MEMBER STATE BENCHMARKING FOR THE CONTRIBUTION TO NORTH ATLANTIC TREATY ORGANIZATION'S STRATEGY OF COLLECTIVE DEFENSE

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by

SEBASTIAN BECKER, LIEUTENANT COLONEL, GERMAN ARMY
Diplom Kaufmann (Univ.), German Armed Forces University, Munich, Germany, 2007
M.A., German Armed Forces University, Hamburg, Germany, 2016

Fort Leavenworth, Kansas
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Influenced by the NATO 2020 strategy review and the Ukraine crisis, the Allies decided to reemphasize the two percent guideline of their gross domestic product (GDP) within a decade in order to reverse the trend of declining military spending and to meet the current security. However, spending two percent of the GDP for military purposes does not automatically create a higher readiness and performance of a country's armed forces. Such a simple comparison of input-variables does not provide any resilient results in terms of efficient and effective measurement regarding forces contribution, nor does it contribute to the measurement of performance and effectiveness in terms of force preparation by the member states.

Based on the NATO objective of collective defense, this thesis will discuss a potential benchmarking concept for NATO – beyond the two percent GDP guideline – to create a performance-orientated measurement of member states in meeting the Alliance's Strategy of Collective Defense and Deterrence. In the context of this research, this thesis will identify a possible financial value of NATO's military means, provided by its member states in accordance with the criteria of readiness.

15. SUBJECT TERMS
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Name of Candidate: Sebastian Becker

Thesis Title: Member State Benchmarking for the Contribution to the North Atlantic Treaty Organization Strategy of Collective Defense

Approved by:

_____, Thesis Committee Chair
David A. Anderson, DBA

_____, Member
Scott A. Porter, M.Ed.

_____, Member
Ronald T. Staver, M.A.

Accepted this 14th day of June 2019 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, Ph.D.

The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

MEMBER STATE BENCHMARKING FOR THE CONTRIBUTION TO NORTH ATLANTIC TREATY ORGANIZATION'S STRATEGY OF COLLECTIVE DEFENSE, by Sebastian Becker, 85 pages.

Influenced by the NATO 2020 strategy review and the Ukraine crisis, the Allies decided to reemphasize the two percent guideline of their gross domestic product (GDP) within a decade in order to reverse the trend of declining military spending and to meet the current security. However, spending two percent of the GDP for military purpose does not automatically create a higher readiness and performance of a country's armed forces. Such a simple comparison of input-variables does not provide any resilient results in terms of efficient and effective measurement regarding forces contribution, nor does it contribute to the measurement of performance and effectiveness in terms of force preparation by the member states.

Based on NATO's objective of collective defense, this thesis will discuss a potential benchmarking concept for NATO – beyond the two percent GDP guideline – to create a performance-orientated measurement of member states in meeting the Alliance's Strategy of Collective Defense and Deterrence. In the context of this research, this thesis will identify a possible financial value of NATO's military means, which are provided by its member states in accordance with the criteria of readiness. Consequentially, the developed benchmarking system could be the most important as well as fairest instrument in NATO's toolbox for controlling and for measuring the performance of modern armed forces.

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lessons about military history. Final thanks go to Ms. Rhonda Quillin for supporting me in the challenges of formatting and editing this thesis.

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ACRONYMS

DGDP	Directorate of Graduate Degree Programs
GDP	Gross Domestic Product
LSCO	Large Scale Combat Operations
NATO	North Atlantic Treaty Organization
PR	Press Review
SGA	Small Group Advisor

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CHAPTER 1

INTRODUCTION

> The American people ask, and legitimately so, why should we carry the heavy burden to ensure international peace and stability. You also profit from it, so you should also take your share in the burden. That's Secretary Gates's message. I share that message.
>
> – Anders Fogh Rasmussen, NATO Secretary General, *The Guardian*

> The art of war teaches us to rely not on the likelihood of the enemy's not coming, but on our own readiness to receive him; not on the chance of his not attacking, but rather on the fact that we have made our position unassailable.
>
> – Sun Tzu, *The Art of War*

Issue and Significance

NATO's strategic concept provides three Lines of Effort, one of which is the establishment of a credible collective defense mechanism. Based on the current threat to NATO[1], it is more than necessary to establish a flexible, agile, and suitable NATO force to counter regular and irregular threat scenarios against the Alliance. Influenced by the NATO 2020 strategy review and the Ukraine crisis, the Allies decided to reemphasize the two percent guideline of the gross domestic product (GDP) within a decade in order to reverse the trend of declining military spending and to meet the current security challenges. In addition, they decided to increase their equipment expenditure as a share of defense expenditure up to 20 percent.

[1] North Atlantic Treaty Organization (NATO), *Wales Summit Declaration,* Press Release Issued by the Heads of State and Government participating in the meeting of the North Atlantic Council in Wales, Wales, United Kingdom, 05 September 2014, 1.

In 2017, only 4 of the 29 NATO member states reached both benchmarks, and expanded their defense expenditure beyond the guidelines (see figure 1 about the current performance.) There are multiple purposes behind the planned increases, one is to improve the military capabilities of NATO and to develop a strong defense industry across the Alliance. The expenditures and improvements on major equipment as well as research and development fall under this aspect. Another purpose is to establish a more balanced cost sharing within NATO for Alliance security and defense.

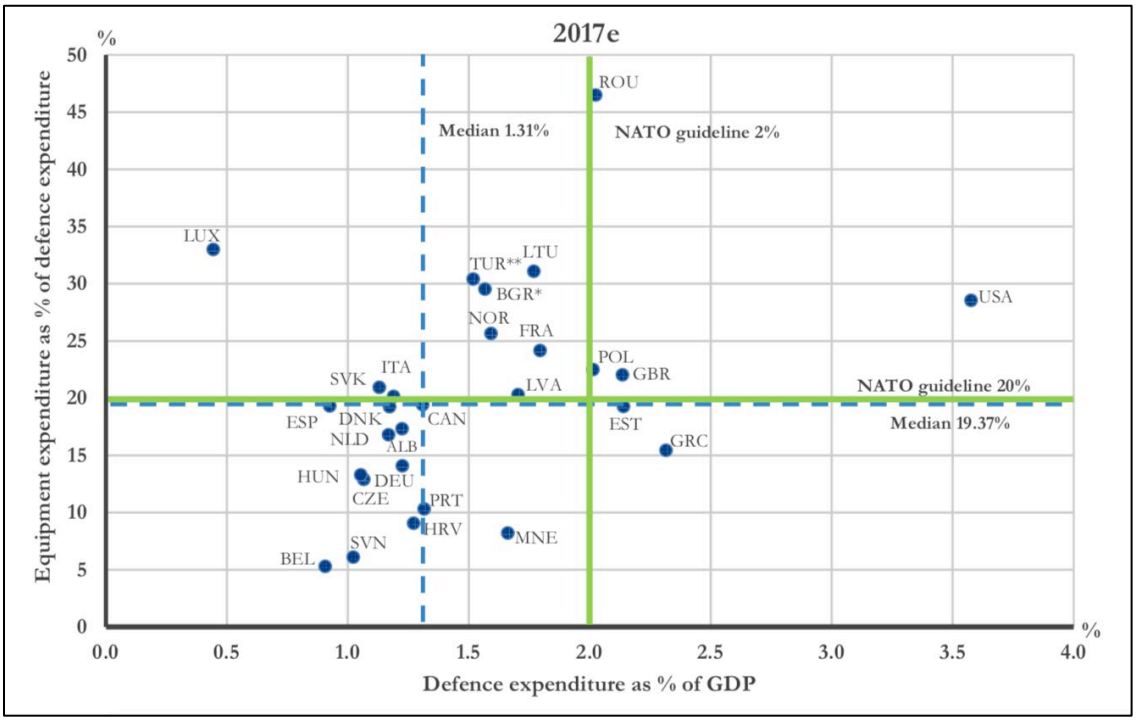

Figure 1. Defense Expenditure as a Share of GDP Versus Equipment Expenditure as a Share of Defense Expenditure

Source: North Atlantic Treaty Organization (NATO) Press and Media, *Defence Expenditure of NATO Countries* (2010-2017), PR (2017/111) (Brussels, Belgium: NATO Press, 29 June 2017), 2.

However, spending two percent of the GDP for military purposes does not automatically create a higher readiness and performance of a country's armed forces. Such a simple comparison of input-variables does not provide any resilient results in terms of efficient and effective measurement regarding forces contribution, nor does it contribute to the measurement of performance and measure of effectiveness in terms of force preparation by the member states.

For example, Greece spent more than $ 4,737 million in defense spending last year, this represented a total share of 2.4 percent of the GDP.[2] In stark contrast to its defense spending, Greece's participation in international operations has fallen over the last decade. In fact, Greece is not participating in NATO's Enhanced Forward Presence Mission in the Baltic States – a notable priority for the Alliance. Such activities do not contribute to the core nature of NATO's credible collective defense.

During the 2018 NATO Summit there was the demand for a more capable, ready, and deployable force by member states, including command structure and increased deterrence measure capabilities. Nevertheless, the question about burden sharing is still in discussion among NATO member states and threatens Alliance cohesion. Member states that do not commit the two percent of their GDP for defense claim they still support NATO goals with other capabilities and means concerning crisis mitigation. The dispute within NATO has to be solved with a broader concept about measurement of force

[2] North Atlantic Treaty Organization (NATO) Press and Media, *Defence Expenditure of NATO Countries* (2010-2017), PR (2017/111) (Brussels, Belgium: NATO Press, 29 June 2017), 2 2.

readiness and the value of forces. Otherwise, the question about burden sharing will further divide the Alliance and could strengthen the power of opponents.

Purpose

Based on the NATO objective of collective defense, this thesis will discuss a potential benchmarking concept for NATO – beyond the two percent GDP guideline – to create a performance-orientated measurement of member states in meeting the Alliance's Strategy of Collective Defense and Deterrence. In the context of this research, this thesis will identify a possible financial value of NATO's military means, which are provided by its member states in accordance with the criteria of readiness. Using modeling, this thesis will quantitatively convert the readiness of military forces into a financial value for each member state. Afterwards, it will relate this value to their financial power per inhabitant, to create an acceptable and transparent benchmark.

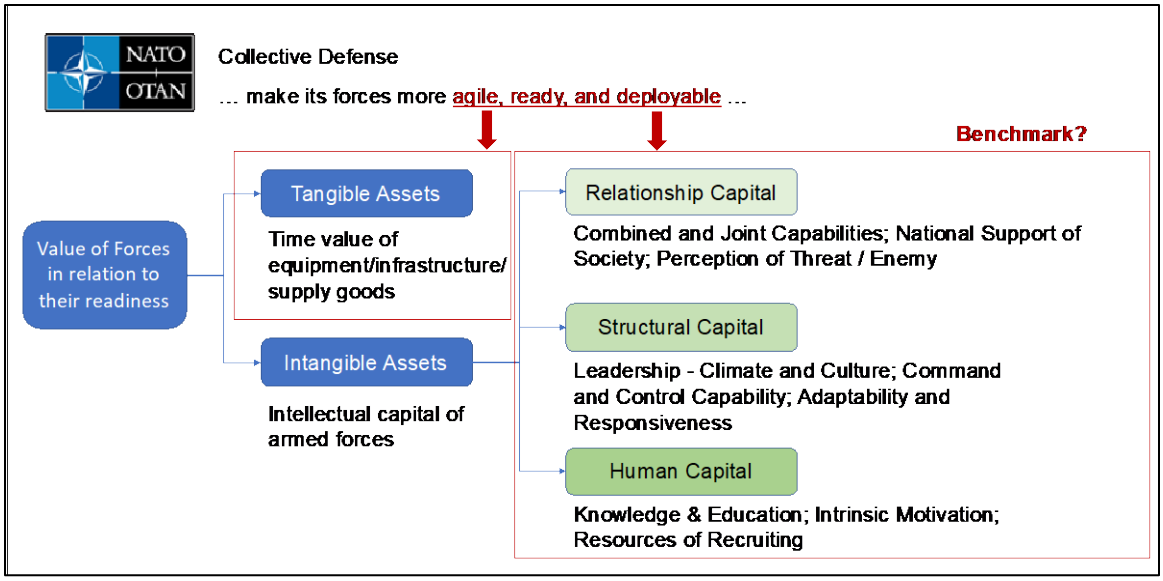

Figure 2. Values of Forces as a Basis for Modeling

Source: Adapted from Jürgen Schnell, "Immaterielle Ressourcen und Vertrauen als kritische Erfolgsgröße in Streitkräften," in *Die Kosten des Friedens*, ed. Robert Buck (Dachau, Germany: Klett Verlag, 2002), 149-158.

In summary, presently the percent of the member state's GDP spent on defense is the only measure of its defense posture. This measure does not account for the member state's ability to meet the challenges posed to the Alliance. There is still the question of how each NATO Member State's contribution could be measured to create a commonly accepted benchmark for the contribution to NATO's objective 'Collective Defense'.

Proposed Research Question

Primary Research Question

In order to create a better NATO defense burden-sharing scheme, is there a performance-orientated benchmark approach that can more fairly measure the real value

of a member state's land force defense capabilities in meeting the Alliance's strategy for Collective Defense?

Secondary Research Questions

1. What are the current shortfalls of NATO's benchmarking system?

2. What contributes to a real value of defense capabilities of member states under the aspect of land forces readiness?

3. How can tangible and intangible values of military forces be measured and what are their indicators?

4. What is the interconnection between the indicators of non-material value and how can they be integrated into the benchmark concept?

Proposed Research Methodology

As stated above, the purpose of this study is to identify a benchmark system regarding the fair burden-sharing within NATO's level of ambition for Collective Defense, this thesis will follow a three-step methodology.

In the first step, this study will look at current benchmarking within NATO and its shortfalls. It will further discuss the current possibilities to measure the performance of necessary capabilities for large scale combat operations under the aspect of readiness (research question 1.) In the second step, this study will identify possibilities to measure tangible and nontangible assets of military forces (research questions 2.) In the third step, this study will link the findings from the previous steps to creating a reliable benchmark model to measure each member state's performance in terms of their individual contribution to NATO's strategy of Collective Defense (research question 3). All steps

will focus on the readiness aspect of military forces as the main criteria for Collective Defense.

This study does not involve human subject research.

Assumptions and Limitations

This study is based on NATO's vision of an operational environment with a 360-degree threat approach, and plan for force generation and collective defense. It will not analyze and discuss which capabilities for Large Scale Combat Operations (LSCO) would be necessary to deter and defend near peer threat advisories, this would go far beyond the scope of this study. However, NATO's shortfalls in its capabilities for LSCO minimizes its contribution to defense and deterrence and must be considered for the modeling process.

Despite the challenges associated with command and control within NATO as well as nuclear deterrence, the main body of land forces on a tactical level provide the real combat power in LSCO, the capability to deploy and lead them is the main factor of deterrence.[3] Within NATO there is already a headquarters structure for the operational and strategic level in LSCO. Therefore, the benchmark model will focus on the measures of performance regarding the provision of tactical forces on Corps-, Division-, Brigade- and Battalion-level by its member states. These formations should be able to work in a joint and combined environment. Nevertheless, the claim of the study is to provide a

[3] North Atlantic Treaty Organization (NATO) Publication, *The Secretary General's Annual Report 2017* (Brussels: NATO Press, 15 March 2018), 36ff.

benchmarking approach which can also transferred to force contribution of sister services, this will be discussed in chapter 5.

The central premise is that all member states will send their capable and intended armed forces in the event of a NATO Article 5 situation, independently from the decisions of respective parliaments. The different decision making steps of the member states to go to war are therefore not the subject of further consideration. However, each society's support, in terms of trust and confidence of their armed forces, will influence the combat effectiveness of the deployed forces. Independent of the decision making, the benchmarking model must take into account the people's behavior towards their politicians and the armed forces.[4]

Definition

In this study, the term "real value of a member state's defense capabilities" defines the monetary corporate value with tangible and intangible assets in the sense of a modern economic analysis of armed forces.[5] In this context, the term defense describes all assets and values that contribute to collective and individual self-defense in accordance with international law and within the framework of Article 51 of the UN

[4] Carl von Clausewitz, *On War,* trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1989), 81. Clausewitz's trinity: necessity of balance between the tendencies of people – commander and his army – government in order to achieve the strategic goals (end state) and to overcome frictions in war.

[5] Harry R. Yarger, *Strategy and the National Security Professional: Strategic Thinking and Strategy Formulation in the 21st Century* (Westport: Praeger Security International, 2008), 145.

Charter.[6] Consequently, it is more comprehensive than the concept of national defense, and also includes all support of the armed forces within the framework of collective security for international conflict prevention and crisis management, beyond the definition and current discussion of Article 5 of the Washington Treaty.

[6] John R. Deni, *NATO and Article 5 –The Transatlantic Alliance and the Twenty-First-Century Challenges of Collective Defense* (Lanham, MD: Rowman & Littlefield, 2017), 117ff.

CHAPTER 2

LITERATURE OVERVIEW

Introduction

To understand and narrow the topic of NATO benchmarking in the context of financial value, it is necessary to look at NATO's current benchmarking models and their shortfalls, the current possibilities to measure the value of tangible and intangible assets from a financial perspective, and the factors that influence the readiness of forces as well as their indicators.

Current Benchmarking within NATO

In general, there are two different processes of benchmarking within NATO: input-orientated on a strategic level, and performance-orientated at the tactical level.

The first benchmarking system is an input-orientated measurement concerning defense spending, sustainability of defense investments, and participation in peacekeeping operations by its member states. The benchmarking system was started in 1988 and was based on the most significant resources for defense planning – money and people.[7] Nevertheless, its greatest shortfall is that figures of input-variables, like GDP for defense spending, do not deliver an indicator of performance in the meaning of outcomes. The question, how the money is spent in order to support NATO strategy by its member

[7] Based on North Atlantic Treaty OATO Defence Planning Committee, *Enhancing Alliance Collective Security: Shared Roles, Risks, and Responsibilities in the Alliance* (Brussels, Belgium: North Atlantic Treaty Organization, 1988), 10f; Hirofumi Shimizu and Todd Sandler, "Peacekeeping and Burden-Sharing, 1994-2000," *Journal of Peace Research* 39, no. 6 (London: Sage Publications, 2002), 655.

states, is still not answered.[8] Another shortfall of this measurement is that allies with small populations but professional armies, like Norway, have spent a large amount of money on its forces but only contribute to the strategy of Collective Defense with battalion-size elements or perhaps attachments to a brigade. In contrast, nations with high populations and lower GDP per capita are more likely to establish large army formations with below-average skills and capabilities.[9]

In 2011, NATO's Joint Analysis and Lessons Learned Centre (JALLC) received the task for additional research on the matters of burden sharing and readiness of forces. JALLC created a rigorous scoring system to measure and compare the member states regarding their readiness mainly based on operational capabilities for peacekeeping operations.[10] However, NATO was not able to implement it because of its member states' lack of judgment. A SAMS monograph in 2014 – mainly focused on burden sharing in peacekeeping operations – identified: "The greatest shortcoming of burden sharing in NATO operations is not freeriding by the members; it is NATO's lack of a system to apportion shares, to set a standard for contribution."[11]

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[8] Anthony H. Cordesman, *NATO Burden Sharing": The Need for Strategy and Force Plans, Not Meaningless Percentage Goals* (Washington, DC: Center for Strategic & International Studies, updated 16 August 2018), 11f.

[9] Jacqueline Eaton, Jiri Trajanek, Ken Ruml, and John Redmayne, *Defence Measurements: The Composite Metrics Approach JALLC/CG/11/218* (Monsanto, Portugal: NATO Joint Analysis Lessons Learned Centre, 2011), 1.

[10] Ibid., 12.

[11] Matthew P. McQuilton, "Fair Share or Freeride: Burden Sharing in Post-Cold War NATO," (Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 2015), 10, 48.

The second benchmarking system is focused on the tactical performance of troop-contributing nations during exercises and missions under the flag of NATO. Currently, there is not any connection between this performance benchmarking on a tactical level and the strategic GDP measurement. NATO's assessment of its performance is divided in two parts and follows the strategic directive for mission planning as well as the overarching education-training-exercises-evaluation (ETEE) policy.

First, the ETEE policy describes the necessity to implement analysis and evolution requirements for individual training and education as well as for collective training and exercises.[12] Each student or trainings audience in NATO's education and training facilities will get a final performance reporting in order to support the learning process as well as to fulfill and increase NATO's quality requirements. Therefore, it has an internal as well as external function to draw conclusions, make recommendations, and provide the remedial/corrective actions that can be taken to increase the readiness of NATO for current and future operations.[13]

Secondly, the operations assessment follows the principles of military planning and is divided in measures of performance, are we doing things right, as well as measures of effectiveness, and are we doing the right things, in order to identify and evaluate the

[12] North Atlantic Treaty Organization (NATO) Headquarters - Military Committee, MC 458/2 - *NATO Education, Training, Exercise and Evaluation (ETEE) Policy (Final)* (Brussels: NATO Press, 12 October 2009).

[13] Supreme Allied Commander, Europe and Supreme Allied Commander, Transformation, *BI-SC Collective Training and Exercise Directive (CT&ED) 75-3* (Brussels, Belgium: North Atlantic Treaty Organization, 2 October 2013), 6-3.

linkages between actions, effects, objectives, and NATO's end-state. [14] It also involves measuring the performance of subordinate units, one example is the assessment plan for training of the Afghan National Security Forces (ANSF) in NATO's International Security Assistance Force mission. In order to hold the framework nations of each regional command in ISAF accountable and to identify transition steps, each headquarters had to provide a report of ANSF performance in key-capabilities on a monthly basis. These types of evaluation reports, whether from trainings or missions, contribute to the assessment of NATO's readiness and performance, but they are not used as an indicator of member states' performance.

Measurement of Tangible and Intangible Assets from a Financial Perspective

In accordance with the definition for the monetary value of defense capabilities in this study and based on current scientific knowledge, there are generally four different procedures for corporate valuation.[15]

1. Determining cash flows for company valuation, also known as income approach: This is an assessment on the basis of future earnings achieved on the market, this includes the benefits of tangible and intangible assets as well

[14] Jonathan Schroden, "Operations Assessment at ISAF: Changing Paradigms," in: *Innovation in Operations Assessment: Recent Developments in Measuring Progress in Conflict Environments*, ed. Andrew Williams, James Bexfield, Fabrizio Fitzgerald, and Farina Johannes de Nijs (Norfolk: Headquarters Supreme Allied Commander Transformation, 2013), 43ff.

[15] Tim Koller, Marc Goedhart, David Wessels, *Valuation –Measuring and Managing the Value of Companies* (New Jersey: McKinsey & Company, 2018), 17ff.

as its possible debts. The basis for this kind of analysis are the expected future cash flows of an enterprise, it must be adjusted by possible capital redemption and discounted to the valuation date by interest rates and taxes.[16]

2. Asset or cost approach: This is the separate consideration of the different values concerning a company's inventory and balance sheet. Therefore, the company value consists of the different positions of material and non-material assets that can be reached on the market or in relation to their reproductive costs, reduced by its debts. However, this procedure cannot measure the real value of intangible goods regarding their composite effects within a company's working environment.[17]

3. Market approach: Taking into account historical market data, it is possible to determine values for the business by looking at comparable companies or market shares with different methods and drawing conclusions on its own value (adaptation effect.)[18]

4. Mixing or goodwill-based approach: In addition to the book value of a company, and based on the asset approach, the total company value will also

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[16] Mario Massari, Gianfranco Gianfrate, and Laura Zanetti, *Corporate Valuation: Measuring the Value of Companies in Turbulent Times* (Hoboken, NJ: John Wiley & Sons, 2016), 125ff.

[17] Wolfgang Ballwieser und Dirk Hachmeister, *Unternehmensbewertung: Prozesse, Methoden und Probleme* (Stuttgart, Schäffer-Poeschel Verlag, 2013), 206f.

[18] Chris M. Mellen and Frank C. Evans, *Valuation for M&A – Building and Measuring Private Company Value* (Hoboken, NJ: John Wiley & Sons, 2018), 101.

include capital gains from future earnings.[19] The main challenge is the forecast and calculation of future earnings, which are based on intangible assets.

Based on the characteristics of armed forces, the valuation approaches one, three and four can be excluded from the further determination of the monetary defense value because it is impossible to determine the market value of the product "external security" and there are only fractional parts of similar goods on the free market. There may be a comparable product in the arena of protection or security personnel training by contractors in warfare. However, they possess only parts of the capabilities for LSCO, which are more associated with consolidation of gains or stability operations, and they depend on the support of further military capabilities to execute their tasks.[20] Therefore, the individual evaluation of armed force's capabilities will be not discussed, due to the lack of comparability on the free market. Another aspect is the financing of armed forces through budgetary legislation. There is no possibility of additional borrowing on the capital market for armed forces, which means that potential future earnings cannot be credited to a company value. As an interim conclusion regarding the financial value of armed forces, there is only the asset or cost approach for further consideration.

In the cost approach valuation, the balance sheet of armed forces consists of current and noncurrent assets. The current assets are consumables for short-term

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[19] Pablo Fernándes, *Valuation Methods and Shareholder Value Creation* (London: Academic Press, 2002), 33.

[20] James Jay Carafano, *Public Wars: Contractors in Combat* (Westport USA: Praeger Verlag, 2008), 69-88.

operation, while the noncurrent assets include long-term investments or assets that serve the continuous operation (longer than one year.)[21] In a further specification, the noncurrent assets are intangible as well as tangible assets (property, plant, and equipment), whereas supply goods or inventories for daily use characterize current assets. Based on financing structure and annual budgetary legislation, the item's liabilities and shareholder's equity of the balance sheet are not considered further.

There are multiple tools to identify the value of total assets. At first, the value of current assets consists of their actual market price, there is no requirement for additional value adjustment. Secondly, acquisition and implementation costs measure the value of tangible assets (property, plant, and equipment), while depreciation rate and any other value adjustments reduce this value. An alternative method to calculate the value of tangible assets is the use of the life cycle cost management tool within armed forces.[22]

A challenge is the measurement of intangible assets as a part of noncurrent assets, in order to counter the weakness of the cost approach valuation. The intangible assets, also known as intellectual and social capital, are the true value drivers of armed forces. The Swedish insurance group Skandia first used the concept of an organization's intellectual and social capital in its annual balance sheet report in 1994.[23] On the basis of

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[21] Jamie Pratt, *Financial Accounting in an Economic Context* (Hoboken, NJ: John Wiley & Sons, 2011), 52.

[22] M. J. Kinch, "Life Cycle Costing in the Defence Industry," in *Life Cycle Costing for Construction,* ed. John W. Bull (New York: Routledge, 2014), 86ff.

[23] Peter Heisig, *Wissenzbilanz, Intellektuelles Kapital erfolgreich nutzen und entwickeln* (Berlin and Heidelberg: Springer Verlag, 2005), 19, 31.

knowledge, the term describes all the intangible assets in an organization and the networking among them, which are available as well as necessary for the creation process valuation.[24] In the case of armed forces, it represents all the knowledge and skills necessary for fulfilling the mission, especially their skills for problem-solving (operational art.)

In the field of business science, there are three main categories for intellectual and social capital.[25]

1. Human Capital describes the expertise, experience, skills, and professional and social skills of an organization's employees. It also includes the softer factors of willingness to learn, the ability to integrate, and the commitment and motivation of the employees. It represents the heart of an organization's intellectual capital, and is the foundation of both other categories. Recent literature focuses more on social capital strategies to emphasize networking capabilities within large organizations.[26]

[24] Janine Nahapiet and Sumantra Ghosal, "Social Capital, Intellectual Capital and the Organization," in *Knowledge and Social Capital –Foundations and Applications,* ed. Eric L. Lesser (Woburn, MA: Butterworth-Heinemann Ltd., 2000), 120f.

[25] Siana Halim, "Statistical Analysis on the Intellectual Capital Statement," *Journal of Intellectual Capital* 11, no. 1 (2010): 61.

[26] Michael J. Arena and Mary Uhl-Bien, "Complexity Leadership Theory: Shifting from Human Capital to Social Capital," *People and Strategy* 39, no. 2 (2016): 22.

2. Structural Capital includes the performance of the organizational structure, the innovation behavior, the communication processes and the management culture.[27] It describes the system and the capabilities for the targeted use and integration of human capital.

3. Relationship Capital describes the skills to interact with all groups outside the organization/persons (e.g. business partners, suppliers, customers, owners and investors) and one's own image in relation to them.[28]

There is a high dependence between the three categories that requires conscious control to increase the efficiency of an organization. Military organizations also have the same three categories of intellectual and social capital. Based on military literature, knowledge and skills of Soldiers, their intrinsic motivation, the type of leadership, the organization's capability to be flexible, their perception of threat, and the support of their society are the main variables for intellectual capital in armed forces.[29] A possible list of measurable influencing factors of a combat unit can be seen in Figure 3, without claiming completeness.

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[27] Laurenz Lachnit und Inge Wulf, "Quantifizierung immaterieller Potenziale – ein Methodenansatz für Zwecke der Unternehmensführung," *Controlling – Zeitschrift für erfolgsorientierte Unternehmenssteuerung* ("Quantification of Intangible Potentials – a Method Approach for Corporate Governance Purposes," *Controlling – Journal for Performance-Oriented Corporate Management*), no. 21 (2009): 527f.

[28] Halim, "Statistical Analysis on the Intellectual Capital Statement," 62.

[29] Jürgen Schnell, "Immaterielle Ressourcen und Vertrauen als kritische Erfolgsgröße in Streitkräften," in *Die Kosten des Friedens*, ed. Robert Buck (Dachau, Germany: Klett Verlag, 2002), 149-158.

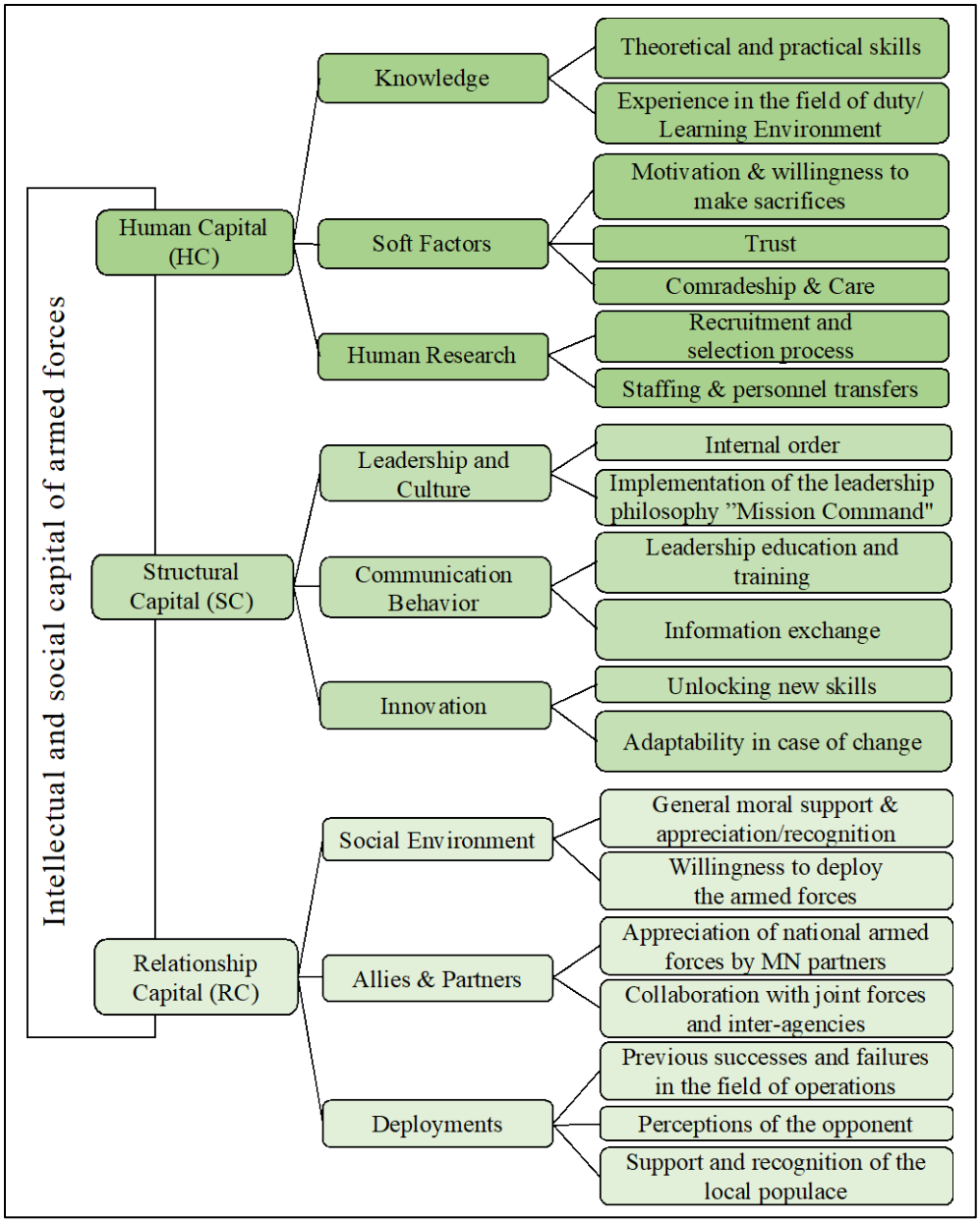

Figure 3. Intellectual Capital of Armed Forces with its Influencing Factors in the Three Main Categories

Source: Created by author in adaption of Jürgen Schnell, "Immaterielle Ressourcen und Vertrauen als kritische Erfolgsgröße in Streitkräften," in *Die Kosten des Friedens*, ed. Robert Buck (Dachau, Germany: Klett Verlag, 2002), 149-158.

In that situation, it should be emphasized that the influencing factor of a social environment can only be effected partially by the armed forces itself, it also depends on the political-strategic level to create trust with regards to the use of armed forces and its connection to the society. However, there is a high degree of leeway in the area of joint and multinational collaboration with other forces. In regards to the structural capital of armed forces, it must be pointed out that the morale of a troop and its obedience is aggregated in its entirety under the influencing factor of "internal order". It is influenced directly by the individual manifestations of the "soft factors" in the category of human capital, but nevertheless forms a separate influencing factor in the situational assessment of the enterprise value.[30]

The design of training and leadership education as well as the quality of information exchange in armed forces have a direct influence on the expansion of its skills, and thus make up the influencing factor of "communication behavior" for knowledge transfer. In this situation, reference to the innovative capacity of combat units do not include continuous suggestions for improvement from its soldiers. Rather, it is intended to measure the ability to deal with new subject areas and unpredictable developments of situations, as this tends to correspond most closely to the characteristics of a dynamic and complex deployment environment. In the category of human capital, the influence of the personnel situation is particularly important in times of a volunteer military and in the current demographic situation of the Western Allies. In this sector as well, the management level of the armed forces itself has little opportunity to exert

[30] Frank Cass, "Myth of Intrinsic Combat Motivation," *Journal of Strategic Studies* 26, no. 4 (2013): 24-26.

influence, but significant understaffing has a decisive effect on tactical deployment principles. In the third chapter of this paper, the indicators and their scale relationships are further identified and defined in order to measure the manifestation of the influencing factors and thus be able to make a quantitative assessment of intellectual capital based on this result.

For the financial valuation of intellectual capital, there are two completely different approaches, both have the challenge of measuring the important variables on the right scale. According to the manner of consideration found in the inductive-analytical valuation approach, the intellectual capital as a whole is deduced from the individual findings. In that situation, non-financial indicators are predominantly considered in order to point out the change processes in the strategic management of enterprises or to carry out strategy development by using predefined ratios.[31] This approach is also pursued in the basic conceptual presentation and further studies of knowledge management in modern armed forces.[32] The Balanced Scorecard and Skandia Navigator are among the most common methods of financial valuation and simultaneously integrate financial and non-financial influencing factors into the strategic alignment of the enterprise on a qualitative basis.

[31] Dimitrios Maditinos, Dimitrios Chatzoudes, Charalampos Tsairidis, and Georgios Theriou, "The Impact of Intellectual Capital on Firms' Market Value and Financial Performance," *Journal of Intellectual Capital* 12, no. 1 (2011): 132f.

[32] Paul R. Niven, *Balanced Scorecard for Government and Nonprofit Agencies* (Hoboken, NJ: John Wiley & Sons Inc., 2008), 9-11.

By contrast, the deductive summary approach draws conclusions for the asset value of intellectual capital on the basis of the total monetary value of an enterprise as a single aggregate factor.[33] This assessment approach can be carried out in three different ways.

1. The market price-oriented method calculates the value of the intellectual assets from the difference between the book value and the market value of a listed company or draws analogous conclusions from comparable market transactions in non-listed companies.[34]

2. The net present value method or the net asset value-oriented method is based on the assumption that future financial surpluses will be generated from the use of intangible resources. To this end, the expected cash flow in subsequent years is adjusted for the value contribution of the supporting resources and discounted using the resource-specific capital interest rate.[35]

3. In the absence of financial data or in case of insufficient appropriate information, it is advisable to use the cost-oriented method. This method is based on the principles of goods replacement and benefit balance, according to which an investor does not invest more capital for a good than that can be acquired on the

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[33] Alzbeta Kucharcikova, Lubica Konusikova, and Emese Tokarcikova, "Approaches to the Quantification of the Human Capital Efficiency in Enterprises," *Communications-Scientific letters of the University of Zilina*, 18, no. 1A (2016): 49f.

[34] Petr Mazouch and Jakub Fischer, *Human Capital - Measurement, Context, Forecasts* (Praha: C. H. Beck, Praha, 2011), 116.

[35] Bernard Marr, *Key Performance Indicators (KPI): The 75 Measures Every Manager Needs to Know* (Harlow: Ft Press, 2012), 376.

market with the same benefit. All costs incurred for intangible resources are accumulated and reduced by any depreciation or withdrawals/losses of value that have already taken place.[36] The method is regarded as the weakest valuation instrument and focuses on employee potential as a personnel asset. It especially reaches its limits in the area of the interdependencies between intangible resources and forces implementation with regard to the inflation effects of an economy. A holistic, cost-oriented approach to valuation was first used in 2006 and performed with an improved model according to the Hagen scheme by Ortner and Thielmann-Holzmayer in 2009.[37] The intangible resources involved in the value creation process are valued according to their most important influencing factors on the basis of the costs of personnel assets. Depending on the objective of the valuation, the intellectual capital can be formed on the basis of the balance sheet value for the annual financial statements as an accounting documentation and information task, or it can be valued as the earnings and utility value of the personnel assets. In that situation, the monetary values and indicators collected serve as a sort of management and controlling instrument for controlling and reviewing the value creation process. In the end, this model can be used to depict a net asset value as the true value of the institutional personnel assets. Future

[36] Kucharcikova, Konusikova, and Tokarcikova, "Approaches to the Quantification of the Human Capital Efficiency in Enterprises," 51f.

[37] Peter Meyer-Ferreira, *Humankapital strategisch einsetzen.* (*Using human Capital Strategically)* (München, Germany: Luchterhand Literaturverlag, 2010), 47f.

personnel expenses can thus also be adjusted to the real benefit generated in the organization.[38]

Due to the lack of analogies of financial data for armed forces on the free market, as well as the non-monetary measurable cash flow in the provision of services "(external) security", it is not possible to carry out a valuation of its intellectual capital according to the market price and net present value-oriented method. However, an assessment using the cost-oriented method can be carried out due to the monetary measurability of the costs incurred in the three main categories of intellectual capital. The main costs of the intangible resources of armed forces arise in the area of personnel expenses and in the expenditures for the recruitment, qualification, and aftercare of personnel, the key factor of armed forces. Particularly in the spectrum of the activities of qualification, all expenditures for the training and continuing education of personnel in the internal and external environment must be recorded. For armed forces, this includes the costs incurred as a result of general troop training, along with individual training, team training, and exercises as the staff members' own responsibility in the internal environment, whereas course-related training, along with individual training, team training, and exercises at the major unit level and in central training facilities of NATO are allocated to the cost center of the external environment. Other costs, such as expenditures for public relations work in the area of relationship capital or seminar costs for external speakers to improve

[38] Jac Fitz-Enz, *The ROI of Human Capital: Measuring the Economic Value of Employee,* ed. AMACOM Div. American Mgmt. Assn. (New York: AMACOM, 2009), 310f.

structural capital, should also be recorded under the costs for intangible resources and included in the valuation.

Factors and Indicators for Readiness of Forces

The term combat readiness is usually defined as the ability of the armed forces to carry out a campaign, mission, or function for which they are organized and assigned. In the literature of the last 50 years, there are always different nuances between the interaction of tangible and intangible assets, which also include the soft and hard power of armed forces. Wen, Nor, and Soon did a literature research concerning "The Measure of Combat Readiness" in 2014. They created a literature map (cf. figure 4) that identified the main driver of combat readiness regarding 1) capabilities of armed forces (assets and resources), 2) the morale component of armed forces, and 3) soldiers' quality of life. They describe the term force readiness as a combination of soft and hard factors in order to identify the physical and psychological drivers.

Nevertheless, the benchmarks for combat readiness must be related to the current capabilities of armed forces to win in relation to the operational environment and an adversary's strength in order to protect and enforce a nation's own political objectives against an opponent.

In addition and based on military history, especially the wars in the 20th century, nations prepare and train their military with the lessons learned from the last war.[39] In order to overcome this challenge and to create a kind of asymmetric advantage, they must

[39] Williamson Murray and MacGregory Knox, "Thinks about Revolutions in Warfare," in *The Dynamics of Military Revolution, 1300-2050*, ed. MacGregor Knox and Murray Williamson (New York: Cambridge University Press, 2009), 4f.

anticipate future warfare and implement innovations in all branches of technology, culture and society, military organization, tactics, and doctrine.

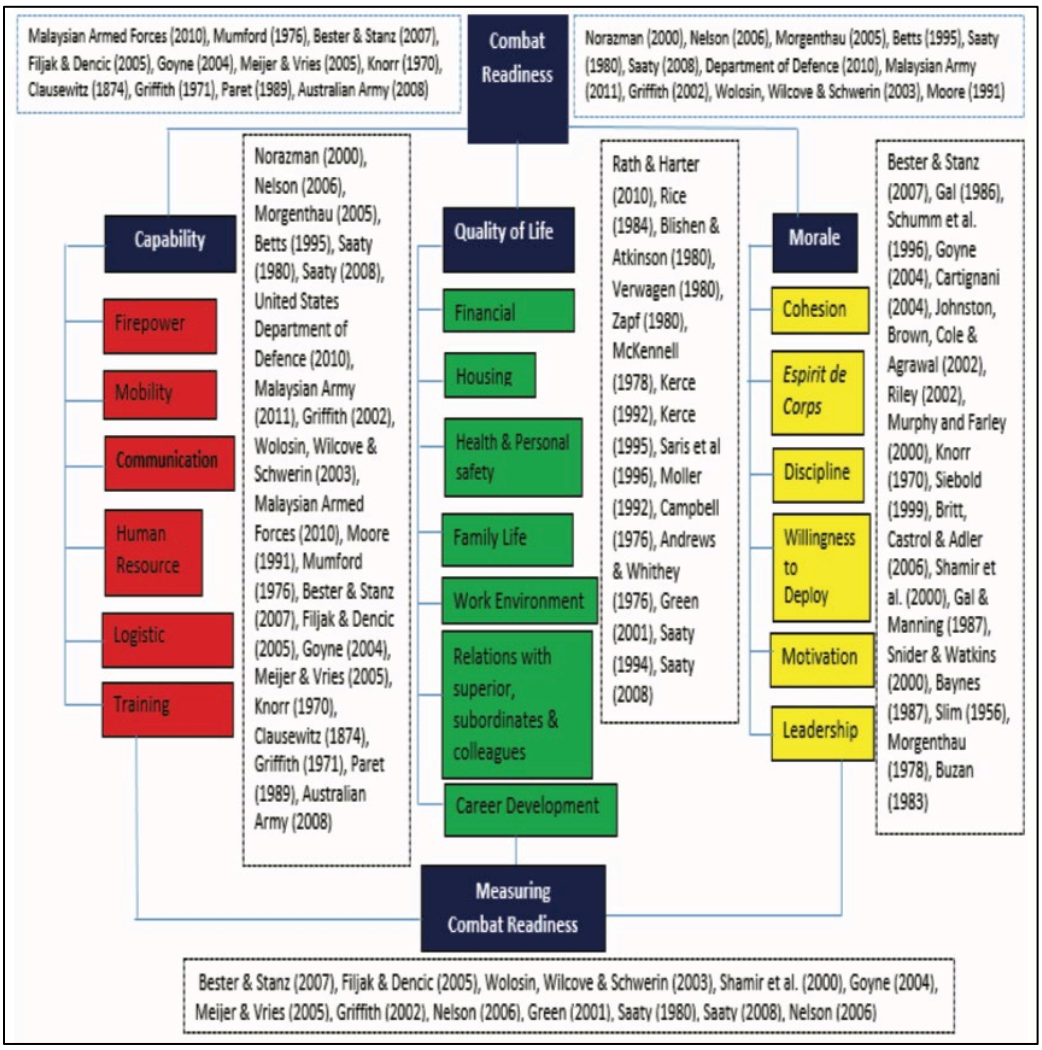

Figure 4. Literature Map for the Review on the Measure of Combat Readiness

Source: Kwong Fook Wen, Norazman Mohamad Nor, and Lee Lai Soon, "A Survey on the Measure of Combat Readiness," AIP Conference Proceedings, Tamilnadu, India, 2014, 7.

For example, changes in organization and training, as well as the implemented structure of the Prussian General Staff, formed the basis for a successful use of technological progress to mobilize and deploy Prussian troops faster than their adversaries in the 1860s.[40] This kind of revolution in military affairs can be only identified and translated in terms of military readiness, if nations compare themselves with their near-peer advisories. The challenge of measuring is therefore connected to the knowledge and data about an opponent's capabilities and means to achieve the asymmetric advantage in warfare. It also shows that the single comparison of capabilities, as a kind of hard factor for force readiness, between opponents does not work. This is because the effective use of new technologies in warfare requires a high amount of effort across all pillars of force development and creates only a short-time advantage.[41] They also have the disadvantage that they are complex to coordinate in battle, adversaries will quickly adapt them, and there is always a need for countermeasures against their effects (vicious circle.)

To summarize in an intermediate stage, the three main pillars of force readiness will describe the basis for evaluation in combination to an opponent's capacity and capability. Furthermore, this concept will create the foundation for the tangible and intangible assets of armed forces with regards to the financial valuation. The following

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[40] Hajo Holborn, "The Prusso-German School: Moltke and the Rise of the General Staff," in *Makers of Modern Strategy, from Machiavelli to the Nuclear Age*, ed. Peter Paret (Princeton, NJ: Princeton University Press, 1986), 285-295.

[41] Dennis E. Showalter, "The Prusso-German RMA, 1840-1871," in *The Dynamics of Military Revolution, 1300-2050*, ed. MacGregor Knox and Murray Williamson (New York: Cambridge University Press, 2009), 112.

chapter will describe the transformation and combination of economic models and indicators of force readiness to a combined benchmarking model.

CHAPTER 3

RESEARCH METHODOLOGY

The primary research question of this study is: In order to create a better NATO defense burden-sharing scheme, is there a quantitative/qualitative and performance-orientated benchmark approach that can fairly measure the real value of a member state's defense capabilities of land forces to meet the Alliance's strategy for Collective Defense? The purpose of this chapter is to develop a performance- and financial-based benchmarking system for use at the strategic level that is influenced by the value drivers for readiness of forces on the tactical level. As part of the literature overview of chapter 2, this study has discussed the different approaches to measure the financial value of organizations. Furthermore, it has identified the key figures of intellectual capital as well as factors of readiness for armed forces.

Based on the cost approach for corporate valuation, the real value of a member state's defense capabilities consists of three elements: current (defense material assets,) non-current assets (defense equipment assets,) and intellectual capital (intangible asset.) In the following modeling process, each must be scaled and weighted in terms of readiness regarding NATO's Collective Defense Strategy (cf. figure 5.) Finally, the benchmark consists of the aggregated value of these three weighted parts of total assets in relation to the financial strength or number of inhabitants per member state.

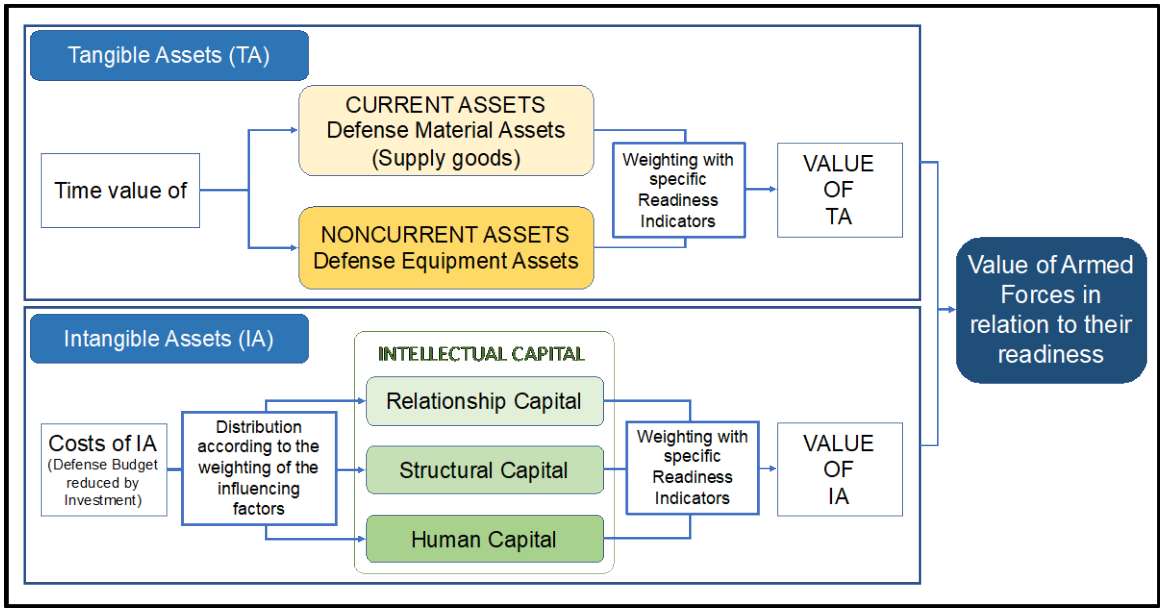

Figure 5. Model of Real Value of a Member State's Defense Capabilities

Source: Created by author.

Step 1 – Value of Tangible Assets in Terms of Readiness

The data required for the valuation of Defense Material and Equipment Assets can be generated from the database of the armaments and logistics from each of the member states. After the financial assessment of the current and noncurrent assets of armed forces, the readiness factor for material and supply must correct the total value of tangible assets.

The total asset value of the defense equipment is the sum of the current values of all the property, plant, and equipment. The financial data of the individual goods to be adjusted to the valuation period as costs from acquisition and implementation must be reduced by the depreciation already carried out and increased by the value adjustment that has been made. The value of the depreciation is calculated from the proportion of the

period of use in relation to the planned period of use for the costs listed above. The unscheduled expenditures for material maintenance, which are not included in the general implementation costs for large equipment, must be added to the area of value adjustment. If necessary, additional revaluations/devaluations of property, plant, and equipment in the event of a change in useful life must also be carried out under these items.

However, the total evaluation of a member state's defense equipment is not always available and may be overly complicated to assess in some cases. In order to simplify the assessment portion, it is possible to use the total amount of investments for the duration of the average useful life of military equipment. With regards to a Department of Defense study for material and equipment readiness in comparison to force readiness and operational tempo, the average useful life of military equipment is approximately 15 to 20 years before a material capability must be renewed; in addition, it also depends on the speed of technology development and the usage of military equipment in deployments.[42] Consequentially, if the model counts the investments of the last 20 years, it will define an approximately value of the total defense equipment assets. Based on the inflation rate of each nation, the total value of the past 20 years must be determined on the basis of dynamic investment calculation. Therefore, the value of each year must be discounted by its inflation rate to the current value for the calculation of investments.

[42] Office of the Under Secretary of Defense and KPMG LLP, "Final Report," *Military Equipment Useful Life Study - Phase II* (Washington, DC.US Government Press, 30 May 2008), 40-42.

Regarding the readiness of equipment for LSCO, the technological superiority and survivability in comparison to possible opponents are the main factors for combat effectiveness. Therefore, the assessed financial value must be increased or decreased by the factor of superiority. For example, the current tank version of a NATO member has a one and a half times higher combat range and better protection for its survivability than the possible opponent. In this case, the financial value must be adjusted by a factor of 1.5.

The value of defense material assets can be determined on the basis of an inventory at the end of the reporting period, at the current replacement costs of the individual supply goods on the market. The sum of the individual items also yields its total value and must be rated with regards to its readiness. In terms of military supply, military readiness of a member state can be defined by the duration of days of unhampered supply of its total force structure in theater. Based on NATO regulations, a member state must be able to self-supply its own troops over the time prescribed. In order to meet this requirement, a nation must have the necessary supply goods available in its own ammunition storages. In relation to the requirement, its duration of resupply for its provided forces will define the relation of For example, the re-supply of all weapon systems at the division level in LSCO requires a total of 79.8 tons of ammunition per day. A member state can only re-supply its own forces for 40 days but NATO's requirement is 50 days, the result is a 20 percent reduction in the total value of defense material assets.

The financial sum of the adjusted material and equipment assets results in the total value of tangible assets under the aspect of readiness.

Step 2 – Intellectual Capital of Armed Forces in Terms of Readiness

The valuation of intellectual capital takes place in four steps according to the cost-oriented approach and is based on the Hager model as well as a scoring-based evaluation process of its influencing variables, including the factor of readiness.[43]

In the first sub step, the influencing factors of the intellectual capital are defined and stored with the corresponding indicators in order to measure its impact on the intangible asset. An indicator stands for a characteristic manifestation that can be subtracted on an ordinal scale (in ranking order.) For a combat unit, it is advisable to collect the ratios, wherever possible, in line with the deployment and training system of armed forces, as the performance capacities and readiness for deployment of units can be represented very well in the assigned missions. It will be supported by means of external team trainings at NATO training facilities and exercises with administrative supervision of NATO. Within this system, NATO provides for at least a central validation of readiness of forces at its central training facilities, during which a large part of the necessary ratios are also collected and can be aggregated later to obtain a common indicator. The valuations can also be summarized according to a different weighting in order to rank the significance of the training institution or the varying quantity and quality of the requirements placed on the unit in training periods.

In the second chapter of the paper, possible influencing factors, based on plausibility considerations and empirical values, were already established for human capital (HC), structural capital (SC), and relational capital (RC). In order to simplify the

[43] Halim, "Statistical Analysis on the Intellectual Capital Statement," 530.

valuation process, only those influencing factors that also have a significant influence on either the unit or both can be changed by one's own behavior can be considered further.[44] Nine influencing factors with indicators were identified during further processing of this topic.

1. HC 1 – Level of knowledge and education of soldiers: This refers to the aggregated skills of the personnel needed to successfully carry out the mission they have been assigned. The manifestation of the indicator of achievement of the learning objective in the exercise round is assessed using a five-point scale at NATO's training facilities.
2. HC 2 – Intrinsic motivation and willingness to make sacrifices: This stands for the intrinsic motivation of the soldiers to serve in the armed forces and has a decisive effect on the fighting morale and willingness to make sacrifices. As already done in the Balanced Scorecard for modern armed forces, the characteristic manifestation is evaluated on a five-point scale and ascertained to this end by NATO's training facilities, as well as by a survey in the unit (sample size: at minimum 30 participants.) It also comprises the willingness to obey and serve loyally in accordance with the individual Soldier's Act.
3. HC 3 - Resources of recruiting: It includes the applicant rate for duty in the armed forces in relation to nation's inhabitants. It serves as an indicator of human resources and attractiveness of armed forces.

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[44] Thomas M. Fischer and Alexander Baumgartner, "Immaterielle Werte als Erfolgsfaktoren von KMU" ("Intangible Values as Success Factors for Medium and Large Enterprises"), in *Wissensbilanzen im Mittelstand,* ed. Fischer und Wulf (Stuttgart, Germany: Schäffer-Pöschel Verlag, 2013), 20.

4. SC 1 - Leadership, Culture and Climate: Stands for the know-how, skills, and abilities of the military leaders of the unit in the sense of modern human leadership and, based on ethical responsibility, the intellectual flexibility, and social and intercultural competence to act and lead. It also covers the internal and social order of a unit.

5. SC 2 – Command and Control capability to seize or maintain initiative: The Mission Command philosophy is shaped by the ideas of the former Prussian Reformers, especially by Scharnhorst and Gneisenau. It is a command and control technique based on a clear and comprehensive articulation of an objective and purpose. It creates the opportunity to seize and maintain the initiative in battle and establishes the purpose-driven freedom of action for subordinated units/formations to achieve the objective without further guidance by the higher commander or echelon. Its manifestation is also ascertained in NATO's training facilities on the basis of a four-point scale.

6. SC 3 - Adaptability and Responsiveness: Power projection and the ability for a fast deployment of forces in conflict areas are the main factors of readiness. In order to seize the initiative in a conflict, it is necessary to increase the flow of forces and deploy credible force packages within the first 90 days of an upcoming conflict. Therefore, its characteristic manifestation depends on the capability to deploy and integrate units into a theater. It measures the size of a formation that can be deployed within 90 days on a five-step scale.

7. RC 1 - General moral support of the society: It describes how armed forces are embedded in their societies. It also forms a building block for motivated

performance of tasks during deployments. Its characteristic manifestation is determined by the annual surveys carried out on the reputation and confidence in the armed forces of a member state. Data basis are national surveys from each of the member states, in respect to their specific cultural behavior and their individual support for its military forces.

8. RC 2 - Combined and Joint Experiences: Early cooperation with other kinds of troops and units simplifies the later complexity of a mission or of forces bound in operations - this opens the way the soldiers view and think in connection with the battlefield and in a multinational (MN) environment. Its manifestation is measured on joint and combined training or mission days per soldier per year with MN forces.

9. RC 3 – Calculation and perception of the opponent's strength: Perception of the opponent's strength results from the assessment of the situation and dictates capability in terms of one's own freedom and ability to act. Its valuation manifestation results from the opponent's combat strength and is likewise represented on a five-point ordinal scale.

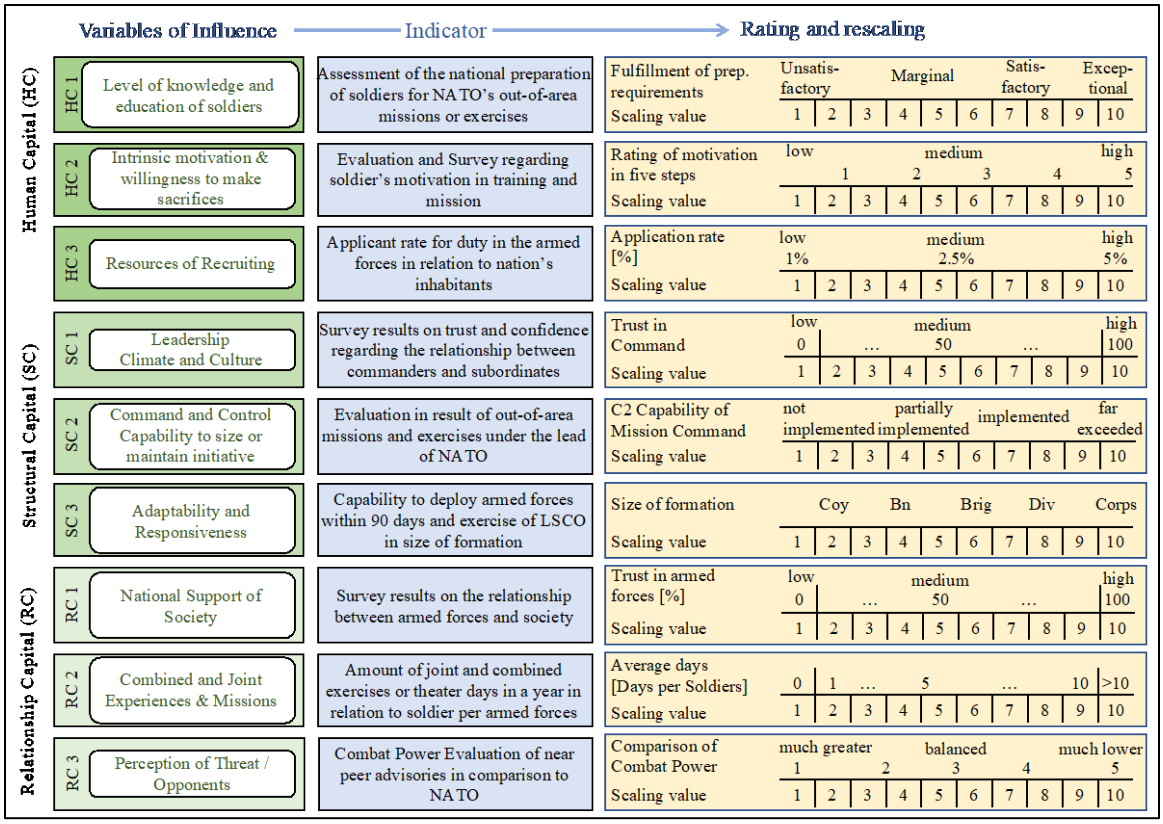

Figure 6. Assessment of the Influencing Factors Regarding Intellectual Capital of Armed Forces with Indicators and Scale Values

Source: Created by author, based on figure 3.

The characteristic manifestations of the indicators that have already been aggregated are then transferred from their individual scale manifestations to a uniform nominal scale in the values of 1 to 10 in order to calculate a joint impact on the value of tangible assets.

In the second sub step of calculating intellectual capital, the interaction of the influencing factors must be investigated, as they cannot be considered in isolation, but rather are interconnected to a considerable extent. For this purpose, the intensity of the interdependencies is investigated in the sense of a sensitivity analysis, and their result is

represented on an ordinary scale using values of zero (no influence) to three (very strong influence.) One influencing factor is always considered as the cause and its influence on the initially constant values of the others is investigated. The effects thus identified are then transferred to a common matrix for further processing (cf. Figure 7 for the nine influencing factors.)

Influence on ⇨ / Cause ⇩		HC 1	HC 2	HC 3	SC 1	SC 2	SC 3	RC 1	RC 2	RC 3	Total / Activity level	**Intensity of Cause**	**Total intensity in the system**
Level of knowledge and education of soldiers	HC 1	-	2	2	2	2	2	1	1	1	13	**0.54**	**0.131**
Intrinsic motivation	HC 2	3	-	2	2	2	1	1	1	1	13	**0.54**	**0.115**
Resources of Recruiting	HC 3	2	1	-	1	2	1	1	1	0	9	**0.38**	**0.111**
Leadership - Climate and Culture	SC 1	2	2	3	-	3	1	3	1	0	15	**0.63**	**0.119**
Command and Control - Capability to size or maintain initiative	SC 2	2	2	2	2	-	1	1	1	2	13	**0.54**	**0.119**
Adaptability and Responsiveness	SC 3	3	2	3	1	3	-	1	2	1	16	**0.67**	**0.107**
National Support of Society	RC 1	2	2	3	2	2	2	-	1	0	14	**0.58**	**0.107**
Combined and Joint Experiences	RC 2	3	2	1	2	2	1	2	-	0	13	**0.54**	**0.091**
Perception of Threat / Opponents	RC 3	3	3	3	3	1	2	3	2	-	20	**0.83**	**0.099**
Total / passivity level		20	16	19	15	17	11	13	10	5	126		**1.000**
Intensity of Influence		**0.83**	**0.67**	**0.79**	**0.63**	**0.71**	**0.46**	**0.54**	**0.42**	**0.21**			

Scoring: 0 – no correlation; 1 – low correlation; 2 – medium correlation; 3 – high correlation

Figure 7. Analysis of the System Intensity with Regard to the Impact on Indicators of Intangible Assets

Source: Created by author.

As the final result of the sensitivity analysis, it is possible to determine which influencing factor exerts a strong effect on others - thus tending to be active in the system and which factor is strongly influenced by others - therefore tending to be passive. The total score of a factor in the area of cause (degree of activity) and effect (degree of passivity) is compared with the total score awarded for further calculation. The resulting values now provide information about the intensity of the cause and the intensity of the effect of each influencing factor in the system of intellectual capital.[45]

The total intensity in the system is determined by calculating the total activity and passivity manifestation of a factor in relation to the total points awarded in both areas. This type of intensity calculation assumes a weighted linear correlation in the interaction of the influencing factors and does not take into account any temporal dimension of the interaction in a long-term perspective.[46] The type of influence on another influencing factor (amplification or deterioration) is irrelevant in this situation, as this must be taken into account by means of the kind of scale manifestation in the indicator valuation.

The calculated results can be displayed afterwards in a data diagram with the degree of activity on the ordinate axis and the degree of passivity on the abscissa axis (cf. Figure 8.) This type of graphical representation is referred to as an influence diagram and provides very rapid visual information about the dynamics of a factor in the overall system, as well as its possible stabilizing interaction or action.[47] A data diagram with a

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[45] Halim, "Statistical Analysis on the Intellectual Capital Statement," 61ff.

[46] Lachnit and Wulf, "Quantifizierung immaterieller Potenziale," *Controlling*, 530f.

[47] Franz Reinisch, *Die Köpfe sind unser Kapital (The Heads Are Our Capital)* Verlag, Heidelberg: Redline Wirtschaft Süddeutscher, 2007), 212f.

significant majority of influencing factors in the first quadrant (Q I) can be rated as a highly dynamic and partly critical system. Due to the associated high complexity of the factors among each other, this also results in higher susceptibility to risk for armed forces in this area of influence. By contrast, the influencing factors in the third quadrant (Q III) have a contrary effect and are assumed to have a buffering and stabilizing effect. Factors with high activity and dynamics are represented in the second quadrant (Q II), whereas reactive and passive influencing factors can be found in the fourth quadrant (Q IV.)

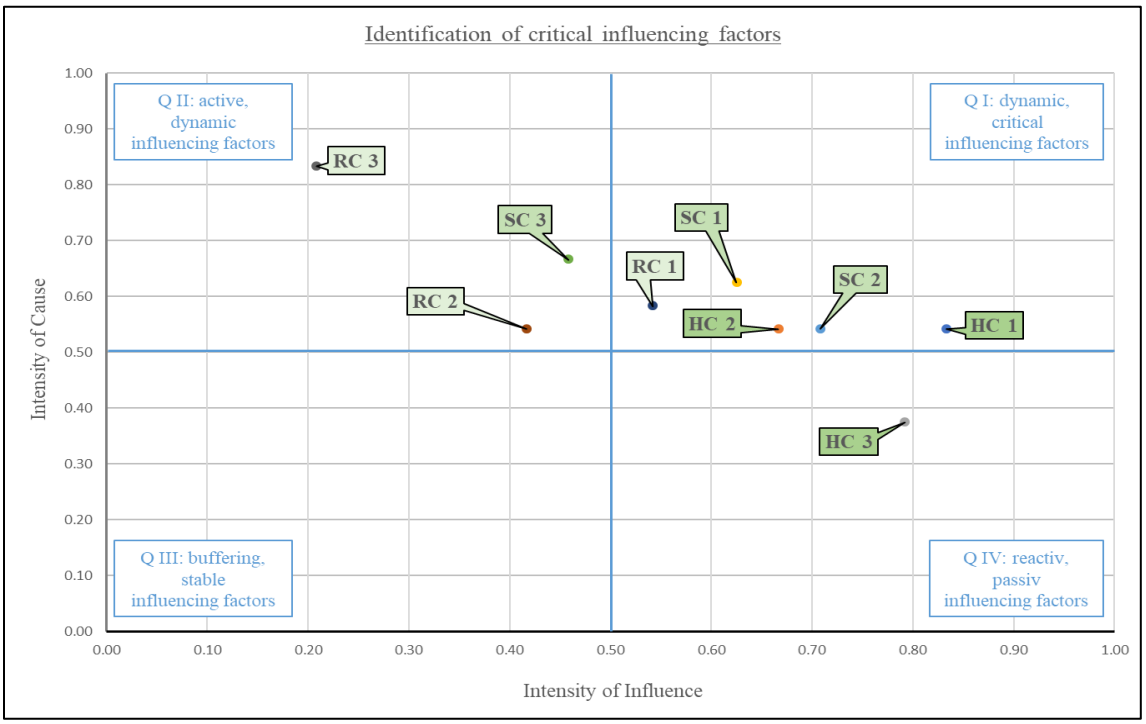

Figure 8. Quad-chart Analysis Regarding the Critical Influencing Factors of Intangible Assets of Armed Forces

Source: Created by author.

With this, the influencing factors of level of knowledge and education of soldiers, intrinsic motivation and willingness to make sacrifices, as well as leadership - climate and culture, must be rated as critical factors for the intellectual capital of armed forces regarding its readiness, whereas resources of recruiting should be classified more as a passive and slightly stabilizing influencing factor for armed forces. It is difficult to control the overall system with the influencing factors of adaptability and responsiveness, perception of threat/opponents, and combined and joint experiences. However, they are well suited to perform an internal self-regulating function.

The indicator valuation of each influencing factor with its calculated intensity in the overall system and the expenditures on intangible resources are considered in the third and final step in determining the change in value of intellectual capital. The expenditures on intangible resources are the personnel expenditures on the wages and salaries of the employees. In order to simplify the system, it will be defined as the amount of defense expenditures reduced by the value of tangible assets. The scale value to which a target agreement is linked must first be determined on the basis of the nominal scale value of each indicator, so that the value of the assets is at least preserved. This comparison should be made on the basis of the annual training missions and objectives for each unit, or should be linked to the minimum requirements of NATO for the deployment readiness of units.

For example, the demand for the influencing factor of level of knowledge and education of soldiers can be linked to NATO's objective of enabling to assert against a militarily organized opponent in robust initial operations with a simultaneous asymmetric threat (hybrid warfare.) As a result, training and exercises in this subject area at the unit

level must also achieve the learning objective. This is the case in the defined valuation scale of the influencing factor and after subsequent transfer to a nominal scale with an index of seven. Therefore, all valuations achieved beyond this scale value are a form of additional value creation for intellectual capital. The nominal scale value of each influencing factor, as a scoring point, is then set in relation to the index value with value preservation. This results in the coefficient for the monetary share of each influencing factor in the overall system for further calculation of the new net present value of the factor.[48] The monetary share of each influencing factor is calculated from its intensity and the sum of all the expenditures for the total intangible resources in the system. The total sum of the calculated net present values of the influencing factors results in the new value of the intellectual capital of a combat unit.

The indicator valuation of each influencing factor with its calculated intensity in the overall system and the expenditures on intangible resources are considered in the third and final substep in determining the change in value of intellectual capital. The expenditures on intangible resources covers all personnel expenditures on the wages and salaries of the soldiers and employees in the armed forces. Normally, they are stored and retrievable in electronical data systems of the human research branch. From a deductive point of view, however, it is also possible to use the total defense expenditure of a fiscal year, which has to be reduced by investment and maintenance costs.

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[48] Thomas M. Fischer and Alexander Baumgartner, "Integration von Wissensbilanz in das operative und strategische Wertmanagement" ("Integrating Knowledge Balance into Operational and Strategic Value Management"), *Magazine of Controlling* 2, no. 26 (2014): 124f.

In order to identify the change in the intellectual capital, it is necessary to identify the overall expectations from NATO for each of its member states. Therefore, the scale value to which a target agreement is linked must first be determined on the basis of the nominal scale value of each indicator, so that the value of the assets is at least preserved. This comparison should be made on the basis of the training and mission objectives for each of the member states or should be linked to the minimum requirements for the deployment readiness of NATO. Thus, for example, the demand for the influencing factor of level of knowledge and education of soldiers can be linked to NATO's objective of enabling to fight against a militarily organized opponent in robust large scale combat operations with a simultaneous asymmetric threat. As a result, training and exercises in this subject area must also achieve the training objective. This is the case in the defined valuation scale of the influencing factor and after subsequent transfer to a nominal scale with an index of seven. Therefore, all valuations achieved beyond this scale value are a form of additional value creation for intellectual capital. The nominal scale value of each influencing factor, as a scoring point, is then set in relation to the index value with value preservation. This results in the coefficient for the monetary share of each influencing factor in the overall system for further calculation of the new net present value of the factor.[49]

The monetary share of each influencing factor is calculated from its intensity and the sum of all the expenditures for the total intangible resources in the system. The total

[49] Fischer and Baumgartner, "Integration von Wissensbilanz in das operative und strategische Wertmanagement" ("Integrating Knowledge Balance into Operational and Strategic Value Management"), 124f.

sum of the calculated net present values of the influencing factors results in the new value of the intellectual capital of a combat unit (cf. Figure 9 in summary.)

Financial Value of the Intellectual Capital

$$= \sum_{k=1}^{n} \frac{S_k}{I_k} * Int_k * EIR$$

k = Influencing factor
S_k = Scoring points of the influencing factor by indicator rating
I_k = Index value of influencing factor in maintaining value
Int_k = Intensity of the influencing factor in the overall intellectual capital system
EIR = Expenses for all intangible resources during the budget period

Figure 9. Calculation Formula for Determining Intellectual Capital

Source: Created by author.

Figure 10 is intended as an example to provide a better understanding of the calculation of intellectual capital. In this situation, the nine influencing factors already described above were assigned a valuation manifestation for calculation of the scoring points and the indices with value preservation as an example.

Accordingly, the factors of Adaptability and Responsiveness, National Support of Society, as well as Combined and Joint Experiences, already increase intellectual capital as of an index value of six. This corresponds to a result of a survey of the appreciation of the armed forces by society of more than 60 percent, for example. All the other factors were assigned a value preservation as of an index value of seven. After transferring the intensity in the overall system for each influencing factor from the sensitivity analysis of interactions, fictitious total costs of 30 billion US Dollars for intangible resources in two years were assumed as the budget period for the member state, and this value was

allocated to the influencing factors on the basis of their intensities in the overall system. Along with the weighting based on the ratio of scoring points to the index value, the net present value is calculated for each influencing factor.

The sum of the calculated net present values of every single influencing factor results in a total value of the intellectual capital of 31.789 billion US Dollars, and thus an additional added value of 1.789 billion US Dollars by the member state. Accordingly, a slight loss in value was generated for the influencing factors of Knowledge and education of soldiers, Command and Control, and Perception of Threat / Opponent. However, it was possible to offset this by the high increase in value of relationship capital and a very good motivation situation in the area of human capital.

The indicator valuation of the factors influencing intellectual capital is largely tied to the training system of armed forces. Accordingly, at least the past two years must be considered in order to generate a sufficient population of data for valuation. In this situation, information dating back further can also be weighted to a lesser extent to allow the current findings to flow into the model more strongly. Another argument in favor of considering at least two years is the period of the deployment system in the army, as well as a duration of two to three years to implement change and to have an effect on the intellectual capital. In particular, it takes time to influence the critical factors of level of knowledge and education of soldiers as well as intrinsic motivation and willingness to make sacrifices in order to achieve a noticeable change in the quantity and, above all, quality of human capital.

Cost of intangible resources in the budget period [in billion US Dollars]	30.00

Value of Intelecutal Capital [in billion US Dollars]	31.789

Tag	Influencing Factor	Indicator	Tag	Influencing Factor	Indicator
HC 1	Level of knowledge and education of soldiers	Assessment of the national preparation of soldiers for NATO's out-of-area missions or exercises	SC 3	Adaptability and Responsiveness	Capability to deploy armed forces within 90 days and exercise of LSCO in size of formation
HC 2	Intrinsic motivation	Evaluation and Survey regarding soldier's motivation in training and mission	RC 1	National Support of Society	Survey results on the relationship between armed forces and society
HC 3	Resources of Recruiting	Applicant rate for duty in the armed forces in relation to nation's inhabitants	RC 2	Combined and Joint Experiences	Amount of joint and combined exercises or theater days in a year in relation to soldier per armed forces
SC 1	Leadership - Climate and Culture	Survey results on trust and confidence regarding the relationship between commanders and subordinates	RC 3	Perception of Threat / Opponents	Combat Power Evaluation of near peer advisories in comparison to NATO
SC 2	Command and Control - Capability to size or maintain initiative	Evaluation in result of out-of-area missions and exercises under the lead of NATO			

		Indicator rating			Intensity of the influencing factor in the overall system		Change in intelectual capital	
Tag	Evaluation/Rating	Scoring-Points	Value preser-vation on index	Tag	Intensity in the system	Value share	New Value	Growth / Loss
HC 1	JFTC: reached learning objectives = satisfactory RS-Mission: Objectives partially reached = Marginal	6	7.00	HC 1	0.131	3.929	3.367	-0.561
HC 2	JFTC: 3 x high, 1x very high Survey: 13 x medium, 15 x high, 8 x very high	7.26	7.00	HC 2	0.115	3.452	3.582	0.129
HC 3	Aplication rate 2018: 4.5 % ; 2019: 4.1%	8.60	7.00	HC 3	0.111	3.333	4.095	0.762
SC 1	Survey result: 85%	8.5	7.00	SC 1	0.119	3.571	4.337	0.765
SC 2	JFTC: Mission Command expectations far exceeded RS-Mission: Philosophy partially implemented	6.25	7.00	SC 2	0.119	3.571	3.189	-0.383
SC 3	Can deploy a Brig-size element in 90 days	6	6.00	SC 3	0.107	3.214	3.214	0.000
RC 1	Trust in armed forces: 82%	8.2	6.00	RC 1	0.107	3.214	4.393	1.179
RC 2	7,64 days per soldier in two years	7.64	6.00	RC 2	0.091	2.738	3.487	0.748
RC 3	blanced, opponant partially higher in combat power	5	7.00	RC 3	0.099	2.976	2.126	-0.850
	Average	**7.05**	**Total**			**30.00**	**31.789**	**1.789**

Figure 10. Calculation Example for the Intellectual Capital of a Member State

Source: Created by author.

Step 3 – Aggregation and Transformation to a Benchmark

After the separate rating and calculation of the individual values for tangible and intangible assets, we will combine the result to the total value of a member state's defense capabilities (cf. figure 5.) In order to create a kind of benchmark, the calculated financial value of the armed forces is not compared to the total defense value of the other member states. Therefore, it must be associated with a measurable indicator that is unique to each country, as well as in relation to NATO's values. Currently, there are three different possibilities with regards to this kind of indicator.

At first and with regard to the Washington Treaty of 1949, the Allies created NATO with the purpose to defend the area of North America and Europe against the threat of communism. Article 5, the collective defense, is still terrain orientated, therefore, it is possible to use the country size in square miles of a member state in relation to its defense value. It gives the financial value of defense – with regard to readiness of forces – for each square mile as a comparable benchmark. The downside of this ratio is that countries with large territory and low population density will never meet the benchmark because of the near impossibility to man its military.[50] Consequently, it is a crucial disadvantage for countries with large swathes of abandoned terrain and agriculture such as Norway or Iceland.

Another approach focuses on the human perspective. In this case, the amount of a country's populace will serve as the key figure to create a comparable benchmark. This

[50] Joel R. Hillison, *Burden Sharing By NATO's Newest Members* (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2014), 108f.

kind of approach will concentrate on the cultural value of the member states. In addition to the architecture and history of a country, a nation's society - with its specific artifacts, beliefs, and values - creates the unique feature of the Western Allies.[51] Based on this concept, the calculated financial value of the armed forces in relation to the number of residents of a country formulate the amount of defense value per inhabitant of a country. It could be a disadvantage for very small countries with a high population; however, the western human being is the core element of protection with regard to NATO's purpose. Therefore, the calculated population-based apportionment of defense is comparable between the member states and can serve as a benchmark.

The third approach ties back to the financial capabilities of a state. The social aspect of the Washington Treaty from 1949 will build the basis for this concept. Based on the declaration, each member state will maintain and develop their individual and collective capacity to equip and maintain armed forces and to resist armed attack.[52] In conclusion, the calculated defense value must be related to the potential economic power of a state. It follows the current model of benchmarking but with the difference that in opposite to the defense budget, the calculated real defense value will be imbedded in the relation to the total GDP of a country.

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[51] Edgar H. Schein, *Organizational Culture and Leadership,* vol. 2 (San Francisco: John Wiley & Sons, 2010), 14f.

[52] North Atlantic Treaty Organization (NATO), "The North Atlantic Treaty: Washington D.C. – 4 April 1949," last updated 22 August 2012, accessed 29 January 2019, https://www.nato.int/nato_static_fl2014/assets/pdf/stock_publications/20120822_nato_treaty_en_light_2009.

Regarding NATO's strategy of Collective Defense and the NATO Defense Planning Committee, the most significant resources are money and people to man and equip a force.[53] However, history, such as World War II or the equipping and training of the South Korean Army, has shown that the most necessary asset in defense planning is the will of the population to train and to fight against an opponent.[54] Nevertheless, financing and equipping are no less significant, but by direct comparison the number of residents to source the fight are more important. In connection with the significant value of culture, the calculated population-based apportionment of defense will create the benchmark for further research.

Intermediate Conclusion

With regards to the secondary research questions of this thesis, there are three main conclusions at this stage. Firstly, the values of tangible and intangible values are defined in three main categories: 1) Current Assets – Defense Material; 2) Noncurrent Assets – Defense Equipment; 3) Intellectual Capital. To identify the financial basis as an entry point for the assessment, the cost approach measurement and the rescaling of specific values are key methods for the further development of a financial driven benchmark. Afterwards, each specific category will be rescaled by the individual assessment of its readiness factor.

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[53] McQuilton, "Fair Share or Freeride: Burden Sharing in Post-Cold War NATO," 9-10.

[54] James H. Willbanks, "Vietnamization: An Incomplete Exit Strategy," in *Vietnam: The Course of a Conflict* (Fort Leavenworth, KS: Army University Press, 2018), 153-188.

Secondly, the intangible value defined as intellectual capital, is divided in three main categories: 1) Relationship Capital; 2) Structural Capital; 3) Human Capital. Based on the literature review, it covers the soft and hard factors for the readiness of forces. The evaluation of the readiness indicators take into account the different cultural behaviors of NATO's member states as well as its individual performance with regard to near-peer opponents. Nevertheless, historical performance is the basis for the evaluation of each indicator, consequently, it is assumed that there will be no fundamental change.

Thirdly, the interconnection between the indicators of intangible assets (Intellectual Capital) is assessed by the cause-and-effect evaluation. A dynamic and critical factor has much more influence on the system than a more passive and buffering factor. It leads to the assessment of the total intensity of an indicator in the system. In the developed model, the assessed intensity of an indicator also defines the amount of the costs that each of the categories accounts for. This simplifies the system, but prevents an estimate and determination of the individual costs for each of the factors.

CHAPTER 4

ANALYSIS

Along with international pressure to generate more spending in the defense sector, stakeholders need a more qualified and transparent view of the armed forces. In this sense, the model can create an approach to reduce both internal and external information asymmetries, but it can also help the military leadership manage their own capabilities better and perform benchmarking in the area of intellectual capital. The methods used in modeling and, secondly, the significance of the benchmark with the calculated values of armed forces in terms of readiness will be considered more closely for an assessment of the model. Based on the developed model, Chapter 4 will simulate the benchmark of three fundamentally different states and compare the results. After the identification of strength and weaknesses within the model, the resulting possible uses and applications will be investigated critically.

Applying the Model to a Fictional Case

This kind of case study focuses on three different member states, all of them have been NATO members for more than 30 years and participated in different missions. In comparison of the defense expenditure as a share of GDP, only two of the member states are over the target of two percent; NATO member state B with 2.3 percent and C with 3.5 percent. With regard to the equipment expenditure as a share of defense expenditure, only member state C achieves the target of 20 percent. It invests more than 26 percent of its defense budget in the modernization of its armed forces. The further assessment is based on a constant inflation rate of 2 percent per year in each of the member states.

NATO member state A has a long tradition in the Western Way of War and is characterized by a growing economy under the umbrella of a social market theory. Based on its history in the 20th century, its own foreign and defense security policy focuses more on diplomatic and economic measures in the field of national power. Member state A has a modern and equal army in relation to near-peer opponents, the main focus is the ability to support one major crisis operation with 2,500 soldiers and 5 smaller deployments up to 250 soldiers at the same time, well within the framework of UN, NATO, or EU missions. It is able to project power in brigade-size elements within 90 days of a crisis and can extend its force package up to a division-size element within 180 days. The average investment amount has been $18 billion a year over the last 20 years, and the assessment of its current equipment assets has a total value of $50 billion. The annual personnel costs have a total value of $19.9 billion. The validation of its human capital is in the target area and marked by a high recruiting rate as well as a satisfactory knowledge management. Regarding the structural capital, the indicators are well above the target line, particularly in the area of command and control capabilities. In comparison to the near-peer advisory, the combat power of member state A is balanced and reduces the total value of the relationship capital.

After the usage of the benchmarking model, member state A increases its total value of tangible assets by nearly three percent due to its higher readiness in the area of defense material assets (overmatch of NATOs supply requirements by 20 percent.) Based on the annual investments over 20 years, discounted by the inflation rate and rescored by factor one concerning its readiness, the total value of defense material assets is $294.97 billion. State A also increases its value of intangible assets by more than 9 percent to

$22.02 billion. The total value of member state A's armed forces is $376.99 billion, in relation to a population of 82.8 million inhabitants, it achieves a benchmark of 4.55.

Values in billion $	Defense Equipment Assets			Defense Material Assets			Cost of Personnel	Intangible Asset Value	Value of Armed Forces	Ammount of Population	**Bench-mark**
	Value	Rating Factor	New Value	Value	Rating Factor	New Value					
Member State A	294.97	1.0	294.97	50.00	1.2	60.00	19.90	22.02	376.99	82.79	**4.55**
Member State B	31.90	0.8	25.52	10.00	0.8	8.00	3.00	2.34	35.86	10.77	**3.33**
Member State C	3123.26	1.5	4684.89	1000.00	2.0	2000.00	120.00	155.35	6840.24	325.71	**21.00**

	NATO Member State A				NATO Member State B				NATO Member State B			
	Indicator rating		Intangible Assets		Indicator rating		Intangible Assets		Indicator rating		Intangible Assets	
Tag	Scoring-Points	Index Target	Value share	Change in intel. capital	Scoring-Points	Index Target	Value share	Change in intel. capital	Scoring-Points	Index Target	Value share Intangible's	Change in intel. capital
HC 1	6.0	7.0	2.606	2.234	5.0	7.0	0.393	0.281	7.0	7.0	15.714	15.714
HC 2	7.3	7.0	2.290	2.376	6.0	7.0	0.345	0.296	8.0	7.0	13.810	15.782
HC 3	8.6	7.0	2.211	2.717	6.0	7.0	0.333	0.286	9.2	7.0	13.333	17.524
SC 1	8.3	7.0	2.369	2.809	8.5	7.0	0.357	0.434	8.5	7.0	14.286	17.347
SC 2	8.5	7.0	2.369	2.877	6.3	7.0	0.357	0.319	7.0	7.0	14.286	14.286
SC 3	6.0	6.0	2.132	2.132	2.0	4.0	0.321	0.161	8.0	8.0	12.857	12.857
RC 1	8.2	6.0	2.132	2.914	6.5	6.0	0.321	0.348	9.1	6.0	12.857	19.500
RC 2	7.6	6.0	1.816	2.313	1.5	6.0	0.274	0.066	14.5	6.0	10.952	26.468
RC 3	5.0	6.0	1.974	1.645	3.0	6.0	0.298	0.149	8.0	6.0	11.905	15.873
			Total	22.016			Total	2.339			Total	155.351

Figure 11. Simulation of Three Fictional Member States with their Benchmarks

Source: Created by author.

NATO member state B is characterized by an economic crisis in the last five years and accordingly decreased its defense procurement during that time. However, it had modernized its army in the years from 2005 to 2010. State B has a conscript army but 50 percent of its personnel are professional soldiers. Its equipment is modern for stability operations but still lacks the current technology standards for combined arms capabilities. However, it still has the capability to deploy more than 1,500 armor and artillery systems for LSCO. Main focus of the country is the stabilization in Southeastern Europe,

particularly along its own borders due to a previous dispute with one of its neighbors. Therefore, it has the ability to support one crisis response operation with 500 soldiers and 1 smaller deployment with approximately 100 soldiers at the same time for UN, NATO, or EU missions. It is able to deploy a company-size element within 90 days of a crisis and can extend its force strength up to two battalion-size elements within 180 days. The average investment amount has been $0.8 billion a year over the last 10 years, and $3 billion per year prior to the financial crisis. The assessment of its current material assets yields a total value of $10 billion, but meets the NATO requirement by only 80 percent. The annual personnel costs are more than 60 percent of the defense budget and have a total value of $3 billion. The valuation of its intellectual capital is below the target area due to a gap in the relationship between the armed forces and its own society, as well as the decreased participation in NATO missions. Other shortcomings lie in the area of knowledge and education as well as in the adaptability of its armed forces.

After the total assessment, member state B achieves a benchmark of 3.33 because of its downgrading with regards to its readiness in the fields of intangible assets by 28 percent, and by 25 percent in the area of tangible assets.

Last but not least, member state C is a global and nuclear superpower with the capability to project power all over the world within 96 hours. After the years of stability operations with a main focus on the Middle East, it revised its capability to LSCO across the full spectrum of multi-dimensional warfare. It increased its defense spending by three to five percent a year over the past three years, and is still the state with the highest defense budget in the world. Member state C has the most modern army in relation to near-peer opponents, its main focus is the ability to project power as a lead nation within

the framework of NATO missions. It is able to deploy two division-size elements within 90 days of a crisis and can extend its force package up to an army-size element within 180 days. The average investment amount has been $180 billion a year over the last 20 years, and the assessment of its current equipment assets has a total value of $1.000 billion. The annual personal costs have a total value of $120 billion. The validation of its intellectual capital is above the target area and marked by high numbers in intrinsic motivation, adaptability, and responsiveness, as well as high experience in joint and combined actions.

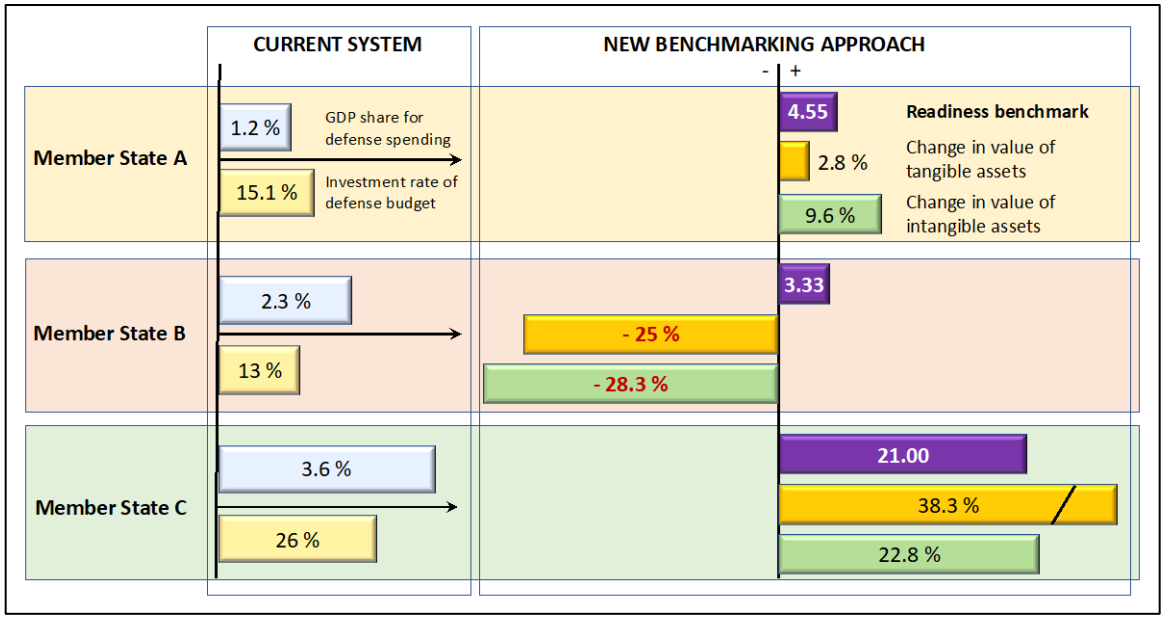

Figure 12. Comparison of Three Fictional Member States with Regard to the Current and New Benchmark System

Source: Created by author.

With the usage of the benchmarking model, member state C increases its value in the fields of tangible assets over more than 38 percent, and intangible assets grow 22.8 percent to $155.35 billion. The total value of member state A's armed forces is $6,840.24 billion, in relation to a population of 325.7 million inhabitants, it achieves a benchmark of 21.

Concluding this fictional case study, there are three main findings. Firstly, the performance of member state C is out of reach for the other states and expresses its dominance in the field of defense and security policy. Based on the characteristic of the benchmark, as already discussed in chapter 3, it also notes that this state invests five times more for security per inhabitant than the other two states.

Secondly, in comparison between member states A and B, the high performance in the field of intellectual capital and the more modern equipment of state A lead to a better rating of this state in opposite to the conventional comparison of the 2 percent GDP guideline. It also identifies that member state B is burning its money in the field of intellectual capital. Beside the modernization issue of its material, it must first focus on realigning its structure of armed forces and its principles of training and education in order to increase its participation in combined and joint training or NATO missions in a further step.

Thirdly, in comparison of member state A and C, the benchmarking model shows that a lack of tangible assets cannot be overcome by an increase of intangible assets. On one side, it depends on the characteristic of LSCO, without available and modern equipment and material, there is no decisive defeat of an opponent on the battlefield. But on the other side, this is part of an American way of war, large and rich countries are

technologically dependent and use their overwhelming armed forces with high firepower faster than poor countries, who must find ways to fight smarter than rich enemies.[55]

With regards to the current Russian strategy of new generation warfare, described by Dima Adamsky, near-peer opponents combine conventional and unconventional capabilities to influence adversaries' population with focus on information warfare and subversion, like cyber offensive operations.[56] Russia deploys its military in the context of national power to target only the center of gravity of NATO member states or to deny a geopolitical advantage of a Western state. Currently, Russia's actions are characterized by gradual escalation and coercive warfare in order to avoid a direct confrontation with NATO and to fight only on a low-cost strategy.[57]

This evidence already identifies that tangible military assets are more than necessary, but maybe not in the same way like the intangible assets of armed forces. In order to create a real asymmetric advantage against an enemy, it is much more necessary to identify and implement a cohesive strategy along all pillars of force development, like the Prussians in the 1860s. As the last finding to reflect on modeling, the value of member state's intangible assets has more significant power than the rescaled amount of

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[55] Colin Gray, "The American Way of War: Critique and Implications," in *Rethinking the Principles of War* (Annapolis, MD: Naval Institute Press, 2005), 27-33.

[56] Valery Gerasimov, "The Value of Science is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying Out Combat Operations," trans. Robert Coalson *Military Review* (2016): 24-27.

[57] Michael Kofman, "The Moscow School of Hard Knocks: Key Pillars of Russian Strategy" (Washington, DC: War on the Rocks, 16 January 2017), 2-3.

defense equipment and material assets regarding their readiness in comparison to a near-peer advisory.

Strength and Weaknesses of the Benchmarking Model

The investigation and implementation of the interaction of the influencing factors of intellectual capital with each other constitutes a great advantage in this modeling. While the methods used so far considered an influencing factor as being variable with simultaneous constancy of the other factors in accordance with the cost-oriented method for the valuation of intangible resources, the resulting interactions are analyzed step by step according to the sensitivity analysis of intellectual capital. With this, an organization that cannot generate a measurable cash flow or identify a comparable market value can enter into the holistic monetary valuation of its assets.

The Hager model described above only considered one or two congruent factors (correlation coefficient plus one) in its calculation and used the result to calculate the individual key valuation figures as assets.[58] This method often channels the observer to the assets exclusively comprising personnel, whereas the concept of intellectual capital - as already defined - must be understood much more comprehensively. With this, the model that has been set up links the sensitivity analysis of the influencing factors from the net present value-oriented method to the calculation process according to the cost-oriented valuation method. This modified implementation of the interactions of all influencing factors with each other makes a transparent investigation in the holistic and interdisciplinary approach of intellectual capital possible.

[58] Halim, "Statistical Analysis on the Intellectual Capital Statement," 61ff.

As a result, a much more accurate analysis of the change in monetary value can be carried out and the subsequent adjustment process can focus on controlling the main influencing factors. At the same time, this is also the main advantage over qualitative alternatives, such as a Balanced Scorecard from knowledge management, as not every factor is considered individually in this approach.[59] As an overall model for calculating the enterprise value of armed forces, it offers the possibility of a quick and accurate analysis of the main value drivers in the value creation process.[60] Statements on quantity and quality can be made very quickly for all three categories of assets in the balance sheet assets, irrespective of ex post application for an analysis or modeling of expected processes for a future development analysis with this model. Particularly when comparing units, this leads to further performance incentives, especially at the management level.

In business literature, the single valuation method is rated as a weaker instrument in comparison to other methods in terms of its application for calculating enterprise value.[61] This is due to the difficulty in capturing the synergies resulting from the interaction of the individual assets of an enterprise. The model thus forces the observer to evaluate the intangible resources of an enterprise individually. This effect is particularly neutralized in the valuation of enterprises in the service sector, as the alleged lack of

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[59] Tatiana A. Burtseva and Nikolay Y. Chausow, "Measurement of Scorecard Balance," *International Electronic Journal of Mathematics Education* 11, no. 9 (2016): 3361-3370.

[60] Fitz-Enz, *The ROI of Human Capital: Measuring the Economic Value of Employee,* 310f.

[61] Fernándes, *Valuation Methods and Shareholder Value Creation,* 34f.

synergy relationships can be found in the three categories of intellectual capital. Their valuation may mitigate the obvious disadvantage of the method. However, as no market prices were used to value intangible resources in this model either, the cost-oriented approach does not enable comparability of the calculated assets with enterprises on the market. This is ruled out completely for a combat unit, as the capabilities of armed forces cannot be fully replaced on the market. However, the model only has limited validity for a comparison of armed forces in different organizational areas. The varying conditioning, education, and training in the organizational areas have only been taken into account rudimentarily until now and are always subject to the different valuation standards of the respective inspectors.

The assumed weighted linear interdependency between the influencing factors is another disadvantage of the model. In this situation, the active and passive factors in the system are identified in four steps and then weighted linearly against each other. However, there is not a permanently congruent impact process among themselves for all the factors. Rather, processes that were synchronous initially may decrease or increase over-proportionally or under-proportionally with reference to one another (in the sense of being reversed) later on. In this situation, the impact processes can best be described exponentially or logarithmically and remodeled. The best way to find out whether that kind of interdependency exists is to use a statistical sample with the correlation measure. This additional need for research on the interdependencies of the influencing factors can be investigated further in subsequent papers. An identification of the real impact processes and their implementation in the model produces even more precise valuation of intellectual capital and must be carried out for market-oriented enterprises with purely

quantitative intellectual capital accounting in particular. When merely considering the values of the fixed assets and current assets, we can conclude by adding that the use of the single valuation method in the model does not provide immediate information on additional value creation in relation to the investments and costs made for a unit. This would have to be checked separately in an investment calculation, independently of the determination of the enterprise value. Merely determining the net present value of defense cannot provide any information, this also applies to a possible replacement relationship between different property items of property, plant, and equipment (e.g. vehicle types - armored vs. unarmored.)

When weighing the strengths and weaknesses of the modeling, it must be noted that this model only determines a value that approximates the truly existing net present value of an armed forces. This is due to the weakness of the cost-oriented database on one hand, and to the assumed linear interdependency of the influencing factors on the other hand. However, it creates a more equal benchmark for the comparison of the contribution and readiness for NATO's forces, but still overestimated the value of tangible assets, like discussed as the last finding of the fictional case study.

Challenges and Opportunities for its Implementation

For one, this model can show how high the added value of the armed forces is with the given budget funds. For another, a uniform valuation matrix of the factors influencing intellectual capital can also be used to compare the international armed forces. Here, a high purpose of use for a reduction of the communication deficit in the international sphere can be recognized for the model. Rather, in view of the fact that the monitoring of input-oriented investment numbers is not significant, NATO should

supervise how output and readiness can be increased with the given defense budgets of its member states.[62]

The developed model is the macro-perspective of armed forces' value from the perspective of its readiness. It includes all the main drivers and variables that contribute to strong and reliable armed forces. From the perspective of fairness and with regard to the central research question, it judges the performance of each member state on the output side of the process in the system of collective defense. In addition to the central benchmark, the model also identifies strength and weaknesses of force development for each member state and, based on its assessment, is free from favoritism or discrimination in an equal environment.

However, it is an idealistic approach with regard to its implementation at the strategic level. There is still the requirement that all nations must approve its implementation on the North Atlantic Council level and they also have to contribute to the assessment portion with the collection and delivery of data. With regard to chapter two, large portions of the data are available but not implemented in the evaluation on strategic level, like the measurement of performance in NATO missions. Other data, such as the value of defense materials and military supplies (e.g. ammunition) must be evaluated and made available for the Alliance. This also requires some sort of independent assessment teams in terms of accountability and acceptance. However, the current discussion about defense spending does not support the reliability of the Alliance and there is the need for change to a fairer model of burden sharing.

[62] Cordesman, *NATO "Burden Sharing,"* 21ff.

In order to overcome this kind of challenges and develop a formal system of apportion, NATO must initiate two major measures. First, the time of peace dividends have long been over, since the beginning of the Ukraine crisis, and all member states must increase their efforts to create an effective mix of deterrence and defense capabilities. Therefore, NATO must push its concept for defense planning on the basis of realistic strategic requirements to challenge Russia's current strategy of new generation warfare. The developed strategy will give the answers on the requirements and needs for NATO's future force goals. The macro-perspective of the developed model can identify the current performance of a member state and must serve as a starting point to assign force development tasks to each of the member states. Therefore, members with a lower benchmark must contribute more to a combined strategy than others. In addition, stronger members can serve as a lead nation to develop capabilities and contribute to NATO's existing Framework Nation Concept. Small members can also form coalitions with other smaller nations to build a combined capability in their strength, such as the Baltic States in the field of offensive and defensive cyber capabilities.

The second measure focuses on the performance of force development in each of the member states. Based on the results of formulating force goals and necessary capabilities, this model can contribute to the measurement of performance in a micro-perspective to assess the members' defense capabilities in detail. Beside the full Doctrine, Organization, Training, Material, Leadership, Personnel, and Facilities (DOTMLPF) approach for capability development in the US Army, the key components of military capability are trained personnel within an existing force structure, implemented

equipment with a high readiness, and supply material to sustain it.[63] The current approach of the model generally compares the existing capabilities of an armed forces with the combat power of an opponent (Relationship Capital #3.) In addition, the level of knowledge and education of soldiers gives the overall performance in terms of training readiness (Human Capital #1.) The model also evaluates the readiness of a member state in terms of equipment standards and supply goods in the category of tangible assets.

In order to implement the measurement of performance for each of the member state's force goal in the new defense strategy, the tangible and intangible assets must be divided into the required capability categories and assessed independently under the main pillar of the existing structure. For an example of defensive cyber capabilities, a nation's tangible assets of cyber equipment and supply goods must be assessed as well as rescaled in terms of technological superiority and survivability in comparison to possible opponents. In the field of intangible assets, the capability will be assessed with regards to training efficiency (Human Capital) and its combat effectiveness in comparison to possible opponents (Relationship Capital.) However, it is only one pillar of the overall assessment and must be repeated for each of the different capability categories. Afterwards, they can be aggregated to a combined value for the overall performance of a member state.

In summary, the model can help in the apportionment of the defense planning strategy, with the identification of a member state's current strength and weaknesses, as well as transparently assess the individual force development process in the future.

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[63] Theodore M. Thomas II, *Army Capability Development Needs to Go Back to the Future* (Carlisle, PA: Army War College, Army University Press, 2016), 17ff.

CHAPTER 5

CONCLUSIONS

The aim of the work was to create a performance-orientated benchmark approach within NATO that can more fairly measure the real value of a member state's land force defense capabilities in meeting the Alliance's strategy for Collective Defense. The developed model demonstrates a monetary enterprise value for a member state's army can be calculated based on the value of its tangible and intangible assets. The created benchmark system is based on the readiness evaluation of an army's financial value relative to a country's total population. Particularly the valuation of intangible assets, in terms of combat readiness, is the core of the model and was the main focus of attention in the study. As a result, there is an output orientated benchmarking model that enables a well-founded and sustainable statement on goal achievements and value creation in the armed forces of each member state. Currently, NATO's two percent defense expenditure guideline as a share of a country's GDP and the required equipment expenditure rate of 20 percent only have an input focus and do not assess the efficiency of their use. The valuable product of an army's readiness for collective defense and deterrence cannot be verified by input-oriented ratios. Consequentially, the developed model and benchmarking system could be the most important, as well as the fairest, instrument in NATO's toolbox for controlling and for measuring the performance of modern armed forces.

As partially discussed in chapter 4, there are some additional options for further application of the model. Firstly, it can also be used as an instrument of external communication within the Western society as shareholders in the broadest sense. The

model can show the corresponding value creation for the product of external security and how taxpayer money was used in order to establish trust in security and defense policy. In particular, this should make it clear once again that tax levies are often counterbalanced by a product, the creation of which is often not directly noticeable, but, on the other hand, makes a contribution to everyone's basic needs.[64] The value of the aggregated defense value illustrates to the citizen the financial deposit of his basic need for security and shows how high the increase in value, or perhaps the loss of value as well, in the area of tangible and intangible assets of the armed forces develops. In addition, the assessed tangible value of an army, as well as its readiness indicator, also forms the quantitative basis for discussions with a country's society in order to increase the expansion of the defense budget in the area of investments.

Secondly, this leads to the internal management and control function of the valuation model. Whereas the public administration of a government, as well as NATO itself, predominantly still considers economic efficiency based on input, a modern controlling system considers efficiency and effectiveness parameters at the output end of the system. The model presented can help in this context, so that, not only is a qualitative statement made, but rather, measurements to determine the quality of the value creation process undergone for achievement of the objectives are also carried out. In addition to the benchmark itself, the relative change in intangible and tangible assets allows each member state to identify and demonstrate the need for optimization in an ex post consideration. Furthermore, it helps to recognize the strength and weaknesses of a

[64] Johannes Göllner, *Wissensmanagement und Wissensbilanz im Österreichischen Bundesheer am Beispiel ABC-Abwehr* (Wien: Landesverteidigungsakademie, 2008), 9ff.

member state; therefore, it can also influence the selection process of force generation for NATO missions. In particular, in the case of a capability assessment approach, as discussed in chapter 4.3, the developed model will enhance a performance oriented force contribution process within NATO.

Finally, the model can also be used for strategic alignment of armed forces. Starting from a basic portfolio of assets, various influencing factors of intellectual capital or the assets of defense material and equipment can be changed according to the strategy chosen. Based on this, the future total values of the armed forces can be determined as a forecast. In particular, by connecting the factors influencing intellectual capital with tangible assets, it is also possible to create a balance with reference to replaceability with a view to maintaining the overall value of the enterprise. In order to forecast and compare the development in different time jumps, the values of the defense capital on the respective observation date must be discounted with the federal government's calculated interest rate for public investments.[65]

Further research in this topic should be carried out from two perspectives. In the internal analysis, the interactions of the influencing factors of intellectual capital should be examined with regard to their possibly asymmetrical interrelations. This can be done using multiple regression analysis of the correlation coefficients of the influencing factors. The first value calculations of units of combat troops on different valuation dates can serve as a database for this purpose. The resulting findings can further concretize the

[65] Halim, "Statistical Analysis on the Intellectual Capital Statement," 61ff.

calculation of intellectual capital and achieve higher model accuracy by also assuming asymptotic distributions for the interdependencies.

In an external perspective, the model should be extended to include an application for sister services in order to adequately cover performance measurement for countries with large naval or air force services. Based on the assumptions and limitations of this thesis, the model looks primarily at the army. In this context, the principles of the single valuation method in the model is not affected, but the categories, influencing factors and indicators of intellectual capital, must be specified elsewhere. In particular, their partially different force structure, training, and mission command system will have another influence on the value of intangible assets. This cannot be achieved by simply aggregating net present values of defense, but rather requires specific consideration.

In addition to the external perspective, further research has to integrate the perspective of necessary capabilities for future LSCO against near-peer opponents, this was also a limitation for the modelling in this thesis. However, as already discussed in chapter 4, the principles of the model are still the same. However the variables of equipment, soldier's skills, and knowledge in the branch of human capital, as well as the evaluation of combat effectiveness in the field of relationship capital must be specified and divided in subcategories. Each subcategory has to cover one core capability of the overall NATO strategy for collective defense and deterrence. Afterward, it will serve as the new evaluation matrix for all countries to prevent a change in scale and assess each member state equally.

However, without a change in NATO's current discussion about burden sharing, there will be no way to build trust and reliability between its members. The proposed

benchmarking model could serve as the necessary new approach to provide transparency in an improved security debate and counter Russian's indirect shaping of the information environment.

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