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The Influence and Development Trend of Information Weapons and Equipment on Modern Warfare

Yuanliang Yang[1,a*], Yaoyao Tang[2,b]

[1]Military Education Section, Southwest Petroleum University, Chengdu 610500, China
[2]Foreign Language Department, Sichuan University of Media and Communications, Chengdu 611745, China
[a]yangyuanliang@swpu.edu.cn, [b]believe1234567@163.com
** Corresponding Author*

Abstract: *The new technological revolution with information technology as the core has not only promoted the development of information weapons and equipment, but also it has accelerated the transformation of war to information. Firstly, this paper analyzes the profound impact of information weapons and equipment on modern warfare and it discusses the new changes from four aspects: combat concept, combat field, combat mode and combat theory. Secondly, the paper also analyzes the development trend of information weapons and equipment, and it believes that there will be development in four directions: intelligence, systematization, new fields and military civilian integration. The article holds that only by fully mastering the application and development law of information weapons and equipment can we build an information army and win the future information war.*

Keywords: *Information Weapons and Equipment, Modern Warfare, New Military Revolution, The Development Trend*

1. Introduction

Since the middle and late 20th century, with the rapid development of high-tech groups with information technology as the main strength, the fourth technological revolution in human history, the information technology revolution, has begun. The information technology revolution has boosted the new military revolution, and a large number of information equipment has been applied, making it a fundamental change in the development direction of weapons and equipment. Information equipment refers to the military equipment that adopts modern information technology which has certain capabilities of information acquisition, transmission, processing, utilization and confrontation. Thus, it can greatly improve the technical and tactical efficiency, such as precision-guided weapons, integrated electronic information systems, and modern aircraft and ships equipped with data chains and related information systems [1]. The emergence and development of information equipment is a new form of the development of military equipment in the information age, driven by the high technology with information technology as the core and promoted by the new military demand. It is expected that in the future, a number of new technologies, such as nanotechnology, biotechnology, new material technology, new energy technology, stealth technology, directional energy technology and artificial intelligence technology, will have greater breakthroughs. Besides, a number of more efficient new equipment, such as new C4ISR system, electronic warfare and network warfare equipment, new information warfare platform, will be equipped with the army one after another, so information equipment will enter a new stage of development. All in all, it is of great significance for national defense construction and future war to study the impact of information weapons and equipment on modern warfare and its future development trend.

2. The Influence of Information Weapons and Equipment on Modern Warfare

Information-based weapons and equipment greatly enhance the combat capability of the army, and its application to the battlefield will have a significant and far-reaching impact on modern operations.

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2.1 Proposing New Idea of Warfare

2.1.1 The View of Victory and Failure

The traditional standard of victory and defeat is how much land, casualties and supplies, but now the measure is whether the one side has heavily weakened the other side's military, economic and political strength; Weather the enemy is effectively contained or not, with the achievement of the purpose of yielding troops hands down.

2.1.2 The View of Power

The traditional concept of power focuses on the pursuit of quantitative advantages, while the concept of power under information conditions pursues information advantages, and put emphasis on the precisive and effective collapsing force. In terms of power composition, we should attach importance to the development of various soft-killing weapons which are not very fatal. Also, in the application of power, we should pay attention to the organic combination between deterrence and actual combat forces.

2.1.3 The View of Time and Space

The development of information technology has made modern combat form a multi-dimensional battlefield space related to sea, air, sky, electricity and network area. The traditional understanding of exchanging space for time or time for space has been changed. We must comprehensively investigate the time and space, and grasp the advantages of these two aspects to win the battle.

2.1.4 The View of Information

In future warfare, information is not only a power multiplier, but also an important killing force. Information ability is becoming the core component of the army's combat effectiveness. Therefore, the right of information control has become the command points for the two sides in the future battle. Whoever has the advantage of information can master the initiative of the war, and the side can win the war.

2.2 Expanding New Areas of Warfare

The wide application of information technology equipment has broadened the battle space, and the warring parties have expanded from the three traditional areas of land, sea and air to new areas such as space, electromagnetic and network warfare, with the emergence of space, electronic and network warfare.

2.2.1 The Space Warfare

The space war refers to the use of space-based weapon system, in order to fight for the "right to control the sky" for the purpose of combat operations, with the outer space of the earth for the battlefield of attack and defense operations. It includes both combat between space-based weapon systems on both sides, as well as attacks by space-based weapon systems on ground and air targets, and ground-to-ground attacks on space-based systems.

2.2.2 The Electronic Warfare

The electronic warfare, also known as electronic countermeasures, refers to a special form of battle between the hostile parties in the electromagnetic space by using special electronic equipment, tactics and technical measures. It is a comprehensive technical measure taken to weaken and destroy the use efficiency of the enemy's electronic equipment and ensure the normal performance of their own electronic equipment. In essence, the two sides of the war struggle for the effective use of the electromagnetic spectrum by using electromagnetic waves, so as to obtain the "control of electromagnetic rights".

2.2.3 The Network Warfare

The network warfare refers to the combat action carried out in the information network space to destroy the enemy network system and network information, weaken its use effectiveness, and protect its own network system and network information. The basic platform of network warfare is the computer network, whose main purpose is to compete for: “the power of network ".

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2.3 Giving Birth to New Modes of Warfare

The wide application of information equipment has changed the features of war and brought about the transformation of combat mode. Symmetry, line and contact operations in the past have become history, while asymmetric, non-linear and non-contact operations have become the basic modes of operations.

2.3.1 The Asymmetric Warfare

The asymmetric warfare mainly refers to the use of superior forces or unconventional means so as to find and enlarge the weakness of the enemy, actively create advantageous opportunities, and carry out mobile and flexible combat operations in an unexpected way at an appropriate time and place, in order to achieve maximum combat results at the lowest cost. Its core concept is to cultivate strengths and avoid weaknesses, to seek advantages and to avoid disadvantages, to keep away from enemy's advantage and to make a victory beyond enemy's expectation. In essence, it is efficient to gather and release combat effectiveness. Asymmetric warfare is not only the patent of the strong nation, but also a "shortcut" for the weak side to "defeat the strong". More than 2,500 years ago, Sun Tzu's Art of War put forward such ideas as "When the enemy retreats, if their flag does not fall, do not intercept them (in case of feigning defeat); Don't attack troops with perfect preparation." and "Commanders should use forces correctly and change tactics flexibly in combat." [2] These ideas are rich in asymmetric warfare.

2.3.2 The Nonlinear Warfare

The nonlinear warfare is as opposed to the line warfare. Due to the rapid development of information technology and equipment, both sides don't have to adopt the battle method of "peeling onions" layer by layer, which means they first attack the front, then the depth, and then the rear area. Instead, they can rely on military satellites and all kinds of remote surveillance reconnaissance system which have insight into the enemy's situation in the whole battlespace, and adopt a variety of corresponding weapon system to attack their front, depth and the rear at the same time. There is hardly distinction between the front and the rear in this kind of operation. The boundary between strategy, campaign and tactics is blurred, because the attack and defense change quickly, and the combat action is unprecedentedly fierce. In the Kosovo and Afghanistan wars, for example, there was no front line between the two sides, and all combat operations were largely non-linear. In the Iraq war, there were partial line operations, but most of the operations were also under non-linear circumstance.

2.3.3 The Non-contact Warfare

The non-contact warfare means the operation in which the forces of both sides actively and flexibly attack the enemy without direct contact, depending on information advantages and using long-range precision strike firepower. In essence, it is to avoid contact with the other party's combat capabilities. Specifically, it can change "two-way contact" into "one-way contact", which means "I can hit you, but you are not permitted to hit me", so as to achieve the purpose of combat with absolute military superiority. For example, in the Kosovo War, NATO aircraft relied on absolute air superiority and information superiority to carry out fierce air strikes against the Yugoslavia, but the Yugoslav army was beyond its reach due to anti-aircraft weapons. As a result, NATO forces set a precedent of "zero casualties" war, which is the classic "non-contact warfare".

2.4 Updating the New Theory of Warfare

With the wide application of information equipment, the confrontation of military system has become the main form of operation. The weapon systems of various services are gradually integrated on the basis of networking, and new operation theories such as "the integrated warfare", "the joint warfare" and "the network centric warfare" have emerged.

2.4.1 The Integrated Warfare

"The integrated warfare" defines the integration of various elements of operations, emphasizing system confrontation. The idea of "integration" began with the theory of "air-ground integrated warfare" put forward by the US army in the early 1980s, and matured in the early 21st century. After that, it developed the theories of "air-sea integrated warfare", "air-air integrated warfare", "internet-electricity integrated warfare", and "air-internet integrated warfare". With the continuous development of various weapons and equipment, what we should carry out for "system integration" can constantly excavate the extreme in the vertical as well as horizontal direction. Under the control of the C4ISR system, different weapons and equipment realize complementary effectiveness; different

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services realize complementary functions; different countries realize complementary military forces, and they have the ability to connect, interwork and interoperate, so as to integrate different weapon systems of different countries and different services in technology. The integration of land, sea, air, space, electricity, network and other multi-dimensional combat space makes military system confrontation become the core of modern combat. The integrated operations make up for the "shortcomings" of independent armed services and single weapon systems, and greatly improve the effectiveness of integrated operations.

2.4.2 The Joint Warfare

"The joint operations"-breaking the boundaries of services to realize true unity. In the era of mechanized war, the services and arms are relatively independent. The army, navy and air force dominate "their own battlefield" respectively. They have different sets of operational principles and methods. There is only simple coordination between them, and it is impossible to implement real-time control and command over other services. The joint operation under the condition of informatization will be a highly systematic combination. The combat space will be expanded from the traditional three-dimensional space to multi-dimensional space. Any combat action cannot leave the support of electromagnetic, network and space forces. The combat forces of various services are only a part of the joint operation. It is difficult for any service or unit of the service to play a role alone, and only large-scale and deep alliances can form a strong and effective combat effectiveness. The boundaries between services will be broken, which demonstrates the traditional concept of land, sea and air operations will be gradually weakened. In addition, the division of operational levels and operational stages such as strategy, campaign and tactics will become blurred, and it will be difficult to distinguish between main attack and auxiliary attack, operational echelon and front and rear.

2.4.3 The Network-centric Warfare

"The network-centric warfare" - seeking full spectrum advantage, leading the development direction. The concept of "the network-centric warfare" was first proposed by the US Navy in 1997. In 2001, the US Department of Defense formally submitted the "The Network-centric Warfare" report to the Congress. It was preliminarily tested in the Afghanistan war and The Iraq War, and it is still continuously enriched and developed. According to the US Army, "the network-centric warfare" is a military action realized through the army network, which occurs simultaneously in the "physical domain", "information domain" and "cognitive domain" and among the three. In the physical domain, each component of the army realizes the network connection and highly integrated operation. In the information domain, the army has the capability of all-dimensional information operation so they can obtain the information superiority, and the operation is highly coordinated; in the cognitive domain, high-quality situational awareness can be generated and shared, and commanders' operational intentions can be understood in real time. Troops have self-synchronous combat capability and high operational efficiency. In short, "the network-centric warfare" is an operational style that can interact with all units of battlefield operations, and transform information advantages into operational advantages, and enable troops to jointly master battlefield situation and coordinate actions, thus exerting maximum operational effectiveness. "The shift from the platform-centric to the network-centric warfare is a fundamental shift that will prove to be the most significant revolution in military affairs in 200 years," says the US military [3]. This is another major step taken by the US military to enhance its information warfare capability in order to seek global and full spectrum advantages.

3. The Development Trend of Information Weapons and Equipment

With the continuous development of military high technology with information technology as the core, the future information weapons and equipment will continue to overturn people's cognition, greatly promote the development of the new military revolution, and change the situation of the future war.

3.1 To the Direction of Intellectualization

With the rapid development of big data, cloud computing, artificial intelligence and other subversive technologies, the future information equipment will continue to develop toward the direction of intelligence, and gradually transform into realistic combat capabilities in remote control, semi-autonomous, autonomous hierarchical mode. By installing a computer chip and command-control system on operation platform, the drone equipment is no longer a simple machine, but with the "brain",

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which can undertake a certain amount of "thinking". It can not only be passive and mechanical execution of instructions, but also it is able to perform independent, active, intelligent operations. For example, in the war in Afghanistan, the US army used drones to successfully "beheaded" al Qaeda's No. 2 leader at that time, and then put the "Predator", "Global Eagle", "God of Death" and other UAVs, as well as the "Sword", "Big Dog" and other robots into battlefield tests. At the end of 2015, Russia invested 6 tracked unmanned combat vehicles, 4 wheeled unmanned combat vehicles and 1 UAV in the anti-terrorism operation in Syria, winning the world's first crucial battle dominated by unmanned combat vehicles.

In recent years, military powers have developed AI equipment to compete for the "new commanding heights" of the future battlefield. At present, the US military takes the lead in artificial intelligence equipment, with nearly 10,000 aerial unmanned systems and more than 12,000 ground unmanned systems, which have become an indispensable part of the US military operations. Russia, on the other hand, approved the implementation of the Concept of developing military science complex by 2025, emphasizing that AI systems will soon become a key factor to win the future battlefield, focusing on the intelligent transformation of weapons and equipment, and developing combat robots and AI missiles for the next generation of strategic bombers. In China, the report of the 19th CPC National Congress stressed the need to "accelerate the development of military intelligence", accurately grasped the pulse of the latest development of military technology in the world, pointed out the key links of future military construction, and will further promote the construction of the Chinese army and the enhancement of combat effectiveness. It should be emphasized that intelligence is not the same as "unmanned", the battlefield can be unmanned, but war control must be manned. The independent operation of intelligent weapons and equipment on the battlefield does not completely leave the operation and control of people. Behind it there is still the competition between people in thinking mode, command mode and combat methods. The change is that warfare is turned from directly facing the battlefield at the front to implementing background control at the rear. Its core is still man-machine integration and common cognition with the purpose of attacking the army’s heart, seizing intelligence skills and destroying the chain system.

3.2 To the Direction of Systematization

In the era of mechanized war, the connection between weapons and equipment is quite limited, and weapons and equipment mainly rely on the information obtained by their own detection devices to carry out operations. The performance level and number of combat platforms are the key to the victory or defeat of a war. However, information warfare is no longer a confrontation between single weapons and equipment, but a confrontation between systems. In recent high-tech local wars such as the Gulf War, the Kosovo war, the Afghan war and the Iraq war, the multinational force led by the United States relied to a greater extent on the overall combat capability of weapons and equipment. Iraq, the Federal Republic of Yugoslavia and Afghanistan were seriously destroyed due to early warning and detection systems, intelligence and reconnaissance systems, communication systems, and command and control systems. The organic connection between weapon systems has been cut off, and some of the more advanced weapons and equipment have basically not played a role.

Therefore, an important index to evaluate the combat capability of an army is the overall combat effectiveness of weapons and equipment system. Among them, integrated electronic information system is the technology and system foundation of weapon equipment system. Without integrated electronic information system, there will be seldom real weapon system, and its overall combat effectiveness will be difficult to achieve. Such systematic confrontation between military forces requires that weapons and equipment become more systematic, interdependent and complementary, and form an overall operational effectiveness that integrates reconnaissance and surveillance, command and control, precision strike, electronic countermeasures, air defense, mobile operations and field survival. From the perspective of development trend, information equipment is gradually shifting from platform to information system, from individual energy concentrated explosion to precise release of overall effectiveness, aiming at the weakness of the enemy to seek asymmetric advantages based on the overall improvement of combat capability.

3.3 To the Direction of New Fields

In the era of mechanization, wars are mainly carried out in the traditional fields of land, sea and air, so countries focus on the development of tanks, warships, aircraft and other mechanized combat platforms. However, the war in the information age has expanded from the previous

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"three-dimensional" space of land, sea and air to the "six dimensions" of land, sea, air, space, electricity and network Therefore, in addition to continuing to develop weapons and equipment in traditional fields, major countries have accelerated the development of weapons and equipment in new fields such as space, electromagnetism and network. Recent high-tech local wars have also fully proved that in order to obtain "land control", "sea control" and "air control", they must first win "space control" and "electromagnetic control" "network control". At present, the US has upgraded and established its cyber warfare command and space command, and has set up special cyber and space warfare forces. Russia has also comprehensively integrated aviation, aerospace, anti-missile and air defense forces to form a new space force. China, on the other hand, has integrated its new combat forces in the fields of intelligence, technical investigation, electronic countermeasures, cyber attack and defense, and psychological warfare into a new strategic support force. It is foreseeable that in the future, new weapons and equipment such as space warfare, electronic warfare and cyber warfare will continue to emerge, and the space carriers, electromagnetic pulse bombs and supercomputer viruses seen in sci-fi movies in the past may become reality in the future.

3.4 To the Direction of Military Civilian Integration

At present, a new round of scientific and technological revolution and industrial reform are accelerating, and new technologies such as 3D printing, Internet of Things, big data, artificial intelligence, new energy, new materials and biotechnology are developing rapidly. The great potential of these new technologies has begun to show, and more and more "science fiction" has become a reality, which opens up a broad space for the development of information equipment to military civilian integration. It is noteworthy that in this round of scientific and technological revolution, the "source" of new technological innovation is gradually turning to the civil field. The civil sector has gradually replaced the military sector as the "pioneer" of new technological development. Many new technologies in the civil field have made breakthroughs and started a prairie fire, showing great prospects for military application. From the man-machine Go game, driverless cars, intelligent robots to virtual reality technology, all show the infinite space for the application of new technologies in the military field. Currently, the new round of scientific and technological revolution is not led by a single technology, but the integration of different technologies and elements, showing the digital, intelligent and personalized characteristics. Some think tanks predict that by 2030, more military technology will come from the civilian sector rather than the military industry, and an increasing number of key technologies likely to drive the military's future will come from civilian companies. In the future, the boundaries between military and civilian, peace and war, economic construction and national defense construction are increasingly blurred. It indicates the arrival of the era of military civilian integration innovation. Therefore, major countries in the world have strengthened their strategic deployment, have tried their best to seize the commanding height of the new scientific and technological revolution through military civilian collaborative innovation, and have tried to apply the achievements of the new scientific and technological revolution to the military field as soon as possible before their opponents, so as to seek the competitive advantage of military strength and comprehensive national strength.

4. Conclusions

The new military revolution with information technology as the core has greatly promoted the development of information weapons and equipment, and it has brought great changes to the concept, field, mode and field of modern warfare, and also it will further to develop in the direction of intelligence, systematization, new field and military civilian integration. We must build an information army in order to win the information war. Before that, we must develop information-based weapons and equipment. The report of the 19th CPC National Congress stressed: "We should strive to basically realize the modernization of national defense and the army by 2035 and build the people's army into a world-class army by the middle of this century." [4] The development of information-based weapons and equipment is not only the basic content of the new military revolution, but also the key to realizing the goal of our army's information construction. Only by continuously and deeply studying the application and development law of information weapons and equipment can we build an information army and win the information war in the future.

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References

[1] Cheng Yongsheng, Military High Technology and Information Weapons and Equipment, Beijing: National Defense Industry Press, 2009, PP. 1-2.
[2] Sun Wu, The Art of War, Trans. Chen Xi, Beijing: Zhonghua Book Company, 2019, PP. 140-142.
[3] Arthur Cebrowski, The Origin and Future of Network-centric Warfare, Trans. Liu Xiaoyan, Intelligence Command Control and Simulation Techniques, 1999, 1, 18-25.
[4] Xi Jinping, Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era Delivered at the 19th National Congress of the Communist Party of China, Renmin Ribao, 2017-10-28(01).
[5] Ji, H., Tang, M. , & Qi, W. Thinking of development of information countermeasures combat system based on the big data and cloud computing. Aerospace Electronic Warfare, 2015