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SWOT analysis of the possibilities of introducing AI technologies into Armenia's military sector

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Abstract: The advent of artificial intelligence (AI) in defense systems has significantly altered the scale, scope, and complexity of military operations. This transformation presents both a profound challenge and a unique opportunity for the technological advancement of states, particularly those engaged in regional conflicts, as is the case with Armenia. Integrating AI in defense enhances military capabilities, enabling faster decision-making, predictive analytics, automated systems, and improved operational efficiency. In the context of Armenia, a nation situated in a geopolitically sensitive region, the implementation of AI in defense not only holds the potential to reshape its military posture but also to redefine its technological development trajectory. Armenia's ongoing security concerns and regional tensions make the adoption of AI in defense of strategic importance. The main question considered within the topic is Armenia's potential to integrate AI-based technologies in defense. The findings (based on SWOT analysis) suggest that Armenia has the potential to evolve its defense capabilities through AI (as the example of another post-soviet country Estonia shows) if targeted steps (administrative effort) are taken to mitigate identified risks and weaknesses, while concurrently capitalizing on its inherent strengths and external opportunities.

Keywords: *AI, Armenia, defense, STEM, technology.*

1. Introduction

For a long time, Armenia has been in a difficult geopolitical situation characterized by historical tensions and modern security challenges. Armenia's defense potential plays a crucial role in ensuring national sovereignty and regional stability. In this context, Armenia faces unique challenges, including limited resources and the current dynamics of regional security issues. The integration of artificial intelligence into defense operations offers a promising way to solve these problems by increasing situational awareness, optimizing resource allocation and improving operational efficiency. Using solutions based on artificial intelligence, from autonomous systems to predictive analysis, Armenia can not only modernize its defense infrastructure, but also strengthen its position in an interconnected and technologically oriented global security environment. All this also promises a positive impact on the country's economy, both in terms of saving resources and in terms of organizing technologically oriented production. However, the county faces administrative challenges in adopting AI within the defense sector. Our study seeks to demonstrate how Armenia's potential for advancing its defense capabilities and economic growth is significantly impeded by administrative challenges. These issues, if addressed effectively, could otherwise lead to more favorable outcomes for both national security and economic development. By examining the current administrative barriers, we aim to highlight how their resolution could unlock greater benefits and improve the overall effectiveness of AI integration in Armenia's defense sector.

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To achieve this objective, we have conducted a comprehensive review of the literature regarding the benefits that artificial intelligence (AI) can offer to the defense sector. This includes an exploration of how AI can enhance various aspects of defense operations and how the private sector contributes to the development and implementation of AI-driven technological solutions, which are subsequently applied within the defense domain. Given the highly sensitive nature of defense-related data, our study was constrained to utilizing international indices that pertain to Armenia's engagement with AI in general and in defense specifically, alongside publicly available sources. In light of these limitations, we determined that employing a SWOT analysis on the accessible information would be the most effective methodological approach. A case study of Estonia's administrative approach is brought as an example. By examining strengths, weaknesses, opportunities, and threats, the analysis provides a comprehensive overview of Armenia's current position and prospects in this field. This method allows for a detailed understanding of the internal and external factors influencing Armenia's AI capabilities in defense, informing strategic recommendations for leveraging AI to enhance national security and technological development.

2. Methods

To assess Armenia's potential for integrating AI into its defense sector, a SWOT analysis of the country's technological capabilities was conducted, providing insights into both strengths and areas for improvement. Given the limited availability of public information on defense matters, this analysis used data from international reports and local databases. As part of this study, a case study of Estonia in terms of administrative effort was incorporated to demonstrate effective strategies for enhancing AI integration in defense, providing a relevant comparison for Armenia.

The analysis indicates that Armenia possesses the potential to develop its AI-based defense capabilities, provided that risks and weaknesses are mitigated while strengths and opportunities are maximized. The scientific contribution of this article lies in its proposal of a systematic approach to addressing the challenges identified through the SWOT analysis.

3. Literature Review

The strategic importance of artificial intelligence (AI) in defense is increasingly recognized, with scholars highlighting its transformative potential and its integration into national security strategies. Danzig [3] emphasizes the critical role of AI and cyber technologies in bolstering resilience against cyber threats and ensuring strategic integration into national defense frameworks. Davis and Nacht [13] argue that AI's evolution was significantly driven by military needs, leading to what Hoffman [4], describes as a revolutionary shift in warfare through algorithmic conflicts. Johnson [8] further asserts that AI will have a decisive impact on military power and global politics, while Horowitz [11] points out the challenges posed by limited combat experience with advanced technologies, underscoring the evolving nature of warfare.

Despite these insights, the application of AI in small states like Armenia, which face security and self-sufficiency challenges, remains underexplored. Armenia's potential for developing an AI-based defense sector is notable but hampered by a lack of a state-coordinated digitalization strategy, as outlined in the decision "On Approval of Armenia's Digitalization Strategy" (2023). Ghazeyan [6] and Harutyunyan [5] have contributed valuable perspectives on the opportunities and challenges of AI in Armenia's military context, with Ghazeyan providing a detailed analysis of AI's advantages and Harutyunyan offering an overview of international practices and Armenia's own technological potential. However, our study employs analysis to further explore these aspects, focusing on Armenia's specific strengths, weaknesses, opportunities, and risks in AI development.

The UNESCO Scientific Report [14] reflects Armenia's robust STEM capabilities. The World Bank's report ("Realizing Armenia's High-Tech Potential," [18]) underscores Armenia's potential in machine learning and its comparative advantage in mathematics. The success of startups like Krisp and Picsart further illustrates Armenia's growing technological influence [2]. However, RA's lack of a

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cohesive digitalization strategy and AI-specific regulations, as highlighted by the NRI Index [21] limits the integration of AI into various sectors, including defense, meantime Global Cybersecurity Index [24] pose additional risks. Global Economy Reports [37] show that brain drain remains a major issue, with a high emigration rate of STEM professionals affecting the retention of crucial talent.

This integrated review combines insights on the broader strategic role of AI in defense with an analysis of Armenia's specific context, highlighting the interplay of strengths, weaknesses, opportunities, and risks in the development of AI technologies.

4. SWOT Analysis of the Potential for the Development of the AI-Based Defense Sector in Armenia

The changing defense sector, which is developing in parallel with technological progress, leaves states with no choice but to find mechanisms to counter new types of threats (asymmetric warfare, hybrid warfare, cyberwarfare). Advances in artificial intelligence have a direct impact on national security, driving change in three areas: military superiority, information superiority, and economic superiority [7]. Investments in defense technologies based on artificial intelligence can provide Armenia with a leading position in the field of technological innovation, thereby strengthening not only the country's defense potential, but also stimulating the overall technological development of the country. In general, the use of artificial intelligence in the defense sector of Armenia can not only strengthen the national security of the state, but also position the country as a competitive player in the global technology market, stimulate economic growth and strengthen its international political and economic influence, thereby also preparing fertile ground for international cooperation. By developing the capabilities of artificial intelligence in the field of defense, Armenia can reduce its dependence on external suppliers of important defense technologies, thereby ensuring some stability in the current conditions of geopolitical uncertainty.

SWOT analysis helps to systematically assess Armenia's strengths, weaknesses, opportunities and threats in the field of artificial intelligence and defense technologies, determining the stage at which the country is located in terms of technological capabilities and infrastructure readiness.

4.1. Strenghts

In the framework of the study, the following were considered as strenghts:

1. Accessibility of STEM researchers
2. Availability of research centers
3. A favorable environment for IT development

Armenia has one of the most important prerequisites for the development of artificial intelligence - STEM researchers according to "UNESCO Scientific Report"[14] on Armenia. It ranks 2nd among the countries of the Black Sea basin with 416 publications in 2019 in terms of the number of scientific publications per million population, ranking 2nd among the countries of the Black Sea basin with 416 publications in 2019. Armenia also held this position in 2011 and 2015, in other words, the country's position remained unchanged for almost 10 years (from 2011 to 2019). This means that Armenia occupies its unique place in the global scientific landscape (which it can also strengthen by conducting research in the field of the latest artificial intelligence technologies, meeting the imperative of the time)(UNESCO Science report[14]).

The Institute of Computer Science and Automation is a leading research and technological development institute of the National Academy of Sciences of the Republic of Armenia (NAS RA) in the field of applied mathematics and the application of computer technologies in various fields of computer science, science and technology (Institue of informatics and applied science[15]). Another well-known center in the STEM field is the Institute of Molecular Biology, which conducts research in the fields of molecular biology, genetics, biotechnology and related fields(Institue of Molecular Biology[16]). The Institute of Radiophysics and Electronics[17], which is examining millimeter wave generation and

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frequency conversion in high-frequency superconducting Josephson structures (Institute of radiophysics and electronics[17]).

Armenia's technological progress is also evidenced by the World Bank's report "Realizing Armenia's high-tech potential"[18], which emphasizes that Armenia has the potential to take a leading position in the field of machine learning thanks to a technology-oriented population (World bank report[18]). The report also highlights Armenia's significant comparative advantage in mathematics and natural sciences.

In the case of an appropriate regulatory framework, as well as investments in research and development, Armenia's mathematical heritage can position it as a center for research in the field of artificial intelligence. This will not only contribute to strengthening the country's defense capability, but also improve its economic prospects on the world market. The same study shows the following: Armenia's participation in the information and communication services (IT) sector has led to promising export growth. Exports of IT services doubled between 2009 and 2017, increasing from about 94 million US dollars to 212 million US dollars.

In recent years, a number of Armenian companies (for example, Synopsis and Mentor Graphics) have switched from modeling to production and attracted significant external subsidies. Many IT companies have developed dynamically thanks to high technologies, for example, Picsart, which is estimated to cost $250 million, has developed an image editing and networking application that has been downloaded from the Internet 600 million times, indicating high global demand for the application .

Some Armenian startups have made significant progress in the development of machine learning. The startup Krisp uses real-time machine learning to eliminate background noise (this feature may be useful in military intelligence). The company earned US$ 9 million with the help of such a development, while it previously stated that it plans to earn US$ 5 million. additional money was spent on the development of the company, which increased both the number of customers and the company's revenue (Coldway, 2021).

In 2013, Instigate Robotics CJSC was founded in Armenia, which is engaged in the development and production of integrated solutions to complex industrial problems in the field of security. The company not only develops dual-use systems for the civilian and defense markets, but also provides comprehensive training and support services (Instigate Robotics).

These and other similar examples show that companies founded as startups have every opportunity to conquer international markets, as they develop in an environment that encourages the IT sector and demonstrate dynamic growth.

Nevertheless, those areas on which the defense sector directly depends are especially important for Armenia, and the modernization of the defense sector largely depends on a strategy that encourages innovation.

In the case of the Global Innovation Index, Armenia's position ranges from 63rd to 75th place (in a list of more than 130 countries). Which is a positive result, given Armenia's modest economic opportunities and modest investments.

	GII Position	Innovation Inputs	Innovation Outputs
2020	61st	83rd	47th
2021	69th	85th	56th
2022	80th	82nd	73rd
2023	72nd	83rd	62nd

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Figure 1.
Armenia's positions in global innovation index 2020-2023.

Armenia demonstrates more inputs to the innovation sphere than outputs. Among the seven components of the GII, we have the following indicators for Armenia: 61st place in creative achievements, 67th place in knowledge and technology, 69th place in institutions, 94th place in business development, 92nd place in human capital and scientific research, and 89th place according to the level of market development. According to the indicators, there is a gap between the inputs and outputs of innovation, and the costs of innovation prevail over the results of innovation. Development in all these areas is an opportunity of technological development for Armenia, and in modern conditions, technological development means development in the field of artificial intelligence.

4.2. Weaknesses
1. The lack of a systematic approach in the strategy of digitization of protection
2. Lack of relevant laws
3. Cybersecurity issues
4. Gap between education and the labor market
5. Lack of adequate infrastructure for the development of artificial intelligence technologies in the field of defense

In the decision "On the approval of Armenia's Digitalization Strategy, program of strategic measures and final indicators", among digital and technological progress, it is also noted that digital development proceeded "disproportionately" and "as a result of the lack of a unified digital transformation policy and unified approaches in the state system, the digitalization of the government was mainly decentralized with partial solutions". What can be analyzed as follows: technologies in Armenia, including artificial intelligence technologies, have developed significantly in recent years due to private sector initiatives, and despite the fact that the defense sector could also feed on technology development, this did not happen due to weak cooperation or lack of levers of cooperation between the development of AI in the private sector the state sector and the defense sector. Meanwhile, in this case, the expenses of the Armenian defense sector could be significantly reduced, freeing up funds necessary for the development of other industries. Therefore, we consider it important to develop mechanisms for monitoring and guiding the sector at the state level, which, according to our research, is a weak point that can turn into an opportunity if the state creates mechanisms to unite private enterprises around AI research serving the defense sector. The problem of a systematic approach on the part of the state can also be traced in the NRI index (Network Readiness index), where of four different indicators: technology (53), people (61), public administration (management,77) and the impact on the economy (51), the worst indicator among all is the indicator of management (Network readiness index 2023[21]). The defense sector, which we plan to transform under the influence of artificial intelligence technologies, cannot but suffer from changes in sectors on which artificial intelligence technologies directly depend.

Another weakness is the lack of regulation in the field of artificial intelligence. There are no laws in Armenia concerning artificial intelligence and its application (both in the civil and military spheres), however, the use of artificial intelligence in various fields is already an unexplored reality, and more than 60 countries of the world, meeting the growing use of AI every day, have already developed a national strategy in the field of AI [12]. The absence of a national strategy, laws and solutions in the field of artificial intelligence means that responsibility for the use of artificial intelligence at the state level is also not established, cybersecurity (the law is currently in the e-draft system), however, there is no government regulation or law regulating the use of AI in general or in the military sphere.

An important prerequisite for the development of technologies based on artificial intelligence in the field of defense is the systemic provision of cybersecurity. In 2020, Azerbaijani hacker forums and channels published data and documents from some of the most important government agencies and electronic systems in Armenia, including the Mulberry Groupware electronic document management

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system used for interdepartmental communication in the Government of Armenia, database footage. As a result of all this, a number of government websites have been offline for a long time (Cyberhub). Similar problems have arisen in non-military situations. Cyberhub (an information technology emergency support platform) has confirmed information that almost 2.5 million pieces of information were leaked during the 44-day war in 2020. Cybersecurity issues are great danger for Armenia that has a number of regional problems, since the development of artificial intelligence technologies can contribute to the development of the defense industry, but can make the country vulnerable to the leakage of digitized information. The situation may become more complicated if military systems powered by AI are targeted in the near future. Armenia's unfavorable position in the field of cybersecurity is also evidenced by the Global Cybersecurity Index [24], where Armenia ranks 90th.

For the development of the defense sector in Armenia, it is important to consider the development of the defense sector through the prism of the development of education. If educational institutions were somehow connected with agencies, research centers serving the defense sector, students and researchers could apply artificial intelligence technologies to enhance defense capabilities. However, for many years Armenia was guided by the stereotypes of the USSR in the field of education and adhered to a conservative approach, slowing down the development of innovative educational directions. Some studies have shown that only about half (53.7%) of young workers in Armenia are engaged in jobs corresponding to their level of education. 33.6% do jobs for which they are overeducated, and 12.7% do jobs for which they are undereducated (Polytechnic university of RA). Data science, machine learning and many other fields related to the field of artificial intelligence have only in recent years become the main subject or specialty taught in higher education institutions. Meanwhile, Armenia, which has many problems in the field of security, should have paid attention to the technology-oriented education system since gaining independence, so that over the years vocational education in certain areas could also be used in the field of defense, which is vital for it. This circumstance, considered as a weak point in research, can turn into an opportunity if educational programs cover topics related to the field of artificial intelligence that can serve both the civilian sector and the defense sector.

Despite the fact that Armenia is constantly trying to improve its digital infrastructure, development is sometimes uneven. Currently, urban areas have good Internet access, while rural and remote areas often face the problem of high-quality Internet connection. This digital "obstacle" is preventing equal access to digital services and opportunities across the country (PSRC[26]). And to get data from the borders in real time, it is important to have as large a radius of digital capabilities as possible. There are also few data centers in Armenia (Yerevan Data center[27]), and the connection between the existing data centers is weak - there is no common data storage and management system.

The Ministry of Defense is not equipped with military exercises, which are used to simulate and test the performance of artificial intelligence algorithms and evaluate their effectiveness in various conditions, including combat scenarios, environmental factors and system failures.

4.3. Opportunities

1. Attracting investments and opportunities for international cooperation

2. Export opportunities

4.4. The Opportunity to use the Potential of the Private Sector for Defense Sector

Due to artificial intelligence specialists in the field of defense, it is possible to expand the possibilities of international cooperation through joint research projects, consortia, and other ways to facilitate the exchange of experience and knowledge. Thus, the strength of the presence of professionals in this field can fully turn into an opportunity to attract investments. To promote cooperation and research in 2013. The National Engineering Laboratory of Armenia (ANEL[28]) was founded with the support of USAID. ANEL research laboratories, industrial and research institutes, offer a quick and inexpensive solution to their technical and scientific tasks, offering a variety of technological solutions such as modern radars, the latest wireless communication and communication systems. The problem is

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that the defense sector is not attractive from a business point of view, and the presence of the state is a prerequisite for ensuring the production and development of equipment for the defense sector by individual companies. Making the sector "business" attractive can create new opportunities for development. The problems of the development of the business and technological environment are noted in the review of Tech & Entrepreneurial ecosystem mapping 2019 report[29]. The report examines the gaps in Armenia's technological ecosystem that hinder the export and business growth of technology-oriented companies. There is a lack of knowledge about global markets, business knowledge, that is, even with important technological progress, turning ideas into business is a problem in the Armenian reality. The problem also arose from the definitions existing in the laws regulating the defense sector, in particular, in the law "On the Military-industrial complex"[30] military-technical policy is defined as "the official point of view and activities of the state aimed at providing the Armed Forces and other troops with domestic military products and property in peacetime and wartime," which implies that the defense sector is unattractive from the point of view of exports, at least in accordance with the law. For the development of the defense sector using the latest technologies (in particular, artificial intelligence technologies), government policy is important, which assumes the prospect of new development opportunities.

The strengths contributing to the development of artificial intelligence in Armenia create the opportunity to create data processing centers, technology parks, and innovation centers (the initiative was mainly taken by the private sector). In order to develop the sphere of information and high technologies in Armenia, the Enterprise Incubator Foundation was founded back in 2002 within the framework of the World Bank's Enterprise Incubator program[31]. The Foundation aims to create and develop an effective infrastructure in the field of information and high technologies to facilitate the improvement of technologies and the transition to a knowledge-based economy. For Armenia, such a private sector initiative is an opportunity for the state to unite existing companies in their specialized areas into a single system and use it in the interests of all and in the interests of the state. This will allow companies in the field of artificial intelligence to integrate with other technology companies and obtain the most desired results, such as the creation of a joint research center between artificial intelligence research centers and telecommunications companies to study artificial intelligence applications in network optimization, which will also be successfully applied in the field of defense. Similar precedents of cooperation have been registered between educational institutions and individual companies. Again, based on the advantage of having competitive specialists in the field of artificial intelligence, in 2022, the joint efforts of Yerevan State University and the Krispos company founded the scientific and educational research center "YSU-Krisp AI Lab" [32] which is a great achievement in the development of artificial intelligence in Armenia. The American University of Armenia (AUA) and Picsart have jointly established an artificial intelligence laboratory, which employs researchers and students to conduct advanced research in the field of machine learning and computer vision. Such cooperation simplifies the possibilities of cooperation in the defense sector due to existing ties.

The opportunities provided by technological progress contributing to the development of the artificial intelligence sector in communications and telecommunications companies are also significant. Viva-MTS [33], one of the leading communications companies in Armenia, has announced the launch of the 5G network in Yerevan in 2023, which is the first new generation network in Armenia. Technologies such as mobile networks will stimulate Armenia's digital future in a number of areas related to artificial intelligence, cloud technologies, the development of smart cities, as well as in the defense sector. 5G networks can provide much higher data transfer speeds with lower latency. This will allow artificial intelligence systems in defense applications to process and analyze data in real time, which is crucial in terms of making optimal decisions in real time.

Another reputable communication provider in Armenia, Ucom, does not stand aside on the issue of the development and dissemination of digital technologies in Armenia. Given the importance of the geography of technology distribution, the company has launched a number of initiatives in the regions. With the support of the company, the Tumo Center for Creative Technologies was founded in the

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village of Kohb[35]. The company also founded the Armat engineering laboratory in Gegharkunik and in Vayots dzor with the aim of developing technological education also in the regions.

The relevant indicators of the Global Competitiveness report [37] also show technological progress in Armenia. In the 2019 Global Competitiveness report published by the World Economic Forum, Armenia scored 61.28 out of 100 possible points, which is the maximum result of the state for the period 2007-2019. The report consists of 98 variables based on combining data and surveys received from international organizations. The variables are grouped into twelve key areas, the most important of which are institutions, infrastructure, ICT improvements, macroeconomic stability, health, professional skills, commodity market, labor market, financial system, market size, business dynamism, and innovation potential. In many of these areas, the use of artificial intelligence can ensure rapid growth and improve the country's economic performance. It should be noted that the economic stability of a state largely depends on security, since a state involved in military conflicts directs a significant part of its resources to the defense sector. The development of an AI-based defense system can become a new guarantee of economic stability, economic development and increased security for Armenia.

4.5. Risks

1. Brain drain

2. Mismatch between skills and labor market requirements

3. Slow development of digital infrastructure

4. Dangerous dependence on external suppliers

Although the development of a protection system using artificial intelligence technologies for Armenia is possible largely thanks to STEM specialists, unfortunately, this vital capital for Armenia is "flowing away". For the period from 2007 to 2023, the average value of the brain drain indicator in Armenia was 6.45 points. In 2014, the brain drain rate was the lowest 5.7 points, and in 2023 it was the highest 7.2 points. At the end of 2023, the indicator was 7.2 points. For comparison, in 2023, the global average, calculated for 177 countries, was 5.17 points (Global economy reports 2007-2023[37]). If the Armenia's government does not take sustainable steps to prevent brain drain, it is likely that in the near future, at least from the point of view of STEM specialists mentioned in our study, we will have a weakness, not a strenght. Another risk problem is the discrepancy between the skills of job seekers and the requirements of the labor market, as also stated in the World Bank's report "The Second Systematic Country Diagnostics in situational analysis" (The World Bank Second Systematic Country Diagnostic Showcases[38]), which generally examines the areas of identifying the development potential of Armenia. Such inconsistencies also create a problem in the field of protection when there is a shortage of specialists with the appropriate skills and knowledge to operate the equipment.

As for digital infrastructure, slow development against the background of dynamic changes in the modern digital world threatens to become "uncompetitive" in the race between the sectors of digital technology and artificial intelligence. This may affect Armenia's ability to effectively defend itself against modern threats, which poses a great risk from the point of view of protecting the sovereignty of the state. AI-based security technologies are driving innovation in areas such as autonomous systems, preventive maintenance, and data analysis. The lack of development of these opportunities may mean missing opportunities for technological innovation and economic growth in related fields, which may be crucial for the development of the Armenian economy.

The dependence of Armenia's defense sector on imports is also a tangible risk. The import of military equipment from Russia has a significant impact on the economic and political processes in the country[9]. From the point of view of defense, self-sufficiency can create new opportunities for the state, and self-sufficiency is possible only with the use of the latest artificial intelligence technologies. Failure to lead them entails the long-term consequences of unprofitable dependence with all its economic consequences.

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5. Results

In recent years, Armenia has made significant strides in the fields of STEM research and IT development, creating a robust foundation for advancing artificial intelligence (AI). The country's strong position in scientific publications, supported by leading research institutions like the Institute of Computer Science and Automation and the Institute of Molecular Biology, highlights its potential to excel in AI and related technologies. This is further bolstered by the growth of successful tech startups and an environment conducive to technological innovation.

Despite these strengths, Armenia faces several challenges that could hinder its progress. A fragmented digitalization strategy and the absence of specific AI regulations create obstacles for effectively integrating AI technologies, particularly in the defense sector. Cybersecurity issues, such as past data breaches and leaks, pose significant risks, potentially compromising sensitive information and the effectiveness of AI systems. Additionally, a disconnect between educational outcomes and labor market needs limits the development of a skilled workforce necessary for advancing AI applications. However, opportunities abound for Armenia to leverage its strengths. Attracting international investments and fostering global collaborations can enhance the country's technological capabilities. The growth of its IT sector presents export opportunities, and the potential to harness private sector innovation for defense applications is significant. Establishing technology parks, data centers, and innovation hubs could further support the development and deployment of AI technologies. Yet, there are risks that need addressing. The high rate of brain drain threatens to deplete Armenia's pool of STEM talent, while mismatches between job seekers' skills and market requirements could hamper the effective use of AI. The slow development of digital infrastructure and dependence on external suppliers for military equipment also pose challenges that need to be overcome to ensure Armenia's competitiveness and security.

In summary, while Armenia has a strong foundation for advancing AI and improving its defense sector, it must address its strategic, regulatory, and infrastructure weaknesses to fully realize its potential. By seizing opportunities for investment and collaboration, and mitigating risks related to talent retention and infrastructure development, Armenia can strengthen its position in AI-based defense and technology.

6. Discussion

Armenia possesses the foundational elements necessary for the advancement of AI-based defense systems. There arises a question on how? To answer the question we have brought the example of Estonia as another post soviet country with security issues and considered mainly the administrative effort (some aspects) invested towards AI adoption in defense. Estonia's defense is shaped by its position as a frontline NATO member near Russia. Thus, like Armenia it also has its motivation in introducing modern defense solutions. Both countries have undergone the process of post-soviet reconstruction and faced administration issues. Estonia used its geographical position in its favour and turned the ' the risk' into possibility for further evolvement unlike Armenia for which despite the fact of being land-locked country (which could serve as a challenge) did not fully develop its external markets and became economically dependent on Russia.

The foremost important step towards AI integration into defense from Estonia's side was making it a part of country's development strategy. One step towards it was the esablishment of AI Task Force and implementation of comprehensive national AI strategy [40]. Whilst Armenia does not imply any significance on AI adopition in its defense even during the recent years (Armenia Development Strategy (ADS) for 2014-2025).

After gaining independence in 1991, Estonia quickly became a hub for defense innovation, creating partnerships between military, government, and private sector players, thus also hindering brain-drain processes in the country. The country has fostered strong collaboration with international AI defense companies. This collaboration enhanced the development of AI capabilities for the Estonian Defense Forces (EDF). Armenia's dependency on Russia and the lack of international cooperation in this matter

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not only put it in an economic dependence from Russia but also hindered its development in defense and other sectors.

Estonia made substantial effort towards supporting startup ecosystem that served defense sector innovation. While Armenia's state authorities did not take steps towards creating mechanisms that could join the already existing AI startups around defense sector.

The examples of differences in the administrative approach between Armenia and Estonia are multiple. Yet, the example of another post soviet country with almost the same starting point shows that Armenia has the chance to have AI-based defense if

- State authorities develop a national AI strategy specifically tailored to defense and align defense policy with AI national strategy,
- State authorities set up defenseAI dedicated research centres or unite already existing AI research centres around defense purpose (e.g. cluster formation),
- State authorities take steps towards gradual integration of AI in defense, e.g. start from integrating AI in logistic system,
- Government encourages public-private partnerships between the defense sector and Armenia's growing tech industry. It can be done by setting clear regulations and guidelines that define the roles and responsibilities of both public and private entities in defense technology development, or facilitating joint research, creating communication platforms where partnership possibilities may arise, etc.

7. Conclusion

For Armenia, the development of the defense sector is an urgent task, and in modern conditions, unprecedented digital developments in the world leave no choice but to use advanced artificial intelligence technologies in the defense sector. The development of the artificial intelligence sector mainly involves the direct involvement of specialized human capital in companies serving the defense sector. In the case of Armenia, the field of artificial intelligence is developing in the private sector, and for the development of the defense sector, a unified state policy and effective steps in this direction are needed. AI research centers and technology parks serve the civilian sector and develop separately, not based on each other's experience, owning different databases, having different directions of development. The latter, however, is especially important, since with companies focused on diversified technology industries, the success of the state will be great if their joint efforts are combined. After all, the success of all companies also depends on one common and vital sphere - defense, therefore, they can be united by servicing this vital area in the name of state and individual interests through the introduction of a cluster artificial intelligence system in the defense sector (which has already proved its success in different countries of the world)[10]. The cluster system will also create an opportunity for self-financing and reduce dependence on foreign direct investment. A certain level of self-sufficiency in the field of AI-based innovation protection will solve several vital issues for Armenia for some time: the brain drain will be stopped or slowed down, the economy will revive based on new technological solutions, the gap between the labor market and educational institutions will be resolved, since the market will dictate professions, the state will find itself in a favorable political and the economic situation, dependence on external factors will decrease, and security issues will improve.

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