Military Human Potential in the Context of Defence-Growth Relationship: Evidence from the Baltic States

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Abstract

Contemporary studies show that military power depends not only on manpower, weapons, or resources, but in many cases, success on the battlefield is determined by the potential of human capital, including knowledge, skills, competences, and other capacities [1; 2]. Using a cost-based approach, the author focuses on the input side assessing military human capital potential in the context of defence expenditure – economic development nexus in the Baltic countries, such as Lithuania, Latvia, and Estonia. The investigation covers the period between 2004 and 2020. Defence expenditure on personnel has been used as a proxy for military human capital potential, and real gross domestic product (GDP) per capita as a proxy for economic development. Research is carried out using econometric methods, including Spearman's correlation analysis and Automatic Linear Modelling (ALM). The research results reveal that investments in military personnel have significant and positive impact on economic development in the Baltic states. Defence expenditure on personnel explains 63.7 percent of variation in real GDP per capita in Lithuania, 71.3 percent in Latvia, and 63.4 percent in Estonia. The author hopes that the findings of the investigation will extend the scope of research across the Baltic States and will be useful for the achievement of Sustainable Development Goals (SDG 8, economic growth).

KEY WORDS: *military, human capital, human potential, defence, economic growth, Baltic States.*

1. Introduction

Human capital is a major factor of economic development. Many recent investigations focus on human capital formation, development, and assessment [1-10]. The concept of human capital encompasses human health, knowledge, skills, motivations and abilities, which are formed as a result of investments and accumulate by a person [8]. In their research, Šlaus & Jacobs (2011) [3] consider a broader view of human capital, which involves the knowledge, skills, attitudes and capacities of people as well as the social and cultural characteristics including the capacity for discovery, invention and innovation [3]. According to Eatough (2021) [11], human capital consists of several factors, such as hard and soft skills, education and training, intelligence and emotional intelligence, personality, work experience, employee well-being, and loyalty to the company. Zveglich et al. (2019) [7] also propose to include expected work experience when measuring human capital. Scientists use a variety of methods to measure human capital potential. Human capital potential can be considered at three levels, such as individual, microeconomic, and macroeconomic. At the individual level, human capital evaluation includes quality of education, the improvement of the sphere of employment, and decent wages. At the micro level, the value of human capital is based on the cost of the company's expenses for training workers, labor protection costs, medical examination and insurance, payment for sick leave and other social services [8]. At the macroeconomic level, the Human Development Index (HDI) is the most commonly used for the evaluation of human capital. The calculation of HDI is based on life expectancy at birth, the average number of years spent in education, expected duration of studies, and gross national income per capita [8]. Human capital as an economic category has qualitative and quantitative parameters [8]. In the articles prepared by the United Nations (UN, 2016) [4] and Chulanova et al. (2019) [8], retrospective (cost-based) and prospective (income-based) approaches are considered for the evaluation of human capital. The cost-based approach estimates the human capital stock as the depreciated value of the investment in human capital [4]. The income-based approach measures the value of the total stock of human capital as the sum of the discounted present value of all future income that individuals expect to earn throughout their lifetime [4]. The cost-based approach focuses on the input side, while the income-based approach evaluates human capital from the output side [4]. One of the main challenges facing national governments is the allocation of financial resources for human capital. The most controversial issue is financial resources for the defence sector. The relationship between defence expenditure and economic performance has been an issue of interest

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for political scientists [9]. Defence funding is often criticized for diverting resources from the civilian sector, despite the fact that defence spending is aimed at ensuring national security [9; 12]. The relationship between human capital and economic development has been subject to extensive discussion as scientists seek to reveal what kinds of training and education impact on economic performance [9; 13]. The defence sector is dependent on human resources and sensitive to their fluctuations. Investing in the health and knowledge of soldiers plays an important role in ensuring national security. According to the research by McDonald (2020) [9], it is notable that investment in the defence sector has a direct and indirect effect on economic performance. Directly, investments provide a positive impact on economic growth, as skills acquired during military service produce a social benefit by increasing the amount of capital available to the country [9]. Indirectly, investments affect the defense sector to produce the military good in the form of peace, stability, and security [9]. Empirical findings on the relationship between military expenditure and economic development are yet to be conclusive. A recent study by Azam (2020) [14] suggests that military expenditure and economic development have a strong inverse relationship in non-OECD countries. In these countries, increasing military spending discourages economic growth. These findings are consistent with the results obtained by Yang et al. (2011) [15] and Shahbaz et al. (2013) [16] and contradict the insights revealed by Raju & Ahmed (2019) [17], Dimitraki & Win (2020) [18], Mohanty et al. (2020) [19] and others who claim that military spending positively contributes to economic development. One of the channels through which this spending affects the economy is human capital [6]. In recent times, capital understanding of the stock has been widened to accommodate not only natural resources, but also human capital as an engine of sustainable economic development [6]. The results of the investigation show that Nigeria's military spending has a positive impact on human capital development; however, this effect is not significant [6]. Furthermore, changes in human capital have been more affected by changes in education and health spending than military expenditure [6]. The expenditure of the American government on military personnel has a positive impact on the nation's human capital [9]. Estimates show that 18.9 percent of annual economic growth is contributed by the human capital investments made by the military. According to McDonald (2020) [9], this reveals the scope of military personnel training and education. Goldman & Blanken (2006) [20] identified the main factors affecting military potential, they are as follows: economic capacity, organizational constraints, knowledge, normative constraints, vulnerability, and ability to sustain military operations, ability to recover from attacks. According to Johnston & Farley (2013) [21], military capability depends on personnel with the right qualifications in the right job when we need them there. Contemporary investigations show that military power depends not only on manpower, weapons, or resources, but success on the battlefield lies in the mind of soldiers [1]. Learning to think depends on a potential of human capital including knowledge, skills, and abilities [1; 12]. Empirical results show that human capital has a positive impact on long-term economic development [14]. The results show that one unit change in the human capital promotes economic growth of approximately 0.03 percent [14]. Furthermore, the findings show that investing in human capital has a significant impact on people's health by increasing life expectancy, which boosts economic development [14]. The examination of NATO countries between 1990 and 2019 also approves that defence spending on personnel has positive impact on economic development in a log-run [22].

Taking into account scientific insights and the human capital model presented in the work of the United Nations (UN, 2016) [4], the author has made the changes and interpretations of the model, applying it to military human capital (Fig. 1).
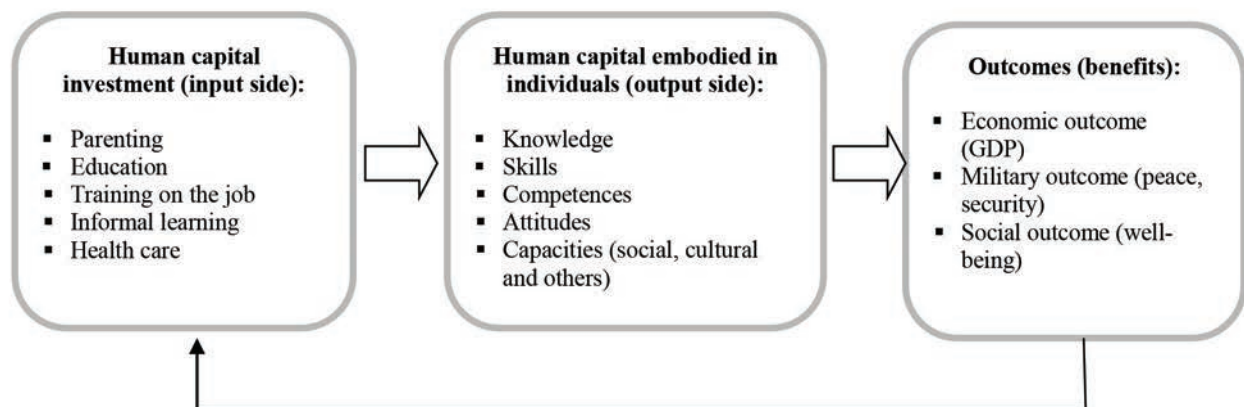

Fig. 1. Military human capital formation, composition and outcomes. Source: author's interpretation based on work of the United Nations (UN, 2016) [4].

Research shows that the potential of military human capital is revealed by including of an increasing number of factors and determinants. The assessment of the economic and social effects of military human capital remains an interesting area of research; however, no consensus has been developed on whether investments in military personnel are beneficial or detrimental to economic development. The next section illustrates this, using the cases of the Baltic States, such as Lithuania, Latvia, and Estonia.

2. Research methodology

Secondary data for the period 2004-2020 were selected to investigate the relationship between defence expenditure on personnel and economic development in the Baltic states, Lithuania, Latvia and Estonia. Statistical data were taken from the Eurostat (2020) [23] and NATO (2020) [24] databases. Using a cost-based approach (UN, 2016), the author focuses on the input side to assess the potential of military human capital. Defence expenditure on personnel has been used as a proxy for military human capital, and real gross domestic product (GDP) per capita as a proxy for economic development. The focus of this research was to answer the following questions:

- Does defence expenditure on personnel (investment in human capital) have an impact on economic development in Lithuania?
- Does defence expenditure on personnel (investment in human capital) have an impact on economic development in Latvia?
- Does defence expenditure on personnel (investment in human capital) have an impact on economic development in Estonia?
- What are the differences among the Baltic states in terms of the links between defence expenditure on personnel (investment in human capital) and economic development?

To answer these questions, a statistical analysis was performed using IBM SPSS 27v software.

The investigation consists of the following steps:

- Descriptive statistics to assess the dynamics of defence personnel expenditure and economic development indicators between 2004 and 2020.
- Correlation analysis is used to determine the relationship between the variables considered. It also indicates the strength and direction of the relationship.
- Automatic Linear Modeling (ALM) which is based on automatic variable selection and automatic data preparation, and the 0.95 confidence level [25]. This allows one to assess the impact of defence personnel expenditure on economic development. The ALM procedure avoids the shortcomings of the collected data set and allows an internal procedure to be carried out on the transformation of the target and predictors in order to maximize the predictive power of the designed model [26].
- The indicators selected for the research are presented in Table 1.

Table 1.

Indicators selected for research

Type of variable	Indicator	Unit
Y (dependent)	Real GDP per capita	Euro
X (independent)	Defence expenditure on personnel	Million euro

Real GDP per capita (Y) measures a country's economic development and level of well-being based on international comparisons.

Defence expenditure on personnel includes all expenditures on current personnel (salaries, training, health care, etc.), retirement pensions of military personnel; and social services for personnel and their families (NATO, 2020; SIPRI, 2022).

The next section presents the results of the investigation.

3. Research results

The investigation starts with descriptive statistics, which helps to reveal the tendencies of defence expenditure on personnel and real GDP per capita in the Baltic States between 2004 and 2020. In this analysis, the dependent variable, Y, is the real GDP per capita and independent variable, X, is defence expenditure on personnel.
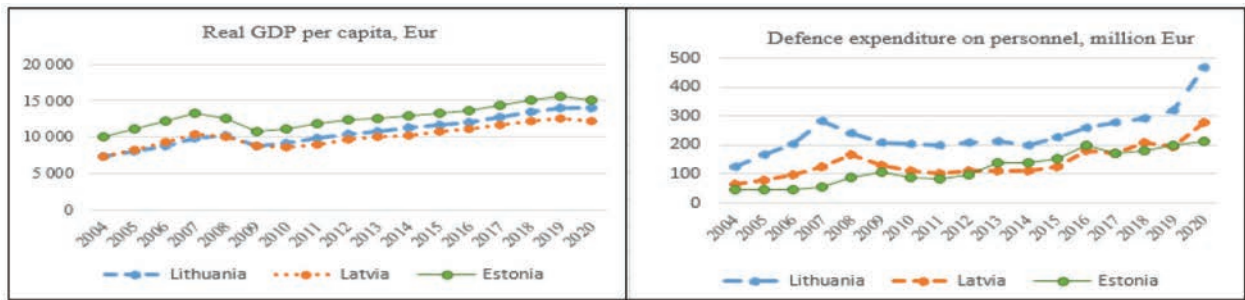
Fig. 2. The tendencies of dependent and independent variables Source: Eurostat (2020) [23], NATO (2020) [24].

Figure 2 shows the tendencies of dependent and independent variables. The dynamics of real gross domestic product per capita shows that the three Baltic countries follow similar trends, but Estonia has a higher level of economic development than Lithuania and Latvia. When analysing trends in defence personnel expenditure, it can be seen that during the period 2004-2020, expenditure increased in the three countries. However, Lithuania invests more in human capital than Latvia and Estonia, which have similar investments.

The case of Lithuania. Table 2 shows the results of the descriptive statistics for the variables under consideration.

Table 2.

Descriptive statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Real GDP per capita (Y)	17	7270	14050	10692	2076.417	0.198	0.550	-0.911	1.063
Defence expenditure on personnel (X)	17	125	468	241	76.080	1.610	0.550	4.261	1.063

Source: author's calculations based on SPSS 27v.

The preliminary analysis reveals that the real GDP per capita (Y) varied from 7270 to 14050 euros, and the average for the studied period reached 10692 euros. Meanwhile, defence expenditures on personnel varied from 125 million euros to 468 million euros and averaged 241 million euros. Given that the investigation focuses on the relationship between real GDP per capita and defence expenditure on personnel, it is essential to answer the question whether there is a relationship between the variables considered. For this purpose, the author uses correlation analysis (Table 3).

Table 3.

Spearman's correlation coefficient and its significance

Country	Correlation coefficient	Sig. (2-tailed)
Lithuania	0.792**	0.000

**Correlation is significant at the 0.01 level (2-tailed)
Source: author's calculations based on SPSS 27v.

Correlation analysis shows a very strong and significant relationship between real GDP per capita and defence expenditure on personnel in Lithuania. As personnel expenditure increases, so does the real GDP per capita.

Next, the author uses Automatic Linear Modelling (ALM) analysis, which allows one to assess the impact of defence personnel expenditure on economic development. Figure 3 illustrates that defence expenditure on personnel explains 63.7 percent of variation in real GDP per capita.
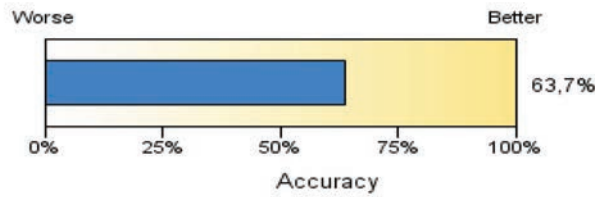
Fig. 3. The impact of defence personnel expenditure on economic development
Source: author's calculations based on SPSS 27v.

Table 4 presents the coefficients of the constructed model.

Table 4.

Coefficients of the model

Model term	Coefficient	Sig.	Importance
Intercept	5341.719	0.000	
Defence expenditure on personnel_transformed	22.168	0.000	1.000

Source: author's calculations based on SPSS 27v.

The regression model can be expressed as the following equation:

$$Y = 5341.719 + 22.168 * X \ (1)$$

Where: Y, real GDP per capita, X- defence expenditure on personnel.

The regression model shows that a one unit increase in defence expenditure on personnel leads to 22 units increase in real GDP per capita in Lithuania.

The case of Latvia. Table 5 shows the results of the descriptive statistics for the variables under consideration in Latvia.

Table 5.

Descriptive statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Real GDP per capita (Y)	17	7340	12530	10094	1490.839	0.013	0.550	-0.745	1.063
Defence expenditure on personnel (X)	17	63	279	139	54.450	1.085	0.550	1.245	1.063

Source: author's calculations based on SPSS 27v.

Preliminary analysis reveals that real GDP per capita (Y) ranged from 7340 to 12530 euros, and the average for the studied period reached 10094 euros. Meanwhile, defence expenditure on personnel ranged from 63 million euros to 279 million euros and averaged 139 million euros. Given that the investigation focuses on the relationship between real GDP per capita and defence expenditure on personnel, it is essential to answer the question whether there is a relationship between the variables considered. For this purpose, the author uses correlation analysis (Table 6).

Table 6.

Spearman's correlation coefficient and its significance

Country	Correlation coefficient	Sig. (2-tailed)
Latvia	0.870**	0.000

**Correlation is significant at the 0.01 level (2-tailed)
Source: author's calculations based on SPSS 27v.

The correlation analysis shows a very strong and significant relationship between real GDP per capita and defence expenditure on personnel in Latvia. As personnel expenditure increases, so does real GDP per capita.

Next, the author uses Automatic Linear Modelling (ALM) analysis, which allows one to assess the impact of defence personnel expenditure on economic development. Figure 4 illustrates that defence expenditure on personnel explains 71.3 percent of variation in real GDP per capita.
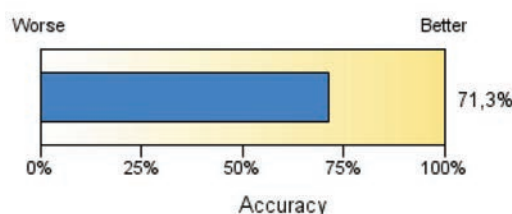

Fig. 4. The impact of defence personnel expenditure on economic development
Source: author's calculations based on SPSS 27v.

Table 7 presents the coefficients of the constructed model.

Table 7.

Coefficients of the model

Model term	Coefficient	Sig.	Importance
Intercept	6833.257	0.000	
Defence expenditure on personnel_transformed	23.415	0.000	1.000

Source: author's calculations based on SPSS 27v.

The regression model can be expressed as the following equation:

$$Y = 6833.257 + 23.415 * X \ (2)$$

Where: Y, real GDP per capita, X- defence expenditure on personnel.

The regression model reveals that a one unit increase in defence expenditure on personnel leads to 23 units increase in real GDP per capita in Latvia.

The case of Estonia. Table 8 shows the descriptive statistics results for the variables considered in Estonia.

Table 8.

Descriptive statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Statistic	Std. Error	Statistic	Std. Error
Real GDP per capita (Y)	17	10050	15510	12791	1577.079	0.110	0.550	-0.705	1.063
Defence expenditure on personnel (X)	17	46	215	121	58.084	0.195	0.550	-1.338	1.063

Source: author's calculations based on SPSS 27v.

The preliminary analysis reveals that real GDP per capita (Y) varied from 10050 to 15510 euros, and the average for the studied period reached 12791 euros. Meanwhile, defence expenditures on personnel varied from 46 million euros to 215 million euros and averaged 121 million euros. Given that the investigation focuses on the relationship between real GDP per capita and defence expenditure on personnel, it is essential to answer the question whether there is a relationship between the variables considered. For this purpose, the author uses correlation analysis (Table 9).

Table 9.

Spearman's correlation coefficient and its significance

Country	Correlation coefficient	Sig. (2-tailed)
Estonia	0.804**	0.000

**Correlation is significant at the 0.01 level (2-tailed)
Source: author's calculations based on SPSS 27v.

The correlation analysis shows a very strong and significant relationship between real GDP per capita and defence expenditure on personnel in Estonia. As personnel expenditure increases, real GDP per capita also tends to increase.

Next, the author uses Automatic Linear Modelling (ALM) analysis, which allows one to assess the impact of defence personnel expenditure on economic development. Figure 5 illustrates that defence expenditure on personnel explains 63.4 percent of variation in real GDP per capita.
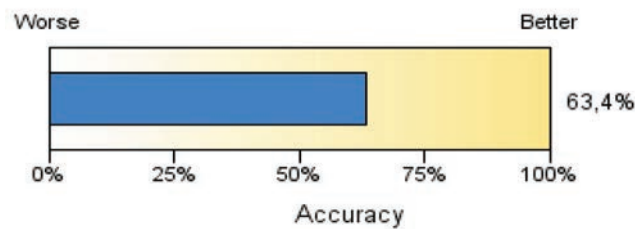

Fig. 5. The impact of defence personnel expenditure on economic development
Source: author's calculations based on SPSS 27v.

Table 10 presents the coefficients of the constructed model.

Table 10.

Coefficients of the model

Model term	Coefficient	Sig.	Importance
Intercept	10131.786	0.000	
Defence expenditure on personnel_transformed	22.009	0.000	1.000

Source: author's calculations based on SPSS 27v.

The regression model can be expressed as the following equation:

$$Y = 10131.786 + 22.009 * X \quad (2)$$

Where: Y, real GDP per capita, X- defence expenditure on personnel.

The regression model shows that a one unit increase in defence expenditure on personnel leads to 22 units increase in real GDP per capita in Estonia.

4. Conclusions

There is no consensus in the academic context on the factors on which the concept of human capital should focus. While some researchers identify skills, health, education, and training as the key factors of the concept, others take a broader view by including emotional intelligence, work experience, employee well-being, and loyalty to the

institution, as well as the social and cultural characteristics. These characteristics are also important for military human capital, as they help to reveal its potential and fulfill an important national duty.

The relationship between human capital and economic development has been subject to extensive discussion as scientists seek to reveal how the value of investment in personnel (salaries, training, education, health) impact the economic development of the country. The defence sector is dependent on human resources and sensitive to their fluctuations. The investments in military human capital provide a positive impact on economic development, as the skills and experience acquired during military service produce a social benefit and the military outcome in the form of peace, stability, and security.

The investigation of the relationship between defence expenditure on personnel (cost-based approach) and economic development reveals that investments in military personnel have significant and positive impact on economic development in the Baltic States. Defence expenditure on personnel explains 63.7 percent of variation in real GDP per capita in Lithuania, 71.3 percent in Latvia and 63.4 percent in Estonia.

The study is limited to assessing the military human potential from a cost-based perspective or from the input side. More detailed research is needed on the individual determinants of military personnel's potential, such as education, health, skills, emotional intelligence, experience, etc., and how they relate to the defence of the country in the face of contemporary threats.

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