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EXPLORING THE MIDDLE EAST AS A MARKET FOR SERBIA'S DEFENSE INDUSTRY[1]

Istraživanje Bliskog istoka kao tržišta vojne industrije Srbije

Abstract

The purpose of this research is to explore the Middle East as a promising market for the Serbian industry of weapons and military equipment. The first step is building the empirical model by estimating the impact of relevant economic and political factors on Serbian military exports. The model utilized annual data over the period 2010-2021. The independent variables refer to military spending and military imports of all importing partners of Serbia in this industry, standard geographical factors, and, more importantly for the targeted Middle East region, the impact of traditional political and trade relations inherited from the former Yugoslavia. The coefficients obtained show a strong influence of traditional military export ties and the total military imports of partner countries. Although post-Yugoslav Serbia has acquired new export markets in the East, and even more so in the West, the most important markets are still the countries of the Middle East and North Africa. The application of the obtained coefficients on the countries of this region indicated four groups of markets in this region, regarding combinations between high and low realized and calculated potential exports. The results indicate the special importance of the markets of Saudi Arabia, Egypt, Iraq, the UAE, and Algeria.

Keywords: *Middle East, Serbia, defense industry, export of weapons and military equipment, military spending.*

Sažetak

Cilj ovog rada je da se istraži Bliski istok kao perspektivno tržište za srpsku industriju naoružanja i vojne opreme. Prvi korak je izgradnja empirijskog modela procenom uticaja relevantnih ekonomskih i političkih faktora srpskog vojnog izvoza. Model je koristio godišnje podatke za period 2010-2021. Nezavisne varijable se odnose na vojnu potrošnju i vojni uvoz svih uvoznih partnera Srbije u ovoj industriji, standardne geografske faktore i ono što je važnije za ciljani bliskoistočni region – uticaj tradicionalnih političkih i trgovinskih odnosa nasleđenih iz bivše Jugoslavije. Dobijeni koeficijenti su pokazali snažan uticaj tradicionalnih vojnih izvoznih veza, kao i ukupnog vojnog uvoza partnerskih zemalja. Iako je post-jugoslovenska Srbija stekla nova izvozna tržišta na istoku, a još više na zapadu, tržišta zemlje Bliskog istoka i severne Afrike su ostala najvažnija. Primena dobijenih koeficijenata na zemlje ovog regiona ukazala je na četiri grupe tržišta u ovom regionu, u pogledu kombinacija između visokog i niskog ostvarenog i obračunatog potencijalnog izvoza. Rezultati su ukazali na poseban značaj tržišta Saudijske Arabije, Egipta, Iraka, UAE i Alžira.

Ključne reči: *Bliski istok, Srbija, odbrambena industrija, izvoz naoružanja i vojne opreme, vojna potrošnja.*

Introduction

The industrial sector has historically been regarded as a cornerstone of sustained development and progress [10, p. 289]. Following the difficult transition of the 1990s and the dissolution of Yugoslavia, Serbia witnessed a decline in its competitive standing across various manufacturing sectors. Sectors such as electronics and machinery regressed to technological levels reminiscent of decades past. Serbian industry has a "large number of problems (low-tech, unequal regional development, low export competitiveness, unfavorable structure of industrial production...)" [3, p. 184]. As innovation remains a "critical factor for global market competitiveness" [5, p. 203], the persistently low sophistication of export products has emerged as a significant barrier to overall economic growth in the Western Balkans, formerly Yugoslavia [16]. Moreover, the proportion of high-tech exports within Serbia's total exports declined during the second decade of the 21st century [5, p. 203]. Amidst these challenges, the military industry stands out as the sole manufacturing sector maintaining its technological level and continuing to advance. Although Serbia's arms and ammunition production suffered transitional shocks and the loss of many plants located in other Yugoslav republics, it has remained a key pillar of the Serbian economy. Despite not being the largest export sector statistically, the military industry holds substantial importance and contributes significantly to the national economy. Unlike other major export products, such as semiconductors and automobiles, which are produced by foreign companies with minimal local revenue due to their role in long international production chains, the military industry is entirely state-owned. Furthermore, all subcontractors involved in this sector—ranging from machinery and metals to rubber, textiles, and electronics—are domestic companies, ensuring that the economic benefits remain within the country.

The primary focus of this research is to assess the potential for increasing Serbia's military industry exports. This study builds upon one of the three models of Serbian arms exports developed in 2020 [19], with a particular emphasis on applying this model to the Middle East and North Africa (MENA) countries, which are crucial markets for any arms manufacturer.

Given the region's numerous economic, political, and geographical characteristics, MENA is identified as a promising market for expanding Serbia's military exports. Although the advantages of the MENA region as an export market extend beyond just weapons, trade and political relations with these countries were largely neglected from 1990 to 2014. This prolonged period of weak economic and diplomatic ties resulted in a significant reduction in both total trade volume and military exports. However, in recent years, relations with several MENA countries have been revitalized, with some, such as the UAE and Qatar, experiencing substantial improvements. Nevertheless, compared to the former Socialist Federal Republic of Yugoslavia (SFRY), Serbia's trade volume and overall economic cooperation with Arab countries have diminished. The scale of arms exports and military cooperation with this region has yet to reach its former levels.

The fundamental assumption of this research is that Serbia has significant untapped potential to increase arms and ammunition exports to MENA markets. An additional hypothesis is that political factors play a crucial role in enhancing Serbian arms exports. In this context, "political factors" refer to the traditional ties that Serbia has maintained since the SFRY era. These ties are not solely based on inherited markets or the passage of time but also on friendly and politically neutral relations, characterized by non-interference in internal affairs—an approach rooted in the Non-Aligned Movement (NAM), which Serbia inherited from that earlier period. The resilience of Serbian military exports to MENA markets, despite the collapse of the Eastern Bloc and the end of the Cold War—during which key export partners such as the UAE and Egypt fell under U.S. influence, and others like Algeria established defense ties with Russia—underscores the importance of these traditional relations.

The first chapter provides an overview of the literature relevant to both the military industry and the methodological framework for constructing an empirical model of Serbian arms exports.

The second chapter addresses the background of the research problem, consisting of two sections. The first

section offers an overview of militarism, military spending, and arms imports in the MENA region, highlighting the significance of this market for arms and ammunition exports. The second section reviews the key features of Serbia's arms and military equipment industry, presenting data on the most important export destinations and the volume of Serbian arms exports, with a particular focus on MENA markets.

The methodological approach is detailed in the third chapter, where the selected variables are explained and classified into economic, geopolitical, and geographical groups. An empirical model is also developed in this chapter to validate the assumption of significant export potential. The variables tested differ somewhat from the usual ones, as they reflect factors specific to this type of trade. Instead of the typical market size indicators (GDP, GDP per capita), this model tests military spending and arms imports. Additionally, the political factor, particularly traditional relations, is quantitatively assessed. Standard geographical factors, such as population size and geographical distance, are also included in the model. The resulting coefficients will be used to construct a model of Serbian military exports.

In the fourth chapter, the developed model (equation) is applied to individual markets in the MENA region to determine their export potential. By comparing potential exports with realized exports, this research will offer concrete recommendations for intensifying efforts by the government, diplomatic corps, and producers to increase exports to countries that show significant "free space" for additional imports of Serbian military industry products.

Literature review

Despite its large share in world trade and great importance for many economies, scientific papers on the economic aspects of this sector are very rare. Most of them refer to the impact of military spending on the domestic economy, such as Ram, Dunne et al., Yakovlev, while the arms trade as an economic topic is completely in the shadow of moral and peace approaches [15], [6], [21].

The first step in exploring this topic was made by Anderton (1995) who applied international trade models to arms trade [1]. An important contribution to this area was also made by the research of Zubair and Wizarat on the effects of arms exports on economic growth [22]. Like any other type of export, it provides amounts of foreign currency necessary for the import or repayment of international loans, provides additional funds that can be used to increase domestic production or create conditions for economic development. Besides, defense industry production usually encourages the development of other manufacturing sectors such as the electronic industry, metal processing, rubber production, and additional engagement of the workforce of all profiles [19]. Also, there is a full range of services, which are also subject to trade: assistance in handling deliverables, "technical assistance" in maintaining those assets, including overhaul and delivery of spare parts, construction of military infrastructure facilities (airports, base facilities, launch ramps), as well as resource production facilities. These rare articles deal with the effects of arms exports on the domestic economy, but, to our knowledge, there are no studies that evaluate the factors of military exports themselves.

There are no statistical databases available on the characteristics and exports of the former Yugoslav defense industry, but in this general assessment we rely on scientific papers and monographs of high-ranking officers of the Yugoslav Army. Radić provides data about military production, demand and export; Matović, and Kovačev *et al.* about distribution of military plants across the republics of former Yugoslavia, and its capacities [14], [11], [9].

To the best of our knowledge, the only study that employed quantitative methods to assess the export potential of Serbia's defence industry is Stanojević's 2020 research [19]. Given the significant shifts in the global security and economic landscape since this analysis, it is crucial to revisit the parameters of Serbia's defence exports. In particular, there is a pressing need to evaluate the export potential to the Middle East, a region historically significant to Serbia's defence industry but now marked by heightened security turbulence.

Background

Militarism, Military Spending, and Arms Imports in the Middle East

The Middle East is one of the most unstable regions in the world security-wise. Since the Second World War, there has been no period without conflicts within states, between states in the region, or international conflicts with the participation of great powers. One of the consequences of armed conflicts and tensions is the extremely extensive militarization of the region. Accelerated armament has been going on for several decades, with different occasions and sources of supply. First, as part of the Cold War, the United States helped organize and arm extreme mujahedeen in some countries to destabilize the Soviet Union, which occupied Afghanistan. Then, weapons worth millions of dollars reached the region, first as Western support for puppet regimes and later for opposition forces, revolutionary or terrorist, to overthrow "unsuitable" regimes. The high level of militarization further encouraged militant and terrorist organizations within the region, which became significant buyers of weapons and ammunition, and then the authorities who were forced to fight these organizations. Thus, extremely high military spending and import is not an exclusive consequence of the participation of some Arab states in various regional conflicts but indicates a widespread sense of insecurity of governments in the region.

In absolute terms, arms purchase of Saudi Arabia in 2022 were $75 billion, Egypt $4.6 billion, Algeria $9 billion, Iraq $5.6 billion etc. [8]. The scale of military spending in the region is best explained by the fact that as many as five of the top ten arms importers globally are MENA countries (measured by their share of world imports), which is completely disproportionate to their size, population, and the overall economy. The MENA region is the largest arms importer globally, with more than 30% of the world's arms imports and only 6% of the world's population. The share of conventional arms imports in the world import in period 2016–2020, was 11% in Saudi Arabia, 5.8% in Egypt, 4.3. in Algeria, more than 3% in UAE, Qatar and Iraq [20].

The armament of the countries in MENA can be analyzed both as a security and as an economic phenomenon.

From a security point of view, a certain level of military spending is necessary to preserve internal and external security. Intra- and inter-regional security crises, which often escalate into serious armed conflicts, are a common stimulus to armaments. In addition to imports, military spending includes the production of weapons, spending on training and accommodation of the army, and more. However, in MENA countries, arms expenditures are at a level that is a burden for most economies, limiting the funds intended for the development of the economy. Military spending in the countries of the region averages more than 7% of their GDP (Table 1). For the sake of comparison, the global average is 2.4%, the Western European average is 1.3%, the same as sub-Saharan Africa, while the US has a share of 3.4% [17].

The share of military spending in the government spending of Saudi Arabia and Oman is a record 22%, but the other governments in the region also have a double-digit share of this indicator (Table 1). This is significantly higher than in other parts of the world. The share of military spending in total government spending is lower than 6% in Africa and South America and around 3% in Central America and Europe [17].

Table 1. Military spending in the MENA countries (2020)

Country	Share of military spending in GDP (%)	Share of military spending in government spending (%)
Saudi Arabia	8%	22%
Algeria	7%	17%
Libya	7%	11%
Morocco	4%	12%
Tunisia	3%	9%
Bahrain	4%	12%
Egypt	2%	5%
Iran	2%	12%
Iraq	4%	8%
Israel	6%	12%
Jordan	5%	15%
Kuwait	7%	10%
Lebanon	3%	11%
Oman	11%	22%
Qatar	1.5%	5%
Syria	4%	14%
UAE	6%	17%
Yemen	4%	14%

*The latest data for Libya, Yemen, Syria, Qatar, and the UAE are for 2014.
Source: authors according to SIPRI Arms Transfers Database: Importer/Exporter TIV tables

The large consumption and import of arms and ammunition to the MENA have been the main basis of trade between these countries and Serbia for several decades, i.e., Yugoslavia in the previous period. Some of the countries in the region are the largest importers of defense industry products from Serbia.

Serbia's defense industry and MENA as its suitable market

Defense industry is frequently described as "the driver of the Serbian economy" [4]. A strong and wide industrial base for the production of machines, electrical equipment, metal processing, rubber, and others was developed within the Socialist Federal Republic of Yugoslavia (SFRY), which enabled the development of a wide range of weapons and military equipment. The Cold War environment and the commitment to a policy of non-alignment gave a strong impetus to the continuous increase in production to ensure relative independence and increase the quality and development of new models of weapons.

Radić provides data that the domestic defense industry met about 80% of military demand, including product development at domestic institutes [14]. Over time, production increased so much that about a third was intended for export [14]. Within SFRY, most of the weapon factories were located in Serbia, as many were actually established before Yugoslavia – within the Kingdom of Serbia [8]. For example, the first cannon barrels in this area were cast in 1853 in the Serbian city of Kragujevac in *Zastava* factory, which became the largest weapons factory not only in the former Yugoslavia but in the Balkans, and today is one of the twenty largest companies in the small arms and light weapons category (SALW) [26], [12]. During the time of SFRY, part of the defense industry was moved to other federal units for political and economic balance. As these were mainly parts production plants, the breakdown of SFRY led to a sharp decline in production. These factories were mostly shut down in other federal units because they did not have the technology to produce any of the products independently [11]. The Serbian arms industry suffered significant damage but survived, and with more than 550 factories, it remained one of the most successful manufacturing sectors in the country. In 2024,

56 companies that have a production license and employ about 10,000 workers were registered in the Register of Arms and Military Equipment Manufacturers [12]. The largest production and export are achieved by 17 of them, which are under the control of the government group Defense Industry of Serbia (DIS).

The most important products of the Serbian defense industry are small arms, as the most recognizable product (M70, as the most exported domestic versions of the Soviet Kalashnikov; a pistol in caliber 9 mm – CZ 99), then ammunition, rockets, and rocket launchers, grenades, explosives, tanks, and armored vehicles [18]. All these products have a certain place in the export of Serbia, but only the production of light arms and ammunition far exceeds the needs of the Serbian Armed Forces, which is why these products have the largest share in military exports. At the same time, this is one of the few product groups which has a significant surplus in foreign trade. As a result, the export of weapons and military equipment is one of the biggest comparative advantages of Serbia on the world market, and exports make up 2–2.5% of the total exports of Serbia.

The value of exports fluctuated between $400 and $450 million in 2016–2019 [13]. With minor oscillations, it increased from 2005 to 2017. Large oscillations are common in the export of weapons because importers sporadically replenish or increase stocks, and only a small part of their imports are regular purchases.

Serbia exports arms and ammunition to more than 40 different countries each year, while the total number of export markets is more than 60 countries, looking at all export markets in the past decade. The largest importers of weapons from Serbia are the United Arab Emirates, Saudi Arabia, and the United States.

Among the most important export markets, there are several other MENA countries, such as Egypt, Iraq, Algeria, and Israel, with variable import volumes per year. MENA region has many advantages as an export market for Serbian goods in general, while some specifics are of particular importance only for the export of the defense industry.

- Trade compatibility in arms and military equipment is extremely pronounced. The assumption is based

mainly on the emphasized import-export compatibility. Weapons and ammunition are one of Serbia's most important export sectors, while the Middle East is most often the region with the highest military spending in the world. Oil monarchies of the GCC make up the core of the Middle East defense market [7]. Most countries in the MENA region do not have a developed industry, thus no basis for producing a significant quantity of weapons for their own needs or the needs of their neighbors;

- An additional argument in favor of the hypothesis of significant export potential is that the products of the Serbian defense industry have been present in many markets of the MENA region for several decades since the time of the former Yugoslavia, whose defense industry was mostly stationed in Serbia. Existing exports indicate no legal or political barriers to these exports, at least to most countries, with trade mechanisms that are already in place;

- The geographical distance is relatively small and allows for lower transport costs compared to other countries in Africa and Asia;

- Another argument is the current intensification of the overall economic relations between Serbia and certain countries in the region. Trade and foreign direct investment with the UAE, Saudi Arabia, and Qatar have been growing strongly for several years, indicating significant economic and political convergence.

The export of weapons and ammunition to the MENA dates back to the Cold War. Former SFRY was the main supplier of weapons to NAM countries. SFRY was the most industrially developed country within the Movement and the only one with significant arms production, supplying arms to buyers among which the most important were the countries of the MENA. As the rest of the world was divided into blocs, which excluded the purchase and sale of weapons on the free market, the conflict areas of the MENA region were crucial for developing the defense industry in Serbia. Along with the United States, these are still the most important export markets today.

Although most of the advantages of the MENA region as an export market apply to all products, not just weapons,

these trade and political relations have been neglected for a long period of 1990–2014. During the 1990s, due to the conflict and the collapse of the former SFRY, there was a general decline in production and exports to Serbia, major changes in the structure of emerging economies, and trade partners and products. Moreover, after the political shift in 2000, Serbia distanced itself further from the Arab countries, as the then new, transitional authorities perceived the "turn to the West" as abandoning previous partnerships. Thus, as early as 2001, thirteen embassies in the Middle East, Asia, Africa, and Latin America were closed. For example, the embassy in Lebanon, where many Serbian companies had always operated, was abolished, which directly resulted in exports to this country being 20 times lower the following year [21].

The long neglect of Serbia's economic and diplomatic ties with the countries of the Middle East resulted in multiple reductions in both the volume of total trade and military exports. After 2014, relations with the MENA countries came back into the focus of Serbian governments, which resulted in increased trade with former partners in a short time. Despite significant trade improvements, earlier export of Serbia has not yet been reached with most countries. Compared to the former SFRY, which had excellent relations and large exports with Arab countries, Serbia has a significantly lower trade volume and overall economic cooperation with these countries. On average, trade cooperation is 40 times lower than in the 1980s [21]. The sector that was the first and strongest to restore Serbia's trade position in the MENA region and that has the greatest prospects for additional placement is arms and ammunition.

Methodological approach

Method

The Multiple Regression procedure is designed to construct a statistical model describing the impact of a two or more quantitative factors X on a dependent variable Y. The basic equation for multiple regression can be written as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon \qquad (1)$$

Where:

- Y is the dependent variable (the variable we want to predict or explain).

- $X_1, X_2 \ldots X_k$ are the independent variables (also called predictor variables or regressors).

- β_0 is the intercept term, representing the value of Y when all independent variables are zero.

- $\beta_1, \beta_2 \ldots \beta_k$ are the coefficients (also known as regression coefficients or parameters), which represent the change in Y for a one-unit change in the corresponding independent variable, holding all other variables constant.

- ε is the error term.

The goal of multiple regression analysis is to estimate the coefficients $\beta_0, \beta_1, \beta_2 \ldots \beta_k$ that best fit the data, minimizing the difference between the observed values of Y and the values predicted by the model. The procedure includes an option to perform a stepwise regression, in which a subset of the X variables is selected. Once the coefficients are estimated, the multiple regression equation can be used to predict the value of the dependent variable for given values of the independent variables. The resulting model will be applied to arms exports to the countries of the Middle East.

Variables

Assessment of export potential of specific sector instead overall exports, requires a special approach, consistent with the characteristics of the observed product group. As this study aims to estimate the export potentials of arms and ammunition rather than total exports, the usual variables need to be significantly modified. In addition to (or instead of) the usual variables of economic market size, military spending, and arms imports are tested, but some of standard trade variables, such as population, geographical distance and bilateral relation, are also included. In this model, we test the following variables:

- Import of arms and ammunition, although expressed in millions of dollars, does not refer to the value of imports at a price paid for procurement but is expressed by trend-indicator value (TIV), as a universal unit of arms value, which is specially constructed by Stockholm International Peace Research Institute [17]. TIV is "based on the known unit production

costs of a core set of weapons and is intended to represent the transfer of military resources rather than the financial value of the transfer" [16];

- Military spending (MS), as a second variable, refers to the governments' spending on armed forces, including the physical capacity, financing, training, and human resources. Although it can be expressed as a share in GDP, military spending is expressed in US dollars in this research. SIPRI Military Spending Database also gives the data on this variable [18]. This variable is not expected to have a large impact on arms imports, as it covers much broader categories, but is a good indicator of the degree of militarization of a particular country;

- GDP is tested as a variable of potential importance because it shows the capacity of countries to import in general [23].

- Political variable cannot be evaluated numerically, but they can be quantitatively measured as categorical variables, which get the value 0 or 1. In this research, the impact of *traditional relations* in the arms trade on Serbia`s export is assessed, as a separate variable (T), which refers to advantages in the export markets which Serbia inherited from the former Yugoslavia. Namely, most of the military-industrial capacities of the former Yugoslavia were located on the territory of Serbia, which means that the new state took over the established trade channels. In addition, Serbia is a legal successor to the former Yugoslavia, which means that it has inherited arms delivery obligations arising from previous agreements. The Serbian defense industry, during the time has not lost these markets and the traditional ties are of key importance.

- The distance (Dis) between the import and export market (usually between capitals) is actually a representative of transport costs and is expressed in kilometers (km);

- Population (Pop) is commonly used as an indicator of the size of the export market. The link between population and arms imports cannot be as direct as in the case of imports of consumer goods. However, as the largest part of Serbian arms exports refers to small arms and ammunition, this variable may have

some significance because the number of soldiers in the armed forces is in line with the number of inhabitants.

Model specification

Having in mind described factors, arms exports can generally be viewed as a function of these factors:

$$EXP = f(TIV, MS, GDP, T, Dis, Pop) \quad (2)$$

The model was made based on panel data for 64 countries, that is a whole set of export destinations of the Serbian arms and military equipment industry. The time frame is twelve years, 2010–2021. As the volume of arms procurement is very uneven in nature, there were no exports to some countries each year, so the variables were estimated based on 752 instead of 768 observations. The model was estimated using panel technique, assuming that the error is constant across countries.

The regression results, with all variables included, are shown in Table 2, where the coefficients indicate the intensity and direction of the influence of individual variables.

Testing the statistical significance of the variables showed that *Distance* and *GDP* variables did not show

statistical significance (p-value > 0.10), so they will not be included in the model. Since the weapons have a high price per unit and are determined by various factors, the absence of the significance of this variable is not unexpected.

The model that meets the highest criteria of statistical significance (p-value < 0.01) consists of 4 variables:

$$EXP_{sjt} = \beta_0 + \beta_1 TIV_{jt} + \beta_2 MS_{jt} + \beta_3 POP_{jt} + \beta_4 T_j + e_i \quad (3)$$

EXP_{sjt} means the export of Serbian weapons to the country j in the year t, TIV_{tj} is the value of the country j military imports in the year t, calculated according to the SIPRI TIV methodology, MS_{jt} is the military spending of the country j in the year t, POP_{jt} means the country j population in the year t, T is a *dummy* variable (0 or 1). The sign s in subscription denotes Serbia, j Serbia's trade partner, and t the year to which the export refers. β_0 is intercept; $\beta_1, \beta_2, \beta_3$ and β_4 are the coefficients of the variables, e_i is a model error. Since the P-value is less than 0,05, there is a statistically significant relationship between the variables at the 95.0% confidence level.

Another test must be done is the test of multicollinearity, and it showed no significant correlation between the independent variables (table 3).

The estimate of potential military exports of Serbia to the target markets is calculated by applying the obtained coefficients, which gives the equation the following form:

$$EXP_{sjt} = 1404 + 5.79TIVjt + 0.12MS_{jt} - 24.08POP_{jt} + 8640T_j + e_i \quad (4)$$

The values of arms imports and traditional trade relations in this sector most strongly determine Serbian exports of arms and ammunition. As the all tested values are expressed in thousands (not in logarithmic form), the obtained results can be easily interpreted. For example, an increase in the partner country's arms imports by $ 1 million (estimated based on the TIV) results in an increase

Table 2. Coefficients of Serbian military export

Variable	Coefficients	Standard Error	t Stat
Intercept	1404***	941.85	1.49
Military import (000 $ - TIV)	5.79***	1.25	4.64
Military spending (000 $)	0.12***	0.01	11.98
GDP (000 $)	0.11	0.08	5.12
Population	-24.08***	4.22	-5.70
Distance	-0.30	0.19	-1.57
Traditional markets	8640***	1732	4.99
R2 (Coefficient of determination)	0.67		
Standard error	8432		
Mean absolute error	3980		
F (Force)	62.74		
Durbin-Watson statistic	0.9047***		

Source: authors' calculation

Table 3. Test of multicollinearity

	Military spending	Military import	Population	Distance	T
Military spending		0.1494	0.4541	0.1358	0.0962
Military import	0.1494		0.2997	0.1010	0.2674
Population	0.4541	0.2997		0.1643	-0.0503
Distance	0.1358	0.1010	0.1643		0.1625
T	0.0962	0.2674	-0.0503	0.1625	

Source: authors calculation

in Serbian arms exports by $ 5790, while an increase in military spending of $1m leads to an increase in Serbian military exports of only $120. Military spending, as expected, has a significantly lower impact than arms imports. However, this variable is statistically significant and contributes to the overall coefficient of determination (R^2), so it is included in the model regardless of the symbolic impact.

Population as a variable in the model indicates that the potential volume of arms procurement is inversely proportional to population growth. Thus, with each additional 1 million inhabitants of the potential market, arms exports from Serbia decrease by $24,008. The inverse proportion can be explained by the fact that Serbia, as a small country, cannot meet the needs of big armies, which is why large countries either produce small arms themselves or import from the world's largest manufacturers such as the US, China, and Russia.

The T variable has a high value, which indicates a strong positive impact of traditional ties and relations on the export of arms and ammunition. As these are unlikely to be inherited close political relations between NAM countries (because this Movement was inactive for decades), the explanation for the permanence of arms trade probably lies in its very nature. Decisions on the type, price, and models of weapons imply long-term strategies, security of regular supply (especially appropriate ammunition for a particular type of weapon), and thus stable political relations. With some reservations, the coefficients for the T variable could also be applied to "new traditional" markets, such as Romania, Belgium, Bulgaria, and the Czech Republic, when it would be the focus of research.

Finally, with these four variables, the obtained model as a whole explains as much as 67% of Serbian arms exports (R^2), which is a high coefficient of determination, especially for specific products such as weapons.

The result of applying the model to MENA markets

By applying the obtained model to the export of Serbia to each country of the Middle East and North Africa, the potential export is determined, i.e., the relatively precise value of Serbian weapons and ammunition that the markets of these countries can receive. Furthermore, by comparing the obtained potential with the realized export, the export routes that are the most open are revealed.

In theory, this ratio is an index that is classified as favorable for additional exports when it is less than 1 because a lower value means more unrealized potential. On the other hand, if the trade potential index is greater than 1, the export potential with a given partner is fully exploited, and the chances for the further increase are slight, at least until significant changes occur in some variables. In arms exports, these changes occur if security conditions are destabilized, or a war breaks out, giving countries an incentive to increase military spending and imports.

In practice, however, the largest importers generally increase imports much more than others, even when there are no extraordinary circumstances, most often because the continued growth of armaments is part of their long-term policy. In contrast, low realized exports relative to potential exports, although showing more opportunity for export, may mean that there are some specific limitations not covered by empirical models. These could be sanctions and bans imposed on a particular country against arms imports, as in the case of Iran, or the dominance of another more competitive exporter (Chinese or Russian military exports) or political influence (US exports). These are not common factors included in the model as variables, as they cannot be generalized, but in specific bilateral trade, it is an almost insurmountable obstacle to increasing exports, despite statistically "great" potentials.

For each MENA country (except Yemen and Libya which have a ban of UN on arms trade), potential exports are calculated, as well as the ratio between realized and potential exports. Due to large annual oscillations and a clear relationship to potential exports, realized exports to the countries of the region are presented as a five-year average (last available 2017-2021).

According to the obtained results, the countries of the MENA region, as export markets for the Serbian defense industry, can be classified into four groups with different export opportunities and specifics.

Table 4. Realized and potential military export of Serbia to MENA countries (average 2017-2021)

Country	Realized export (million $)	Potential export (million $)	Share of realized in potential export (%)
Egypt	18.26	26.99	67.65
Algeria	29.66	27.52	107.78
Israel	2.87	14.87	19.30
Bahrain	1.38	18.50	7.46
S. Arabia	31.66	46.28	68.41
Iraq	10.69	26.18	40.83
Turkey	1.98	11.99	16.51
Oman	1.51	13.88	10.88
UAE	67.45	25.04	269.37
Jordan	3.10	19.89	15.59
Kuwait	0.29	20.13	1.4
Iran	0.00	9.93	-
Qatar	0.00	13.80	-

Source: authors' calculation

Absence of exports and high export potentials

Iran, Qatar, did not import weapons and ammunition from Serbia in the tested five-year period. The main reason for the absence of arms exports to Iran is that it was under UN sanctions until recently and is still under US sanctions. According to the Joint Comprehensive Plan of Action (JCPOA) and UN Security Council Resolution 2231 of 2015, Iran has been banned from transferring all types of conventional weapons listed in the UN Register of Conventional Arms for five years [22]. These are all types of battle tanks, armored vehicles, large-caliber artillery systems, fighter planes, warships, missiles, or missile systems. In October 2020, the arms embargo was lifted, which means that Iran can import and export weapons and military equipment as far as the UN is concerned. The US, however, withdrew from the JCPOA in 2018, and President Donald Trump announced that no country doing business with Iran would be able to do business with the US. Given that trade ties between Serbia and Iran in the arms sector were not particularly developed even before the embargo and potential exports are not large enough for Serbia to ignore the US warning, no penetration into Iran's otherwise large and important market should be expected soon.

As for Qatar, the prospects are far more favorable. Although there are no direct exports, according to the permits issued by the Serbian Ministry of Trade, these countries actually receive deliveries of weapons and ammunition from Serbia worth several million dollars, but through intermediaries, most often through Cyprus and the United States [13]. The exact amounts are usually unknown because intermediaries report several final destinations without the obligation to inform the exporter (Serbia) about the distribution of types and quantities of weapons in the countries listed as final buyers. In the earlier period, more precisely in 2013 and 2014, Kuwait realized significant purchases of weapons from Serbia for 2.2 million and 6.5 million USD, which is much more than in the case of some countries in the region that have regular but small purchases (Bahrain, Oman, Israel, and Turkey) (Table 4). After 2014, there were no more direct exports to Kuwait, but only through the United States as an intermediary.

For the three countries that did not import weapons from Serbia in the analyzed period, the realized and potential exports ratio cannot be calculated. However, more important information is potential exports, and it is obtained by applying all parameters, as in the case of other countries. Available data on Iran's total imports and military spending are unreliable, but it is roughly a potential export of $ 9.9 million. The potential annual export to Qatar is 13.8 million USD. Given the large export potential and the relatively high values of previous exports Qatar could be more important export market for Serbia, with some initiatives by producers or state development institutions. On the other hand, direct exports are not a priority, as long as the products of the Serbian defense industry reach these markets.

Small Realization of high Potential Exports

The export potentials of the Serbian arms and ammunition industry are least used in the case of the markets of Bahrain, Oman, Turkey, and Kuwait and Jordan, and relatively unrealized in the case of Israel. These countries have small imports of weapons from Serbia, and given the values of their military spending, imports, and other variables, potential exports are far higher. The ratio between realized and potential exports shows that these countries have the most unrealized potential. Only 1%–19% of potential exports are realized (Table 4).

However, as it has been said, large potential exports do not necessarily mean large export opportunities but more frequent disadvantages, specific to each export market. These types of barriers are usually much harder to overcome than to increase exports to countries where potential exports are not much higher than realized. This group of countries is not about the complete absence of exports as in the previous ones, but about much greater potentials. In the case of Israel, its annual imports weapons from Serbia are worth $7 million in 2021, $3 million in 2017, but in the intervening years, exports were symbolic or non-existent. Israel appears here mainly only as an intermediary, which places these goods in less developed countries in Asia and Africa [10]. Besides, Israel and Jordan have close trade, security, and political ties with the United States, where almost all arms imports come from.

Turkey, Bahrain, Kuwait, and Oman are the markets to which Serbia should pay more attention and try to achieve higher exports. All these countries are large importers, so the export potentials in the model are of great value. There are no special obstacles in these countries, special relations and ties with the great powers, which would reduce Serbia's export opportunities. In recent years, all three countries have been importing more and more weapons from France and Spain, whose products are not more competitive than Serbian ones in terms of price or quality. With the additional involvement of economic diplomacy and manufacturers, these markets could be far more important to the Serbian arms industry than they are now.

High realization of high potential exports

The largest potential export obtained by applying the model is to Saudi Arabia, $46 million, followed by Egypt and Iraq, with about $26 million. These countries also have high realized imports, which means that the ratio between them is not as large as in the previous group. Statistical unused potential is almost 60% in Iraq and just over 30% in Egypt and Saudi Arabia. Nevertheless, the combination of high potential and realized exports indicates that relatively permanent trade links have been established in this sector, and the chances for increasing exports are realistic.

Larger realized than potential exports

In contrast to the unfulfilled and partially fulfilled export potentials in previous groups, Algeria and the United Arab Emirates have higher arms imports from Serbia than the potential obtained by applying the obtained model. Algeria imports $29 million out of a potential $27 million, while in the case of the UAE, the gap between realized $67 million and potential exports of $25 million is very high.

There is a common limitation of statistical models in these two countries – the inability to include important specifics of each export market. In this particular case, "specificity" is the large-scale re-export of Algeria and the UAE. Namely, the UAE imports large quantities of weapons from Serbia, but only partially for its own needs, while most are resold to third countries. The UAE, along with Algeria, the United States, and Singapore, are the most common and largest intermediaries in the arms trade from Serbia. For example, according to MTTTS reports in 2017, the final export destinations were Saudi Arabia and Indonesia; in 2018, the UAE listed its own country as the final import destination, but also Saudi Arabia and Burkina Faso [13]. The model shows that these countries do not have "space" for additional imports from Serbia because they are based on variables of their military consumption and distance from Serbia, which do not include re-export, while only the variable of arms imports has a connection with re-export. In general, intermediaries could be introduced into the model as a separate categorical variable, but even then, the assessment would not be much more precise, as most partner countries sometimes appear as an intermediary for smaller arms deliveries to their neighbors. So, although the UAE and Algeria are already importing more than calculated potential import from Serbia, the results do not mean that Serbia cannot further increase exports to these markets. On the contrary, the increase in exports to these two countries is just as certain as in the case of other large importers, Egypt, Saudi Arabia, and Iraq, due to their increased import.

Conclusions and policy recommendations

The arms, ammunition, and military equipment industry is one of the few growing sectors of the Serbian economy.

Additional exports of these products could significantly contribute to increased production activities in many supporting industries and stimulate overall economic growth. The Middle East and North Africa have been explored as a market for additional exports. The research showed the potential of each individual MENA market as an export destination. The results can be summarized in several specific recommendations.

The largest military export potentials of the Serbian defense industry were identified in Saudi Arabia, Egypt, and Iraq, as the countries that are already large importers. Significant future markets are also the UAE and Algeria, to which exports were significantly higher than potential. However, this limitation is only theoretical. The statistical model results for these two countries do not show the real situation because most of the realized exports do not end up in their markets but are resold to third countries.

Export potentials to Bahrain, Israel, Oman, Turkey, and Jordan are the least used, i.e., in these countries, there is the largest disproportion between realized and potential exports. With the strong involvement of Serbian manufacturers, exports could increase, but not significantly, due to the pronounced dominance of the United States as its main supplier of weapons. Another obstacle is that Serbia does not have developed economic or significant political relations with these countries (except Turkey), while the arms trade implies relatively developed overall relations.

The markets of Kuwait and Qatar provide moderate chances for increasing the exports of the Serbian arms industry. These countries have large arms imports in general, high potential imports from Serbia, but have not had any military imports from Serbia in the past decade. These two markets have a relatively high demand for weapons and ammunition from Serbian manufacturers, but they procure it through intermediaries, such as the UAE, USA, and Cyprus. Therefore, Qatar and Kuwait could be more important markets for the export of weapons and ammunition from Serbia, with strategically coordinated initiatives of producers and state institutions.

Hypothetically, the source of additional income for the defense industry would be direct exports, without intermediaries, because it can be assumed that end buyers buy weapons and ammunition from intermediaries at higher prices. However, this is not a recommendation of this study. Each individual case should be considered separately from the angle of direct benefits and long-term or wider benefits. In the case of the UAE, which is the largest intermediary, it is more important to keep this country as a partner in arms exports than to conquer final destinations. There are several reasons for this. The UAE is the largest importer of Serbian weapons and ammunition, not only from the MENA region but in general, except for certain years when the United States has large purchases. Furthermore, the UAE is an increasingly important partner of Serbia in other economic sectors due to large investments and joint projects in agriculture, energy, tourism, and many others. Disruption of these relations and future cooperation is not strategically justified by a possible increase in exports of any individual sector, not even weapons.

In the coming years, a notable increase in Serbian arms exports to the UAE and Saudi Arabia can be expected, given that the EU has recommended to its members to reduce arms exports to these countries and that some of the countries have turned the temporary suspension into a permanent one. At the same time, the administration of US President Biden also stopped the sale of weapons to these countries. When it comes to exports to the UAE, deliveries relate not only to the consumption of this country itself but also several countries in the MENA region and also countries outside it, with which trade is conducted through the UAE.

In addition to these specific recommendations, one of the more important and general conclusions is that Serbia should devote more attention and activities to preserving and promoting lasting trade ties in this sector. This is primarily indicated by the data on very uneven procurement and *ad hoc* deals in the placement of arms and ammunition. Secondly, by the very nature of weapons as commodities, trading partners must have stable, preferably friendly political relations. Third, the assessment of the variables of the empirical model showed a very high value of inherited arms export markets from the former Yugoslavia. Although post-Yugoslav Serbia has acquired new export markets in the East, and even more so in the West, the most important markets are still the

countries of the Middle East and North Africa, to which governments of Serbia have contributed little or nothing.

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