ON NEW MILITARY TECHNOLOGIES AND CONCEPTS EXPLORED FROM THE SYRIAN CONFLICT EXPERIENCE

Nebojša V. Nikolić
University of Defense in Belgrade, Strategic Research Institute, Defense Studies Section, Belgrade, Republic of Serbia,
e-mail: nebojsa.nikolic11@mod.gov.rs,
ORCID iD: https://orcid.org/0000-0003-4875-3418

DOI: 10.5937/vojtehg69-31659; https://doi.org/10.5937/vojtehg69-31659

FIELD: Military applications, Military technologies, Modern warfare
ARTICLE TYPE: Original scientific paper

Abstract:

Introduction/purpose: The purpose of this paper is to presents some tendencies stemming from the experiences from the ongoing Syrian conflict towards the development of new military concepts and technologies. The manner, scope and dynamics of exploitation of the combat experience from the Syrian conflict is a good example how great powers improve the capabilities of their defense systems.

Methods: An extensive content analysis of selected reference sources has been applied. The system approach was used for a structural and balanced presentation of the available information. The comparative analysis has confirmed some similarities in the behavior of the great powers in terms of deploying and testing complex combat systems of strategic importance in local wars. Inductive thinking has contributed to the synthesis of appropriate conclusions.

Results: Among the presence of several great and regional powers heavily involved in this conflict, Russia's is considered to be the most dominant and as such is the main subject of investigation in this paper. Field testing of new military equipment is known to be important but of extreme importance is its testing under real combat conditions. In parallel with intensive testing of a wide range of military technologies, there are indicators of developing new concepts, doctrines, and organizational upgrades on the basis of the Syrian combat experiences.

ACKNOWLEDGMENT: This work was partially supported by the Ministry of Education and Science of the Republic of Serbia under Interdisciplinary Project No.III-47029 (title: “Cost Effective Selection of New Technologies and Concepts of Defense Through Social Reforms and Strategic Orientations of Serbia in 21st Century).

Conclusion: From the standpoint of military technology and concept development, the Russian endeavor in Syria has become an example of a comprehensive and systematic aproach to learning, training, innovations, and implementations of the most relevant factors in the development of a modern military organization as a response to challenges of contemporary armed conflicts.

Key words: military technology, innovation and testing, military concepts, combat experience, Syrian conflict.

Introduction

All military organizations focus on preparing themselves for future warfare in the best possible way. It is highly beneficial to conduct all available analyses of experiences from current conflicts. The main goal of this paper is to review the available lessons learned from the Russian engagement in the current conflict in Syria. This conflict has more different aspects, to mention the most important ones: international, political, humanitarian, demographic, strategic, economic, social, military, and technological. Additionally, all these implications are not exclusively related to Syria and Russia, nor to the other powers involved, like Turkey, the USA, Israel, Iran, and some Western states, but to a wider set of other states: all neighbor states, regional states, South-European states, and organizations like the EU and NATO. Due to its space limit and its purpose, this paper will treat only the military-technical aspect with consequential inclusion of some organizational, doctrinal, and personnel aspects for a military organization.

Co-relations among military technologies (and other civilian but military applicable technologies), military concepts (including tactical, operational, and strategic levels as well as organizational issues), and the character and nature of contemporary and future warfare / conflicts are permanent subjects of various research studies. Of particular importance is perceiving trends and changes in military technology in some future period, a decade or two, for example (O'Hanlon, 2019). A good review of contemporary trends in military technology development has been offered by O'Hanlon (2019), together with an estimate of their impacts through the three-level scale (moderate, high, and revolutionary impact). O'Hanlon (2019) has grouped various technologies into four general groups as follows: sensors; computers and communications; projectiles, propulsion, and platforms; and other weapons and technologies (O'Hanlon, 2019). It is interesting that this O'Hanlon's forecast has assigned the highest impact ("revolutionary") mainly to the second general group ("computer and communication") and only to the "robotics and autonomous systems" component from the third general group ("projectiles, propulsion and platforms"). Therefore, these are as follows (O'Hanlon, 2019): "computer hardware; computer software; offensive cyber operations; system of systems; and artificial intelligence and big data".

Besides availability of modern military technology, at least equal importance has an organizational propensity of a military organization to explore, test, and implement technological novelties and, if necessary, to adapt its organization, concepts, and doctrines to the best use of new technologies. So, both issues are needed: firstly, military technology development, innovations, and patents; and secondly, "military technology diffusion" (Schimd, 2018).

In rare cases, it is possible to monitor the application and use of a wide set of new military technologies in an ongoing armed conflict. Some great powers frequently have such opportunities to test and check their novel military equipment and improve its performance through real combat testing. It is exactly the case of the Syrian conflict where many great powers and regional states have been involved for almost the whole second decade of the 21st century. Therefore, the Syrian warfare theater has become "an incubator of learning, training, and innovation" (Adamsky, 2018).

Among the most interesting cases is the Russian military experience due to a wide engagement scope, but also due to a high level of exploitation of overall experience and improved "culture of military innovations" (Adamsky, 2020). In the context of mutual relations between military technologies and military concepts, it should be always kept in mind that "technology shapes warfare, not war" (Roland, 2009). That means that technology may have tremendous influence on warfare (a way in which a war is conducted) and on the means and materials engaged and used in a war. However, the war is a more general category; it relates to the state in which one society or state may be found due to decisions of its top ruling elites. On the other hand, warfare is a way in which a war is conducted and that heavily depends on war material and military technical factors.

According to some official statements, it is considered that more than 600 pieces of military equipment and various weapon systems were field-tested and thanks to that many monitored defects were resolved (Thomas, 2020), some of which are presented in the third chapter. The following chapter presents some doctrinal and organizational issues which are consequent implications of the warfare conditions and applications of new technologies. The concept of network-centric warfare is one of them (McDermott, 2020). The concluding chapter summarizes the main implications for a military organization based on the experience from the Syrian operations.

General context of the Russian engagement in Syria

Among other great and regional powers interested and engaged in the Syrian conflict, Russia is the only one officially called to enter the Syrian territory by a call issued from the legal Syrian government. Consequently, the Russian military engagement is the most dominant comparing to others. The Russian engagement in Syria started in late September 2015 immediately after a large military exercise, "Tsentr-2015" (Blank, 2019), and has many dimensions and implications, many of which are significant and a subject of research in various fields (Jones, 2020).

Russia conducted a diplomatic campaign and a military campaign in support of the Syrian government as well as a peace-enforcement and peace-keeping campaign with Turkey, together with air operations and air control, military coordination with the forces of the Syrian government, Turkey, the USA, Israel, Iran, and various local and regional militias. The international and strategic consequences of the Syrian conflict have been widely considered at many political instances, and have been a subject of many research studies, but also explored in the media.

Unlike its former engagement in Afghanistan, Russia's dominant form in Syria was distance operations with the engagement of the Russian Air Forces. Intensive engagement of air forces against an asymmetric opponent is not a new model - it has been applied many times by the Western states. The modes of deployment of air forces in achieving operational and strategic goals are a very interesting topic in general and particularly for great powers engagement in various hybrid wars in terms of considering possibilities to reach the main strategic goals by air forces only (Waller, 2020). Nevertheless, there are also important consequences from the Syrian campaign for land forces (the Army), particularly in the context of modernization of the already existing (older) weapon systems in artillery (International Institute for Strategic Studies, 2021).

Military-technology testing on the Syrian battlefield

"Military research and development (R&D) is the most expensive and basic phase in the creation of a new weapon platform", (Hagelin, 004). During several past decades, interference and overlapping between military R&D and civilian R&D have been established in many fields of technology and science. However, even if some civilian technology is found appropriate for use in some military domain, it still has to be tested and checked according to specific military standards. Furthermore, some military technological entities, such as various combat platforms (tanks, fighters, submarines, artillery), do not have any civilian counterpart, so they have to be invented, designed, produced, and tested through military research and development. In any case, the above statement by Hagelin (2004) will be still accurate in the near future.

The main question could be formulated here: what kind of military platforms, weapons and equipment, with which performances, should be created by military R&D? The answer to this question leads us to military battlefields (current or imagined future ones), and to the military operational art, strategic thinking, and tactical expertize. In order to strengthen the link between military R&D and battlefield expertize, smart armies use various approaches. For example, the US Army has created "a US Army Science Officer position for liaison in order to bring operational experience quickly to the laboratories and help implement new technology requirements", (Hagelin, 2004). In other cases, engineers and researchers are temporary assigned to military formations in order to be close enough to see, perceive, recognize, and record the relevant parameters of the platforms and equipment under study as well as the operational conditions and requirements in the environment where their weapon platform or equipment operates. The Russian performance in the Syrian conflict shows a very high level of this cooperation between the representatives from industrial and military R&D and the world of operational art in contemporary warfare such as the Syrian conflict.

Field testing of armament and combat equipment

Real combat environment is the best place for testing real values and applicability of new weapons and equipment. Official media statements confirm that over 600 items of different weapon systems and equipment have been tested with engagement of 1,200 engineers from 57 defense companies, and with a very high level of elimination of defects on the tested equipment (Thomas, 2020). We are presenting here some of those weapon systems, platforms, and equipment which were used in field testing during the Syrian conflict.

Combat aircraft. A Russian government official stated that various combat aircraft were tested in the Syrian theater: the Su-35S and Su-30SM fighters; Su-34 and Su-24M (fighter-bombers and frontline bombers); Su-25SM attack aircraft; Tu-22MZ and Tu95MS long-range aircraft. A particular attention was dedicated to electronic devices, software, compatibility, and interoperability among various equipment and platforms (Thomas, 2020). A fast operational tempo of air forces combat engagement induced opportunities for testing and improvement of servicing and maintenance procedures. Some estimations suggest that there were between 20 to 50 various combat aircraft and from 16 to 40 attack and transport helicopters (Jones, 2020).

Combat helicopters. Some helicopters were field tested in Syria as follows: Ka-52, Mi-24, Mi-35, and Mi-28. Multirole helicopters, like Mi-28N and Mi-35, are capable of various missions, and they were also used, for so-called “free hunting” of terrorists, including demanding night missions (night vision systems could detect a vehicle at 15 kilometers (Mi-28N), and up to 7 km for Mi-35 (Thomas, 2020)). Some anti-tank guided missiles mounted on the Mi-28NE were tested and replaced due to field test results (Khrizantema-VM 9M123M was involved instead of Ataka anti-tank guided missile).

Anti-radiation (anti-radar) missile. There are some indices that the tactical anti-radiation missile Kh-25ML was tested as well. It is a modernized version of an older missile which intended use is against surface-to-air missile platforms of adversary’s air-defense systems. Its range is about 20 kilometers and speed is 850 meters per second (Thomas, 2020).

Tanks. From rare statements of some Russian officials, it could be concluded that even the Armata T-14, a future main battle tank, was field tested in the Syrian combat environment (Pronk, 2020). Also, continued field-trial testing will be provided with a number of these tanks to be delivered to the Russian Army units at the field. The tank factory managers hope that this “combat-proven” marking will help Armata’s trade position on the international armament market.

Armored reconnaissance vehicle BRDM-2 modernization. This vehicle had a third wave of modernization in 2017 and field testing in Syria. A closed turret with a machine gun was installed, while the gunner is protected from enemy projectiles (Thomas, 2020).

Artillery systems. There are indices that some new howitzer types were deployed in Syria, i.e. the 2Sm19M1 Msta and its novel version, the 2S19M2 (Thomas, 2020).

Anti-tank grenade launcher, the SPG-9 Kopye. The Kopye is an accurate anti-tank grenade launcher for close combat, with a high rate of fire of up to six rounds per minute, with a maximum range of one kilometer and low production cost (Thomas, 2020).

Heavy flamethrower, the Solntcepek TOS-1A. This rocket launcher was used in Hama and Idlib provinces and has proved its effectiveness in countering terrorists in urban structures and mountain hiding-places. This system uses thermo-baric mixtures which produce an effect of a fuel-air explosion with high temperatures (Thomas, 2020).

Pontoon bridge. Russian forces deployed the PP-2005M pontoon bridge (carrying capacity of 120 tones, and with about 1 hour erection time), across the Euphrates in support of a Syrian army combat mission (Thomas, 2020).

Individual reconnaissance system, the Glaz. The Glaz is equipped with a high resolution camera and is intended for hand-held rocket launching at 300 meters into the air in order to monitor and send live recordings of the enemy positions behind some barriers, buildings or uneven terrain. Its field of view covers about one half of a square kilometer and is landed by a parachute (Thomas, 2020).

Individual protection system. It is observed that a new generation of armor suits for individual protection is used for field testing in the Syrian combat environment (special Kevlar, aramid fiber material). According to some information, it is five times stronger than steel (Thomas, 2020).

Field-testing of new Command and Control systems

Command & Control systems. Probably the most beneficial impact from the engagement in the Syrian conflict, inside military framework, has been found in the development, implementation, testing, and improvement of the complex system of military command and control which had to be established for expeditionary forces deployed far from the Russian territory. Also, this engagement in Syria has been an excellent experiment for a tactical command and control system known as ESU TZ, which is in its essence a modern C4 system (Command, Control, Communications, and Computers). It supports successfully inter-service communications between army units and air forces. This C4 system also integrates target data gathered by UAVs and processed further towards air force striking units or to artillery units for fire support (Thomas, 2020).

In general, the modernization of command and control systems in the Russian military is a part of practical implementation of an older Russian concept known under the terms “reconnaissance-strike” (term for the strategic-operational level) and “reconnaissance-fire” (name for the operational-tactical level), Adamsky (2018). In the essence of both concepts there is an idea about the shortest possible reaction time of the military capability of connecting the reconnaissance process for target determination, processing the data, making a decision, and engaging the target. Similar to this concept are some other well-known concepts such as: the OODA cycle (Observe-Orient-Decide-Act), Lawson's C2 model, and the HEAT model (Nikolić, 2016), (Nikolic, 2017).

The Russian command and control system with regard to operations in Syria has been organized in three general levels (Adamsky, 2018). At the top level, there is the Group of Combat Management – an integral part of the National Defense Management Center in the Moscow region. This Group is responsible for the communication and coordination with high commands of other foreign countries and organizations present in Syria (the US, Turkey, Israel, UN). At the middle level, there is the Command Post of the Grouping of Forces, located at the Khmeimim base in Syria. The second level conducts the communication and coordination activities with all other allied high commands in Syria such as the Syrian Army, Iran, and a number of pro-regime militias. It also exchanges information with local operational commands of the US, Turkey, and Israel in order to avoid confusion and forces collisions. At the third level, there are Operational Groups of Advisors. They are deployed widely and attached to selected operational-tactical command posts of the Syrian Army and other allied forces in the Syrian theater (Adamsky, 2018).

Emerge of UAV use and recognition of drone importance

UAVs – Unmanned Aerial Vehicles (popular term is Drones; or, UAS – Unmanned Aerial Systems in the Russian terminology). The Russian forces have clearly realized potential of unmanned aerial vehicles in their different roles. In 2016, Russian Army had about 2,000 drones, while 70 of that number were deployed in Syria at that time (Center for Analysis of Strategies and Techniques, 2020). That number increased in the following years with a respectable number of drones engaged on a daily basis (Adamsky, 2018). By 2018, there were more than 23,000 sorties of various drones which made about 140,000 hours in aerial operations (surveillance, reconnaissance, and target acquisitions), and those numbers confirm greater engagement of drones than that of manned aircraft. The prevailing type of drones used by the Russian forces has been the Orlan-10, a reconnaissance drone (reconnoitering targets for airstrikes; spotting artillery engagements; and assessing results of strikes and fires) with the following characteristics: it carries up to 5kg (cameras, electronics, transmitters); operational autonomy 120 kilometers, up to 5,000 meters altitude and up to 14 hours in a single flight; launched by catapult, landing by parachute, no runway needed (Center for Analysis of Strategies and Techniques, 2020). A complete set of the Orlan-10 consists of the following items: 2 UAVs, the ground control station, the payload, the additional accessories, and a light vehicle. The price of the whole set is nearly 600,000$.

Threats from UAV attacks were recognized and some measures were taken. The air defense system for close combat, the Tor-M2, has been noticed at the Khmenimim airport base in Syria. It is supposed that this system will contribute to defense from drone attacks. This system is able to detect, track and engage targets in the zone up to 15 kilometers in radius and 10 kilometers in height, while servicing up to four targets simultaneously. It is worth to point out that for many militaries across Europe, drone defense is still an open question.

Strategic technology testing and/or demonstration of power

Cruise Missiles. In the Syrian theater, two types of cruise missiles were used for targets located deep in Syria: Kh-555 (range of 2,000 km), and a more modern Kh-101 (4,000 km of range). But the main motive to use these sophisticated missiles against terrorist groups was not only combat need nor weapons testing (which is always welcomed), but rather a demonstration of technical and operational capabilities for a long-range strike, as well as strategic willingness to put in use such weapons if it is needed (Pronk, 2020). However, Russia is not alone in this kind of reasoning - principally the same logic was applied by the USA in NATO bombing of Yugoslavia in 1999, when strategic stealth bombers B-2 were used flying long way from their base in Missouri to the Balkans in Europe (Lambeth, 2001). According to Lambeth (2001, p.89), six B-2 strategic bombers performed 49 combat sorties form Whiteman base, Missouri, which is only about 0.5% of all combat sorties conducted during the war in 1999, but they were much more effective – even 11% of all dropped bombs came from the B-2. Furthermore, one third of all smart bombs was dropped from the B-2 (Lambeth, 2001). In that way, the following goals were achieved: demonstration of capability for a global strike (from the USA mainland to the Southeast Europe); demonstration of the penetration capability against air-defense (due to the stealth capability of the B-2); precision bombing of up to 16 different targets in one sortie; check of crew's capability to conduct combat missions of long duration (28 to 32 hours per one round-trip combat mission); multiple refueling capability for long distance missions, etc. (Lambeth, 2001). All of the above seen in 1999 has similar counterparts in ongoing experimentations of great powers involved in the Syrian conflict (long-range bombers Tu-22M3, see - launched cruise missiles Kalibr, etc. Thomas, 2020).

Engineering and logistics

New robotic mine clearing devices. Russian engineering units and teams have successfully cleared large areas of minefields (thousands of hectares, and tens of thousands of buildings), and many roads while destroying more than a hundred thousand of explosive devices (Thomas, 2020). For these tasks, they used some new robotized engineering equipment (multifunctional mine clearing robotic system - the Uran-6; ground-penetrating radars - the OKO-2; remote-controlled mine clearing vehicle equipped with an electromagnetic pulse generator - the Listva). Besides that high engineering performance, they established a mine clearing training center and had trained more than 600 Syrian soldiers by 2018 (Thomas, 2020).

Logistics. Due to long distances from the Russian territory and drastically different climate conditions and heavy terrain, as well as due to challenging security environment at all levels, logistics support of the Russian forces in Syria has been and still is a huge challenge. Health support for personnel and good living conditions, together with very improved quartermaster, food, and sanitary conditions, are much better than in some former times, i.e. accommodation tents replaced with solid block modules; food prepared by only Russian cooks instead of locals; strict control over food stocks and water supply; special uniforms for high temperature climate, etc. Combat items supplies (ammunition and fuel) were well managed and sustained at appropriate level with the goal to sustain demands for a high consumption rate caused by intensive air operations, ground patrolling, as well as for combat support of operations of the Syrian allies (Thomas, 2020). To illustrate the level of logistics efforts, during the five months in 2015 (the beginning of engagement), Russian logistics deployed more than 200,000 tons of material from Russia to the deployed forces in Syria (Clark, 2021).

Military management lesson learned

The Russian armed forces conducted two main reforms during the last few decades. The first one was induced after the war in Georgia in 2008 while the second one started with personal changes at the highest ministerial level (with the then-new Minister of Defense Sergei Shoigy), and at the level of the new Chief of General Staff (General Valery Gerasimov), in 2012.

A strong reform momentum to the Russian military modernization and improvement occurred at the beginning of wider Russian engagement in Syria in 2015. That momentum brought changes and improvement in many aspects: strategic, doctrinal, operational, tactical, logistical, and military-technical upgrading with new weapons and military systems. Some of them will be presented here.

Military personnel upgrade with combat experience

Engagement in the Syrian conflict has been a unique opportunity for gaining combat experience, and it has been performed in a well-organized manner. Some estimations (Ramm, 2019), suggest that by the middle of 2018, more than 63,000 military personnel (including 434 generals and 25,738 officers) were deployed in Russian bases in Syria on a rotating basis, usually a 3-month deployment, while for senior officers it was six to nine months (Jones, 2020). The estimates for the personnel contingent go between 3,000 to 5,000 troops with periodical peaks of about 6,000 troops (Jones, 2020). A large part of deployed personnel consisted of officers (about 40%) selected from across all units and districts in Russia so that their experience as well as burden sharing could be distributed throughout all parts of the armed forces. It is interesting that almost two thirds of Russian Air Force personnel had gained deployment experience in Syria by 2018 (Jones, 2020).

Similarly to the situation in Western armies, combat experiences gained from deployment in combat zones have become a valuable factor for successful professional careers of Russian officers. The Russian military has recognized indispensable value of combat experience and has started to consider that as a precondition for promotions and appointments for higher professional positions in military organizations.

Contemporary warfare enriches military professionals with additional types of experiences such as: facing with several categories of conflict participants; field-testing of new weapons and equipment; application of old procedures in new environment and testing new operational procedures and doctrinal guidelines; performing joint forces coordination and operations; conducting cooperation with different allies, local population, units, and commands of other powers present in Syria, etc.

Adjustment of concepts, procedures, and doctrines

Perception of dominance of urban operations. It has been realized that terrorists and insurgents mostly use populated areas for their activities (operations, sustainment, supply, recruitment, and protection). Some lessons learned from urban operations in Syria show some similarities with urban operations in Grozny (Chechen wars) and even with some cases during WWII. In Syria, the following tactic was usually used: attacks on fortified terrorist bases in urban environment usually start after extensive situation monitoring followed by encircling the enemy location but not completely - instead, one small corridor is left uncovered as an offer to defenders to retreat including all those from civilian population who want to leave the location; it is then followed by artillery and direct fire engagement on focused parts of the urban location; after the artillery action, what follows are actions by specially composed maneuverable assault teams, with optional tank support behind assault teams if needed (Thomas, 2020). Sometimes, instead of artillery and tanks, helicopters delivered precision-guided weapons, while robotized platforms were used for reconnaissance and mine-clearing.

Defense from UAVs. The Russian forces in Syria experienced several drone attacks. In spite of media attractiveness of such events, it should not be a surprise as it was foreseen in some earlier studies (Bunker, 2015), and every army (and not only the military, but also commercial sector) should expect that in future conflicts. Efficient and effective “drone defense” is an open question (Bendett, 2019) for many militaries around the world due to a great potential of drone engagement (Yaacoub et al, 2020). Anti-drone combat could be successful with good air-defense systems and highly trained personnel. For example, in rebels’ UAV attacks on the Russian forces in Tartus and Khmeimim bases in January 2018, seven of 13 attacking drones were destroyed by the air-defense system Pantcir while the rest of them were landed by Russian electronic warfare units capturing the control over them (Urcosta, 2020). On the other hand, when poor servicing of air-defense system is present, attacking drones are very efficient and an effective combat tool due to their much lower price than those of targets which they attack. This new way of warfare generates many possibilities and subjects for research studies at higher levels of military education (Nikolic, 2018).

Conclusion

The military lessons learned from the engagement in the Syrian conflict are numerous. However, the main beneficiary can be probably found in the domain of command and control process and corresponding technical systems, with the main output in shortening the decision-making cycle, networking of forces, and superior situation awareness. From the purely technical side of military technology, combat environment is almost indispensable for developing and testing new weapons and equipment, and that fact has been used intensively. The importance and applicability of robotized platforms and unmanned aerial vehicles was recognized and will fuel development of future similar systems as well as appropriate counter measures.

Gathering combat experience through periodical force rotation was applied and then used and disseminated through the whole force structure by appropriate promotions, advancements and posting combat-experienced personnel to the key positions across the military hierarchy. The analyses of the deployment and combat experience serve as a pivot for creating new procedures, manuals, and military doctrines.

This work should be taken not as a final review of a contemporary conflict's impact on military technology development but rather as an initial step for further research and deeper insight into particular topics. Future research should unavoidably include other contemporary conflicts such as the Caucasian war in the fall of 2020 which was far less asymmetric than the Syrian conflict and as such could be of interest for many small countries.

References

Adamsky, D. 2018. Moscow's Syria Campaign: Russian Lessons for the Art of Strategy. *Russie.Nei.Visions*, 109, July [online]. Available at: https://www.ifri.org/en/publications/notes-de-lifri/russieneivisions/moscows-syria-campaign-russian-lessons-art-strategy [Accessed: 1 April 2021]. ISBN: 978-2-36567-890-2.

Adamsky, D. 2020. *Russian Lessons from the Syrian Operation and the Culture of Military Innovation*. Garmisch-Partenkirchen: European Center for Security Studies „George C. Marshall", Security Insight report No.047.

Bendett, S. 2019. The Rise of Russia's Hi-Tech Military. *Fletcher Security Review*, 6(1), Summer, pp.6-14 [online]. Available at: https://www.fletchersecurity.org/summer-2019-military-technologies [Accessed: 1 April 2021].

Blank, S.J. 2019. *The Russian Military in Contemorary Perspective. Strategic Studies Institute*. Carlisle, PA: U.S. Army War College Press.

Bunker, R.J. 2015. *Terrorist and Insurgent Unmanned Aerial Vehicles: Use, Potentials, and Military Implications*. Carlisle, PA: Strategic Studies Institute, U.S. Army War College [online]. Available at: https://scholarship.claremont.edu/cgu_facbooks/50/ [Accessed: 1 April 2021].

-Center for Analysis of Strategies and Techniques (CAST). 2020. *Russian UAV in Syria* [online]. Available at: http://cast.ru/eng/products/articles/russian-uavs-in-syria.html/ [Accessed: 1 April 2021].

Clark, M. 2021. *The Russian Military's Lessons Learned In Syria*. Washington, DC: Institute for the Study of War [online]. Available at: http://www.understandingwar.org/report/russian-military%E2%80%99s-lessons-learned-syria [Accessed: 1 April 2021].

Hagelin, B. 2004. *Science- and technology-based military innovation: the United States and Eur*ope. Solna, Sweden: SIPRI Yearbook 2004: Armaments, Disarmament and International Security, pp.285-304.

-International Institute for Strategic Studies (IISS). 2021. *The Military Balance 2021.* London, UK: Routledge & CRC Press. ISBN: 9781032012278.

Jones, S.G. 2020. *Moscow's War in Syria*. Washington, DC: Center for Strategic & International Studies and Lanham, MD: Rowman & Littlefield [online]. Available at: https://www.csis.org/analysis/moscows-war-syria [Accessed: 1 April 2021]. ISBN: 978-1-5381-4015-4 (pb); 978-1-5381-4016-1 (eBook).

Lambeth, B.S. 2001. *NATO's Air War for Kosovo: A Strategic and Operational Assessment*. Santa Monica, CA: RAND Corporation. Available at: https://doi.org/10.7249/MR1365.

McDermott, R. 2020. Tracing Russia's Path to Network-Centric Military Capability. *Jamestown Foundation*, Programm: Russia's Path to the High-Tech Battlespace, 4 December [online]. Available at: https://jamestown.org/program/tracing-russias-path-to-network-centric-military-capability/ [Accessed: 1 April 2021].

Nikolic, N. 2017. Tandem Queueing Concept in Improving Command & Control Process in Hybrid Environment. In: *XLIV International Symposium on Operational Research "SYM-OP-IS-2017"*, Zlatibor, Serbia, pp.675-680, September 25-28 [online]. Available at: http://symopis.vggs.rs/razno/Zbornik_radova_SYM-OP-IS_2017.pdf [Accessed: 1 April 2021]. ISBN: 978-86-7488-135-4.

Nikolic, N. 2018. Strengthening defense research as part of higher military education for future security challenges. *Security and Defense Quarterly,* 21(4), pp.58-72. Available at: https://doi.org/10.5604/01.3001.0012.5181.

Nikolić, N. 2016. Conceptualizing Simulation for Lawson's Model of Command and Control Processes. In: *7th International Scientific Conference on Defensive Technologies OTEH*, Belgrade, pp.446-450, October 6-7.

O'Hanlon, M. 2019. *Forecasting Change in Military Technology*, *2020-2040*. Washington, DC: The Brookings Institution [e-book]. Available at: https://www.worldpittsburgh.org/wp-content/uploads/2019/01/Forecasting-change-in-military-technology-2020-2040-Brookings-2018.pdf [Accessed: 1 April 2021].

Pronk, D. 2020. Lessons Learned in the Levant: Russia's Arms in the Syrian Conflict. *Clingendael Magazine,* May [online]. Available at: https://www.clingendael.org/publication/russias-arms-syrian-conflict [Accessed: 1 April 2021].

Ramm, A. 2019. The Russian Army: Operations and Modernizations. *CNA Analysis Solutions*, October [online]. Available at: https://www.cna.org/CNA_files/PDF/IOP-2019-U-021801-Final.pdf [Accessed: 1 April 2021].

Roland, A. 2009. War and Technology. Program on Teaching Innovation. *Foreign policy research institute*, 27 February [online]. Available at: https://www.fpri.org/article/2009/02/war-and-technology/ [Accessed: 1 April 2021].

Schimd, J. 2018. *The Determinants of Military Technology Innovation and diffusion*. Ph.D. thesis. Atlanta, GA: Georgia Institute of Technology [online]. Available at: https://smartech.gatech.edu/handle/1853/59877 [Accessed: 1 April 2021].

Thomas, T. 2020. Russian Lessons Learned in Syria: An Assessment. *MITRE Center for Technology and National Security*, June [online]. Available at: https://www.mitre.org/sites/default/files/publications/pr-19-3483-russian-lessons-learned-in-syria.pdf [Accessed: 1 April 2021].

Urcosta, R.B. 2020. The Revolution in Drone Warfare: The Lessons from the Idlib De-Escalation Zone. *Journal of European, Middle Eastern, & African Affairs*, August 31 [online]. Available at: https://www.airuniversity.af.edu/JEMEAA/Display/Article/2329510/the-revolution-in-drone-warfare-the-lessons-from-the-idlib-de-escalation-zone/ [Accessed: 1 April 2021].

Yaacoub, J-P., Noura, H., Saman, O. & Chehab, A. 2020. Security analysis of drone systems: Attacks, limitations, and recommendations. *Internet of Things*, 11(art.number:100218). Available at: https://doi.org/10.1016/j.iot.2020.100218.

Waller, J.K. 2020. *Airpower Theory And Hybrid Warfare: Warden's Five Rings*. Masters thesis. Baltimore, Maryland: Johns Hopkins University [online]. Available at: https://jscholarship.library.jhu.edu/handle/1774.2/62790 [Accessed: 1 April 2021].

НОВЫЕ ВОЕННЫЕ ТЕХНОЛОГИИ И КОНЦЕПЦИИ, ОСНОВАННЫЕ НА ОПЫТЕ СИРИЙСКОГО КОНФЛИКТА

Небойша В. Николич

Университет обороны в г. Белград, Институт стратегических исследований, г. Белград, Республика Сербия

РУБРИКА ГРНТИ: 78.00.00 ВОЕННОЕ ДЕЛО:
78.25.00 Вооружение и военная техника;
78.25.23 Новейшие разрабатываемые средства вооруженной борьбы и защиты от них
ВИД СТАТЬИ: оригинальная научная статья

Резюме:

Введение/цель: Целью данной статьи является описание некоторых тенденций, вытекающих из опыта актуального сирийского конфликта, в направлении разработки новых военных концепций и технологий. Способ, масштабы и динамика использования боевого опыта в сирийском конфликте являются хорошим примером того, как великие державы улучшают возможности своих систем обороны.

Методы: В статье был применен обширный контент-анализ избранных информационных источников. В использовании доступной информации был применен системный подход для ее структурного и сбалансированного изучения. Сравнительный анализ подтвердил некоторое сходство в поведении великих держав в плане развертывания и тестирования сложных боевых систем, имеющих стратегическое значение в локальных войнах. Индуктивное мышление способствовало обобщению соответствующих выводов.

Результаты: Среди участия нескольких великих и региональных держав, активно вовлеченных в этот конфликт, Россия считается доминирующей, и она как таковая является основным предметом исследования данной статьи. Всем известно насколько важны испытания новой военной техники и, что ее испытания в реальных боевых условиях являются важнейшим показателем. Наряду с интенсивным тестированием широкого спектра военных технологий в условиях войны, также выявляются главные индикаторы разработки новых концепций, доктрин и организационных совершенствований вооруженных сил, основанных на опыте сирийского конфликта.

Выводы: Вмешательство России в вооруженный конфликт в Сирии с точки зрения военной технологии и разработки концепции стало примером комплексного и систематического подхода в изучении, учениях, инновациях и во внедрении наиболее важных факторов в развитие современной военной организации в качестве ответной меры на вызовы современных вооруженных конфликтов.

Ключевые слова: военные технологии, инновации и испытания, военные концепции, боевой опыт, сирийский конфликт

НОВЕ ВОЈНЕ ТЕХНОЛОГИЈЕ И КОНЦЕПТИ НАСТАЛИ НАКОН ИСКУСТАВА ИЗ СИРИЈСКОГ СУКОБА

Небојша В. Николић

Универзитет одбране у Београду, Институт за стратегијска истраживања, Београд, Република Србија

ОБЛАСТ: војне примене, војне технологије, савремени рат
ВРСТА ЧЛАНКА: оригинални нуачни рад

Сажетак:

Увод/циљ: У раду су приказане одређене тенденције развоја нових војних технологија и концепата проистекле из искустава из текућег оружаног сукоба у Сирији. Начин, обим и динамика коришћења борбених искустава из овог сукоба представљају добар пример како велике силе побољшавају своје способности и спроводе реформе сопственог система одбране.

Методе: У раду је примењена анализа садржаја обимног материјала из одабраних референтних извора информација. Системски приступ је примењен за структурирани и балансирани приказ расположивих информација. Упоредна анализа потврдила је сличности у понашању великих сила при употреби и провери сложених борбених система стратегијског значаја у локалним сукобима. Индуктивно мишљење допринело је синтетизовању одговрајућих закључака.

Резултати: Поред више великих и регионалних сила које у великој мери учествују у овом сукобу, руско присуство се сматра најдоминантнијим. Улога и важност тестирања нове војне опреме и технологије је позната, а посебну вредност имају тестирања у реалним борбеним условима. Истовремено са интензивним тестирањима широког скупа војних технологија у ратним условима, евидентни су и показатељи развоја нових концепата, процедура и доктрина, као и усавршавања организационих форми војних снага заснованих на борбеним искуствима из рата у Сирији.

Закључак: Руски подухват у Сирији, са аспекта развоја војних технологија и нових концепата, постаје пример свеобухватног и систематског приступа у изучавању, обуци, иновацијама и имплементацијама најрелевантнијих фактора у развоју модерне војне организације, што представља одговор на изазове савремених оружаних сукоба.

Кључне речи: војне технологије, иновације и тестирање, војни концепти, борбено искуство, сиријски сукоб.

Paper received on / Дата получения работы / Датум пријема чланка: 04.04.2021.
Manuscript corrections submitted on / Дата получения исправленной версии работы / Датум достављања исправки рукописа: 31.05.2021.
Paper accepted for publishing on / Дата окончательного согласования работы / Датум коначног прихватања чланка за објављивање: 02.06.2021.