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The Implications of the Technological Trends in Military on the Defence of Small States

The article argues that technological innovations change war, and pushes to innovate, to rethink strategic, operational and tactical decisions which raise new issues of moral and legal impacts. Small states have to redefine their defence concerning major technological trends. Technological progress will only strengthen the polycentric system in military technology because war is waged in six domains; small states do not have access to all of them, and at the same time they lack financial and industrial capabilities. Artificial intelligence, the increasing role of cyber and informational elements, unmanned systems, 3D printing and changing battlefield force to adapt the defence of small states. Small states have to plan their defence in three periods – peace, attack until full occupation and resistance. Technological innovations for the defence of small states are important, but the most crucial element is preparation of military and society for total resistance with the focus on denying victory for the aggressor. Small states cannot compete with technologically advanced powers (in terms of arms quality and quantity), so they have to adapt by expanding their fighting force, adapt to defend in the areas which decrease technological advantage and increase uncertainty. Small states also have to approach defence more creatively by exploiting non-conventional instruments, focusing on capabilities to fight without clear command and control, investing in personal skills of officers and soldiers, as well as maintaining symbiotic relations with technologically superior allies.

Introduction

The core element of war studies have to answer – what kind of armed forces should a country have in order to ensure its security?[1] The answer becomes focused on the analysis of the impact of technology on war and all of its aspects. Technology becomes the core determinant of military power in contrast to the previous historical periods. The pace of technological innovations forces defence institutions to contribute significant time and effort as well

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[1] War in the article is defined as armed hostile conflict between states, nations and non-state actors (terrorist groups). Cyber or informational attacks are taken into account as long as they are part of armed conflict. The term warfare is used synonymously.

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as financial, expertise and other resources to stay at the edge of technological change. Technological innovations constantly force innovation, a rethink of doctrines, strategic, operational and tactical level decisions, as well as moral and legal impacts. The small states have to assess how technological innovations change their security environment and their military capabilities; what opportunities do they open, and what challenges do they create?[2]

The main goal of the article is to identify major technological trends in the warfare and discuss how small countries should approach their defence in the rapidly changing technological environment. The first chapter focuses on the impact of contemporary technological trends on military power. The second chapter specifies how technologies are adapted in military affairs. The third chapter broadly overviews defence strategy of small states in the context of technological progress. The fourth chapter defines the elements that have to be taken into account when planning the defence of small states, considering technological trends.

Overall, the article applies an inductive reasoning method. The article indicates the patterns of technological change using a method of scientific literature review. The analysis of historical examples and analogies in combination with observations on technological developments allows to suggest elements for consideration when defining strategies of small states in contemporary and future warfare.

1. The Impact of Technology on the Military Power of States

A war is the outcome of a clash of political interests, but it is defined by the technologies available to the opposing sides. Technology defines strategy and tactics. Unfortunately, history shows that the impact of technological advancements is usually underestimated. The consequences of technological changes are taken into account after the war has dragged for some time, and significant losses have been experienced.

"[N]o two conflicts are ever the same ... war itself, forming an integral part of human history, is forever changing and will continue to change."[3]

[2] A small state is defined as a state with "limited capacity to influence the security interests of, or directly threaten a great power and defend itself against an attack by an equally motivated great power". Elman, M. The Foreign Policies of Small States: Challenging Neorealism in its own Backyard, *British Journal of Political Science* 25(2), 1995, pp. 121-71.

[3] Creveld M. van, *More on War*, Oxford University Press, 2017, p. 2.

According to J. F. C. Fuller "[technology] – is one of the most important factors that determine the shape of warfare at any given time and place."[4] Looking back at history it is obvious how the impact of technology was underestimated in wars. World War I (1914–1918) demonstrated a lack of appreciation of the stopping and destructive power of artillery. World War II (1939–1945) showed that the allies were not prepared for fast and mobile land warfare (tank warfare) and the navies took time to appreciate airpower and understand how obsolete battleships had become. The Korean War (1950–1953) showed the supremacy of the technologically advanced United States of America against much more numerous, but the technologically backward enemy (Communist (North) Korea and People's Republic of China). The new tactics using modern weapons allowed Israel to win wars against numerous Arab countries. The US technological supremacy combined with a new strategic and operational doctrine was demonstrated in the Gulf War (1990–1991) and NATO bombings in Yugoslavia (1999). The importance of even small military technological assistance to the technologically backward country in its war with a superpower was demonstrated in the Soviet–Afghan War (1979–1989). Analysing the trends it is reasonable to expect that technologies will bring even greater impact on the battlefield, changing the whole concept of it while at the same time broadening perspectives for surrogate warfare, i.e. "conceptual umbrella for all forms of externalization of the burden of warfare to supplementary as well as substitutionary forces and platforms".[5] With an increasing pace of technological development, the militaries will be forced to adapt to the continuous change in strategy, operations, tactics, armament, command and control (C2), and training.

The assumptions that technological innovation will allow for small countries to increase their military power is flawed. It is necessary to accept that economic power defines technological superiority which is further translated into military power. The technology does not allow small states to catch up to greater economic powers and will not significantly increase their positions on the battlefield. The technological innovation mostly increases the capabilities of great military powers when compared to smaller powers for at least three reasons.

The first is that the greater military powers have significant financial resources which they can invest in research and development (R&D). The in-

[4] Ibidem, p. 5

[5] Krieg A., Rickli J., Surrogate Warfare: The Art of War in the 21st Century? *Defence Studies*, 18(2), 2018, pp. 113-130. DOI: 10.1080/14702436.2018.1429218.

vestments are not only higher but also distributed across the whole spectrum from fundamental to applied research while small countries, despite huge investments, can focus on R&D only in particular fields in order to produce components for application to the existing platforms. The data shows how great the outperformance of the great powers is in the technological field. One-third of the US defence budget of approximately $600 billion is allocated to R&D, tests and procurement of new systems.[6] Currently, there are about 78,000 researchers in the US working exclusively on artificial intelligence (AI) while in China there are approximately 39,000, but China aims to become the leader in AI technologies by 2030 and just one city – Tianjin – created a fund of $16 billion to support the AI industry.[7] The data suggest that the capabilities to compete in technological innovations for small countries will decrease as they will not be able to prepare enough researchers in the different fields, let alone satisfy increasing needs for the latest research technologies.

The second reason is that small countries lack industrial complexes and resources to turn technologies into military products. Small military powers do not have sufficient industry to produce highly sophisticated arms, except Israel. However, even it cannot produce across the whole spectrum and in high quantities. Middle- and small-size countries have to acquire weapons from dominant military powers. According to the available data, out of fifty leading armament manufacturers worldwide in 2016, twenty-four companies were from the US, five from the UK and Russia, four from France, and three from Israel and South Korea.[8] Small countries have to acquire a substantial amount of arms from abroad while domestically producing arms or components for their specific needs.

The third reason is that modern warfare is conducted in six domains: land, sea, air, space, cyberspace and information. Small countries can create capabilities to some extent in all domains except for space. However, in modern warfare, space significantly expands military capabilities: intelligence gathering, surveillance, planning, information transferring, deliveries of weapons (rocket systems), and power multiplication. At the current time, only nine countries have orbital launch capabilities: the US, Russia, France, Japan, China, India, Israel, Iran and North Korea, but even fewer of them have developed space power capabilities. All other states have to rely on space powers in order to get access to space or act with a significant military disadvantage.

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[6] Latiff R. H., *Future War: Preparing for the New Global Battlefield*, New York: Alfred A. Knopf, 2017, p. 82.
[7] Thornhill J., China is Intent on Overtaking America to Dominate AI, *Financial Times*, 24 July 2018.
[8] Statista.com, The 100 leading armament manufacturers worldwide in 2016, based on defense revenue, https://www.statista.com/statistics/262627/largest-armament-manufacturers-worldwide-based-on-revenue/, 22 September 2018.

The provided examples show that the international system becomes technologically polycentric. Smaller states have to rely on the existing and rising greater technological powers. In the sector of military technologies, small powers become client states. The ongoing process further strengthens the global hierarchy in military technologies with the possibility to solidify the client system.

The Third Offset Strategy of the US suggests that the great powers will continue to compete in the technological field in order to gain advantage.[9] At the same time, it has to be accepted that any technological advantage is short-lived due to the extremely fast dissemination of technologies, industrial spying and accelerating investment in R&D.

Accelerating technological development and an increasing need for resources leads towards greater military technological stratification. The top technological military powers continue to rival each other, but the direct war between them is unthinkable due to the continued investments into nuclear deterrence. Technology makes war of greater military powers against lower military powers more plausible because the negative impact of military actions continues to decrease. Even if small powers have advanced technologies, they lack capabilities to produce platforms and weapons to match greater powers. At the same time, warfare does not change between low technological powers using non-advanced military technologies. They continue to focus on conventionally trained soldiers who can use small arms as well as older motorized or mechanized arms. The side having more soldiers and arms will dominate, but not necessary win the war. Technological supremacy of small power over less technologically advanced but much more numerous enemies ensures security, as in the case of Israel.

The technologically polycentric system would suggest that great powers will clash indirectly in proxy wars as they would probably happen in or between their client states. Such conflicts would allow the testing of new weapon systems and tactics in what can be defined as more or less conventional warfare. Military technology becomes more efficient in unconventional warfare, such as in the war against terrorism as well. However, military technological prowess is less clearly expressed when the opposing side is fighting a guerrilla war, because there is no clear chain of command, there are numerous fighters and it is difficult to distinguish fighters from the civilian population and has strong identity (Vietnam war (1955–1975) and Afghanistan (2001–…) and Iraqi conflict (2003–…).

[9] U.S. Department of Defence, *Secretary of Defence Speech, Reagan National Defense Forum Keynote as Delivered by Secretary of Defense Chuck Hagel.* Ronald Reagan Presidential Library, Simi Valley, CA. November 15, 2014, https://dod.defense.gov/News/Speeches/Speech-View/Article/606635/, 12 October 2018.

2. Impact of Technology in Military Preparation and Fighting Capabilities

Technological breakthroughs redefine how warfare is conducted. According to the Marine Corps Operating Concept, "A military that is slow to exploit technological advances and adopt new ways of fighting opens itself to catastrophic defeat".[10] The adaptation touches command and control with the inclusion of AI, an increasing role of cyber power, a focus on EM warfare, the multiplication of power through unmanned vehicles and AI, an increasing speed of war, relocation of battles to urban areas, new trends in training of troops and officers, revolution in military logistics and a growing importance of informational warfare.

Command and Control. The technologies increase C2 capabilities through the live monitoring of tactical operations and direct coordination of soldiers to increase their performance individually and in the squad, as well as the success of operations. Currently, C2 is becoming significantly dependent on the inclusion of AI in decision-making. China is investing heavily in AI in the military sector in order "to harness artificial intelligence for military uses, including autonomous drone swarms, software that can defend itself against cyberattacks, and programmes that mine social media to predict political movements."[11] The growing role of AI in the military in strategic, operational and tactical levels has resulted in its much greater capabilities to calculate and suggest the most rational actions (according to the set parameters) because it can evaluate many more signals, filter them and use unlimited access to the data. The increasing role of AI in tactical decisions is also related to the increasing opportunities to coordinate human actions and actions of autonomous systems. The importance of AI and its growing control over the battlefield changes the battlefield per se.

As a result of technological innovations in the military sector, the battlefield moves from open spaces to extremely difficult areas – cities. Such changes lead to centralization of C2 and coordination of even tactical operations at the highest level because of the need for coordination between different types of forces, and the need to conduct informational warfare at the same time. The centralization of C2 and increasing application of AI leads to lower autonomy

[10] Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century, September 2016, p. 16.
[11] Segal A., When China Rules the Web: Technology in Service of the State, *Foreign Affairs*, 97(5), 2018, pp. 10-18.

of lower-level officers because this significantly decreases the time between decision-making and decision implementation on the ground. According to Valery Gerasimov, Russia's military was successful in reducing the period between decision-making and its implementation three times.[12] It can be stated that militaries become more efficient, the top-level officers become involved in lower-level decisions, but their decisions are becoming increasingly impacted on AI-generated options.

Extension of cyber power. Land, sea, air, space and informational power become extensions of cyber power because of the growing dependence, which is the result of growing capabilities when the cyber element is applied. The cyber element in warfare provides additional speed and can disrupt C2 at the initial phases of conflict, minimizing opportunities for the adversary to coordinate the defence. This is elaborated by Freedman arguing that, "What if one side suddenly found itself in the dark, with screens either blank or full of misleading information, and was unable to send out orders to local commanders or else had these orders substituted by false instructions?."[13] The US successfully applied the cyber element in the war with Serbia. "During the 1999 NATO bombing of Yugoslavia ... a Pentagon unit hacked into Serbia's air defence systems to appear as if US planes were coming from a different direction than they really were."[14] Russia used the cyber element in its war with Georgia. "During its invasion of Georgia in 2008, Russia employed denial-of-service attacks to silence Georgian television ahead of tank incursions to create panic."[15] The cyber element can disrupt coordination between institutions or the functioning of crucial infrastructure (electricity and water supply, traffic and rail control) creating problems for movement of armed forces and escalating chaos to divert attention or to disperse forces, thus gaining advantage.

EM warfare. EM warfare is becoming one of the most important topics in the US, NATO and Russian militaries. The number of sensors in the battlefield is significantly increasing as well as the reliance of soldiers and C2 on them. Sensors provide better coordination especially in a difficult urban environment and increasingly centralized C2. At the same time, they can create increasing vulnerability in the coordination of actions, positioning and inte-

[12] Герасимов. В.В. Влияние современного характера вооруженной борьбы на направленность строительства и развития Вооруженных Сил Российской Федерации. Приоритетные задачи военной науки в обеспечении обороны страны, Вестник Академии Военных Наук, 2(63), 2018, pp. 16-22.
[13] Freedman, L. *The Future of War: A History*. London: Penguin Books, 2017, p. 230.
[14] Flournoy M., Sulmeyer. M., Battlefield Internet: A Plan for Securing Cyberspace, *Foreign Affairs*, 97(5), 2018, pp. 40-46.
[15] Ibidem.

roperability with and between forces if EM jamming instruments are applied. Luis Simón gives an example that "[t]hrough 2014 and early 2015, Russia's use of artillery and large-scale electronics jamming complicated substantially the communications of Ukraine's armed forces, as well as its ability to access the Donbas region (within Ukraine) and move safely there."[16] In the conflict each opposing force tries to maintain its EM capabilities and to disrupt the enemy's EM capabilities. The importance of EM is increasing when planning high-precision strikes in operations and identifying enemies in the densely populated urban areas. Hiding or coding EM signals is a new technology application area in warfare, important for the protection of high-value targets.

Multiplication of power. Multiplication of power cuts across the whole spectrum of contemporary military technologies. The core of multiplication of power resides in the growing capabilities of the unmanned air, land and sea vehicles. Multiplication is further pushed forward by the inclusion of AI and the provision of greater autonomy for it. The expansion of AI allows the creation of swarms of unmanned vehicles. The technologically advanced countries significantly decrease costs of weapon platforms by eliminating soldiers from being in the platforms physically. The most expensive elements in platforms are systems that have to protect humans inside the platforms – planes, tanks or ships. The manned platforms also make them less efficient in size, weight, manoeuvrability, fuel consumption and other aspects. The production of UVs is cheaper, and performance is more efficient. The most important element is that UVs in military actions allow avoiding manpower losses, trained professionals in particular, thus preserving experience and skills in the ranks. Prevention of manpower losses also generates support for military actions on the side which has technological superiority.

UAVs create the effect of "unlimited pilots" because the same pilot can operate new drones after previous ones were destroyed. For this reason, numbers of UAVs in militaries are increasing. The number of UAVs in Russian armed forces increased from 180 in 2011 to 1,720–2,000 by 2017.[17] In the future, airpower limitations will be defined only by the industrial performance – the capability to produce UAVs. For this reason, big military-industrial powers will have a significant advantage. As Hayward states, "Israeli UAS [unmanned aircraft systems] manufacturers ... have the technology to demonstrate very advanced capabilities, [but] they may lack the necessary mass to be able to

[16] Simón L. The "Third" US Offset Strategy and Europe's "Anti-access" Challenge, *Journal of Strategic Studies*, (39)3, 2016, pp. 417–445. DOI: 10.1080/01402390.2016.1163260 p. 433.
[17] Sutyagin I., Russian Air Power. In J.A. Olsen, ed., *Routledge Handbook of Air Power.* London: Routledge, 2018, pp. 313-326.

compete on the world market."[18] Traditionally, the framework of the battle and options depended on material resources, personnel and geographical positions, but the UVs allow the elimination of personnel from the equation. Another element as a strong initiative to invest in UVs is rising costs of manned vehicles. The UVs are smaller and cheaper, can be modernized faster and need smaller amounts of resources compared to manned planes. The cost-efficient approach significantly expands military capabilities, for small and great powers, but sufficient production can be ensured only by major industries. However, it is worth noting that cyber vulnerability to a state employing significant numbers of UVs also increases. If hacked, UVs might become useless or even used against the country that owned them in the first place.

Increasing the speed of war. In modern and future warfare, speed becomes extremely important in order to capture or destroy the political institutions of the adversary, military capabilities, disrupt the C2 of armed forces and capture or destroy the core infrastructure. This approach, developed by Colonel John Warden for the US air force, is extensively applied on the strategic level with inclusion and coordination of all forces. Russian military thought is currently being developed along these lines.[19] The capture of centres of gravity rather than the destruction of armed forces is at the focus of military actions. Such strategy is extremely threatening for small states because their centres of gravity and core institutions can be destroyed by conventional weapons extremely fast due to their small territories. The conventional war becomes significantly shorter, and small states become increasingly vulnerable. Historical examples of Nazi Germany's attack on Denmark and Norway expose vulnerability. Germany, by focusing on governmental and military centres, was able to defeat Denmark in six hours and Norway in twenty-four hours. Speed is important from the perspective of the preservation of manpower and resources.

The speed of action also defines consequences for the aggressor in the international arena. The shorter the campaign, the less impact the country faces from 24-hour news cycle and international community. The attention defines political and military actions against the aggressor and support for the occupied country.

Increasing speed of war indicates growing vulnerabilities of the defensive alliances. Small members of the defensive alliances will have more challenges to stall attacks and slow down enemies. The defending country will be

[18] Hayward K., Air Power and Industry. In J.A. Olsen, ed., *Routledge Handbook of Air Power.* London: Routledge, 2018, pp. 287-298.
[19] Герасимов. В.В., (Footnote 12). pp. 40–46.

conquered before allies prepare to send their forces to the battlefield, despite the fact that allies possibly have extremely fast and efficient logistics. Retake of the territory of the ally would be costlier than countering the attack. At the same time, failure to respond and defend the ally will inevitably destroy the credibility of the alliance. For successful deterrence and prolongation of the period of defence, the stationing of the fighting force before the conflict begins is inevitable.

Battles in urban areas. The battles are moving from the open fields and forests into urban areas, which limits the usage of heavy arms (except when destruction of cities becomes part of the strategy – e.g. Russian strategy in Chechnya and Syria), no clear lines of engagement exist, combatants and civilians cannot be separated, heavy casualties on the civilian population are inflicted. Because battlefields move into cities, high-precision weapons become necessary in order to inflict minimal damage on non-combatants and avoid collateral casualties. The combat is happening in close spaces at close distances with the interference of non-combatants. In order to boost the performance of an individual soldier or small squad in urbanized areas, technologies are focused on increasing the lethality of smaller weapons.

Airpower through UAVs is a force multiplication element that allows monitoring situation on the ground as well as better coordination of tasks issued directly from headquarters in real time. Such airpower means a decreasing number of soldiers in dangerous environments and gaining ground control without deploying troops, and at the same time putting enemy's ground forces at a disadvantage.

Fighting in the urban areas puts additional challenges on individual soldiers, including morale. Urban challenges create the need to change the training of soldiers with an increasing focus on assessment, cognition, endurance, coordination and improvisation. Warfare in urban areas creates the need to transform each soldier into a member of special forces "light" version, equipped with gadgets.

Education of officers and training of soldiers. Modern education of the officers accentuates critical thinking and creativity, possibilities to act under extremely chaotic situations and with disrupted C2. The US Marines Operating Concept emphasizes the importance of critical thinking elements when training the future force.[20] Increasing reliance on technologies might be disrupted, the battlefield becomes much more complicated in terms of particip-

[20] Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century, (Footnote 10), p. 24.

ants, the tasks have to be planned on kinetic, cyber and informational levels, and the adaptability to the changing environment including technological aspects has to increase. The technological development is becoming so fast that manufacturers have to constantly upgrade products. Such cases can already be observed in the navy. Just completed new ships lag behind in the newest technologies, especially in the cyber field, because some elements advanced while the ship was in production. To stay at the edge of technology is an additional challenge for officers. Officers and soldiers have to be constantly retrained, leading to increased expenses on the preparation of personnel. The life of an officer becomes lifelong learning.

As new technologies (cyber, informational and AI) are continuously upgraded, they significantly readjust strategic, operational and tactical planning. Readjustment calls for a flexible military personnel system, which would allow experts (technical and industrial) to enter service at more senior ranks.[21] Adding to that, Latiff also notes scepticism about such a system from older military personnel who moved through ranks traditionally.

In the soldiers training programmes, significant attention is given to urban warfare as well as the use of technologies, control of UVs, EM, cyber and information warfare, while at the same time keeping basic training at the core. An individual soldier with an increasing application of technologies, integration of sensors, application of exoskeletons and even greater interaction with AI is becoming a highly performing unit – to some extent, a modern tank. The difference between a soldier and a special operations soldier is decreasing as a consequence of the increasing inclusion of technologies.

Revolution in military logistics. The increasing speed of war challenges existing military logistics. Militaries move fast, and adequate supplies have to be behind them. The efficiency of the logistics becomes extremely important in the campaigns far away or in the environments where military bases cannot be situated next to an adversary in order not to provoke it. In case of an attack, significant fighting forces with supplies have to be transported at extremely short notice in the shortest possible period. Logistic lines define reaction and put huge strains on actions as well as financial strains. Significant changes in military logistics are underway. More efficient logistics is moving from transportation of particular items, equipment and parts to 3D printing at military bases close to the areas of action. 3D printing allows the production of items instantly with only the supply of raw materials, so it revolutionizes the whole concept of military logistics. Though 3D printing does not allow highly sophis-

[21] Latiff R.H., (note 6), p. 152.

ticated weapons and systems to be produced, it allows production of parts of different systems or weapons, saving significant resources, time and in some cases lives. Military bases become more efficient because they do not need to store parts which they do not need.

Information warfare. Increasing connectivity, the number of "smart" devices and access to media and social networks make informational warfare and the battle of the narrative very important. The narrative ensures the support for military actions and changes world opinion about the actions of states. The informational warfare is crucial for occupying forces to ensure the support of society and for defenders to maintain support and resistance against the aggressor. Social media becomes a crucial element in warfare, replacing traditional sources of information. To win information warfare is to gain the support of society on multiple levels. Soldiers and officers are trained in the production of information and at the same time prevention of opportunities for the opposing forces to gather and disseminate information.

These are the core, but not the only drivers behind contemporary warfare and accelerating development in military technology will have a significant impact on how wars are fought. The inclusion of technology redefines tactical, operational and strategic actions. It is a grave mistake to think about future conflicts with the focus on how wars were fought in the past. Accordingly, technological trends have to be closely followed, and differences in technological level and access to technologies involved in calculations of power.

3. The Defence Strategy of Small States in the Shadow of Technological Superiority

The technological developments create disadvantages for the defence of small states, further increasing disproportions in waging war between small technological powers and great technological powers. Cyber or informational warfare can be important additional elements of small state military power, but they are only additional disruptive elements in kinetic war, where the core determinant remains material resources.[22] Material resources supported by technological excellence further increase the kinetic abilities of bigger powers. In the end, the victory in most cases depends on national power – manufacturing, population, resources, the technological level and the will to fight. For

[22] Berkowitz B. D., *The New Face of War: How War Will Be Fought in the 21st Century.* New York: Free Press, 2007, p. 143.

this reason, the analysis focuses only on the warfare in which kinetics are applied together with other instruments.

The war has three periods: peace – preparation for kinetic war, war – active fighting and losses, victory or defeat – the winner enforces new rules. Of course, these stages can be divided into many substages, but modern war has changed dramatically.

Contemporary wars can hardly be won against countries with a strong national, cultural or religious identity. A more powerful side can control territory, but it cannot control society. The whole society or its groups can continue armed or unarmed resistance. The resistance is an element which does not allow for the technologically superior adversary to obtain victory. Historical and contemporary examples illustrate such a claim. The US, despite its manpower, industrial and technological supremacy, was unable to achieve victory in the Vietnam war. The USSR with the same advantages had to accept defeat in Afghanistan. The US was able to claim swift victory in Iraq in 2003 but was not able to pacify it. The war in Afghanistan is the longest war the US has ever fought. The US search for opportunities to withdraw, while the Taliban is on the rise, despite the US technological superiority in communication, weapons, control of the sky and intelligence provided by drones and satellites. Taliban has no such technologies, but its influence in Afghanistan grows. The identity as soft power element changes war and redefines capabilities to win against the more technologically advanced country.

In order to analyse the capabilities of small countries to defend against a more technologically superior enemy the whole period of war is divided into three stages: pre-war – peace period; war period starting at the moment of the attack to occupation of territory of the defender; resistance period – which has no defined ending and in different cases might end differently. Resistance aims to achieve the loss of will of the attacker to control territory. Such decisions are connected to changes in the international system. The periods and the outcomes of resistance do not change in connection with technological changes. Technology changes only the means of how outcomes could be achieved using technologies.

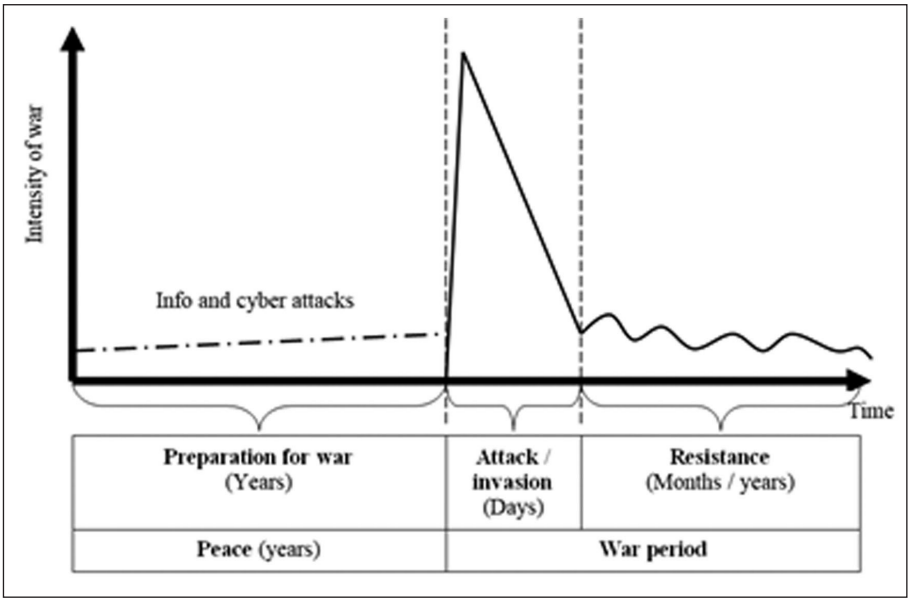

Figure 1. **Periods of the defence strategy of the small states**

In the pre-war – peace period, the small state has to be focused for the preparation for the active stages of the kinetic war, hoping that this situation might not materialize. In the peace period, informational and cyberattacks could be conducted by a possible aggressor, especially if to take into account the so-called Gerasimov Doctrine.[23] The informational and cyberattacks can have significant negative consequences, but it is doubtful that they will lead to kinetic war.[24] The peace period is key for the preparation of defence strategy which has to change following changes in military technologies. The strategy also has to be adapted by including the means that should decrease the military technological advantage of a possible attacker during a period of military action. Strong deterrence focuses on the prevention of the attacker from actions, or denial of victory.

The attack period (from the attack to full occupation) is the shortest period of active defence a small country has to prepare for. In this period the aggressor has the biggest technological quantitative and qualitative advantage. The aim of the defender becomes to inflict maximal damage in the shortest time on the most technologically advanced systems the attacker uses. Later,

[23] Герасимов. В.В., Ценность науки в предвидении. Новые вызовы требуют переосмыслить формы и способы ведения боевых действий, Военно-промышленный Курьер, 26 February 2013, https://www.vpk-news.ru/articles/14632, 12 October 2018.

[24] The kinetic element still defines periods between peace and war.

the most advanced systems of the defender will be destroyed or exhausted, so it will have to rely on different means. The defence installations and bases will be destroyed by enemy's airpower, rocket systems and rocket artillery, and control of territory as well as of centres of gravity will be lost.

Maximal losses for the attacker at the initial stage will force it to reconsider its strategy, delay invasion and will hurt its morale. Significant damage to the attacker will allow the defender to win some time. The aggressor will target cities, where defence might be more viable and would provide benefits for defenders because urban areas limit movement of mechanized systems and warfare is conducted with smaller weapons. Individual performance (mental and physical) and tactics of small units will be more important. Urban areas also limit the possibilities to use military technologies in order to avoid civilian casualties, and the number of signals as well as uncertainty increases. The clear transition periods between fighting in urban areas (war) to resistance is non-defined, except in the decrease of intensity of military actions.

For small states wars are shorter than anyone expects. As discussed, Denmark and Norway had been conquered in a matter of hours, but in case of Norway resistance lasted for five years. The preparation for the resistance period does not mean defeatism but simply preparation for another type of war – denial of victory, which might be even more beneficial for the defender. After occupation of the country the number of enemy forces will decrease as well as reliance on technologies. It will become financially challenging for an occupying force to keep extremely high readiness. Transition to more peaceful period will begin, or the enemy will have to divert more resources for other needs. In that period, armed resistance will have opportunities to harass, disrupt and destroy the enemy when acting autonomously in small groups without centralized C2, applying improvised tactics, with little reliance on technologies in the field. The unarmed resistance could involve cyber resistance (hackers could disrupt communication, information dissemination and functioning of key infrastructure) and informational resistance (continue to expose atrocities and ensure support from the international community, ensure communication with government in exile).

The technologically inferior country must fight smarter while maintaining a strong will to fight. Wars in Vietnam, Afghanistan, the war in Iraq and the Syrian War demonstrated limitations of even the most sophisticated technologies. The small states have to take experience from the activities of terrorists and proxy fighters. The most powerful and technologically advanced countries can be bogged down in the perpetual conflict in which smaller

powers are without any possibility of winning. Because small states cannot win conventional wars dominated by latest technologies, the only strategy they have is the "bogging" strategy – draining the greater powers' resources in the medium and long term. Small states have to achieve a subjective, ideologically-shaped perception of victory which "overcome[s] an actual military defeat on the battlefield."[25] If small countries are successful in draining resources and manpower until conflict becomes unacceptable for a great power, it can expect withdrawal of the aggressor without conceding defeat. Warden argues that "[t]he really decisive successes have come to those who adopted a new doctrinal concept to which their enemies were unable to respond", but the doctrines for small states are limited in scope and originality determined by access to the resources and technologies.[26] Though the defence strategies of small states seem to be the same, they have to be extremely adaptive, and the core element of adaptation is technological changes, how to use them, how to disrupt them or deny their advantage.

4. Preparation for Defence of Small States in Technological Inferiority

The preparation of defence in a new technological environment requires constant attention to technologies and significant financial investments because the most sophisticated technologies become increasingly expensive. In the rapidly-changing technological environment, states face a challenge to constantly upgrade their military force and readjust operational and tactical decisions. Francis Domingo citing Bernard Loo argues that "small states are left with the challenge of constantly upgrading their military force structures, capabilities and doctrines just to maintain modest defence capabilities".[27]

The increasing speed of war forces small states to invest in defence systems which would inflict the biggest losses for the attacker at the initial phases of the war and later move to resistance. A separate task force, involving representatives of the military, ministry of defence and independent experts, for technological innovations and adaptation in defence becomes necessary. The task force should indicate the newest technologies, trends, and possibilities

[25] Krieg A., Rickli J., (Footnote 5). pp. 1-18.
[26] Warden J. A. III., *The Air Campaign: Planning for Combat*, Pickle Partners Publishing, 1988, loc. 1018-1019.
[27] Domingo F., The RMA Theory and Small States, *Military and Strategic Affairs*, 6(3), 2014, pp. 43-58.

to adopt innovations in the initial defence and long-term resistance. The task force could produce suggestions for acquisitions of newest arms and systems, innovate in tactical and operational decisions and also find ways in which modern civilian technology can be applied for resistance. The task force also needs to analyse strategies, doctrines, operations and tactics of the major rivals, their technologies and arms development in order to prepare countermeasures. Jim Thomas argues that small states on the NATO frontline in the East have to develop the capacity to conduct popular resistance, a defence that is highly irregular in its characteristics with prepositioned concealed weapons, clandestine support networks, auxiliaries, modern guerrilla forces armed with short-range man and truck portable guided rockets, guided artillery, guided mortars and a focus on manoeuvres, ambushes and sabotages.[28]

The vulnerability for small states emerges from a lack of long-term integrated and clearly defined defence policy. The capabilities to acquire the newest weapon systems is related to the funding of defence. The small states are limited in their capabilities to amass finances in order to acquire equipment. The acquired equipment has to serve over a longer period. Small states have to invest more in the improvement of equipment they have, rather than focus on the acquisition of new equipment.

Funding determines the development and strategy of national defence through access to technologies, quality and quantity of arms, the composition of the armed forces, and quality of soldiers and officers. Inadequate or inconsistent funding forces cherry-picking between armed forces types and systems of arms, and not integrating elements into an efficient defence system. Long-term defence planning methods, according to Thomas-Durell Young, "can support a defence institution to respond with military forces in a period of escalation, let alone during war."[29] With rapidly changing technologies, dynamic mid-term defence planning would ensure the integration between different forces and weapon systems, constantly renewing the needs of the new systems and changes in training, so in this way keeping an army on the edge of military technologies.

Because small states lack the capabilities to invest in the newest military technologies, they have to replace quality with quantity in order to push the balance in their favour. For this reason, small states inevitably have to increase the share of population which in the event of attack can offer resistance.

[28] Thomas J., Protraction: a 21st Century Flavour of Deterrence, *Small Wars Journal*, 11, 2015, http://smallwarsjournal.com/jrnl/art/protraction-a-21st-century-flavorof-deterrence, 15 October 2018.
[29] Young T.D., Questioning the "Sanctity" of Long-term Defense Planning as Practiced in Central and Eastern Europe, *Defence Studies*, 18(3), 2018, p. 357–373. DOI: 10.1080/14702436.2018.1497445.

Increase of manpower to some extent deters even the most technologically sophisticated attacker. Wide resistance negatively impacts morale and prestige of the attacker. Populations' readiness to resist is crucial for the bogging strategy against more technologically capable and larger enemies. The mandatory military service could be the key to the preparation of society for armed and non-armed resistance. It also contributes to essential psychological preparation of society because the decision not to grant victory for the attacker is the most powerful instrument of defenders and historical examples support such a claim.

In the case of an attack, officers of small state, which is the technological inferior, will be forced to operate under huge technological (qualitative) and probably quantitative disadvantage and organize resistance with non-existent C2. Technological inferiority leads to the assumption that officers have to be creative and trained to improvise with resources and technologies they can access. The analysis of the tactics when one side fights a technologically superior enemy is essential. The use of civilian technologies for armed resistance is of high importance. Vietnamese, Afghan, ISIS, Taliban and Peshmerga tactics can contribute to the tactics of small and less technologically advanced states. In technological inferiority, the goal is to prepare the armed forces where "lower echelons of command need little guidance from higher echelons and probably could continue to function for some time without any guidance."[30]

As a result of technological developments, the majority of the fighting will be conducted in urban areas, which decreases technological superiority and increases uncertainty. Because of this urban warfare, resistance in urban areas has to be prioritized in the training of officers and soldiers of small states. John Spencer argues that "[t]he city's defenders have the advantage, providing them large areas of restrictive terrain to incorporate into their defensive plans".[31] He continues: "Defenders can literally turn every building into a battlefield with a single sniper or small group of fighters that attacking forces must either fight or destroy."[32] Defenders obtain possibilities to hide and mix-in and disguise EM, digital (for reconnaissance, cyber and informational warfare) and heat signatures.[33] A significant element of the special forces training

[30] Warden J.A. III., (Footnote 25), loc. 943-946.

[31] Spencer J., Why Militaries Must Destroy Cities to Save Them, Modern Warfare Institute at West Point, 8 November 2018, https://mwi.usma.edu/militaries-must-destroy-cities-save/?utm_source=Sailthru&utm_medium=email&utm_campaign=ebb+09.11.18&utm_term=Editorial+-+Early+Bird+Brief&fbclid=IwAR0Fo75_RHRmCIcz4ekMZxmY1AdSgRo0mHSxQIVEYJzkZ5B6PzypAoiafvs, 12 November 2018.

[32] Ibidem.

[33] Ibidem.

programme could be included in officer training; cyber and informational warfare training become important in officer education. The cyber element can contribute to the disruption of the activities of an aggressor, information gathering and transmission. The cyber element is also important for defence because before the kinetic attack, cyberattacks will be performed against defensive installations and civilian infrastructure in order to decrease the efficiency of the defence. The expansion of the cyber element in the structure of the defence system becomes of crucial importance. According to Krieg and Rickli "In the twenty-first century where war is a spectacle broadcast live via social media, victories are no longer just won on the physical battlefield but also in the cyberspace and in the information sphere".[34] The informational element is essential to keep resistance with domestic and foreign support, to change the narrative defined by the occupying force.

International cooperation is extremely important for small states to defend against a larger and technologically superior enemy. Without international cooperation, access for small states to the latest technologies in military affairs are limited, and they cannot use some advantages that technologically advanced allies have. The military technologies that small states acquire from their technologically superior allies have a deterrence element because they raise the possibility of losses for the attacker. Through the alliance, small states get access to technologies – satellites, drones for intelligence gathering and coordination of actions. Allies are also capable of supplying arms for resistance and technologies that make the technologies of the attacker less effective. The case of Israel shows that countries can develop their defence technologies by acquiring technologies from key allie – the US, and adjusting them to their particular needs.

Small countries become significantly dependent on technologically advanced great powers. The technological revolution in military affairs leads to the polycentric world and the necessity for small countries to align with technological powers. They also have to rely on the tactics of unconventional forces and expect substantial civilian casualties when conducting resistance against technologically superior enemies.

[34] Krieg A., Rickli J., (Footnote 5), pp. 1-18.

Conclusion

The technological revolution in military affairs changes war and strengthens the dominance of technologically advanced great powers against small states. Small states, despite their technological innovations, are not able to produce technologically advanced weapons in high quantities. Such qualitative or quantitative disparity leads to the technologically polycentric world in military affairs.

Technologies have an impact across the whole spectrum of warfare. The C2 capabilities are increasing as direct control of the units in the battlefield becomes available through the increasing number of sensors, direct command and AI inclusion in the decision-making. Land, sea, air, space and informational power become an extension of cyber power as it is increasingly used in different systems to increase performance. Focus on EM warfare is in line with increasing C2 capabilities and cyber capabilities, as an element to deny their performance or reconnaissance. The multiplication element opens new possibilities for countries with large military industrial complex. Multiplication eliminates manpower losses in action, making military options more attractive. The speed of war significantly increases, thus putting small countries at great disadvantage in reaction and fighting capabilities. Technologies are becoming more focused on urban battlefields, changing officer and soldier training. Military logistics have experienced a revolution with the application of 3D printing.

In preparation for war, small states have to focus on the latest defence technologies to inflict maximal damage for the attacker at the initial phases and then move to the resistance phase, and use tactics which decrease the advantages of the more technologically advanced enemy. The preparedness of the small country to conduct long, low-intensity asymmetric warfare against the much bigger and technologically capable enemy should act as the core deterrence element. The small country has only one strategy of defence against the more technologically advanced enemy – the bogging – the denial of victory strategy.

Small states have to keep on with technological changes to readjust them for their needs, but the core element has to be preparation of officers, soldiers and citizens psychologically, physically and mentally to resist, to act under great uncertainty without C2. Small states may counter a technologically advanced enemy with a quantity approach, unconventional use of civilian technologies, studying unconventional warfare and even terrorist tactics.

Focus on urban warfare is essential because the urban environment decreases technological superiority. A cyber element becomes crucial for defence because it will be used before the beginning of kinetic actions. Informational action becomes part of warfare in order to keep and win hearts and minds. Finally, without strong and technologically superior allies, small states will not be able to acquire the newest weapon systems and capabilities essential for the initial phase of defence.

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