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MILITARY HUMAN RESOURCES MANAGEMENT IN THE ROBOTIC WARFARE ERA

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Abstract:
Today's world is in the middle of a major revolution in the way the work is done. Unlike previous labor shifts, this revolution is led by the advanced technologies such as Robotic Process Automation (RPA) and Artificial Intelligence (AI). RPA and AI has opened up new horizons both for organizations and their workers. While repetitive and mundane work is performed easily by them, people can allocate time to focus on more strategic activities. Naturally, these revolutionary developments has taken the attention of military forces and started a digital transformation. In due time wars are expected to be fought with hybrid military forces. However the development of these hybrid forces will bring forth several concerns and human resources management is one of the most significant issues among them. In this study, we discuss different points of views to analyze these issues and challenges and try to put forth recommendations for a more modern military human resources management in the robotic warfare era.

Keywords: Human Resource Management, Military Human Resource Management, Robotic Warfare, Human-Robot Co-working.

1. Introduction

Technology has always changed the nature of wars. During the recent years significant developments have been experienced about artifical intelligence and robotics research fueled by the Industry 4.0 revolution. Even some studies suggest visions for Industry 5.0 human – robot co-working as a result of rapid developments in technology. However, these improvements bring along a number of technological, sociological, organizational, moral, legal and ethical concerns.

Apart from these issues, there are significant questions still waiting for answers. For instance how these developments should be addressed by different military departments remain partly unanswered. In order to keep up military specialists need to have an understanding of current robotic technologies as well as evolving ones; advantages and disadvantages and how to lead and manage hybrid military forces. In this study, we discuss different points of views to analyze these challenges and put forth recommendations.

2. Robotic Warfare Era

The progress in unmanned system technologies has initiated a transition the focus from specific domains to become domain agnostic. Developments in any domain are beneficial for all of them and future operations are expected to be relied heavily upon

multi-domain capabilities which requires a joint force structure. Major developments, advancements, challenges and trends are examined in four critical themes. These themes are selected due to their potential to accelerate unmanned systems into the future:

- **Interoperability:** It is a major thrust in the integration and operation of unmanned systems. As a result of increasing synergy of manned and unmanned systems' capabilities, a robust interoperable structure becomes compulsory for future advances in warfighting. Interoperability consists of common / open architectures, modularity and parts interchangeability, compliance, test, evaluation, verification, validation, data strategies and rights.
- **Autonomy:** As a significant force multiplier, it is one of the major revolutions in robotic warfare era. Advances in autonomy and robotics have already revolutionized warfighting concepts. Autonomy has potential to provide strategic advantages for defence ministries due to significant increase in efficiency and effectiveness of manned and unmanned systems. Autonomy involves AI and machine learning, increased efficiency and effectiveness, trust and weaponization.
- **Network Security:** This theme is especially indispensable for national security because operations of unmanned systems heavily rely on networked connections and efficient spectrum access. Network vulnerabilities should be addressed immediately in order to avoid any disruption or manipulation. Network security includes cyber operations, information assurance, electromagnetic spectrum and electronic warfare.
- **Human – Machine Collaboration:** Human-machine collaboration becomes the ultimate objective when integration and interoperability is applied. Teaming between human forces and machines will accelerate warfare transformation. It will enable a revolutionary collaboration in which machines will be considered as critical teammates. Human – machine collaboration is related to human-machine interfaces and human-machine teaming[1,2,10].

In order to ensure a successful progress in line with the rapid technical and capability advancements of all systems, these four key themes must be supported by strong policies. Strategic advantage of a military can be maintained as long as the emphasis remains on the evolution, availability and employment of unmanned technology [3].

It is obvious that robotic warfare will eventually change the nature of wars [4]. As it is pointed out by former DARPA Director Mr. Prabhakar *"Advances in autonomy and in AI and autonomous control systems and advanced computing and big data, and learning machines and intuitive graphic visualization tools, metamaterials, miniaturization – they are leading us to a time of great human-machine collaboration..."*[5]. Naturally, a new type of armed forces becomes imperative in the robotic warfare era. These hybrid armed forces will be composed of humans, drones, and robots. Human-machine teaming is the key element in this process. We can describe human-machine teaming as synchronized employment of soldiers, sailors, marines, airmen as well as civilian experts working with manned and unmanned systems to achieve improved lethality, survivability and situational awareness. Hence, synergy and overmatch with asymmetric advantages by combining the inherent strengths of the warfighter who uses these systems will be ensured [6].

However, the transition to hybrid armed forces is not an instantaneous development. First of all, human-machine teaming mission should seek for the most efficient balance between the warfighter and the unmanned systems. In addition to utilizing the current state of technology, optimization of the tasks requires a delicate balance as well. Adding more automation into unmanned systems eventually allows one operator for many systems. Hence, the human's role will be shifted from operator towards mission manager. In order

to keep up with these developments, a joint structure within the military forces needs to be established. And then acquisition, education and training issues should be addressed comprehensively by defense experts from different fields [7]. The main concerns to be dealt in robotic warfare era are listed in Table 1.

Table 1. Armed Forces Development Issues in the Robotic Warfare Era

Human-machine tactics, techniques, procedures and strategy
Management of public perception
Legal and policy constraints
Development of robotic warfare operations concept
Weaponized autonomous system policy
Transformation of military forces
Acquisition of robotic and AI defense systems
Strengthen connections to private sector advancements
Vulnerable network security – new approaches to securing data
Education and training
Military human resources management

All of these issues are highly significant and require immediate attention. In this study we only focus on the issue of military human resources management.

3. Military Human Resources Management (MHRM) in Robotic Warfare Era

The requirements for future employees have started to change owing to numerous emerging multidisciplinary support alternatives due to autonomous machines. While the demand for workers decreases, demand for more qualified employees increases. Although a better education helps in this process, it is only valid for certain circumstances. In order to meet the new standarts set for Industry 4.0, future personnel should also be adapted to new framework conditions. Adaptability is one of the major challenges yet it can be a major strong point as well. The next generation of employees is expected to adapt quickly to technical, social and digital change [8]. For instance a production robot is supposed to have fine motor skills, perception, adaptability and cognition. In order to function properly, is should be programmed dynamically and rigidly. Thus, the operating human is supposed to be able to adapt the system's functions to their individual needs if the system fails to recognize [9].

The additional qualification of an employee is directly connected to the work in question. It is also argued that mere knowledge workers will no longer be required. The training and skills requirements for operating autonomous machines are much complicated compared to conventional tasks and this situation leads shifts in employment. To ensure agility during missions, human-machine interfaces are expected to support a range of control options. In these options the human can be either "off the loop" which means no control over an autonomous system. He can be "on the loop" and supervise the unmanned systems or "in the loop" which means exercising commands to control a vehicle [10]. Although it is a highly controversial topic, the main focus should not be on taking the

human out of the loop but to redefine where the human fits into that loop. Thus, non-formal qualifications such as ability to act independently, build networks or organize teams with a focus on targets and to think abstractly has gained significance in this process [11, 12]. In the future, finding creative solutions to problems will become more and more significant.

To sum up, challenges of robotic warfare era require informed decisions on force structure requirements, personnel recruitment and retention programs, well-being programs as well as personnel readiness from both individual and unit perspectives. The life cycle of military human resources management (MHRM) is given below:

- Personnel structure
- Acquisition
  - Manpower management
  - Accession and retention management
  - Training integration
- Distribution
- Development
- Deployment
- Compensation
- Sustainment
- Transition [13].

However, without overcoming legal and policy constraints and developing human-machine tactics, techniques, procedures and strategy along with the military transformation process, this life cycle will remain as a futile attempt. MHRM would only be enhanced after developing proper policy and strategies.

4. Conclusion

Robotic warfare is becoming a reality. As a result of increasing speed, number and efficiency of the weapon systems, modern battlefield has become a very complex environment; it necessiates a great burden of knowledge more than soldiers can manage. Developments of unmanned technologies within the armed forces have made it necessary to take a different approach in terms of organization and process management. It is thought that the structural and functional reorganization of the human resources management approach should be prioritized in terms of adapting to the developments and meeting the needs of the future warfare. Rather that a fixed organization structure, this requires a flexible organization structure which can perform different tasks in different human-machine combinations in order to overcome the asymmetric threats that may rise in the uncertainty environment.

To manage this transition process successfully, a vision and strategy plan called “Digital Transformation” should be prepared. Starting from the top headquarters, establishing digital transformation offices suitable for the military hierarchical structure and preparing training programs for the assigned personnel in these offices will enable a more efficient transformation process. Last but not least, public perception is another significant issue in this process and public should also be informed about these developments.

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