

Benchmarking National Military Forces Through Comparison with Allies

Marcin Pilat

Director General Military Personnel Research and Analysis
Department of National Defence, 101 Colonel By Drive, Ottawa, ON K1A 0K2
CANADA

Marcin.Pilat@Forces.gc.ca

Etienne Vincent

Defence Research and Development Canada Centre for Operational Research and Analysis
Department of National Defence, 101 Colonel By Drive, Ottawa, ON K1A 0K2
CANADA

Etienne.Vincent@Forces.gc.ca

ABSTRACT

Military personnel are at the heart of an armed force's strength and nations strive to optimize their forces' structure and composition. For example, they seek to maximize retention of qualified personnel, to have an appropriate fighting-force-to-overhead ratio, and to reflect national diversity. Evaluating progress against such objectives in the absence of national targets is problematic, but comparable foreign military forces can provide a yardstick. This paper advocates increased sharing across NATO of standardized statistics on military forces, in order to enable such benchmarking. It also highlights substantial current difficulties stemming from different national definitions, and the potential solution, which is to develop mappings of nation's data to common standards or to the national standards used by their allies. This is a topic that a newly proposed NATO Science and Technology Organization Research Task Group will be tackling.

Keywords: Benchmarking; Personnel Operations Research; Armed Forces Personnel.

1.0 INTRODUCTION

Personnel Operations Research is an important OR&A application area that seeks to analyse and optimize force structure and military Human Resources (HR) processes. For such tasks, a useful starting point is often a comparison to allies. Comparing military personnel statistics between allies provides useful yardsticks, and indicates important examples worthy of further study. Interest in personnel statistics benchmarking is rising among NATO nations with regular activities such as the Defence Planning Capability Survey (DPCS)¹ and the Summary of the National Reports of NATO Member and Partner Nations Questionnaire².

We will first define the concept of benchmarking. We will follow by showcasing three real world examples in order to highlight the value of military personnel statistics benchmarking, but also to identify substantial obstacles to its successful execution. We will then present a set of requirements for successful benchmarking and a potential way ahead. We hope to convince the reader that increased benchmarking of military forces across NATO is a low hanging fruit for military personnel OR&A.

¹ The biennial DPCS falls under the NATO Defence Planning Process (NDPP).

² This Questionnaire is an annual activity of the NATO Committee on Gender Perspectives (NCGP).

2.0 BENCHMARKING

Benchmarking is not a new concept but has not achieved its full potential in military personnel OR&A. It is an area of extensive research focusing on the comparison and improvement of business processes. A 2002 literature review by Dattakumar and Jagadeesh identified 382 academic publications on the subject across many business applications, with HR identified among those receiving the most attention [1].

Various definitions of benchmarking have been proposed in the literature as summarized by Invernizzi, Locatelli and Brookes [2]. A pragmatic definition is provided by Camp, as “the continuous process of measuring products, services and practices against the company’s toughest competitors” [3]. This definition specifically characterizes external (or competitive) Benchmarking, where the object of comparisons is an external organization. Akinnusi presents a structured overview of benchmarking as applied to HR that helps to further define the term [4]. Inspired by Drew’s benchmarking process [5], he outlines the following steps: (1) Identify the object of the study; (2) Select the superior performer; (3) Collect and analyse data; (4) Set performance goals for improvement; and (5) Implement plans and monitor results. Such a process would run cyclically, with the aim of continuous improvement.

In the NATO personnel context, benchmarking can be simply defined as the process of comparing basic personnel statistics of national military forces (Akinnusi’s steps 1 to 3) in order to observe their range across the alliance, identify high achievers with respect to metrics of interest, and set goals for others. This simple definition can be expanded to include the analysis of the processes that lead to higher achievement, but important obstacles must first be overcome in the initial basic statistical data comparison.

3.0 EXAMPLES OF BENCHMARKING

To showcase the value of military personnel statistics benchmarking and present some obstacles to its successful execution, we present three recent examples from a Canadian personnel OR&A team.

As a first example, consider the objective to increase the proportion of women in armed forces. Measuring current proportions across the alliance allows nations to appraise their progress in comparison to others; to consider the feasibility of their targets; and, to identify partners who may serve as models. Figure 1 shows female proportions in active duty forces, as compiled in a recent NATO report [6]. Each nation is subject to different policies, culture and structures,³ but Figure 1 provides a useful first look across the alliance.

There are nevertheless substantial obstacles to deriving even simple statistics as those shown in Figure 1. One fundamental obstacle is the lack of consistent definitions for metrics across nations, such as the term “active duty”. For example, in Canada, this term is not officially defined. We would expect that any proposed definition would include the *Regular Force*, but whether it should also include certain full-time reservists is unclear. The statistics would also depend on the establishment of a common standard on whether to include members who are on long term leave (e.g. maternity leave), ill, injured, or untrained – the default treatment of which varies across nations. Sex or gender data that is tracked by national systems also varies across nations (e.g., the Canadian Armed Forces personnel system of record currently tracks “sex”, but government policy promotes a transition to “gender”). A logical next step to Figure 1 would be to break down the proportions by attributes such as rank or occupation – doing this would require mappings between national systems, or to alliance standards.

³ For example, women have often faced fewer barriers in occupations providing healthcare or administrative services than in those that are combat-oriented. Comparison between nations where such functions are divided differently between military and public servant or contractor supporting staff are therefore less appropriate.

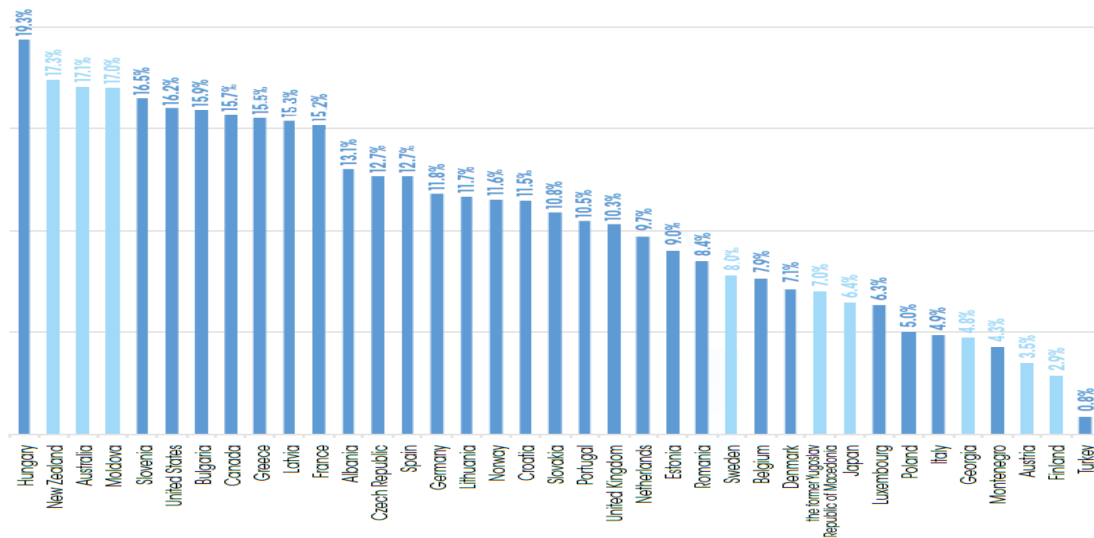


Figure 1: Proportion of active duty military personnel who are female, 2017 (modified from [6]).

As a second example, we can look at the relative number of general officers and flag officers (GOFOs). Figure 2 presents the number of Regular Force⁴ members per GOFO in selected militaries. These numbers were compiled from various sources⁵ by Canadian analysts in response to a request from a Canadian senior leader wanting to gauge the appropriateness of the current structure. These results appeared to show that the Canadian Armed Forces were not top-heavy compared to some allies.

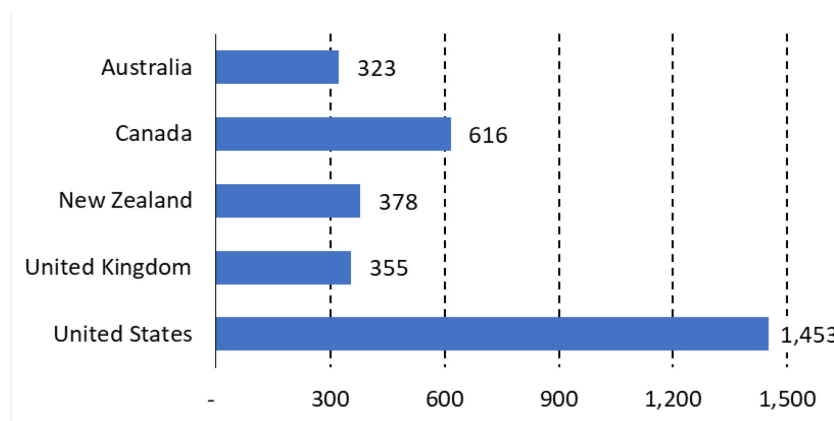


Figure 2: Number of regular force members per GOFO, 2016.

However, the comparison in Figure 2 suffers from a number of interpretation and methodological difficulties. Interpretation difficulties include the fact that Regular Force GOFOs may supervise reserve and civilian staff, while Regular Force members may be supervised by reserve GOFOs or senior public servants,

⁴ This analysis was performed from a Canadian perspective and so compared the Canadian *Regular Force* to presumed equivalents in other nations, but difficulties similar to those noted above around the term *active duty* applied.

⁵ Australia: from Defence Annual Report 2015-16; Canada: calculated from Guardian, system of record for military HR data; New Zealand: from a news article (<http://www.defensenews.com/story/defense/policy-budget/2015/09/29/new-zealand-defence-force-review-highlights-weaknesses/73024730/>); United Kingdom: from Tables of UK armed forces monthly service personnel statistics (more recent similar reports available at <https://www.gov.uk/government/statistics/quarterly-service-personnel-statistics-2021>); United States: from Table of Active Duty Military Personnel by Rank/Grade (available at <https://dwp.dmdc.osd.mil/dwp/app/dod-data-reports/workforce-reports>).

and the extent of such arrangements vary between nations. Similarly, the extent to which forces post GOFOs to exchange or international staff positions impacts the ratios. A complete treatment of these finer details would require more investigation and substantial collaboration between analysts from the respective nations. In terms of method, these numbers require a shared interpretation of the terms *Regular Force* and *GOFO* as they apply to each nation. Remaining complications include the potentially different treatment of acting ranks, and different ‘as-of dates’ (often resulting from different fiscal years). In particular, the number of general or flag officers may vary with annual posting cycles (as substantive promotions may be concentrated at a given time of year, but address vacancies that accumulated over the entire year).

Our last example involves a comparison of attrition rates. Here, “attrition” is taken to mean any member (trained or untrained) departing the military for any reason (e.g., voluntary release, retirement, death, etc.). The rates in Figure 3 were compiled from various sources⁶ by Canadian analysts in preparation for a meeting of The Technical Cooperation Program (TTCP) where retention was to be a focus of discussion. Attrition rates are the outcome of a plethora of economic, demographic and policy factors. Nations seeking to increase retention may be able to learn from allies, with a first step being the comparison of attrition rates. However, when rates are to be compared across nations, they must be derived consistently, which proved exceedingly difficult for the example in Figure 3, making the conclusions from this comparison tenuous.

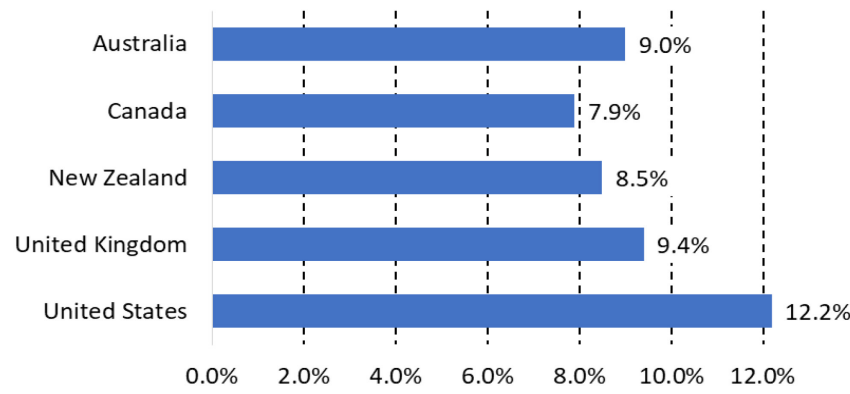


Figure 3: Regular force attrition rate, latest available as of July 2020.

A first problem with the comparison in Figure 3 involves dates. The effects of the COVID-19 pandemic on retention began to be felt in early 2020. The annual period covered by the rates shown in Figure 3 are different for each nation, as they were based on readily available fiscal year or other periodic data. As such, some country’s rates were more heavily impacted by the pandemic than others.

A second problem is that different rates were obtained using different formulas. There are, in fact, many different options for deriving rates from data (see [7] for an extensive discussion). An effort to apply the formula used in Canada to other militaries was partially successful based on the availability of the necessary data from the United Kingdom and United States, but such data could not be obtained in time from Australia and New Zealand, and the comparison was thus based on rates published in annual reports that did not provide methodological details. Later, through TTCP channels, data was obtained from New Zealand for the years ending 30 June 2017 and 2018. Using the Canadian formula, the rates were respectively 9.7% and

⁶ Australia: from Defence Annual Report 2019-20; Canada: calculated from Guardian, system of record for military HR data; New Zealand: from 2019 New Zealand Defence Force Annual Report; United Kingdom: calculated by a Canadian analyst from data extracted from Quarterly Service Personnel Statistics 1 July 2020 Report (more recent similar reports available at <https://www.gov.uk/government/statistics/quarterly-service-personnel-statistics-2021>); United States: calculated by a Canadian analyst from data extracted from Defense Manpower Requirements Report found at https://www.dmdc.osd.mil/appj/dwp/dwp_reports.jsp.

9.8%. In comparison, the substantially lower value of 8.5% in Figure 3 was for the year ending 31 December 2017, which overlapped the other two periods. It thus appears that the rate in the New Zealand Defence Force Annual Report was based on a formula that yields substantially lower rates, making the comparison problematic. Effectively comparing attrition rates across nations would thus require agreement on dates and formulas, as well as common definitions of *attrition* and of the *Regular Force* denominator.

The three examples that we presented offer a glimpse at the possibilities for NATO military forces benchmarking, but are still fairly simple and limited. We could imagine a much broader use of benchmarking to address more complex questions. Indeed, almost any time that a specific military HR process or structure is being analysed, comparison to allies could offer insights. Comparing statistics at a fine level of detail is however currently beyond our capability. It would require more active sharing networks, but also standardized definitions and correspondences between national data and agreed on standards and conventions to ensure apples-to-apples comparisons.

4.0 REQUIREMENTS FOR EFFECTIVE BENCHMARKING

As the previous section identified some obstacles to effective benchmarking of military personnel statistics across NATO and partner nations, in this section, we suggest a sample list of requirements to ensure comparisons among nations are accurate and meaningful.

Create an Analyst Network:

- Analysts currently lack a network of international contacts who could be approached with requests for statistics and who can work together to address each other's benchmarking requirements.
- Each nation has laws protecting the privacy of its citizens and military members. As such, an analyst requiring statistics from allies will never get wholesale access to data, but instead must rely on authorized allied analysts to compile the statistics for them.

Standardize Formulas and Measures:

- Nations use different formulas to compute metrics such as attrition and promotion rates. Effective comparisons will require a willingness to either standardize formulas or apply multiple formulas in parallel to meet allied requirements.
- Different nations may apply different conventions for counting personnel, such as how to include personnel who are on long-term leave, acting, or serving part-time (e.g., Canada occasionally uses *average paid strength* for its Primary Reserve). Benchmarking requires agreement on such conventions or the ability to report according to multiple conventions.

Standardize Definitions:

- Nations define various concepts differently (e.g., attrition), and break down attributes into different categories (e.g., occupations). Comparisons across nations would require either mapping national standards to new NATO standards, or one-to-one mappings between pairs of collaborating nations.
- An area that especially suffers from ambiguity is the breakdown into components. For example, the boundary between active duty and reserve vary across nations, with some defining intermediate statuses. The treatment of components not found in all nations must also be settled toward some analyses (e.g., National Guard, Conscripts, or Canadian Rangers).
- Breakdowns into services are often sought in military personnel benchmarking, but are also problematic. One issue is the treatment of services not present in all allied forces (e.g., Marines). Another is the lack of services in unified forces (e.g., Canadian Armed Forces). A full practical mapping of all nations' militaries into standard services is not likely, but a clear common understanding of services across nations would be necessary to enable accurate comparisons.

- To be effective, comparisons must have the same as-of date or cover the same time periods. Benchmarking will require nations to be ready to provide data based on a calendar that might be different from their national fiscal year. One option would be to select a standard calendar for statistics sharing (e.g., the calendar year).
- Ranks is an area where a NATO standard exists enabling cross-nation comparisons (STANAG 2116 – *NATO codes for grades of military personnel*). Such standards are an important step toward benchmarking, but they do not provide a full mapping. For example, the Canadian ranks of lieutenant and second lieutenant both map to NATO OF-1, and some other nations also have 2 or 3 ranks mapping to OF-1. The standard does not state if the Canadian lieutenant maps exactly to some of the other nations’ OF-1 ranks, and so does not provide the complete nation-to-nation mapping that could be valuable to certain analyses. It is nevertheless a useful starting point and an example of how similar standards for other attributes could greatly assist benchmarking.

5.0 WAY AHEAD

We have shown through examples that benchmarking could be highly valuable to military personnel Operations Research but can be challenging due to various obstacles. We suggested a sample list of requirements for effective benchmarking. As a way ahead, networks of analysts are required across NATO and partner nations to address these and any additional requirements through cross-border discussions. Finally, thought must also be put toward developing NATO standards, or nation-to-nation mappings of definitions in order to enable accurate international comparisons.

Eventually, the concept of a benchmarking exchange could be considered to further ease sharing. Privacy requirements would prevent raw data sharing, but it might be possible for each nation to build a standardized interface for its data holdings allowing other nations to design queries that could be run on partner systems for the gathering of statistics in a consistent fashion across nations. The concept can be expanded to facilitate tool sharing among nations via standardized interface adapters. Another possible initiative could be the development of the periodic sharing of standardized statistics consistently compiled across nations.

In 2021, NATO Science and Technology Organization Human Factors and Medicine (HFM) Exploratory Team HFM-ET-189 entitled “Workforce Analytics Exchange: Standards for Military Personnel Data” concluded its work of identifying the need for enabling easier benchmarking and workforce model sharing across NATO. The follow-on joint HFM and Systems Analysis and Studies (SAS) Research Task Group entitled “Standards for Military Personnel Data and Analytics Exchanges” has recently been proposed to continue the work. This activity aims to develop and validate a standardized approach for NATO military forces analytics products and workforce analytics exchanges.

6.0 REFERENCES

- [1] R. Dattakumar and R. Jagadeesh, “A review of literature on benchmarking”, *Benchmarking: An International Journal*, vol. 10 no. 3, pp. 176-209, 2003.
- [2] D. C. Invernizzi, G. Locatelli, N. Brookes, “A methodology based on benchmarking to learn across megaprojects: the case of nuclear decommissioning”, *International Journal of Managing Projects in Business*, vol. 11, no. 1, pp. 104-121, 2017.
- [3] R. C. Camp, “Learning from the Best Leads to Superior Performance”, *Journal of Business Strategy*, vol. 13, no. 3, pp. 3-6, 1992.

- [4] D. M. Akinnusi, “Benchmarking of Human Resource Management in the Public Sector: Prospects, Problems and Challenges”, South African Journal of Human Resource Management, vol. 6, no. 2, pp. 25-31, 2008.
- [5] S. A. W. Drew, “From Knowledge to Action: the Impact of Benchmarking on Organizational Performance”, Long Range Planning, vol 30, no. 3, pp. 427-441, 1997.
- [6] “Summary of the National Reports of the NATO Member and Partner Nations to the NATO Committee on Gender Perspectives”, NATO, 2017.
- [7] E. Vincent, S. Okazawa and D. Calitoiu, “Attrition, Promotion, Transfer: Reporting Rates in Personnel Operations Research”, Proc. International Conference on Operations Research and Enterprise Systems, pp. 115-122, Feb 2021.

