



Empowering the Association of Indonesian National Private Defense Industries (Pinhantanas) to Build the Independence of the Defense Industry

Wulan Nurfitriani^{1*}, Vicky Nugroho², Afpriyanto³, G. Royke Deksono⁴

^{1,2,3}Universitas Pertahanan Republik Indonesia, Indonesia

wulan.nurfitriani@tp.idu.ac.id^{1*}, vicky.nugroho@tp.idu.ac.id², afpriyanto@tp.idu.ac.id³,
georgeroykedeksino@gmail.com⁴

*Corresponding Author

Article Info

Article history:

Received: July 10, 2023

Revised: August 9, 2023

Accepted: August 31, 2023

Keywords:

BUMNIS,

BUMS,

Defense Industry,

Empowerment,

Law Number 11,

Pinhantanas,

Private-Owned Enterprises

Abstract

The fact that the empowerment of the private defense industry needs to be improved. This is indicated by the problems that still exist in the defense industry, namely the lack of government commitment to increasing collaboration between State-Owned Strategic Industry Enterprises and Private-Owned Enterprises, and many domestic defense industry products that are still imported. This also raises the question, has the private defense industry not fulfilled the local market opportunity? Has the private defense industry yet to fulfill the Domestic Component Level (TKDN) obligation in producing the defense systems? Has the private defense industry yet to cooperate with the foreign defense industry? A literature study method underpins this research, offering the researchers a profound understanding of the Association of Indonesian National Private Defense Industries (Pinhantanas) empowerment. Employing this methodology, insights into defense industry challenges and the Association of Indonesian National Private Defense Industries are revealed. Hence, an investigation into Empowering the Association of Indonesian National Private Defense Industries to Augment Defense Industry Independence proves pivotal. By dissecting defense industry challenges using three research questions, this research offers insights and recommendations to empower the Association of Indonesian National Private Defense Industries (Pinhantanas).

DOI:

<http://dx.doi.org/10.33172/jp.v9i2.15820>

2549-9459/Published by Indonesia Defense University This is an open-access article under the CC BY-NC license (<https://creativecommons.org/licenses/by-nc/4.0/>)

INTRODUCTION

The defense industry has an important role in supporting the achievement of Indonesia's Minimum Essential Force (MEF). MEF is a national development credential stipulated by the 2010-2014 Medium-Term Development Plan (RPJM). MEF is the first level to reach the ideal national defense posture (Sudarwono, 2020). MEF is a step-by-

step approach strategy in reaching the ideal defense posture desired as stated in the Regulation of the Minister of Defense of the Republic of Indonesia Number 19 of 2012 Concerning the Alignment Policy for Minimum Essential Force Main Components (*Kebijakan Penyelarasan Kekuatan Komponen Utama in Indonesian*). The MEF policy started in 2010 structured in three phases. The first phase took place from 2010-2014, the second phase from 2015-2019, and the third phase from 2020-2024. The MEF policy generally focuses on achieving rematerialization, revitalization, relocation, and procurement. It focuses on several supporting parts, such as empowering the defense industry and increasing welfare and soldiers' capacity and capability.

Procurement of the leading defense system equipment (*alat pertahanan dan keamanan* or *alaphankam*) consists of domestic and foreign sources. Until today, the capability of the domestic defense industry still has restricted capacity to fulfill the desired needs of the Indonesian National Armed Forces (TNI). It includes technological factors, human resources, raw materials, spare parts, and mastery of Science and Technology in the defense sector. The MEF program will only be fulfilled if it is supported by budget allocations to increase defense capability itself. The defense budget, which increases yearly, is expected to become domestic defense investment, to further not increase the defense spending abroad. This aligns with the optimism of achieving 100% MEF in 2024. Today, the defense budget has been increased in the defense industry, both for Strategic State-Owned Enterprises (*Badan Usaha Milik Negara Industri Strategis* or BUMNIS) and the private defense industry or Privately Owned Enterprises (*Badan Usaha Milik Swasta* or BUMS).

President Joko Widodo inaugurated the establishment of the Defend ID holding company in October 2022. It is a significant highlight for domestic foreign defense industries. Defend ID was formed to strengthen the defense ecosystem and accelerate the independence of the defense industry in fulfilling the needs of domestic defense staff, both from the quantity of human resources and the quality of technology. We can observe that the defense industry of State-Owned Enterprises has implemented their function as lead integrators or producers of the main weapon system equipment that combines all the primary components, other support components, and raw materials to become the leading equipment. On the other hand, the Job Creation Law that passed on October 5, 2020, mentions that defense industry SOEs are allowed to become lead integrators (Macdonald, 2020). This law reminds us that Indonesia still has a private defense industry that must be cultivated and empowered to support the independence of the domestic defense industry.

The fact that the empowerment of the private defense industry needs to be improved. This is indicated by the problems that still exist in the defense industry, namely the lack of government commitment to increasing collaboration between the BUMNIS and BUMS, and many domestic defense industry products that are still imported. The above issues become the key focus elaborated into three problem formulations, namely:

1. Has the private defense industry yet to fulfill local market segmentation?
2. Has the private defense industry yet to fulfill the mandatory domestic component level (TKDN) percentage in producing defense and security equipment?
3. Has the private defense industry been in cooperation with the foreign defense industry?

Hence, this study titled "Empowering the Association of Indonesian National Private Defense Industries (Pinhantanas) to Foster Defense Industry Independence"

emerges as highly pertinent. By scrutinizing the defense industry's obstacles and the three focal concerns, this research aims to proffer actionable recommendations to empower Pinhantanas.

METHODS

This research uses the literature study method to analyze empowerment, defense industry pillars, Pinhantanas, military market segmentation, and Domestic Component Level. The following are the stages carried out in this research method. First, identification of research objectives. Second, search and selection of relevant reference sources, such as scientific journals, articles, or books. Third, analysis and data collection and interpretation, and conclusion. This research method allows researchers to gain deep insight into the Association of Indonesian National Private Defense Industries (Pinhantanas) empowerment. By using this method, this research can provide suggestions and input on the problems of the defense industry and the Association of Indonesian National Private Defense Industries (Pinhantanas).

RESULT AND DISCUSSION

Empowerment

Empowerment of industries is planned, directed, and measurable by delivered policies and efforts of the central government and local governments to enable and empower the industry players actively by increasing competitiveness as stated in the Republic of Indonesia Government Regulation Number 29 of 2018 Concerning Industrial Empowerment (Maksum, Rahayu, & Kusumawardhani, 2020). Industrial groups that are considered to have weaknesses should be encouraged to develop through positive industrial empowerment programs. Empowerment of industry aims to escalate domestic products produced by the state and local governments, businesses, communities, and consumers; secure the domestic market; reduce our dependency on goods from abroad; and improve the structure of the industry by elevating the use of domestic capital goods, raw materials, supporting components, technology, and human resources.

The empowerment of the domestic defense industry affects the independence of the fulfillment of defense equipment as stated in the Regulation of the Minister of Defense of the Republic of Indonesia Number 19 of 2012 Concerning the Alignment Policy for Minimum Essential Force Main Components. The goal of the growth of the defense industry is to achieve self-sufficiency in the ability to provide defense equipment to assist defense capabilities against threats. By 2024, the defense industry expects to prepare the necessary defense equipment to support defense and overcome threats from neighboring countries (Sumadinata, Achmad, & Riyadi, 2022).

The objective of developing the defense industry is to achieve integrated design, production, marketing, maintenance, and logistics independence that meets national and international standards through the development of science and technology at a certain level, sustainably, and consistently according to the industrial sector. Cooperation with foreign institutions regarding technology transfer is also a determining factor for the independence of the defense industry. As an end user, the Indonesian National Armed Forces (TNI) must follow government guidelines regarding the use of domestic production.

The Defense Industry as One of the Pillars of Science and Technology Actors and Defense Self-Reliance

Efforts to realize defense independence should not be detached from the concept of the three main actors in implementing the defense industry (Fatah, 2020). This concept is oriented towards an integrated, mutually supportive relationship between the government as a regulator, the national industrial sector (BUMN and BUMS) as a producer, and the utilization of defense technology and science in production and distribution and as a user or end-users (military). The three main actors of science and technology implementers are universities, research and development institutions, industry, and the Indonesian National Armed Forces as end-users.

As one of the main actors of science and technology, the defense industry plays a vital role in complying with MEF and building a country's defense forces. A strong state defense and security force will be achieved if supported by the capabilities of the domestic defense industry. It cannot be denied that the defense industry in Indonesia does not yet have sophisticated technology and still relies on raw materials from abroad; human resources have not fully mastered the technology and have been unable to make components of defense equipment raw materials (Budiman, Ardipandanto, Fitri, & Dewanti, 2021). These factors affect the procurement of the Indonesian National Army's defense equipment and the need for more trust of the government, defense policymakers, and decision-makers in supporting the independence of the defense industry in Indonesia.

The Independence

In a broader sense, self-reliance means independence in buying, using, maintaining, and making defense equipment (Karim, 2014; Sutrisno, Cakranegara, Hendrayani, Jokhu, & Yusuf, 2022). Independence would provide economic benefits for the country. In addition, the Indonesian defense industry will develop and be independent and thus help meet the MEF target. The independence model is such to reach true defense independence (Setiadji, 2020; Purnomo, Rahayu, Riani, Suminah, & Udin, 2020). There are three benchmarks for defense independence, namely:

1. The state's capacity to be capable in the field of military technology is needed to manufacture weapons systems.
2. The financial power of the state to spend money for the cost of producing weapons systems.
3. The capability of the domestic industry to build defense systems.

Independence can only be achieved if the state can maintain its financial, technological, and weapons production capacity of at least 70%. Of course, this is marked by the state's commitment to invest in the domestic defense industry, efforts to obtain transfers or transfers of military technology from leading arms manufacturers, and the development of strategic plans. Independence means that the defense industry aligns with the country's sovereignty goals in building defense equipment without pressure and control from other parties. In other words, the internal capabilities will support the independence defense. The domestic defense industry still has to be open and cooperate with other countries to build capable defense industry independence. The desire to achieve an independent defense industry is not easy because it must involve all elements, including BUMN and BUMS. The defense industry's ability must also receive full support from the government to align to establish an independent domestic defense industry as stated in the first paragraph of Law of the Republic of Indonesia Number 16

of 2012 concerning the Defense Industry (Wisedsin, Jermsttiparsert, Thitart, & Aunyawong, 2020). Articles 11 and 52 of Law of the Republic of Indonesia Number 11 of 2020 Concerning Job Creation state that BUMS gets the opportunity to participate in business development in the defense industry sector as a lead integrator. BUMS also gets financial ownership of the primary equipment industry with the approval of the Minister of Defense. In other words, BUMS has allowed for investment and contributes to making and developing defense and security equipment products in fulfilling the Indonesian National Army's defense equipment.

The Association of Indonesian National Private Defense Industries (Pinhantanas)

The Association of Indonesian National Private Defense Industries known as Pinhantanas founded in 2017. Pinhantanas is a non-profit organization established by the national private defense to develop the national private defense industry. Suharyo (2021) the purpose of the establishment of Pinhantanas is to contribute as well as to improve the welfare and productivity of the national private defense industry in Indonesia and as the association of private companies that produce defense and security equipment and suppliers of various principal defense system products for the Indonesian National Army, Ministry of Defense of Republic Indonesia, Police, and National Agency for Disaster Management (*Badan Nasional Penanggulangan Bencana* or BNPB) alike. Pinhantanas' vision is to expand a strong defense and security system by meeting user needs in the fields of Defense Equipment, Maintenance Services, and Maintenance. Meanwhile, its mission is to make a strong and competitive defense industry, master defense technology, reduce dependency on foreign goods, support economic growth, increase employment, and build professional defense technology human resources. (<https://www.pinhantanas.com/>). Following the description above, Pinhantanas' vision and mission aim to become a strong and competitive defense industry. Pinhantanas' vision and mission align with the fulfillment of the MEF policy, namely, to achieve the independence of the domestic defense industry. However, the domestic defense industry's management, guidance, and empowerment could not have been optimal. Pinhantanas consists of 24 BUMS that produce defense and security equipment. Those companies and output productions are shown in Table 1.

Table 1. Company Names and Production Results

No.	Company Names	Production Results
1	PT. Merpati Wahana Raya	
2	PT. Prasadha Dumayasa	
3	PT. Jala Berikat Nusantara Perkasa	
4	PT. Karya Tugas Anda	Special Vehicle, Tactical Vehicle,
5	PT. Karya Samudra Wiwaca Kusuma	Combat vehicle (armored),
6	PT. Burangeng Maju Teknik	Nubika vehicles and
7	PT. Bangkit Nata Mandiri Sejahtera	Unmanned Aerial Vehicle (UAV)
8	CV Indo Pulley Perkasa	
9	PT. Kadomas Aviasindo	
10	PT. Citra Shipyard	
11	PT. Bandar Abadi	Ships (tank carriers and warships or combat ships)
12	PT. Bamatec	

13	PT. Caputra Mitra Sejati	
14	PT. Karimun Anugrah Sejati	
15	PT. Komodo Armaments	Weapons, polymers, propellant, and munitions
16	PT. Respati Solusi Rekatama	
17	PT. Sari Bahari	Remote Controlled Weapon Stations (RCWS), bombs, rockets, missiles or missiles, and drones
18	PT. Bhimasena Global Teknologi Industri	Optics (binoculars)
19	PT. Hariff Daya Tunggal Engineering	
20	PT. Indoguardika Cipta Kreasi	Communication and cyber systems
21	PT. Graha Fatta Wisma Sentosa	
22	PT. Surya Utama Putra	Energy generator and battery
23	CV Maju Mapan	
24	PT. Langit Biru Parasut	Soldier equipment (parachutes, military tents, tents, field kitchens, platoon tents, medical tents, and aircraft tents)

From Table 1, PT. Merpati Wahana Raya, PT. Prasadha Dumayasa, PT. Jala Berikat Nusantara Perkasa, PT. Karya Tugas Anda, PT. Karya Samudra Wiwaca Kusuma, PT. Burangeng Maju Teknik, PT. Bangkit Nata Mandiri Sejahtera, CV Indo Pulley Perkasa, PT. Kadomas Aviasindo produces vehicles: Special Vehicle, Tactical Vehicle, Combat vehicle (armored), Nubika vehicles, and Unmanned Aerial Vehicle (UAV). PT. Citra Shipyard, PT. Bandar Abadi, PT. Bamatec, and PT. Caputra Mitra Sejati produces Ships (tank carriers and warships or combat ships). PT. Komodo Armaments produces Weapons, polymers, propellants, and munitions. PT. Respati Solusi Rekatama, PT. Sari Bahari produces the same products: Remote Controlled Weapon Stations (RCWS), bombs, rockets, missiles or missiles, and drones. PT. Bhimasena Global Teknologi Industri produces Optics (binoculars). PT. Hariff Daya Tunggal Engineering and PT. Indoguardika Cipta Kreasi produces Communication and cyber systems. PT. Graha Fatta Wisma Sentosa and PT. Surya Utama Putra produces energy generators and batteries. CV Maju Mapan and PT. Langit Biru Parasut produces soldier equipment (parachutes, military tents, tents, field kitchens, platoon tents, medical tents, and aircraft tents). The principal defense system equipment produced by the private companies above has long been a supplier to meet the needs of the Indonesian National Armed Forces, Indonesian Police, and other government agencies.

Military Market Segmentation

The products of companies incorporated in Pinhantanas have become suppliers of end-user needs, the Indonesian National Armed Forces, the Maritime Security Agency (*Badan Keamanan Laut* or Bakamla), and the National Agency for Disaster Management (BNPB) (Maga, 2022), including the following.

1. PT. Citra Shipyard. This company engaged in shipbuilding. One of its products is KRI 851, which the Indonesian Navy has used for a long time.
2. PT. Merpati Wahana Raya. This company engaged in defense and security equipment. The company produces special vehicles such as IVANDER or bomb disposal vehicles (*pending bahan peledak* or jihad in Indonesia), GANILLA or special field kitchen vehicles, STALLION or nuclear, biological, and chemical vehicles,

- “DECONT Trucks” or decontamination vehicles, STALLION or vehicles for rapid reaction purposes, field workshop trucks and SWG R-1 UAVs. Indonesian National Armed Forces (TNI), especially Zeni, and the Marine Corps have used those vehicles.
3. PT. Karya Tugas Anda. This company is engaged in the vehicle manufacturing industry. This company has produced products such as the Turangga vehicle APC 4X4. The Indonesian Air Force's Kopaskhas have also used this vehicle.
 4. PT. Sari Bahari. This company is engaged in the manufacture of training bombs, missiles, and rockets. The products produced by PT. Sari Bahari include P-100 bombs, P-250 bombs, P-500 bombs, and missiles. PT. Sari Bahari also cooperate with PT Dahana. The product is used by the Indonesian Air Force.
 5. CV Maju Mapan. This company produces command tents, kitchen tents, kitchen tents, team tents, command tents, weld beds, backpacks, and plunges and has become a logistics supplier for the Indonesian National Armed Forces (TNI).

Domestic Component Level or TKDN (*Tingkat Kandungan Dalam Negeri*)

Article 61 of the Republic of Indonesia Government Regulation Number 29 of 2018 Concerning Industrial Empowerment states that the process of providing goods and services must use the domestic component level with a minimum value weight of 40%. Referring to this regulation, PT. Komodo Armament has produced Komodo D5 and D7 firearms. These firearms have achieved a domestic component level of 82.5%. The enormous weight of the content value shows that PT Komodo Armament has been able to produce goods whose content is made from domestic raw materials.

Cooperation

In 2018, Pinhantanas established a partnership with Nigeria. In 2021, Pinhantanas established a cooperation with the Ukrainian Defense Industry. In 2022, during Indo Defence and Forum 2022, Pinhantanas established a partnership with the Czech Republic's Defense and Security Industry Association (DSIA). All of that cooperation is carried out to assist Pinhantanas in mastering the transfer of technology (ToT) and increasing the productivity of the domestic defense industry. The existence of Pinhantanas has a positive impact on the defense sector and helps to increase awareness of the domestic defense industry to the government, ministries/agencies, the public, and users. Promoting the development of the national private defense industry, assisting the government in building defense industry capacity, increasing the involvement of the private defense industry national defense in national defense projects as well as increasing awareness of the importance of a strong national private defense industry.

CONCLUSIONS AND RECOMMENDATIONS

Pinhantanas functions as a privately owned Enterprise dedicated to advancing and procuring Indonesian National Army defense equipment. Formation of Pinhantanas aims to support the realization of MEF by 2024. Comprising 24 private companies, it is reported to satisfy the Indonesian National Army market segmentation and domestic TKDN criteria. Collaborative ties with foreign entities, such as the Czech Republic's Defense and Security Industry Association (DSIA), have been established. Numerous firms within Pinhantanas have a longstanding history of supplying defense equipment, from naval vessels to specialized vehicles and training explosives, for the Indonesian Army, Navy, and Air Force. Notably, PT Komodo Armament, a member of Pinhantanas, has produced firearms with a local content level exceeding 80%.

From the aforementioned facts, several strategies for optimal empowerment emerge:

1. Coaching programs are essential for governmental and institutional entities to enhance BUMS human resources and technology mastery.
2. Sectoral egos need shelving to facilitate collaborative efforts between BUMN and BUMS, promoting national defense industry independence.
3. Defensive investment endorsement should align with Article 52 of the Job Creation Law.
4. Collaborative training and knowledge sharing between BUMN and BUMS is paramount.
5. Companies under Pinhantanas should be prioritized in supplying primary defense product raw materials.
6. BUMN and BUMS should synergize in alignment with the domestic industry, facilitating global supply chain inclusion.
7. Entrustment in defense equipment modernization, complemented by collaborations with strategic defense industries, is crucial.

Achieving these strategies necessitates enhanced governmental, defense policymaker, and decision-maker support to foster a resilient, proficient defense industry. Pinhantanas should also adhere to specific commitments:

1. Emphasis on Research and Development (R&D) is crucial, pushing forward new technologies and innovative defense solutions.
2. Partnerships with academic institutions, encompassing universities and research centers, are necessary to foster defense-focused education and training.
3. Production capabilities must undergo enhancement, requiring infrastructure investments and process improvements.
4. Service and product diversification, covering diverse defense facets, is imperative.
5. Close collaborations with government entities in policy and regulation formulation will further defense industry independence.
6. A robust defense industry ecosystem, complete with comprehensive supply chain collaborations, is vital.
7. Exploration of international markets and prioritizing defense product exports will boost revenue and competitive advantage.

Integrity, stringent security standards, and robust collaborations between Pinhantanas, the government, and other relevant entities should underpin all these commitments. With apt attention from governing bodies and a focus on using domestically produced products, a formidable, competitive domestic defense industry can emerge. Such empowerment aims to amplify the projected expenditure within the domestic defense industry, curtailing imports, and fostering domestic defense industry evolution.

REFERENCES

- Budiman, A., Ardipandanto, A., Fitri, A., & Dewanti, S. C. (2021). *Pembangunan Kekuatan Minimum Komponen Utama Pertahanan Negara Di Era New Normal*. Jakarta: Penerbit Publica.
- Fatah, M. (2020). Empowerment of Women Through Organisasi Pemberdayaan Kesejahteraan Keluarga (Family Welfare and Empowerment Organization) in the Family Income Development Program in Banjarbaru City, Indonesia. *European Journal of Political Science Studies*, 3(2), 96-111.

- <https://doi.org/10.46827/ejps.v3i2.838>
- Indonesian National Private Defense Industry Association. (n.d.). Tentang Kami: Visi Misi. Retrieved July 14, 2023, from <https://www.pinhantanas.com/>
- Karim, S. (2014). *Membangun Kemandirian Industri Pertahanan Indonesia*. Jakarta: Gramedia.
- Law of the Republic of Indonesia Number 11 of 2020 concerning Job Creation.*
- Law of the Republic of Indonesia Number 16 of 2012 concerning the Defense Industry.*
- Macdonald, K. (2020). Private Sustainability Standards as Tools for Empowering Southern Pro-Regulatory Coalitions? Collaboration, Conflict and the Pursuit of Sustainable Palm Oil. *Ecological Economics*, 167. <https://doi.org/10.1016/j.ecolecon.2019.106439>
- Maga, A. (2022, September 17). Nigeria Menjajaki Potensi Kerja Sama Alat Pertahanan dengan Indonesia. Retrieved July 21, 2023, from <https://makassar.antaraneews.com/berita/425441/nigeria-menjajaki-potensi-kerja-sama-alat-pertahanan-dengan-indonesia>
- Maksum, I. R., Rahayu, A. Y. S., & Kusumawardhani, D. (2020). A Social Enterprise Approach to Empowering Micro, Small and Medium Enterprises (SMEs) in Indonesia. *Journal of Open Innovation: Technology, Market, and Complexity*, 6(3). <https://doi.org/10.3390/joitmc6030050>
- Purnomo, S., Rahayu, E. S., Riani, A. L., Suminah, & Udin. (2020). Empowerment Model for Sustainable Tourism Village in an Emerging Country. *Journal of Asian Finance, Economics and Business*, 7(2), 261–270. <https://doi.org/10.13106/jafeb.2020.vol7.no2.261>
- Regulation of the Minister of Defense of the Republic of Indonesia Number 19 of 2012 concerning the Alignment Policy for Minimum Essential Force Main Components.*
- Republic of Indonesia Government Regulation Number 29 of 2018 concerning Industrial Empowerment.*
- Setiadji, A. (2020). *Arah Kemandirian Industri Pertahanan*. Jakarta: Universitas Pertahanan Republik Indonesia.
- Sudarwono, E. T. (2020). Pokok-Pokok Pikiran mengenai Pembangunan Kemandirian Industri Pertahanan Indonesia dalam Undang-Undang Nomor 16 Tahun 2012 tentang Industri Pertahanan. *Ius Constituendum*, 5(1), 111–139. <http://dx.doi.org/10.26623/jic.v5i1.1759>
- Suharyo, O. (2021). *Buku Penguatan Peran Perguruan Tinggi dalam Menyiapkan Sumber Daya Manusia pada Riset Teknologi Alutsista guna Mendukung Kemandirian Industri Pertahanan Menghadapi Revolusi Industri 4.0*. Malang: Madza Media.
- Sumadinata, R. W. S., Achmad, W., & Riyadi, S. F. (2022). Indonesian Border Defense Policy: A Case Study on the Interoperability of the Joint Regional Defense Command. *Central European Management Journal*, 30(4), 886–895. <https://doi.org/10.57030/23364890.cemj.30.4.87>
- Sutrisno, Cakranegara, P. A., Hendrayani, E., Jokhu, J. R., & Yusuf, M. (2022). Positioning Women Entrepreneurs in Small and Medium Enterprises in Indonesia – Food & Beverage Sector. *Enrichment: Journal of Management*, 12(5), 3873–3881.
- Wisedsin, T., Jermisittiparsert, K., Thitart, P., & Aunyawong, W. (2020). Role of Advanced Manufacturing Technology, Human Capital and Employee Empowerment to Enhance Manufacturing Industry Supply Chain Performance. *International Journal of Supply Chain Management*, 9(2), 411–418. <https://doi.org/10.59160/ijscm.v9i2.4617>