JOURNAL OF MODERN SCIENCE

Том 4/53/2023

www.jomswsge.com

DOI: doi.org/10.13166/jms/177592

KONRAD STAŃCZYK

Military University of Technology, Poland

ORCID iD: 0000-0003-2788-5358

INTEGRATED MULTI-LEVEL INFORMATION SYSTEM OF THE MINISTRY OF NATIONAL DEFENSE AS AN IT SYSTEM SUPPORTING THE MANAGEMENT OF MILITARY RESOURCES

Abstract

The current threats to national security and defense require effective management of the national defense sector, including the armed forces, by means of, among others, applying adequate, modern IT systems that support the management of military resources. The aim of this study is to define the nature and designation of the Integrated Multi-level Information System of the Ministry of National Defense as an integrated and unified IT system designated to support the organizational cells and units of the national defense sector that are responsible for the proper management of financial, logistic, and human resources. The system ensures the standardization of actions and the exchange and integration of data. One of the aims of the complete implementation of the system is to ensure the maintenance of integrated, consistent and secure records of personal, material, and financial resources in quantitative, qualitative, and value-based aspects as well as access to current data on all required levels of management, the acceleration and improvement of the quality of planning, decision-making, and reporting processes and the circulation of documents and communication between the organizational cells and units of the sector.

Keywords: *state security, IT systems, resource management, security sciences*

Introduction

Observations of the current reality lead to the conclusion that nowadays, the dominant threats among numerous types of risks defined in history are political, and often become a stimulus for causes other types of dangers, first of all the military ones. The historical experiences of nations demonstrate that, due to their scale, military threats are the most serious challenges with which states are confronted. This results from the risk of interference and loss of the appropriate conditions for the functioning of the state, and the loss of sovereignty and territorial integrity.

In the 21st century, the world continues to be entangled in multiple military conflicts, from civil wars and separatist uprisings, border disputes, ethnic cleansings, through religious conflicts, to regular international conflicts. The proof of these threats is the fact that approximately 40 military conflicts are currently in progress. At the moment, the most serious conflict in Europe is the war in Ukraine.

The destructive nature of military threats determines the need to maintain armed forces which, if necessary, will be able to build an advantage and confront the existing threats to security, whether independently, or as a part of existing alliances, thus also creating an effective method to deter potential aggressors. In Poland, the Armed Forces of the Republic of Poland are the main element of the national defense system. Due to their unique capabilities on a national scale, the Armed Forces are a multi-functional tool able to perform a wide range of missions, including ensuring national security, and counteracting military aggression; supporting protective sub-systems in terms of internal security, and supporting the community; participating in the process of stabilizing the international situation, including in international crisis management.

Currently it seems justified to state that the course and outcomes of military activities are often determined by the resources possessed, and the skillful use of those resources. In world literature, there is acceptance that an organization's resources are everything in its holding, operational during its activities (Hunt, Morgan, 1995, pp. 1-15). Resources detail active provisions and stock potentially suitable for entity's functional activities (Nowak, 1998, p. 105). Organizational resources are assets of various nature, and belong to a set of available factors controlled by any given organization. In short, what the organization has or controls in its operational activities (Skowronek-Mielczarek, 2013, p. 37).

One of the most recurrent scheme of classifying institutional resources is the division of assets into tangible and intangible resources (Grant, 1991, Collins, Montgomery, 1995, Obłój, 1993, p. 85, Obłój, 2001, pp. 222-223, Pierścionek, 1996, p. 118). The material components of assets include physical, human and financial means (Głuszek, 2001, p. 86). In addition, some authors also discuss managerial capacity, and informational products (Barney, 1991, pp. 99-120, Griffin, 2004, p. 5, Kunasz, 2006, pp. 33-48, Szczygłowska, 2016, pp. 9-32). Therefore, a resource can be a tangible or intangible value that allows the organization to achieve given goals and predicted effects at the disposal of the organization's management. In perspective, the *resources* are the scope and measures used for an intended purpose in a given time. Their valuableness, rarity, uniqueness and limited possibility of replacing them are

also emphasized (Bukh, P.N. et al., 2005, pp. 713-732).Nowadays, resources are a key asset of a manager. He can plan their use, obtain them, dispose of them, and control their use (Płaczek, 2009, p. 44).

An element of the armed forces potential, and thus the defense potential of each state, are the military resources expressive of the armed forces ability in neutralizing enemy threats. Hence, military resources are not only the logistical means (materiel resources, material and technical durability, or military equipment) but also the human resources (both soldiers and civilian personnel), plus the financial means. Quantitative and qualitative spectrum of these possessions define essential content of country's defense capabilities, determinative of expected security provision. The Ministry of National Defense plans and anticipates the pragmatic effects of intensity measures depended on the scale of national security threats, level of socio-economic development, general international environment, objective, and specific perception of threats observed and managed by the state authorities, and organizational entities. (Płaczek, 2014, p. 84).

The Ministry of National Defense is one of the largest organizations in Poland, consisting of nearly 1,000 units and organizational units, almost 100 of which act as the administrators of budget funds. In 2022 there were over 3 million economic events registered in the field of resource management of logistics, resulting in the creation of over 20 million documents. In the case of the Polish Armed Forces, these resources currently include over 1.5 million material indexes, over 4.8 million pieces of military equipment, nearly 200,000 soldiers and over 45 thousand civilian employees of the ministry, and a defense budget of over PLN 100 billion. One also should not forget the identified resources that are outside of the Ministry of National Defense, and which may be used by the Polish Armed Forces in the event of conflict.

The appropriate use of the possessed resources has become possible thanks to the support of adequate IT systems. In Poland this system is the Integrated Multi-level Information System of the Ministry of National Defense (IMIS MND), which enables the efficient planning, use, and distributing the possessed military resources on all levels of military operation: i.e. political, strategic, operational, and tactical. The political aspect refers first and foremost to the realistic, in-depth estimation of the possessed military resources in

order to establish the adequate internal policies, and international alliances correlated in terms of defense. On the strategic level, the political objectives and guidelines are analyzed and transformed into real military action. In times of peace, this takes the form of developing, and implementing a comprehensive concept of military defense that relies mainly on acquiring the desired defensive capacity, based on the resources and means of the armed forces. Operationally, the system enables the allocation of the adequate forces and resources for the successful realization of operations. This means, first of all, selecting appropriate and available global resources to enable the successful completion of a defined operational task. In conditions of peace, tactically, basic activities are performed by military units to build the functionality of the system. This generally means the correct recording of the possessed military resources, and of their turnover. Such activities provide accurate information about the state of resources of individual military units, which enables their proper management. The sums of specific resources possessed by units allow for a more effective influence on the armed forces as a whole, and therefore, on the level of national security.

The aim of this study is to define the nature and objectives of the functioning of the Integrated Multi-level Information System of the Ministry of National Defense as a system that assists the management of military resources. This aim determines the structure and content of the article, which presents the origin, stages of implementation, and the current status of the IMIS MND system, along with a presentation of its functionalities, and directions for further development. This goal may be achieved by attempting to answer the following research question: What are the main advantages of using the IMIS MND IT system to manage military resources? This is what this study aims to answer.

In order to answer the above question, it may be helpful to state that the implementation of a modern IT system such as the IMIS MND improves the efficiency of managing military resources thanks to its positive influence on the quality of planning, recording, recreating, and control of those resources as well as facilitating access to information about military resources on all operational levels of the national defense sector. Such evaluation of the system definitely leads to the improvement of the state security and defense. For the purposes of this article, this statement will be treated as a working hypothesis.

This allows to properly organize the discussion, and to achieve the objectives of the article. The adopted format of a monograph allows for an analytical and empirical approach, and the interdisciplinary area of research, as it uses the content, language, research methods, ways of formulating conclusions, and solutions used in social sciences, in the fields of security sciences, management and quality sciences, economics and finance, as well as political science and administration.

The source materials selected during the preparation of this study were processed, and interpreted with the use of both theoretical and empirical methods, which include analysis and synthesis, induction and deduction, concluding, critical literature review, analysis of specialist (industrial) documents of the national defense sector and the participatory observation method applied by the author as part of practical classes at the Military Logistics Laboratory at the Centre for Applied Logistics of the Military University of Technology in Warsaw.

The author is convinced that the content of this article may be useful for those who seek knowledge about the application of modern IT solutions in the field of national security and defense.

The origins and implementation of the system

The integrated IT system combines multiple processes and areas of activity of an entity through a single interface and database. In the past, units of the national defense sector used to employ many different types of software to record specific events. In 2007, the national defense sector used approximately 225 IT systems that were at various stages of operation, implementation, or design. these systems, divided into task areas, accounted for 24% of all automated command systems, 19% of logistic systems, 12% of financial systems, 8% of all human resource systems (including issues related to mobilization) and 37% of other systems.

The existing digitization of the national defense sector at that time was split into different areas of responsibility and referred mainly to systems related to domains, sectors, or even objects. This resulted in a lack of the exchange of information between systems, large inconsistencies between databases and

the necessity to enter the same data to various systems, as well as building multiple sub-systems (modules) that performed the same or very similar functions but within different systems.

At the time, single-domain and single-site systems were used, based on archaic technology. When resource data was entered for individual military units, it could be used only by those units, as the aggregated data was not centralized in any way. Therefore, managing the information about the financial, logistic, and human resources with the use of such systems was difficult and ineffective. Not long ago, there was no functioning IT system that would provide comprehensive support for all organizational levels in individual sectors (divisions), from the Economic Division (Military Budgetary Unit), through Regional Material Bases (RMB), Tactical Unions (TU), Military Districts (MD) and Types of Armed Forces (TAF) up to the top level.

In order to adapt the solutions offered by modern IT systems to the needs generated by the Armed Forces and the Ministry of National Defense, in 2008, the Minister of National Defense issued an order to develop a system platform that would integrate the processes related to the acquisition, management, and distribution of material and technical resources, the management of human resources, and the related financial processes. To this end, by order of the Minister of National Defense, three task teams were established that were assigned the duties in the sub-systems: Logistics, Finance, and Human Resources. The main aim of the activities of all task teams was to build and implement a centralized, integrated, and unified IT system to support the management of logistics, finance, and human resources, and thus to ensure the standardization of operations and the exchange and integration of data between the organizational units of the national defense sector (The Strategy, 2022, p. 61).

The partial objectives of this project were to provide specific users of the Ministry of National Defense, at the desired time, with comprehensive and reliable information on human, financial and logistics resources in the Ministry and to provide support for the implementation of basic processes taking place in the areas of human resources, logistics and finance, as well as to organize and optimize the way functioning of the Ministry in this area. In addition, activities centered on precise description of the organization (including its resources) with goal of enabling optimization of management processes at

all levels of management and Command, and to adapt the legal regulations to the requirements of modern information processing systems. In order to achieve these goals, we began to develop a coherent and comprehensive system for collecting and providing information on human, financial and logistic resources in the Ministry of National Defense by building a precisely described correlation between the employment structures and the activities performed, allowing for realistic assessment of changes in the structures of the Ministry in respect to integration, autonomous and independent records of resources – kept by individual functional departments, as well as by optimizing employment and eliminating double records. These goals were prospected by aggregating information about resources at various organizational levels based on the Uniform Material Index.

The defined tasks related to the realization of the Integrated Multi-level Information System involved creating the following sub-systems within one system, that were focused on:

- maintaining integrated quantitative, qualitative, and value-based records,
- financial and management accountancy,
- the management of human resources and organizational structures,
- material and financial planning,
- sector database – i.e. an aggregated database of the sector,
- real estate management,
- assistance for armament and military equipment,
- managing the transport and movement of troops,
- planning the strategic acquisition and use of resources.

By Decision of the Minister of National Defense of 2012 on accepting the Integrated Multi-level Information System of the Ministry of National Defense (IMIS MND) for use in the budgetary units of the national defense sector, the implementation of the system at military units and institutions of the sector that play the role of Military Economic Divisions began (Decyzja, 2012). In the years 2012–2017, the system was implemented in all units and institutions as budget holders of the 3rd degree. Since April 2017, the system has been operating in all units and institutions where implemented. At the same time, the previous IT systems were shut down. (Olszak, 2017, pp. 65-76).

Due to shifting circumstances that result, among others, from changing legislation mainly after the introduction of the Act of 11 March 2022 on Defense of the Homeland, and changes in public finance and accountancy principles on the one hand, and the emerging new possibilities of the system resulting from technological progress on the other hand, the system is being continuously improved and new functionalities added. The solutions adopted in the design objectives are based on the assumption that ultimately the system should be capable of exchanging data between the IMIS MND and the other command support systems used by the Armed Forces of the Republic of Poland, NATO and the EU. Work is in progress to enable the system to ensure communication with other national systems (e.g. those used by tax offices, the Social Security Office, public administration and local government administration, banks, etc.) (Byłeń, 2020, p. 152). The authors of the system are also working on improving the Human Resources module to include the possibility to plan the professional development of professional soldiers, bringing soldiers of the Territorial Defense Forces into the module, and to develop the functionality, so that it covers issues related to mobilization.

Functional architecture and modules of the IMIS MND system

The architecture of the IMIS MND system is based on SAP. This system belongs to ERP-class systems (Enterprise Resource Planning). The ERP system (Banaszak, et al. 2016, Gunia, 2010) is an extension of the MRP II model (Manufacturing Resource Planning). The MRP II model is a newer version of the closed-loop MRP system, which is an extension of the MRP system (Material Requirements Planning) for planning closed-loop material needs (Harrison, Petty, 2002, Zijm, Regattieri, 2019). The ERP system also includes DRP (Distribution Resource Planning) modules and LRP (Logistics Resource Planning) modules, which integrate MRP and DRP functions (Kozłowski, Sikorski, 2013, Smyk 2001). The system has a modular structure, and each module provides support for a specific aspect of the organization's activity (Martinez, Kohlbacher, 2022, pp. 230-235). The functional architecture of the

IMIS MND is divided into the following modules: logistics (material resources), finance (financial resources), Human Resources, and organizational structures to perform the identification, recording, planning, and reporting functions.

Therefore, the functional scope of ZWSI RON includes in the area of finance: records of personnel (soldiers and employees of the Ministry of National Defense) in terms of salary data, accounting of remuneration of professional and other soldiers, accounting of salaries of civilian employees of the army, accounting of military pensions, records of civil law contracts , conducting settlements with the tax office, the Social Insurance Institution, banks, keeping accounting by administrators of budget funds, preparing financial reports (including to the Ministry of Finance), keeping quantity and value records, financial planning, control over budget implementation and correcting financial plans. In the area of logistics: supply (acquisition, storage, distribution of resources), operation of weapons and military equipment, infrastructure management, transport and movement management of troops, medical support, planning (including material planning) and standardization, logistic reporting. In the area of human resources: records of personal resources (persons with military qualifications, soldiers, employees, retirees, pensioners), activities related to military discipline, organizational and employment activities, planning of service and development of soldiers, mobilization and supplementation records, reporting on human resources management.

The functional architecture of the IMIS MND enables the functioning of interrelated sector (specialist) modules that are designed based on the assumptions resulting from the models of the identified and optimized processes that take place in the resource management area of the national defense sector. For example, in the area of logistics, the IMIS MND configures the IT infrastructure of the logistics of military units. It integrates the services, functions, and organizational processes. Operations are conducted with the use of a single common database, which allows for effective communication and sharing information. The system is responsible, among others, for registering and distributing goods, managing the quantity of stock, and warehouse traffic. The database is updated on an ongoing basis and contains information about key logistic processes, such as the levels of stock in the warehouse, and

user load. The optimization of these levels significantly reduces the costs of stock maintenance (Klimek, 2012, pp. 551-558).

The modules of the IMIS MND function on various organizational levels, and the data obtained from them are aggregated at the departmental data warehouse (Kozioł, 2019, p. 248). The data warehouse is a centralized, non-transactional database that is designed to store information globally across the institution, long-term, in multidimensional analytical systems. It focuses on direct search for information by users. In general, the task of the data warehouse is to provide standardized records of business information that is critical for the company and to disclose it for the purposes of the analysis of decision-related issues, answering inquiries and reporting (Milewski, 2013, pp. 195-204). The main features of a data warehouse include: arranging different analytical areas by topic, integrating data from various database systems, and ensuring the durability of the recorded and stored data in time.

The Departmental Data Warehouse is a source of analytical data for decision-makers on the highest levels of the Ministry of Defense, the General Staff of the Polish Army, Commandments on the operational level, etc. The departmental Data Warehouse will ensure the support for processes connected to reporting on: the stock levels of goods stored in warehouses; the level of resources in use (including fixed assets and equipment). It will also support the process of reporting data concerning employee records and calculating remunerations at the Office of the Minister of National Defense, data concerning the Main Books, settlements with suppliers and customers, and budget reports will be reported.

The IMIS MND system is based on the SAP ERP 6.0 commercial system, which also has a modular structure. Individual modules provide support in specific areas of activity of the entities in the sector, including military units. From the point of view of the system's functionality another important aspect is the fact that the system architecture enables introducing flexible modifications and adding further modules depending on the needs created by reality.

Benefits and challenges of the implementation of the system

The implementation of the IMIS MND system ensures uniform and safe recording of human, material and financial resources on all levels of management of the national defense sector and improves the effectiveness of their control. The system provides long-term maintenance support and offers the possibility to add further functionalities (or updating existing ones) as required by users or decision-makers.

The introduction of the system in the national defense sector has ensured and guaranteed the following integrated, consistent and safe recording of personal, material, and financial resources in a quantitative, qualitative, and value-based approach and access to current data on all required levels of management. Moreover, it increased the efficiency of the management of resources of the Ministry of National Defense by organizing, unifying (standardizing) and optimizing processes and procedures in the field of logistics, human resources and finance, as well as accelerating and improving the quality of: planning, decision-making and reporting processes as well as the circulation of documents and communication between units and organizational units of the Ministry. The effectiveness of supervision over the flow of military assets between the individual organization units of the Ministry also have been increased, taking into account characteristics related to time, place, quantity, quality and value. The new solutions also provided tools for ongoing control of the implementation of budget expenditure in the entire Ministry and at individual management levels, including the ability to report data in various sections, which in turn allowed for a reduction (by 12) in the number of IT systems used in the Ministry by taking over their functionality by ZWSI RON, and to reduce the number of people involved in the registration of economic events in organizational units and units of the Ministry. (Statement, 2016, p. 26).

According to the data provided by the Inspectorate for Information Technology, 2 to 2.5 thousand users work particularly with the logistic module every day. They enter new business-related activities into the system.

In the opinion of experts, the implemented system meets the requirements of data comprehensiveness, consistency, and security. The indisputable

advantages of the system include building one central database containing all resources and integrating the functional divisions of the national defense sector. Thus, military resource management processes founded on online financial, logistic and personnel information, were unified. This resulted in avoiding the duplication of economic events by entering data into the system once. And thanks to the consistency of the technological platform, access to information about resources has become more common (available) (Byłeń, 2020, p. 369). Since 2019, work has been underway to implement further modules to support the operation of military equipment, including: aircraft, vehicles and ships, as part of the Operation Support Subsystem (PWE) of ZWSI RON. This module supports the processes of managing the efficiency and thus the availability of military equipment, understood as equipment specially designed or adapted for military needs and intended for use as weapons, ammunition or war materials (Decyzja, 2021).

The module will contain, among others, information about the wear and tear and technical maintenance of the equipment, or defects being repaired. As a result, each item will have its own electronic file where all maintenance processes will be recorded, such as scheduled maintenance of the equipment and its elements, ongoing maintenance, replacement of components and parts, realisation of technical bulletins, recording failures and the course of repairs, consumption of consumables, work performed.

PWE enables, among others, unambiguous identification of the particular machine, and recordings of operating time, specifically imperative for determining of the resources, among the other functions. Breakdowns and modifications can also be recorded, and periodic inspections and repairs can be planned. The condition is to create the so-called digital model, i.e. introducing detailed data describing individual pieces of equipment and its components into the system.

The high level of complexity of modern military equipment means that, in the case of ships or aircrafts, the number of objects that needs to be subsumed within the digital mode or the number of work plans and maintenance tasks that needs to accounted for in the system amounts to several thousand. Therefore, the preparation process for a digital mode of an equipment itself is a significant challenge for logisticians, but it brings considerable benefits. It allows for optimal use of machines and devices, with the through

scheduled servicing and maintenance, based on technical standards and manufacturer's recommendations, which extends their operational life and provides considerable savings.

Moreover, integrating PWE with other ZWSI RON modules allows to order the issuance of consumables or spare parts for a given machine from the warehouse automatically. The registers in the system also allow to assess the progress of renovation or service work, thus determining, for example, the possibility of using the equipment.

Additionally, insight into the operation history of individual machines combined with an analysis of renovation expenses will allow to assess whether it is more economical to repair and modernize the equipment or it is better to withdraw from use. This holistic view has another advantage: it shows the potential of using a given type for specific activities. In short, it is about whether, for example, by sending *Rosomaks* on a mission in a given configuration, we can expect them to function without problems or should remain in workshops. However, equipment is not everything. The existing HR subsystem provides information about technical staff, their qualifications, and even makes it possible to record their working time, allowing the optimization of services and more precise planning (Sendek. 2021, p. 22).

The participant observation confirmed that PWE ZWSI RON is an interesting solution because, unlike the previously used solutions, it has not only functionality allowing for recording operational events in order to determine the efficiency of military equipment, as this module implements mechanisms that also allow for planning operational activities and forecast the availability of military equipment (forecast failures). After completing the module implementation, users will have reliable information about the efficiency of the equipment in one place. The next challenge will be the integration of PWE ZWSI RON with systems supporting the operation of military equipment provided by external suppliers and operated within NATO logistic IT systems (Byłeń, 2021, p. 256).

Work has also been conducted for several years on creating a PZM module (items of uniform supplies) that supports the processes in uniformed services. The test launch of the module took place in 2022. The uniformed services module of the IMIS MND system is an extension of the basic modules. Among

others, it is integrated with the MM-SD module (material management, sales & distribution). The documents recorded in the module contain data connected to issuing items of armament and equipment to soldiers. As a result, when planning the needs, reports on the possessed resources may be generated easily (Instruction manual, 2018, p. 6). It also contains information about business units, recipients, and their personal equipment cards, batch classification and hierarchic classifiers and materials (Guidebook, 2020, p. 4). The database also lists the amounts of cash equivalents paid to professional soldiers for uncollected items of uniform and equipment.

The final pragmatic evaluation proves that the integrated multi-level system allows the efficient management of the assets of the Ministry of National Defense. The unifying processing activity provides efficiency and practical solutions for multilevel, departmental and interdepartmental data operations. Its functional goals are centered on, and ensure proper collaboration in the following departments: financial, material, technical, medical, transport, movement of troops and military infrastructure. Its potency may bring huge savings, and above all, may significantly improve the functioning of the Polish military – particularly in terms of human resource management, weapons and military equipment (Bogusz, 2020, pp. 22-30).

Conclusions

The implementation of the IMIS MND in the Armed Forces of the Republic of Poland ensured real-time information management, the automation of processes in the areas of planning, realization and control, acquiring, recording, executing financial plans, the use and monitoring logistic resources, maintaining structural (based on military hierarchy) records of human resources, and enabled this information to be shared for management and commanding purposes throughout all levels of the sector.

The choice of the existing business solution based on SAP IT systems was justified, as it has yielded measurable benefits. Its implementation in the armed forces resulted in improved transparency in the area of managing fixed assets, more efficient cooperation with the national economy, reduction of logistic

costs (warehousing and storage, transport or global logistic costs related to international logistics of quotas), reduction of costs related to the lifespan of fixed assets (by correlating their economic usability with the period of use), improved use of qualified personnel, improved operational availability of armament systems, and the reduction of the number of operational planning cycles.

A further goal of the programmers is to achieve the ability to track all the logistic resources that will yield information about their quantity and location, technical condition and completeness, and will expand functionality by adding a module related to transport of troops and providing catering for soldiers. Work is also in progress on communication between this system and the national financial infrastructure, including taxation. In the future, IMIS should also be compatible with NATO IT systems, in order to be able to import data from the national database to the logistic modules of the automated system of command, that will be compatible with the systems used by NATO for transport, troop mobility, the reporting system, logistic database, and support the process of planning and managing the logistic potential to meet the needs of NATO. This is a priority arising from the increased presence of NATO troops in Poland. This is also another step on the path to building a specific level of national security that can face current threats.

References

Banaszak, Z., Kłos, S., Mleczko, J. (2016). Zintegrowane Systemy Zarządzania, PWE, Warszawa.

Barney, J.B. (1991). Firm Resources and Sustained Competitive Advantage, Vol. 17, No. 1, 99-120, Journal of Management.

Bogusz, D. (2020). The Integrated Military Information System of the Ministry of National Defense in the Aviation School Airbase, 6 (1), 22-30. Safety & Defence. Scientific and Technical Journal.

Bukh, P.N., Nielsen, C., Gormsen, P., Mouritsen, J. (2005). Disclosure of Information on Intellectual Capital in Danish IPO Prospectuses, 18(6), 713-732. Accounting Auditing & Accountability Journal.

Byłeń., S. (2020). Systemy informatyczne wspomagające zarządzanie logistyką w Siłach Zbrojnych Rzeczypospolitej Polskiej. Difin, Warszawa.

Byłeń, S. (2021). Podsystem techniczny logistyki Sił Zbrojnych RP, w: P. Kler (red.), Logistyka w systemie bezpieczeństwa narodowego, 225-266, Difin, Warszawa.
Collis, D., Montgomery, C. (1995). Competing on Resources Strategy in the 1990s, July–August 1995, 31-45, Harvard Business Review.
Decyzja nr 116/MON Ministra Obrony Narodowej z dnia 1 września 2021 r. w sprawie pozyskiwania sprzętu wojskowego. Dz.Urz.MON.2021.188.
Decyzja Nr 8/MON Ministra Obrony Narodowej z dnia 20 stycznia 2012 r. w sprawie dopuszczenia do eksploatacji Zintegrowanego Wieloszczeblowego Systemu Informatycznego Resortu Obrony Narodowej (ZWSI RON) w jednostkach budżetowych resortu obrony narodowej. Dz.Urz.MON.2012.9.
Głuszek, E. (2001). Zasoby niematerialne w świetle kryteriów rynkowych warunkujących generowanie przewagi konkurencyjnej, 886, 82-96, Prace Naukowe Akademii Ekonomicznej we Wrocławiu.
Grant, R.M. (1991). Contemporary Strategy Analysis: Concepts, Techniques, Application, Basil Blackwell, Cambridge.
Griffin, R.W. (2017). Podstawy zarządzania organizacją, PWN, Warszawa.
Gunia, G. (2010). Zintegrowane systemy informatyczne zarządzania w praktyce produkcyjnej. Wydawnictwo Fundacji Centrum Nowych Technologii, Bielsko-Biała.
Harrison, D.K., Petty, D.J. (2002). Systems for planning and control in manufacturing. Butterworth-Heinemann.
Hunt, S.D., Morgan R.M. (1995). The Comparative Advantage Theory of Competition, 59, 1-15, Journal of Marketing.
Instrukcja realizacji procesów logistycznych z wykorzystaniem ZWSI RON w zakresie zasobów służby mundurowej w oddziałach gospodarczych. (2018). Szefostwo Służby Mundurowej, Inspektorat Wsparcia Sił Zbrojnych, Bydgoszcz.
Klimek, M. (2012). Uwarunkowanie odpowiedzialności zarządzania w logistycznych systemach informacyjnych, 95, 551–558. Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego.
Kozioł, M. (2019). Systemy informatyczne zarządzania wojskowym oddziałem gospodarczym. Akademia Sztuki Wojennej,. Warszawa.
Kozłowski, R., Sikorski A. (2013). Nowoczesne rozwiązania w logistyce. Wolters Kluwer, Warszawa.
Kunasz, M. (2006). Zasoby przedsiębiorstwa w teorii ekonomii, 10 (211), 33-48. Gospodarka Narodowa.
Martinez, S. B., Kohlbacher, H. (2022). ERP lifecycle main indicators and guidelines to determine a change of ERP provider, ICCTA ,22: Proceedings of the 2022 8th International Conference on Computer Technology Applications 2022, 230-235.
Milewski, R. (2013). Zintegrowany system informatycznego wsparcia wojskowych jednostek budżetowych, 2 (168), 195-204. Zeszyty Naukowe Wyższej szkoły Oficerskiej Wojsk Lądowych.

Nowak, W. (1998). Rachunkowość sektora publicznego. Koncepcje, metody, uwarunkowania, PWN, Warszawa.
Obłój, K. (1993). Strategia sukcesu firmy, PWE, Warszawa.
Obłój, K.(2001). Strategia organizacji, PWE, Warszawa.
Olszak, W. (2017). Systemy informatyczne jako element wsparcia decyzji w logistyce Sił Zbrojnych RP, XI, 65-76. Rocznik Bezpieczeństwa Morskiego.
Pierścionek, Z. (1996). Strategie rozwoju firmy, PWN, Warszawa.
Płaczek, J. (2014). Ekonomika bezpieczeństwa państwa w zarysie, Difin, Warszawa.
Płaczek, J. (2009). Zarys ekonomiki bezpieczeństwa, Akademia Obrony Narodowej, Warszawa.
Podręcznik użytkownika – moduł PZM. (2020). Narodowe Centrum Bezpieczeństwa Cyberprzestrzeni, Ministerstwo Obrony Narodowej, Warszawa.
Sendek, R. (2021). Cyfrowa logistyka, 11(907), 18-25. Polska Zbrojna.
Skowronek-Mielczarek, A. (2013). Zasobowe uwarunkowania rozwoju przedsiębiorstw w Polsce. CeDeWu Warszawa.
Smyk, S. (2001). Logistyka dystrybucji. Difin, Warszawa.
Strategia Rozwoju Systemu Bezpieczeństwa Narodowego Rzeczypospolitej Polskiej. (2022). Rada Ministrów. Warszawa.
Szczygłowska, L. (2016). Zarządzanie niematerialnymi zasobami organizacyjnymi w bibliotece, in: M. Wojciechowska (edit.), Zarządzanie zasobami niematerialnymi bibliotek w społeczeństwie wiedzy, 9-32. Wydawnictwo Stowarzyszenia Bibliotekarzy Polskich.
Wystąpienie pokontrolne. (2016). Wdrażanie Zintegrowanego Wieloszczeblowego Systemu Informatycznego Resortu Obrony Narodowej, Najwyższa Izba Kontroli Departament Obrony Narodowej, Warszawa.
Zijm, H., Regattieri, A. (2019). Manufacturing Planning and Control Systems. in: Zijm, H., Klumpp, M., Regattieri A., Heragu S. (edit.). Operations, Logistics and Supply Chain Management, Lecture Notes in Logistics, Springer, Cham.