
Influence of Financial Liquidity on the Competitiveness of Defense Industry Enterprises

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Abstract:

Purpose: The aim of the article was to analyse the correlation between financial liquidity and the competitiveness of enterprises from defense industry enterprises.

Design/Methodology/Approach: The solutions were developed on the basis of literature analysis, case study, document analysis. As part of the case study were used diagnostic and prognostic sheets, as well as the analysis of source documents. The analysis of financial liquidity was performed using the induction method, which includes examination of details, generalization in the form of conclusions, synthetic evaluation and diagnosis. The time scope of the research covered the period 2015-2018. Four defense companies in the world were selected for the purpose of the research.

Findings: The analysis of four enterprises from the defense industry shows connection between the financial situation (measured by liquidity ratios) and the competitiveness of the surveyed companies. The most stable company, one of the leading defense in the world, is Northrop Grumman. In turn, United Aircraft is characterized by a large dispersion of results and negative values of cash flows from operational activities. The article is also an overview of competitiveness, showing the diversity in managing the resources of an economic unit, and indicates practical guidelines for the use of methods and interpretation of the financial liquidity ratios of enterprises.

Practical Implications: The results of the research can be used by company managers, both from the defense industry and others, to create mechanisms that increase competitiveness.

Originality/Value: The study is a new contribution to research into the competitiveness of defense companies. The aspects of the competitiveness of defense enterprises on the basis of liquidity ratios remained beyond the area of scientific interest.

Keywords: Financial liquidity, competitiveness, defense industry, enterprise.

JEL codes: O11, L1, P11.

Paper type: Research study.

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1. Introduction

Defense enterprises, similarly to enterprises representing other industries, operate in a global and competitive environment typical of a given strategic group. The analysis of this environment in the context of their potential allows them to react in advance to any turbulences occurring in the environment. It is a requirement to maintain a competitive advantage (Nowakowska-Krystman, 2018), which is inseparable from the concept of competitiveness (Szwacka-Mokrzycka, 2017). One of the measures of competitiveness is the effectiveness in achieving strategic goals of competition. These goals most often include: increasing sales profitability, gaining new markets, acquiring new customers, customer satisfaction, increasing sales, improving the market position, and employee satisfaction (Haffer, 2003). By implementing these goals, the enterprise builds its competitiveness and gains market advantage over its competitors (Nowacki, 2015).

It should be emphasized, that the defense industry as an element of hard power, unlike other industries, has for centuries been a unique aspect of the implementation of national interests (Stoessinger, 1969; Höhn, 2011; Ageev, Mensch, and Matthews, 2012; Orrmerod and Riordan, 2004). The industrial defense potential, assessed through the prism of export capabilities, shows the possibility of shaping the political and economic goals of countries. The dimension of the competitiveness of defense enterprises is therefore an important aspect of the nationality power.

2. Definition and Essence of Competitiveness

Competitiveness is a complex phenomenon, as evidenced by the multiplicity of definitions (Table 1). However, competitiveness is always referred to the ability to compete. Moreover, it is a feature that can be assessed by comparing it with other economic units operating under similar conditions. This concept applies both to enterprises and sectors of the economy in national and international terms. The competitiveness of the economy as a whole is the basis for shaping the competitiveness of individual enterprises, especially in the international dimension (Schwab, 2016). A competitive industry is one that has the ability to gain and maintain market shares in the domestic and / or foreign market.

Competition is an inherent part of a market economy. Through the constant confrontation of the forces of demand and supply, it not only leads to optimal choices under given conditions, but also encourages competitors to search for even better solutions, continuous research of needs, investing in their own development, while being a source of benefits also for other participants in this process - co-operators, employees, beneficiaries of public tributes. The strength of competition is its diversity. It consists of a mosaic of producers, sellers, buyers, their behaviours and methods of market competition, a variety of products and services, and forms of sale. The effect of its impact is not only the benefits. Winners create losers.

Competition activates selection mechanisms that contribute to crowding out the least effective enterprises. This may, in the long run, lead to extreme selection and the denial of free competition, which in turn may mean the emergence of a monopoly and the associated privileges at the expense of the environment. Competition processes are often accompanied by external costs, burdening the natural environment or human health. Knowledge of these processes leads to the search for further optimization in the form of institutional solutions protecting and developing competition, with the key role of the state as the initiator and enforcer of the adopted regulatory solutions. However, also in this case, the excessive role of the state, eliminating other competition, leads to a distortion of rational allocation and inefficiency (Pietrewicz and Sobiecki, 2019).

Competition creates economic progress. On the one hand, it rewards the best with extraordinary profits, and on the other, it eliminates the weakest. The chance of success and the risk of failure encourage entrepreneurs to look for even better solutions to improve their competitive position. It is also connected with taking investment risk and innovative ventures. Competition reshapes the business environment, which requires the creation of adequate, new forms and mechanisms of competition. Under the influence of the transformations, the behaviour and expectations of consumers are also changing. From the market perspective, this creates both the need and the necessity to undertake adjustment measures (Pietrewicz and Sobiecki, 2019).

The most frequently presented definitions of competitiveness in the literature on the subject are given in Table 1. The OECD defines competitiveness as: [...] the ability of companies, industries, regions, nations or supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis” (Hatzichronoglou, 1996). Competition as an element of the market economy is considered as competition between market participants, pursuing similar goals (Stankiewicz, 2005), using the competences of the organization to create innovation (Hamel and Prahalad, 1990). The aim of the competition is to gain a relative advantage in resources, allowing to achieve a market advantage and, consequently, a better financial position (Hunt and Morgan, 1995).

Table 1. Selected definitions of competitiveness

Author (s)	Definition
WEF representatives	– competitiveness refers to the alignment of domestic economic institutions and economic structure to produce growth that is visible against the overall structure of the world economy. A national economy is therefore competitive on an international scale if its institutions and policies support fast and long-lasting economic growth;
According to the authors of the World Competitiveness	– a country's competitive ability is the result of transforming a country's resources that already exist or are produced through processes into economic results, which are then verified in

Report 1994	competition on international markets;
According to the authors of the World Competitiveness Yearbook 2011	– an area of economic knowledge that analyses facts and policies that shape a country's ability to create and maintain an environment conducive to the creation of more value by businesses and greater well-being of its inhabitants;;
European Commission	– the ability of the economy to provide inhabitants with a high and increasing standard of living and wide access to employment (for those who want to work), based on solid foundations. Refers to those institutional and political conditions that enable productivity and production to grow in a sustainable and sustainable manner;
European Investment Bank	– the company's ability to organize and efficiently use production resources that are necessary to offer products and services in a global environment;
K. Piech	– the country's ability to obtain higher added value than in other countries. Competition is about maximizing added value. [...] competition is also the ability to attract production factors (eg. capital, but also work, especially educated - and cheaper) from abroad;
S. Lobejko, Z. Pierścionek	– a process that is a chain reaction that connects the sphere of resources and skills of the enterprise with the needs and sphere of expectations of customers;
A. J. Abbas	– the company's ability to innovate and be flexible, which is manifested in gaining a competitive advantage;
J. F. Caudredo-Roura	– winning and gaining benefits on the market with increasing intensity of competition;
I. Dunbar, M. McDonald	– a collection of strengths of the organization and the degree of its ability to use of the emerging market opportunities, which is a relative assessment in relation to the ability of competitors to meet customer needs;
J. Maxwell	– generating economic benefits as a result of improving the quality of human capital;
J. Misala	– the ability of various entities operating in a given country to achieve the greatest possible benefit from the social division of labor, greater than that achieved by partners in order to increase the amount of income to be distributed within their own country and to better meet the diverse needs of customers;
P. Uri	– the ability to create conditions for obtaining higher income;
R. Veliytag, S. Zahra	– the company's ability to keep up with industry leaders in terms of product and organizational standards;
T. Wattanaprutti-Paisan	– greater efficiency in the production and delivery of products compared to competitors;
A. Zorska	– the ability to create and use a competitive advantage over other domestic and foreign companies as a result of operating on the global market treated in a uniform manner;
K. Żukrowska	– the ability of economic operators or their production to adapt to changing conditions, allowing them to maintain or improve their position on the market in global conditions;

Source: Own study based on, Szymanik E., „Konkurencyjność przedsiębiorstwa – główne aspekty”, Zeszyty Naukowe - Uniwersytet Ekonomiczny w Krakowie, Kraków 2016, p. 109; The Global Competitiveness Report 2010–2011: Highlights, ed. K. Schwab, World Economic Forum Geneva, Switzerland 2010, www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2010-11.pdf; M. Gorynia,

Pojęcie konkurencyjności – istota i poziomy, w: Luka konkurencyjna na poziomie przedsiębiorstwa a przystąpienie Polski do Unii Europejskiej, red. M. Gorynia, Akademia Ekonomiczna, Poznań 2002, p. 53;
www.imd.org/research/centers/wcc/upload/Fundamentals.pdf; *European Competitiveness Report 2010, European Commission, Brussels 2010, p. 22, ec.europa.eu/enterprise/newsroom/cf/_getdocument.cfm?doc_id=6222*; K. Piech, *Wiedza i innowacje w rozwoju gospodarczym: w kierunku pomiaru i współczesnej roli państwa, Instytut Wiedzy i Innowacji, Warszawa 2009, p. 186*; S. Łobejko, Z. Pierścioneł, *Zarządzanie strategiczne w praktyce polskich przedsiębiorstw, Oficyna Wydawnicza SGH, Warszawa 2011, p. 46*; *European Investment Bank, Restoring EU Competitiveness, Luxembourg 2016, p. 11.*

When analyzing the presented definitions of competitiveness (Table 1) from the economic point of view, its determinants are analyzed at three levels: microeconomic, mesoeconomic and macroeconomic (Figure 1).

Figure 1. Three levels of competitiveness

macroeconomic level	• national economy perspective
mesoeconomic level	• industry perspective
microeconomic level	• enterprise perspective

Source: Own study

Competitive advantage is defined as an advantage of one enterprise over a competitor or a group of competitors on a given market, sector or economy. Competitive ability is a long-term tendency of an entity to maintain or improve its competitive position. It is essential to have a sustainable competitive advantage (to maintain it over time) (Szwacka-Mokrzycka, 2017).

3. The Perspective of the National Economy and the Defense Industry

The world consists of a set of diverse states and it does not seem that, despite far-reaching globalization, they have ever been unified (such attempts end up with acts of terror, among others). Formally equal states differ in their power (Witana, 2009; Sulek, 2015). It is defined as "the ability of one political unit to impose its own will on other units" (Aron, 1995) is a classical definition. The assessment of power "must take into account what is inseparable from its existence and functioning, i.e., people operating in a specific space and at a specific time, representing specific organizational and production skills (or the ability to process matter and information)" (Sulek, 2011). According to J.G. Stoessinger power is defined as "the ability of a state to use its tangible and intangible resources in a way that will affect the behaviour of other states" (Stoessinger, 1969). Huntington points to power-generating resources, such as: economic, military, institutional, demographic, political, technical, social, etc., (Huntington, 2007).

To sum up, state power (national power, the power of the state) is "*all measures determining the power of the state in the political-military, economic, spatial, demographic and technological dimensions, which at a given time constitute a determinant of power*" (Zdrodowski, 2008).

It is assumed that "*the power of the state consists of geographical factors (territory, borders, climate, natural resources, water bodies), demography (number and structure of the population), economy (size and innovation as well as technological advancement), authority and nature of power, military and defense potential (state readiness, bravery and society's willingness to sacrifice, expenditure on defense, the number and quality of armed forces, armaments and equipment of troops, reconnaissance and command system and logistics), alliances and their credibility, national cohesion and others*" (Zdrodowski, 2008).

From the point of view of this study, it is important that economic and military resources are a priority indicator of power. Many countries are trying to develop their own defense industry due to its political and strategic importance. It includes, among others production of military equipment, weapons and ammunition. The defense industry also includes specialist branches, e.g., military aviation companies, military automobile companies, shipyards or production facilities for military equipment. A characteristic element of the defense industry is the difficulty of adjusting it to one branch of the economy. Defense companies operate in many industries that use advanced technologies, including in the following industries: metallurgical, electro-technical, electronic, IT, aviation, chemical and precision.

The analysis of the functions performed by the defense industry shows three basic aspects, defense (military) - aimed at meeting the needs of the armed forces, including ensuring the readiness of the mobilization base as well as modernization and repair of weapons, economic (financial) - participation in the creation of gross domestic product as well as research and political - as a measure of state power that affects building its position in the region and in the world (Zamelek, 2013).

The announced increases in military spending in many countries and the indication of purchasing priorities for 2020-2025 are some of the determinants of the development of the defense industry and obtained financial indicators (Table 2).

Table 2. *Purchasing priorities of selected countries in 2020-2025*

Country	Purchasing priorities
The Netherlands	additional F35; strengthening land forces in mobility and their firepower (long-range artillery); marine missile systems; support for special forces; information and cybersecurity systems
Latvia	anti-aircraft systems; fire support; command systems; mechanized equipment for land forces; military infrastructure
France	airplanes (tankers and fighters), helicopters, drones, automatic rifles, armored land vehicles, communications (vehicle radios), mid-range missiles, frigates, marine missile systems, radars

Germany	modernization of equipment and achieving the level of combat readiness of equipment up to 70%
Sweden	construction of a third brigade equipped with artillery and several local battalions; construction of a military unit in Gotland
Norway	increasing the number and level of training; strengthening the share of innovative technologies; monitoring of arctic areas; new land equipment (tanks, air defense systems, long-range artillery); increasing firepower, combat readiness and self-sufficiency; modernization of the fleet by 2030 and purchase of additional planes; modernization of the equipment and weapons of the National Guard
India	purchase of imported high-tech equipment; equipment modernization
Japan	cybersecurity; missile defense systems; electronic protection systems; fighters
Taiwan	air defense and anti-missile systems
Peru	border protection equipment, armoured vehicles, small arms, shooting equipment
Pakistan	Navy; air defense systems, transport, training; ammunition, border protection equipment

Source: The Clingendael Institute; Rijksoverheid, Baltic News Network, The Economist; Aljazeera, Business Insider India; IDSA, Defensenews, The Japan Times, Defense Aerospace, Ministerstwo Obrony Norwegii; Second Line of Defense, Taiwan News.

The development of your own arms industry is of political and strategic importance. Repeated purchasing priorities for 2020-2025 in different countries were: development of information and cybersecurity systems, modernization of anti-aircraft, air defense and anti-missile systems, equipment modernization i.e. border protection equipment, armoured vehicles, shooting equipment, high-tech equipment.

4. Enterprise Perspective

Competitiveness at the enterprise level can be assessed from the perspective of the financial liquidity of the entity, which is *"a key factor describing the condition of the enterprise. The level of sales revenue growth or the value of net profit is not a guarantee of a good financial condition of the company"* (Białas, 2017). Loss of liquidity - not losses - is the main cause of corporate bankruptcy.

The company's liquidity, understood as the ability to meet its obligations on a current basis, is considered the most sensitive barometer of the company's financial situation. Even the smallest disturbances are noticed by the environment and have negative consequences for the company. The importance of liquidity in corporate management is also heightened by the fact that although companies aim to generate profits in the long run, in the short run they are able to survive without them and even grow. Lack of liquidity in practice means risking bankruptcy (Davues, 1992). Financial liquidity can be divided into three groups (Gos, 2001), relative liquidity, current liquidity and financial liquidity (Figure 2). Liquidity analysis can be made in the following dimensions: static, dynamic, methodological and balance relations. The dimensions of these analyses cover various levels of the company's activity and at the same time require different data for the purpose of evaluation.

Figure 2. Three groups of liquidity

RELATIVE LIQUIDITY	CURRENT LIQUIDITY	FINANCIAL LIQUIDITY
<ul style="list-style-type: none"> • an entity's ability to purchase a variety of goods or services; • the ability to total payment of receivables for these goods; 	<ul style="list-style-type: none"> • the company's ability to pay its liabilities on a regular basis; • its changes are perceived as the most sensitive element representing the company's financial situation; 	<ul style="list-style-type: none"> • the ability to convert the company's assets into cash without losing their value; • it depends on the market demand for given assets;

Source: Own study.

Taking into account the static dimension of liquidity (Table 3), then the main concentration is on assets owned by the company, which are characterized by a different degree of liquidity. Liquidity ratios measure the company's ability to pay its short-term liabilities by assessing its financial security. The company's liquidity is also known as the ability of an economic unit to settle liabilities on a current basis and mainly depends on the cyclical impact of receivables and regularity in settling liabilities. The main static liquidity ratios include: the current liquidity ratio, the increased liquidity ratio and the cash ratio.

Table 3. Static liquidity ratios (description and calculation method)

Indicator	Counting method
Current liquidity ratio (safe index value: 1.2 - 2.0)	$\frac{\text{current assets}}{\text{short - term liabilities}}$
Increased liquidity ratio (safe indicator value: 0.8 - 1.5)	$\frac{\text{current assets} - \text{inventories}}{\text{short - term liabilities}}$
Cash liquidity ratio (safe indicator value: 0.1 - 0.2)	$\frac{\text{founds}}{\text{short - term liabilities}}$

Source: J. Antczak, Zarządzanie płynnością przedsiębiorstwa z branży logistycznej, Gospodarka Materialowa i Logistyka Nr 5/2019, p. 5.

When analysing an enterprise using static liquidity ratios, it is possible to determine liquidity fluctuations resulting from changes in current assets or changes in current liabilities in a specific, finite period.

Taking into account the dynamic dimension of the liquidity analysis (Table 4), then the main source of information is the cash flow statement “*Being able to pay its own liabilities means generating cash that enables the organization to pay its due payments and cover unexpected expenses. Maintaining liquidity requires controlling inflows and outflows to keep them in balance*” (Skowronek-Mielczarek and Leszczyński, 2010), that means, to keep them synchronized.

Table 4. *Dynamic liquidity ratios (description and calculation method)*

Indicator	Calculation method
Cash efficiency ratios	
– reports on how much operating cash an enterprise makes over a specified period of time in relation to sales, assets involved or profit;	
Cash efficiency ratio of sales	$\frac{\text{cash from operating activities}}{\text{przychody ze sprzedaży}}$
Cash flow rate ratio	$\frac{\text{cash from operating activities}}{\text{net profit}}$
Cash efficiency ratio of assets	$\frac{\text{cash from operating activities}}{\text{average assets}}$
Cash adequacy ratios	
– report the relationship between the cash generated and the enterprise's various expenses and liabilities	
Operating cash adequacy ratio for total debt repayment	$\frac{\text{cash from operating activities}}{\text{total liabilities}}$
Operating cash adequacy ratio for repayment of long-term liabilities:	$\frac{\text{cash flows from operating activities}}{\text{total long – term liabilities}}$
Operating cash adequacy ratio for repayment of current liabilities	$\frac{\text{cash flows from operating activities}}{\text{current liabilities (short – term)}}$
Cash generating ratios	
Ratio of the ability to generate cash from operating activities	$\frac{\text{cash flows from operating activities}}{\text{cash flows from operating activities} + \text{inflows from investing activities} + \text{inflows from financing activities}}$

Source: Own study based on A. Skowronek-Mielczarek, Z. Leszczyński, *Controlling analiza i monitoring w zarządzaniu przedsiębiorstwem*, Difin, Warszawa 2007, s. 250, M. Sierpińska, D. Wędzki, *Zarządzanie płynnością finansową w przedsiębiorstwie*, PWN Warszawa 1997, s. 52.

Cash efficiency ratios, the higher the level they achieve, the better the situation of the business unit. Cash efficiency ratios in sales reflect "percentage of margin realized in cash" (Gołębiewski and Tłaczała, 2005). Cash flow rate ratio determines what percentage of profit is realized in cash. The cash efficiency ratio of assets measures the ability of an economic entity's assets to generate cash and is known as the "cash productivity of assets" (Gołębiewski and Tłaczała, 2005).

Cash adequacy ratios compare operating cash flows with many balance sheet items. They answer the question whether the cash flows from operating activities are sufficient to cover liabilities. The operating cash adequacy ratio for total debt repayment "informs about the extent to which the funds generated from operating activities are sufficient for the basic expenses of the entity. It is expected that the value of this indicator will be at least equal to one (...). If the value of the ratio is less

than one, then it is very likely that the further development of the entity will require an increase in equity capital (Gołebiewski and Tłaczała, 2005).

5. Own Research

Arms sales by the world's 25 largest arms-producing and military services companies (or "arms companies" for short) totalled US\$361 billion in 2019 (Table 5). This represents an 8.5% increase over the arms sales of the top 25 arms companies in 2018. The total in 2019 was 15% higher than for the top 25 in 2015 (Béraud-Sudreau *et al.*, 2020).

Table 5. *The SIPRI top 20 arms-producing and military services companies in the world, 2019 (millions of US dollars)*

Rank		Company	Country	Arms sales, 2019	Arms sales, 2018 (constant 2019)	Change in arms sales, 2018–19	Total sales, 2019	Arms sales as a % of total sales, 2019
2019	2018							
1	1	Lockheed Martin Corp.	United States	53 230	48 119	11 %	59 812	89
2	2	Boeing	United States	33 580	32 704	2,7 %	76 559	44
3	3	Northrop Grumman Corp.	United States	29 220	26 666	9,6 %	33 841	86
4	4	Raytheon ¹	United States	25 320	23 866	6,1 %	29 176	87
5	6	General Dynamics Corp.	United States	24 500	22 400	9,4 %	39 350	62
6	5	Aviation Industry Corp. of China ²	China	22 470	21 841	2,9 %	66 846	34
7	7	BAE Systems	United Kingdom	22 240	20 672	7,6 %	23 378	95
8	9	China Electronics Technology Group Corp.	China	15 090	13 581	11 %	32 951	46
9	8	China North Industries Group Corp.	China	14 540	14 580	-0,3 %	65 929	22
10	-	L3Harris Technologies ³	United States	13 920	13 460	3,4 %	18 074	77
11	14	United Technologies Corp. ⁴	United States	13 100	9 479	38 %	77 046	17
12	11	Leonardo	Italy	11 110	9 383	18 %	15 432	72
13	10	Airbus	Trans-European ⁵	11 050	11 197	-1,3 %	78 905	14
14	13	Thales	France	9 470	9 087	4,2 %	20 601	46
15	12	Almaz-Antey	Russia	9 420	9 784	-3,7 %	9 657	98
16	16	Huntington Ingalls Industries	United States	7 740	7 331	5,6 %	8 899	87
17	38	Dassault Aviation Group	France	5 760	2 812	105 %	8 219	70
18	18	Honeywell International	United States	5 330	5 529	-3,6 %	36 709	15
19	19	Leidos	United States	5 330	5 091	4,7 %	11 094	48
20	22	Booz Allen Hamilton	United States	5 140	4 765	7,9 %	7 464	69
21	28	General Electric	United States	4 760	3 716	28 %	95 200	5
22	-	EDGE ⁶	UAE	4 750	-	-	5 000	95
23	23	Rolls-Royce	United Kingdom	4 710	4 561	3,3%	19 732	24
24	25	China South Industries Group Corp	China	4 610	4 125	12%	29 065	16
25	21	United Shipbuilding	Russia	4 500	4 770	-5,7%	5 416	83

		Corp. ⁶						
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¹ Raytheon and United Technologies Corp. merged in 2020, ² The arms sales figure for this company is an estimate with a high degree of uncertainty, ³ L3Harris Technologies is the result of a merger between Harris Corp. and L3 Technologies. Its arms sales figure for 2018 is 'pro forma', i.e. it is the combined 2018 arms sales of Harris Corp and L3 Technologies; ⁴ Raytheon and United Technologies Corp. merged in 2020; ⁵ Trans-European refers to companies whose ownership and control structures are located in more than one European country; ⁶ The arms sales figure for this company is an estimate with a high degree of uncertainty.

Source: Own study based <https://www.sipri.org/publications/2020/sipri-insights-peace-and-security/mapping-international-presence-worlds-largest-arms-companies>

For each year in 2015-19, the United States was home to the highest number of companies listed. Twelve US companies appear in the top 25 for 2019, accounting for 61% of the combined arms sales of the 25 largest arms companies. Four Chinese arms companies, three of which were in the top 10, accounted for 16% of the total in 2019. The combined revenue of these four Chinese companies grew by 4.8% in 2019 and by 8.2% between 2015 and 2019. The six West European companies in the ranking (two based in the United Kingdom, two in France, one in Italy and one trans-European company) together accounted for 18% of the total arms sales of the top 25 in 2019. The two Russian companies accounted for 3.9%, and the one company based in the United Arab Emirates (UAE) accounted for 1.3%.

Four arms companies around the world were analyzed for liquidity: two American defense concerns: Lockheed Martin and Northrop Grumman, Chinese concern - North Industries Group Red Arrow, Russian company - United Aircraft Corporation and French electronics company - Thales. The selection of companies was determined by the volume of sales and the diversity of the geographical location of enterprises.

Lockheed Martin's 2017 sales were \$ 43.88 billion. The products offered by the company are: Sikorsky helicopters, combat planes, marine, air and land solutions - radars, communication systems and the possibility of their integration in various applications. The company invests in research and development of its products, in particular in artificial intelligence and hypersonic weapons. Lockheed Martin supplies the Polish army with F-16 planes and the 5th generation fighter - F-35 Lightning II.

Northrop Grumman's 2017 sales were over \$ 25 billion (up \$ 33 billion in 2019). The concern was created after the merger of Northrop and Grumman in 1994. The concern provides solutions in the field of aviation and space science, and marine equipment. The most famous product of the company, despite the fact that no one has seen it, is the B-2 Stealth Bomber.

North Industries Group Red Arrow generated sales of \$ 20 billion in 2017. The company focuses on research, in particular in the field of materials science, then using the results in armor and rocket applications. Red Arrow is also a producer of internal combustion engines used in combat vehicles. The concern sells weapons mostly on the domestic market, but the company's export branch is also developing very dynamically. An example of a product of the North Industries Group Red Arrow is the HJ-10A combat vehicle with anti-aircraft armament, presented at the arms fair in Iran.

The Russian representative among the surveyed companies is **United Aircraft Corporation**. The company was established in 2006 by decree of the President of Russia. Sales of the company in 2017 were at the level of USD 7.5 billion. The company produces aircraft for military and civilian customers. United Aircraft as a company that brings together many smaller ones in Russia, also offers repair and modernization services for aircraft. The flagship product of the concern is the fifth generation Su-57 fighter.

The French electronics company **Thales** supplies avionics, assistance systems and electronics for ground vehicles, aviation and ships with 2017 sales of \$ 10 billion. The company is the second largest concern in Europe after the multinational Airbus. The concern provides systems and products used in land transport, aviation, military and space industry. Stand-alone devices produced by the concern are drones and unmanned aerial vehicles.

The liquidity analysis was carried out over a four-year period. Due to the limited possibilities of accessing financial data of companies from different regions of the world, the time period analysed is the years 2015-2018. Financial data are given in the currency appropriate for the company's country of origin. This does not affect the values of the calculated liquidity ratios as they do not have units.

Table 6. Static liquidity ratios of the surveyed companies

Static liquidity ratios	2015	2016	2017	2018
Lockheed Martin				
Current liquidity ratio	1,02	1,06	1,30	1,28
Cash liquidity ratio	0,08	0,13	0,21	0,06
Northrop Grumman				
Current liquidity ratio	1,16	1,22	2,34	1,17
Cash liquidity ratio	0,42	0,45	1,58	0,19
Red Arrow				
Current liquidity ratio	1,88	2,38	3,20	3,18
Cash liquidity ratio	0,34	1,00	1,21	1,50
Thales				
Current liquidity ratio	1,06	1,03	1,16	0,87

Cash liquidity ratio	-	0,06	0,06	0,05
United Aircraft				
Current liquidity ratio	1,39	1,35	1,39	1,32
Cash liquidity ratio	0,35	0,33	0,34	0,31

Source: Own study based on financial data for the years 2015 -2018 www.cenzin.com www.macrotrends.net.

Among the surveyed companies, the French company Thales is characterized by the greatest operational risk. The values of the ratios in individual years are similar to each other, which may indicate the purposeful action of managers to use the resources at the company's disposal as effectively as possible. Such activities are typical for young companies trying to make up for their position in relation to the current industry leaders. The company Thales, however, is not a young one, and its desire to increase market share proves it well.

The values most distant than expected are achieved by the Chinese concern North Industries Red Arrow. High values of the current liquidity ratios, as well as cash liquidity, may indicate a very conservative use of the company's cash and resources to increase the company's efficiency. It is also a premise of many development opportunities for the coming years thanks to the improvement of the company's resource management. Stability in operation and achievement of indicator values close to the expected ones are the domain of American companies.

You can see here the awareness of company leaders about how they should dispose of the company's resources. The Russian company United Aircraft also cares for a similar level of indicators every year. The current liquidity ratio is within the expected values, while the amount of cash in the company is almost twice as high as the expected value. Analyzing the dynamic indicators, one can see the connections between the financial data, which are not visible in the static analysis (Table 7).

Table 7. Dynamic liquidity ratios of the surveyed companies

Dynamic liquidity ratios	2015	2016	2017	2018
Lockheed Martin:				
Cash efficiency ratio of sales	0,13	0,11	0,13	0,06
Cash flow rate ratio	1,08	0,88	0,96	0,43
Cash efficiency ratio of assets	0,10	0,11	0,14	0,07
Operating cash adequacy ratio for total debt repayment	0,10	0,11	0,14	0,07
Operating cash adequacy ratio for repayment of long-term liabilities:	0,16	0,15	0,19	0,11
Operating cash adequacy ratio for repayment of current liabilities	0,36	0,36	0,48	0,25
Ratio of the ability to generate cash from operating activities	-14,33	6,95	6,32	-1,50
Northrop Grumman:				
Cash efficiency ratio of sales	0,09	0,11	0,10	0,13
Cash flow rate ratio	0,61	0,77	0,71	0,84

Cash efficiency ratio of assets	0,08	0,10	0,07	0,10
Operating cash adequacy ratio for total debt repayment	0,08	0,10	0,07	0,10
Operating cash adequacy ratio for repayment of long-term liabilities:	0,34	0,40	0,18	0,28
Operating cash adequacy ratio for repayment of current liabilities	0,40	0,50	0,37	0,46
Ratio of the ability to generate cash from operating activities	0,37	0,52	0,25	0,22
Red Arrow:				
Cash efficiency ratio of sales	-	0,04	0,11	0,30
Cash flow rate ratio	-	0,28	0,92	1,94
Cash efficiency ratio of assets	-	0,02	0,06	0,14
Operating cash adequacy ratio for total debt repayment	-	0,02	0,06	0,14
Operating cash adequacy ratio for repayment of long-term liabilities:	-	0,02	0,07	0,19
Operating cash adequacy ratio for repayment of current liabilities	-	0,06	0,28	0,71
Ratio of the ability to generate cash from operating activities	-	0,07	0,35	0,72
Thales:				
Cash efficiency ratio of sales	-0,01	0,07	-0,01	0,10
Cash flow rate ratio	-0,12	0,96	-0,14	1,08
Cash efficiency ratio of assets	-0,01	0,05	-0,01	0,06
Operating cash adequacy ratio for total debt repayment	-0,01	0,05	-0,01	0,06
Operating cash adequacy ratio for repayment of long-term liabilities:	-0,12	1,15	-0,09	0,49
Operating cash adequacy ratio for repayment of current liabilities	-0,01	0,08	-0,01	0,10
Ratio of the ability to generate cash from operating activities	-0,42	0,80	0,07	-0,65
United Aircraft:				
Cash efficiency ratio of sales	-0,01	-0,10	-0,17	-0,60
Cash flow rate ratio	-0,20	3,86	-2,35	7,39
Cash efficiency ratio of assets	0,00	-0,02	-0,05	-0,06
Operating cash adequacy ratio for total debt repayment	0,00	-0,02	-0,05	-0,06
Operating cash adequacy ratio for repayment of long-term liabilities:	-0,02	-0,07	-0,16	-0,21
Operating cash adequacy ratio for repayment of current liabilities	-0,01	-0,03	-0,10	-0,12
Ratio of the ability to generate cash from operating activities	-0,06	-0,63	2,93	-3,53

Source: *Own study based on financial data for the years 2015 - 2018* www.cenzin.com
www.macrotrends.net

Comparing cash flow rate ratios achieved by the surveyed companies, differences in the calculated values are visible. Expected is the maximization of the ratio, which indicates the amount of cash coming from operating activities. Operational activity, i.e. the basic activity for which the company was established, should generate the highest possible profit. In the case of Lockheed Martin, the fluctuation of the ratio is smaller. The largest, almost two-fold decrease in the value took place between 2017 and 2018, which may be a reason for increased vigilance of managers to improve the ratio in the future. The Chinese company North Industries Red Arrow has recorded a continuous increase in the ratio over the three years. Initially, the ratio increased threefold, then doubled, so the trend is towards stabilization.

The Russian aviation company United Aircraft maintains the level of the ratio at very volatile values, both positive and negative. Thales also does not maintain the ratio's value at an even level. Taking into account the static analysis, this may indicate a risky pursuit of enterprise growth. The most stable picture of the ratio can be seen when analyzing Northrop Grumman. The values are close to one, they are not the best results, but they increase slightly each year. Cash efficiency ratio of assets tells how much company's assets are used to generate cash from operations.

Lockheed Martin, like Northrop Grumman, can boast the most stable ratio values over the four years studied. The achieved values of 0.1 are high compared to other companies. The Chinese company Red Arrow's index position is analogous to that of the cash flow rate ratio. The values increased annually from 0.02 to 0.14 over the three years. It is a signal for the company's future development. The French Thales, due to negative values of cash flow from operating activities, has a negative result for the cash efficiency ratio of assets every two years. The Russian United Aircraft is the worst in the ranking, as it has never reached the value of the ratio higher than zero. This proves that the company's assets are not used to generate cash flows from operating activities. The operating cash adequacy ratio for the repayment liabilities indicates to what extent the funds generated from operating activities are sufficient to pay off debts. It is desirable that the value of this ratio should be at least equal to value 1 that is not achieved by any of the surveyed companies.

The ratio of the ability to generate cash from operating activities informs about the relation between operating revenues and the revenues from all activities of the enterprise. Operating flows should be the most profitable for the company, as operating activities are the backbone of the company's revenues. Lockheed Martin is not in a stable situation as far as the analyzed ratio is concerned. This is due to the repayment of liabilities and large investments. This is made possible by high operating revenues.

The Chinese company Red Arrow incurs less and less liabilities, its investment activity is based on reaping the benefits from it, and operating cash flows threefold every year. Therefore, it is not surprising that the ratio of the ability to generate cash from operating activities increases every year. The question is whether such sharp growth will continue.

The Russian company United Aircraft is characterized by unstable ratio values, mostly negative. Analyzing the cash flow from operating activities, which are negative every year, and the increasing incurring liabilities, the company appears as a young and developing company. However, over-investment without positive cash flows can cause financial problems in the future. United Aircraft is not a young company, its customers are recognized on the world markets companies in the field

of military and civil aviation. The French company Thales also shows volatile index values. When analyzing the cash flow from activities, one can see continuous investments over the period under study. Negative values of cash flows from operating activities in two out of four years under study may indicate problems with stabilizing operating income. Northrop Grumman maintains this ratio at a stable level over the period under review. Positive cash flows from all types of activity may indicate that funds are being collected for future investments or that the company's funds are used too conservatively. The annual slight decrease of the ratio informs about the decreasing share of cash flows from operating activities compared to the rest of cash flows.

6. Conclusions

The functioning of the company, especially in the defense industry, is very complicated. On the one hand, they are classified into services, and on the other hand to industry, specific industry - the armed industry. There is no universal method that will allow an organization to remain a leader in this industry. The management staff can ensure the most effective management of the organization by using internal resources to gain a competitive advantage on the market.

The knowledge of the financial condition of the company, and in particular, the ability to pay the liabilities of an economic unit, translates directly into its competitive position on the market and at the same time allows the managers to react quickly to changes in the environment. The liquidity analysis is a helpful tool for determining the financial situation of the company (static liquidity analysis) and for the prospective design of strategic activities (dynamic liquidity analysis). From the point of view of the management staff, the most information - for decision-making purposes - can be obtained from indicators based on cash flows.

The analysis of four enterprises from the defense industry shows a strong correlation between the financial situation measured by liquidity ratios and the competitiveness of the surveyed companies. The most stable company, one of the leading defense concerns in the world, is Northrop Grumman. In turn, United Aircraft is characterized by a large dispersion of results and negative values of cash flows from operational activities.

References:

- Antczak, J. 2019. Zarządzanie płynnością przedsiębiorstwa z branży logistycznej, *Gospodarka Materiałowa i Logistyka* Nr 5/2019, 5-6.
- Aron, R. 1995. *Pokój i wojna między narodami*, Warszawa: Centrum im. Adama Smitha, 69.

- Béraud-Sudreau, L., Marksteiner, A., Lopes da Silva, D., Tian, N., Kuimova, N., Wezeman, P.D., Wezeman, S.T. 2020. Mapping the International Presence of the World's Largest Arms Companies, SIPRI Insights on Peace and Security, No2020/12, December, SIPRI 2020, <https://www.sipri.org/publications/2020/sipri-insights-peace-and-security/mapping-international-presence-worlds-largest-arms-companies>.
- Białas, K. 2017. Rola dynamicznych wskaźników płynności finansowej w zarządzaniu przedsiębiorstwem. *Finanse i prawo finansowe*, Łódź, p. 47.
- Davues, D. 1992. *Sztuka zarządzania finansami*, McGraw Hill, Warszawa-Londyn, p. 9.
- Gołębiewski, G., Tłaczała, A. 2005. *Analiza ekonomiczno – finansowa w ujęciu praktycznym*, Difin, Warszawa, p. 185.
- Gos, W. 2001. Polityka rachunkowości a polityka finansowa, *Prawo Przedsiębiorcy*, 4, 17.
- Haffer, M. 2017. Konkurencyjność polskich przedsiębiorstw w świetle badań empirycznych (In:) Skowronek-Mielczarek, A. (red.), *Przedsiębiorstwo – przedsiębiorczość – rynek*, Oficyna Wydawnicza SGH, Warszawa, p. 180.
- Hamel, G., Prahalad, C.K. 1990. The Core Competence of the Corporation. *Harvard Business Review*, 68, (May-June), 79-91.
- Hatzichronoglou, T. 1996. Globalisation and Competitiveness: Relevant Indicators. STI Working Papers, No. 5, p. 20. OECD, Paris.
- Hunt, S.D., Morgan, R.M. 1995. The competitive advantage. *Theory of competition. Journal of Marketing*, 59, p. 16.
- Huntington, S.P. 2007. *Zderzenie cywilizacji i nowy kształt ładu światowego*, Warszawa: Wyd. MUZA SA, p. 128-145.
- Klaus Schwab, K. 2016. World Economic Forum. *Global Competitiveness Report 2016-2017*. Cologny/Geneva, p. 14.
- Nowacki, R. 2015. Diagnostyka poziomu konkurencyjności przedsiębiorstw w Polsce na podstawie oceny ich menadżerów. *Handel Wewnętrzny*, 5(358), 451.
- Nowakowska-Krystman, A. 2018. Zarządzanie strategiczne przedsiębiorstwem zbrojeniowym w aspekcie zmian. *ASzWoj*, Warszawa, s. 106.
- Pietrewicz, J.W., Sobiecki, R. 2019. *W poszukiwaniu konkurencyjnej przewagi*. Oficyna Wydawnicza SGH, Warszawa, p. 9.
- Skowronek-Mielczarek, A., Leszczyński, Z. 2007. *Controlling analiza i monitoring w zarządzaniu przedsiębiorstwem*, Difin, Warszawa, p. 247.
- Stankiewicz, M. 2005. Konkurencyjność przedsiębiorstwa. Budowanie konkurencyjności przedsiębiorstwa w warunkach globalizacji, *Dom Organizatora TNOiK*, Toruń, p. 18.
- Stoessinger, J.G. 1969. *The Might of Nations. World Politics in Our Times*, third. ed. New York, Random House, p. 27.
- Sułek, M. 2011. Metodyka analizy geopolitycznej (na przykładzie potęgotetrii). *Przegląd Geopolityczny*, T. 3, p. 14.
- Szwacka-Mokrzycka, J. 2017. Czynniki konkurencyjności przedsiębiorstw przemysłu spożywczego w Polsce, *Studia Ekonomiczne, Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, Nr 330, p. 206.
- Szwacka-Mokrzycka, J. 2017. Czynniki konkurencyjności przedsiębiorstw przemysłu spożywczego w Polsce, *Studia Ekonomiczne, Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, Nr 330, p. 206, 208.
- Zamelek, P. 2013. *Przeobrażenia polskiego przemysłu obronnego w warunkach otwartego europejskiego rynku*, Wyd. Adam Marszałek, Toruń, p. 48-49.
- Zdrodowski, W., red. nauk. 2008. *Słownik terminów z zakresu bezpieczeństwa narodowego*, Wyd. 6, Warszawa: AON, p. 104.