to be different from Cultural Clusters 2, 3, 1 and 5. The Cultural Cluster 6 Military Expenditure trend differs from Cultural Clusters 1, 4, and 5. It was anticipated that the Cultural Cluster 6 Chief of General Staff trend would differ from Cultural Clusters 3, 4, and 1. It was predicted that the Cultural Cluster 6 National Military Strategy Directive trend would differ from Cultural Cluster 4. Most likely, those results were related to the amount of missing data. It was not possible to estimate which Cultural Cluster was characteristically similar to Cultural Cluster 6. In conclusion, Cultural Cluster 6 test results proved that Cultural Cluster 6 was different from 28 NATO nations.

There was enough evidence to conclude that the relationship between Military Expenditure, turnover in the Chief of General Staff, modification of the National Military Strategy Directive, and personnel downsizing differs across NATO nations' cultural clusters.

5.3 Conclusion

It was found that turnover in the Chief of General Staff was a key factor that drives personnel downsizing in 28 NATO nations' armed forces. In contrast, modification of the National Military Strategy Directive was a key factor that drives personnel upsizing. On the other hand, reduction in Military Expenditure was generally declared the reason for military personnel downsizing. In this study, it was found that Military Expenditure was not a factor that drives Active Duty Personnel downsizing;

instead, the Chief of General Staff was found to be the key player. Military expenditure might have been used as justification for the Chief of General Staff's downsizing decisions.

This study showed that the main player in Active Duty Personnel downsizing implementation is the Chief of General Staff, neither Military Expenditure, nor NMSD. Even though Military Expenditure can drive a military organization to downsize, the Chief of General Staff can delay or cancel the actual implementation. Even though there seems to be a sufficient Military Budget to hold all Active Duty Personnel for a certain period of time, a Chief of General Staff may also decide to downsize for other reasons. However, all these inferences are subject to change when applied to different Cultural Clusters of NATO nations. The analysis results of Step 1 of this study looked at the overall NATO group as a whole. However, in one culture, when a Chief of General Staff directs his command to perform personnel downsizing of the Total Active Duty Personnel number, his / her staff may obey the rules and work very hard to meet the commander's order as soon as possible. Inversely, in another culture, the staff may request to know the rationale of the personnel downsizing order before implementing the directive. The staff may request to work on possible risks, mitigations, and opportunities. In the end, they may either support or not support the Chief of General Staff's decision by providing detailed rationale. To conclude, it was found that the key factors that drive personnel downsizing differ across NATO nations' cultural clusters.

The National Military Strategy Directive might reflect the ideal defense power that a nation desires to have; however, the Chief of General Staff, when faced with the realities of defense planning with limited resources including personnel and budget,

might act differently. That might be the reason why NMSD is a key factor in triggering personnel upsizing rather than downsizing. The Chief of General Staff might need to find a rationale for personnel downsizing decisions in order not to be blamed for layoffs and might use a declining military budget as justification for personnel downsizing. In agreement with this view, Scott (1998) anticipated that some firms might use poor economic conditions as a rationale for closing unsatisfactory divisions of the organization. In this study, it was found that Chief of General Staff is the key factor driving personnel downsizing in military organizations of NATO nations. On the contrary, the news frequently declares that due to the declining military budget the armed forces are performing layoffs. For instance, according to an article in the *Los Angeles Times*, "There's little doubt that the spending cuts will downgrade armies and arsenals, which could cause a strain on the United States" (Chu, 2010, December 5, p. 1). According to an article from Agence Presse, "America will need to scale back the size of its armed forces in the face of deep budget cuts" (France-Presse, 2013, November 5, p. 1). Yet another article from the *New York Times* expresses that "The White House has told the Pentagon to squeeze that growth in the next five years, Gates said, reducing by $78 billion the amount available for the Pentagon, as a result of this the Army is expected in 2015 to begin cutting its active-duty troop levels by 27,000, and the Marine Corps by up to 20,000" (Thom & Christopher, 2011, January 7, p. 4). However, in this study it is found that Military Expenditure is not a significant factor that drives personnel downsizing in military organizations. Therefore, the findings in this study support the idea of using a decline in Military Expenditure as a justification for personnel downsizing.

5.4 Implications

There are a few studies on military downsizing, but none of them investigated key factors that drive personnel downsizing in NATO nations' military organizations and whether or not those factors differ across NATO nations' cultural clusters. This time series cross-sectional dynamic panel data study was the first of its kind to investigate the relationship between the Active Duty Military Personnel number and Military Expenditure, tenure of the Chief of General Staff, and the National Military Strategy Directive maturity. This study was a unique example in military settings, and it may encourage researchers to work on the factors that drive downsizing in bases, facilities, hierarchical organizations, work processes, weapon systems, and equipment in military settings. The methodology used in this military setting was unique, and it can be easily implemented in civilian settings. This study contributed to our understanding of a number of key factors that drive personnel downsizing in military organizations of NATO nations and whether or not those factors differ across NATO nations' cultural clusters. The findings from this research contribute to the discipline of engineering management by providing a model to improve our understanding and ability to predict future personnel downsizing decisions and to increase our understanding of military governance not only NATO wide but also worldwide. The findings may also set off a series of publicly shared military downsizing studies. Cultural diversity was found to affect the decision making process in military downsizing. Findings on cultural diversity make this study more significant. Researchers from other nations can repeat this study by using their own data to investigate what lies behind military downsizing in their regions and organizations.

This study filled a gap in the literature about the factors that drive personnel downsizing in military organizations and how they differ across cultural clusters. In addition, there was no previous study on how influential factors may differ across NATO nations' cultural clusters. This study relied on prior literature on cultural differences to assign 12 NATO nations to existing cultural clusters since those nations were not included in the GLOBE study (Chnokar et al., 2009). The modification of NATO nations' cultural clusters may encourage researchers to update the GLOBE findings by adding missing NATO nations. The same methodology can be used in civilian settings in different business disciplines using time series cross-sectional dynamic panel data. The study showed that NATO nations in Cultural Cluster 4 (Eastern Europe - Poland, Greece, Hungary, Albania, Slovenia, Czech Republic, Latvia, Croatia, Bulgaria, Estonia, Lithuania, Romania, Slovak Republic) may need to be further explored to investigate whether some of the nations were culturally similar to other cultural clusters or if there were other sub-cultural clusters among Cultural Cluster 4 nations.

Since this study found the Chief of General Staff to be the key factor that drives downsizing in NATO nations' armed forces, it might also mean that the main factor in military organizations is human. Whatever the organization is, whatever the organizational strategy guides, it is up to us, human beings, to decide when and what to do when it comes to personnel downsizing. In order to better understand personnel downsizing decisions, it is critical to identify the most significant factor that affects final decision. One of the key factors in personnel downsizing decisions might be to influence the CEO or the Chief of General Staff for the ones who seek to get the desired results for personnel downsizing decisions.

This study also proved that NATO clusters differ with respect to the approach they take to downsizing decisions. The drivers of downsizing decisions were different across NATO cultural clusters.

Military culture can be also seen as coexisting with national culture and creating a different subculture within the overall national population. One of the reasons might be that NATO as an organization forms a culture of its own, and the national personnel experienced in NATO might have reached a level of mutual understanding, sharing values and beliefs with other NATO nations' military personnel. The purposes, goals, training methods, and decision-making processes might be similar enough to create a NATO culture among NATO nations' armed forces.

5.5 Limitations of the Study

There are no previous studies that specifically search for the factors that drive personnel downsizing in military organizations. The data and analysis methods used in the research design are limited in certain areas. With respect to data, there was some missing data because some NATO nations gained independence after 1990, and there were no established armed forces or recorded data for some of the NATO nations for a certain period of time. Some of the missing data by nation and year is as follows: Albania 1990-1991, Croatia 1990-1991, Czech Republic1990-1992, Estonia 1990-1991, Iceland 1990-1994, Latvia 1990-1992, Lithuania 1990-1992, Slovak Republic 1990-1992, and Slovenia 1990-1991 (The World Bank, 2014). With respect to the analyses, the study focused on quantitative indicators for the most influential factors as identified in the previous literature. Qualitative factors and less influential factors were out of the scope of this study for feasibility purposes. Downsizing in NATO nations' armed forces is a

highly complex phenomenon, and it is hard to find out what really lies behind downsizing. The Arellano-Bond Generalized Method of Moments (GMM) cannot run with relatively little or missing data (Arellano & Bond, 1991). This is the reason why it was not possible to identify the factors for Cultural Clusters 5 and 6. Originally, 12 NATO nations were not a part of the GLOBE study with respect to Cultural Clusters. It was possible to include missing nations in groups by researching relationships. However, an educated assumption had to be made by considering the modified Cultural Clusters in this study. Three lagged values of Total Active Duty Personnel were calculated in the model.

Strategies of downsizing, types of downsizing, the management of a downsizing process, the decision making process of downsizing, the pros and cons of downsizing, the question of whether or not downsizing is good or bad for the health of an organization, the question of whether an organization should downsize or not, rightsizing of an organization, the risks of downsizing, the causes of downsizing, and the effects of downsizing were out of the scope of this study since they were not directly related to the investigation of the key factors that drive personnel downsizing in military organizations. Hence, literature on the aforementioned areas was not reviewed in this study.

Data was collected from 28 NATO countries between the years of 1990-2012 (a span of 23 years) to work specifically on these countries. To maintain the feasibility of this study, the number of years devoted to research was limited to 23. Other possibly related populations were not considered because it was not feasible to work on all of the countries around the world for a limitless period of time. National Instability can be defined as the fluctuation or irregularity of a NATO nation before, after, or during a war,

crisis, military operation, or an extreme event such as joining NATO (Future Atlas, 2014). During National Instability periods, the Total Active Military Personnel number and Military Expenditure of a NATO nation might fluctuate and affect the data. The possible effects of National Instability periods on the data were not taken into consideration because data for this variable were not available.

5.6 Suggestions for Further Research

The same methodology used in this study could be applied in different ways. First, it could be applied to different armed forces and different cultural clusters to understand the effects of cultural diversity on military personnel downsizing actions. Second, it could be used in civilian settings in different business disciplines to determine whether CEOs are the key factors that drive personnel downsizing. Finally, the same methodology used in this study could be applied to qualitative and less influential factors (e.g. downsizing in hierarchical structure, closing facilities or bases, training, developments in information technologies, buying new warfare systems or modernization) that could drive personnel downsizing.

With respect to cultural clusters, further research needs to be conducted. This study made an assumption by locating into suitable Cultural Clusters 12 NATO nations that were not covered in the GLOBE study. First, a study to update the GLOBE findings by adding missing NATO nations needs to be conducted. Second, a subculture study considering NATO nations' military personnel culture could be performed. Finally, with a motto of 'cultural transformation', an investigation to determine if any nation from the current GLOBE findings moved to another cultural cluster could be performed.

The key factors that drive decisions about military units, equipment, weapon systems, or facilities and bases downsizing in NATO nations' military organizations, and whether those factors differ across NATO nations' cultural clusters could be studied for further research.

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APPENDIX

A variety of data sources were used to collect data on 28 NATO nations' armed forces. Data sources for each variable are listed below.

Data sources for Total Active Duty Personnel

NATO nations' armed forces official webpages, (The World Bank, 2014), (NATO, 2013, August 20)

Data sources for Military Expenditure

(The World Bank, 2014), (SIPRI, 2013), (SIPRI, 2014), (US ACDA, 1995)

Data sources for Chief of General Staff

National Liaison Representatives (NLRs) of 28 NATO nations working collaboratively with Headquarters Supreme Allied Commander Transformation (HQ SACT), NATO nations' armed forces official webpages, (The World Bank, 2014), (NATO, 2013, August 20), (Bundeswehr, 2011), (Turkish Armed Forces, 2014, May 22)

Data sources for National Military Strategy Directive

National Liaison Representatives (NLRs) of 28 NATO nations working collaboratively with Headquarters Supreme Allied Commander Transformation (HQ SACT), NATO nations' armed forces official webpages, (NATO, 2013, August 20), (Albanian Parliment, 2005), (Tagarev, 2003), (DCAF, 2003), (EU Security and Defence Affairs, 2011), (Bumci, 2003), (Ciocoiu, 2004), (Bundeswehr, 2011), (Global Security, 2014c), (Hesterman, 2014), (French MOD, 2013), (Turkish Armed Forces, 2014, May 22), (Iceland Governmental Committee, 1993), (EU Security and Defence Affairs, 2011), (MERLN, 2014), (Estonian MOD, 2014), (ISN, 2014), (Matei, 2011), (Paoletti, 2007),

(Camillo & Marta, 2009), (Latvian MOD, 2014), (CSIS, 2002), (e-Luxembourg, 2007), (Blom, 2002), (Carreiras, 2007), (Soare, 2008), (Ciocoiu, 2004)

Data sources for Cultural Clusters

(Chnokar et al., 2009; Robert J. House & Javidan, 1999), (Chhokar et al., 2013), (Randburg, 2014), (Bakacsi et al., 2002)p.1), (Hampden-Turner & Trompenaars, 2000), (Laurent, 2011), (House, 2004), (Essays UK, 2013c), (Essays UK, 2013a), (Bunkśe & Tietze, 1994), (Kohl, 2008), (Russo, 2000), (Stoltenberg, 2009)

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NATO AFSOUTH HQ, Plan Officer, Naples/ITALY, 2004.

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Platoon Leader, Mardin/TURKEY, 2000-2002.

Platoon Leader, Ankara/TURKEY, 1997-2000.