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Sustainable Business Practices in the Defense Industry : Between Efficiency and National Security

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ABSTRACT

Defense industry own role strategic in guard state sovereignty, but also faces challenge For apply practice business sustainable. Research This aiming For analyze balance between efficiency business and security national in implementation of sustainable business practices in the sector defense. With use approach qualitative, research This to study what is sustainability strategy can applied without sacrifice interest strategic state. Research results show that Implementation practice business sustainable in industry defense bring various benefits, such as efficiency cost, increase Power competition, innovation technology, and reduction impact environment. Implementation This allow industry defense operate more efficient through innovation technology friendly environment, diversification energy, and optimization chain supply. In addition, sustainability also helps industry face challenge geopolitics, regulation environment, and global market changes. Impact social seen from creation field Work quality as well as improvement welfare through development technology green and collaboration academic. However, there are necessary risks anticipated, such as dependence on technology foreign, threat cyber, and potential decrease readiness military consequence efficiency excessive. Therefore that, balance between efficiency business and needs strategic defense become crucial. Government and stakeholders interest need ensure that the sustainability strategy is implemented still support resilience national, guard independence technology, and improve readiness military in face future threats.

Keywords:
Sustainable business practices, industry defense, efficiency, security national, sustainability.

INTRODUCTION

Dynamics global geopolitics reflects change constellation strength between countries influenced by factors economics, politics, technology, and military. The shift This can caused by regional conflicts, competition economy, as well as change in alliances and defense strategies (Murdani, 2015). In the context of this, industry defense own an increasing role strategic, because every country tries increase capability his military For face growing threats. Global uncertainties, such as increasing tensions in the region certain or emergence threat asymmetric like war cyber and terrorism, encouraging government For allocate budget more big for strengthening industry defense they (Rudiana et al., 2021).

Improvement expenditure defense often associated with with development technology military new aiming For maintain superiority strategic. Innovation in intelligence artificial, system weaponry automatic, and technology defense increasingly digital based become priority for many countries (Monratama, 2014). Investment in sector This No only strengthen ability defense national, but also contributes to growth economy through creation field work and development industry based on technology high. However, this this can also be trigger race weapons in between competing countries, which in turn can increase tension geopolitics and complicating diplomatic relations (Ramadan, 2023).

On the contrary, strengthening industry defense can also become changing factors balance global power. Countries that are able to develop and export technology military advanced own influence more big in connection international, good through Work The same defense and also policy overseas based strength military (Arief et al., 2022). The existence of industry strong defense can increase Power bid a country on the global stage, but on the other hand it can also trigger reaction from other countries who feel threatened by increasing capability military a party Kristiyanto et al., 2022).

In the middle dynamics geopolitics that continue changed, the world has also experience development significant in practice business sustainable. The concept of sustainable business practices is increasingly get attention, no only in sector commercial but also in industry strategic like defense (Sibarani et al., 2022). Many countries and companies start realize that sustainability No only about not quite enough answer environment, but also related with efficiency operational, resilience economy, and stability term long. The defense industry, which has been This known as sector with footsteps carbon high and dependency on sources Power great nature, now face demands For adopt more practice friendly environment and sustainability (Novrianto et al., 2014).

In context industry defense, implementation business sustainable covers various aspects, start from efficiency energy in production weapons and vehicles military, use of environmentally friendly materials environment, up to management waste industry in a way responsible answer (Mayestika) et al., 2022). In addition, innovation in technology green, like development material burn alternatives and systems more logistics efficient, start applied use reduce impact environment without sacrifice capability defense. Steps This No only contribute to sustainability environment, but also improve efficiency cost and power competition industry defense in the global market (Dwiguna) et al., 2022).

More far, practice business sustainable in industry defense also includes aspect social and better governance good. Companies in the sector This the more sued For apply Environmental, Social, and Governance (ESG) principles in its operations (Khairuman et al., 2023). Transparency in chain supply, policy fair employment, and compliance to regulation international become factor important in ensure that strengthening industry defense No only profit oriented economy and security national, but also harmonious with values global sustainability (Gofur & Soediantono, 2022).

With the more strong awareness will importance business sustainable, many countries are starting to balancing between need defense and sustainability. Policies that integrate efficiency energy, innovation green, and responsible answer social in industry defense can become solution strategic For face challenge geopolitics at a time guard stability long term (Hanafi & Soediantono, 2022) Therefore that, the future industry defense No only determined by how much advanced technology military developed, but also by how much Good sector

This capable adapt with demands sustainability in an increasingly global world complex and interrelated connected (Alfianzi, 2022).

The problem between efficiency business and security national in industry defense lies in balance between subtraction cost and power defense. Efficiency business demand savings source more power and technology economical costs, while security national need resilience industry, independence production, and data protection (Sahid, 2022). Dependence on the supply chain global supply can reduce costs, but also risks If happen conflict or embargo. In addition, the implementation of technology green must done without reduce effectiveness defense. Therefore that, a strategy that combines efficiency and safety needed for the industry defense still strong, innovative and independent (Febrianto & Soediantono, 2022).

Study This aiming For analyze how sustainable business practices can applied in industry defense without sacrifice security national, as well as find a balancing strategy efficiency business with resilience defense. Through study this, it is expected can obtained outlook about policies and innovations that enable industry defense still competitive, independent and sustainable in the midst of dynamics global geopolitics. Benefits of research This covers contribution for maker policy in to design supporting regulations efficiency without reduce state sovereignty, as well as for perpetrator industry For develop technology and practice more business friendly environmental and economic. In addition, research this can also be become reference academic in understand role sustainability in sector strategic like defense.

METHOD

Study This use method qualitative with approach descriptive For analyze implementation of sustainable business practices in industry defense as well as the impact to efficiency business and security national. Data collected through studies literature that includes journal academic, report industry, regulation government, as well as document related policy defense and sustainability (Sugiyono, 2016). In addition, interviews deep with expert industry defense, economist, and maker policy can used For enrich analysis. The data obtained will analyzed in a way qualitative with approach thematic use identify patterns, challenges, and opportunities in implementation sustainability in the sector defense. With method this, research expected can give deep understanding about How industry defense can integrate efficiency business without sacrifice aspect strategic security national.

RESULT AND DISCUSSION

Practice Business Sustainable That Has Been Applied In The Defense Industry

For optimize efficiency without sacrifice security national in industry defense, implementation culture improvement and learning sustainable become key main. Defense industry must Keep going innovate in increase efficiency operational, good through use technology advanced, optimization chain supply, as well as subtraction waste and consumption energy (Yuswantoro et al., 2022). With apply continuous improvement concept, every process in industry defense can evaluated and refined in a way sustainable, so that No only increase efficiency cost but also strengthens resilience industry in face challenge geopolitics and economics (Fanulene & Soediantono, 2022).

In addition, because technology military develop rapid, industry defense need connected with practice business best, including practice business sustainable. This is covers

use of friendly materials environment, development energy renewable For operational military, as well as subtraction emission carbon in the production process (Irwanto et al., 2022). Many countries are starting to adopt approach This with create system more defense economical energy and reduce dependence on sources difficult power updated. With integrate principle sustainability, industry defense No only contribute to efficiency business but also build system more defense flexible, independent and sustainable in Long term (Lantemona et al., 2024).

More far, sustainability in industry defense also includes aspect social and good governance. Implementation Environmental, Social, and Governance (ESG) standards in industry defense can increase transparency and accountability company, which ultimately strengthen trust public and partners strategic. With adopting a business model sustainable, industry defense can still competitive in the global market at the same time ensure that need security national still become priority main. Therefore that, synergy between innovation technology, efficiency business, and sustainability must become focus main in development industry modern defense.

Practice business sustainable applied in industry defense includes:

1. Improvement efficiency cost

Improvement efficiency cost in industry defense can achieved through collaboration strategic with various stakeholders interests, including company defense other, institutions research, and government. With share burden financial in research and development (R&D), company can reduce cost production, speed up innovation technology, as well as increase Power competition without sacrifice quality and durability Product. Work The same This also allows for the transfer of technology and resources. power, so that development defense equipment and systems defense become more effective and efficient. In addition, the joint development and joint production models can reduce risk failure project at a time ensure that technology produced in accordance with need defense national. With this strategy, the industry defense can still competitive in a way economy without put aside aspect sustainability and security of the country.

2. Improvement Power competition

Improvement Power competition in industry defense can achieved with expand market reach through global promotional strategies and diversification product. With utilise exhibition defense international, partnership strategic, as well as digital platforms, companies can introduce technology and innovation they to a bigger market wide, including countries in need modernization system defense. In addition, certification international and compliance to global standards, such as NATO Standards or ISO, can increase credibility and trust customer to the products offered. With develop superiority competitive through innovation, efficiency production, as well as service finished sell quality, company defense can maintain market share and compete in a way sustainable in an increasingly global industry competitive.

3. Improvement innovation

Improvement innovation in industry defense can achieved through collaboration between company, institution research, and government For create more technology sophisticated, efficient and quality high. With build ecosystem strong innovation, company can access source more power and expertise wide, allowing development product more defense adaptive to modern threats. For example, work The same in study intelligence artificial intelligence (AI), system autonomous, and new materials can produce technology

more military effective and friendly environment. In addition, synergy between sector public and private enable technology transfer and acceleration production without sacrifice aspect security national. With approach this, industry defense No only capable fulfil need domestic but also has the opportunity become player major in the global market through sustainable innovation.

4. Improvement use technology clean

Improvement use technology clean in industry defense become step important For reduce impact environment without sacrifice effectiveness operational. The company can integrating biofuels, electrification, and advanced materials in development defense equipment use increase efficiency energy and reduce dependence on materials burn fossils. The use of biofuels in vehicle military and aircraft combat, for example, can reduce emission carbon at a time increase independence energy. In addition, the application of system propulsi electric and hybrid on ships war as well as armored vehicles allow more operational silent and economical energy. While that, the development of advanced materials, such as composite light and nanotechnology, can increase Power durability and efficiency without add burden weight on the vehicle combat. With adopt technology clean, industry defense can create system more weaponry friendly environmental, efficient, and stable capable fulfil need strategic defense national.

5. Improvement use non- lethal product

Improvement use non- lethal product in industry defense be one of step going to sustainability and compliance to law humanitarian international. Companies can develop non-lethal weapons like weapon shock electric (tasers), bullets rubber, device acoustic distance far (LRAD), as well as system control mass based on technology light and waves Micro. Products This designed For disable or control the target without cause injury permanent or death, so that more in accordance For operation enforcement law, control riots, and protection facility strategic. In addition, innovation in non- lethal technology can also help minimize impact social and political from operation military, especially in demanding situation de-escalation approach. With Keep going develop a better alternative safe and effective, industry defense can contribute to greater global security humanist at a time still maintain efficiency and effectiveness its operation..

6. Improvement precision product

Improvement precision product in industry defense become key For reduce damage collateral, increase effectiveness operations, and optimize use source power. With utilise intelligence artificial (AI), machine learning, and systems navigation sophisticated, company can develop weapon precision tall like missile guided, autonomous drones, as well as system artillery with accurate targets. Technology This allow more attacks appropriate target, reduce risk of civilian casualties and damage infrastructure that is not necessary. In addition, advanced sensor integration and real-time data analysis enable detection more threats fast and more responsive effective, improve endurance and power competition industry defense. With Keep going innovate in development product precise high, company can ensure that system the resulting defense No only efficient and reliable but also in harmony with principle sustainability and ethics in operation modern military.

7. Improvement methodology and strategy

Improvement methodology and strategy in industry defense is step crucial For ensure efficiency, effectiveness and adaptability in face dynamics a continuing global threat develop.

The company can invest time and resources Power in production strategy development, testing, and implementation technology latest use increase endurance and power compete. With apply agile manufacturing and lean production methods, companies can minimize waste, optimize chain supply, and speed up cycle innovation. In addition, the approach based on big data and artificial intelligence (AI) in analysis operational can increase prediction threats and taking decision strategic. With Keep going renew methodology and business strategy, industry defense can produce more solutions sophisticated, sustainable, and capable fulfil demands security national and global markets more optimal.

Impact practice business sustainable in the Defense Industry and National Security

Practice business sustainable in industry defense and security national own various impact positive to efficiency sector This. Here a number of the impact:

1. Efficiency Operations and Management Resource

Implementation principle sustainability in industry defense and security national contribute significant to efficiency operational as well as management source power. One of the step main is optimization chain supply with use material more standard friendly environment and can recycled repeat. In production tool defense like vehicle combat, aircraft, and weapons, the use of more materials light but still strong, like alloy metal based on recycle repeat, can reduce consumption energy in the manufacturing process as well as increase efficiency material burn in its operations. In addition, the implementation system production based on technology green, like manufacturing additive (3D printing) and automation smart, enabling industry for reduce waste production, saving time workmanship, as well as press cost operational term long.

Apart from the aspects production, efficiency in management source power also includes utilization more energy clean and sustainable. Installation of solar panels at the facility defense, use vehicle military based on energy renewable, as well as system management more energy intelligent can reduce dependence on materials burn fossils and increase independence energy. With apply draft economy circular, industry defense can extend the service life equipment through system more maintenance and repair effective, and recycling repeat components that have been No used become material standard new. Steps This No only reduce impact environment but also improve Power durability and efficiency operational industry defense in support security national.

2. Innovation Technology and Excellence Competitive

Innovation technology in industry sustainability - oriented defense push development more systems and equipment efficient as well as friendly environment. One of the example real is development vehicle military that uses material burn alternatives, such as biofuels or electricity, which can reduce emission carbon at a time save cost operational term long. In addition, technology like material composite light However strong used in making aircraft combat and ship war for increase efficiency material burn without sacrifice Power durability and performance. With existence innovation this, industry defense No only increase resilience energy and efficiency operational but also reduces dependence to source limited and risky power fluctuation price.

apart from aspect equipment, innovation based on sustainability is also visible in system operational and infrastructure defense. Use digital technologies such as intelligence artificial intelligence (AI) and the Internet of Things (IoT) in maintenance predictive allow system weapons and vehicles combat for checked and repaired before happen failure, reduce time

stop operational and costs maintenance. In addition, development system defense based on energy renewable, such as radar and powered sensors solar or microgrid military that can stand alone, increasingly increase resilience national in face threat. With Keep going invest in innovation sustainable, industry defense can create system more security effective, flexible and powerful competition tall in term long.

3. Security and Industrial Independence

Security energy and independence industry defense become the more important in an era of global uncertainty, where access to source Power energy can become factor determinant in stability national. Implementation business sustainable in sector This contribute to diversification source energy with utilise technology friendly environment, such as biofuels, hydrogen, and energy solar, in operational military. For example, some countries have develop boat war and vehicles combat based on hybrid or electricity that reduces dependence on materials burn fossil as well as increase efficiency energy. With reduce consumption material burn conventional, industrial defense No only press cost logistics but also strengthens independence strategic in guard security national without must too depend on imports energy from other countries.

Besides efficiency energy, application principle sustainability in industry defense also contributes to development more infrastructure independent and resilient to disturbance external. For example, development base military equipped with system generator electricity power solar or microgrid based on energy renewable allow operation still walk although happen termination supply energy from network main. This is increase resilience defense to threat cyber or attack to infrastructure energy. In addition, with push investment in research and development technology energy alternative, industry defense can create solution that does not only beneficial for sector military but also for sector civil, such as transportation and industry manufacturing, so that create positive domino effect for economy national in a way overall.

4. Management Risk and Stability Long- term

Management risk in industry defense based sustainability help increase stability operational and resilience term long to various global challenges. With apply principle sustainability, industry defense can reduce dependence on sources limited and risky power fluctuation price, such as material burn fossils and metals rare. In addition, the regulation an increasingly environment strict in various countries encourage industry This For adapt with higher standards friendly environment use avoid sanctions or obstacle trading international. With develop appropriate technology with global regulation, company industry defense can maintain access to the international market and increase Power the competition in trading tool defense.

Apart from facing risk environment and regulation, business sustainable in industry defense also helps manage risk geopolitics and instability economy. With adopt a diversification strategy in chain supply and sources Power energy, industry defense can reduce risk disturbance supply consequence conflict international or trade embargo. For example, the use of recycled materials repeat and energy renewable allow production still walk although happen global crisis that limits access to source Power conventional. In addition, the application of system more production flexible and based digital technologies, such as manufacturing additive (3D printing), can increase ability industry For adapt to change market demand without experience surge cost significant production. With approach

this, industry defense can ensure sustainability its operation as well as increase stability in support security national..

5. Impact Social and Industrial Image Enhancement

Impact social from practice business sustainable in industry defense is very significant, especially in increase image industry this is in the eyes community and stakeholders interests. During this, industry defense often associated with with impact negative environmental and social factors, such as exploitation source Power nature and pollution consequence production tool combat. However, with apply principle sustainability, industry This can show his commitment to not quite enough answer social and ethical more business good. For example, the development program technology friendly environment and initiatives For reduce footsteps carbon in production tool defense can increase perception positive public to sector This. In addition, transparency in chain supply as well as compliance to standard ethics international also helps increase trust public and work The same with partner countries in procurement tool defense.

In addition to improving image industry, business sustainable also contributes to the improvement welfare social through creation field more work quality and future - oriented. With development technology green and digital in industry defense, appears need will power Work with expertise in the field energy renewable, manufacturing smart, and intelligence artificial. This is push company For invest in training power work and education programs based on sustainability, so that create source Power more human Ready face challenge industry in the future. In addition, partnerships with institution academic and institutional research in develop technology more defense friendly the environment also accelerates innovation and provide benefit for sector civil, such as implementation technology military in system transportation or management disaster. With Thus, business sustainable in industry defense No only impact on efficiency and power competitiveness, but also on development more social and economic inclusive.

In general overall, implementation business sustainable in industry defense and security national No only increase efficiency operational but also strengthens Power competitiveness and resilience industry in term long. With adopt technology friendly environment, optimization chain supply, and diversification source energy, industry defense can reduce dependence on sources Power limited as well as press cost operational. Innovation in utilization energy renewable and recycled materials Restart is also possible industry This For operate with more efficient and appropriate with increasingly global regulations strict. In addition, the use of intelligence artificial and system digital manufacturing delivers flexibility and resilience to change market dynamics and geopolitics, ensuring that sector This still adaptive in face global challenges.

More from just efficiency and power competition, implementation principle sustainability also contributes to the aspect more social and environmental wide. With create field more work quality and based future technology, industry defense can push growth economy as well as increase welfare community. Collaboration with institution academic and institutional research in develop technology green also speeds up innovation that is not only beneficial for sector defense but also for industry civil. In addition, with strengthen transparency and accountability in chain supply, industry This can build trust public as well as expand Work The same with partner countries. Therefore that, business sustainable in industry defense and security national No only become needs, but also a crucial strategy in

create system more defense efficient, resilient and responsible answer to environment and society.

CONCLUSION

Implementation practice business sustainable in industry defense give various benefits, such as improvement efficiency cost, power global competitiveness, innovation technology, as well as subtraction impact environment. implementation business sustainable in industry defense and security national give wide range of benefits, both from aspect efficiency operational, power competition industry, as well as resilience term long. Innovation technology friendly environment, diversification source energy, and optimization chain supply allow industry defense for operate more efficient at a time reduce dependence on sources limited power. In addition, the application of principle sustainability also helps industry This face challenge geopolitics, regulation environment, as well as change global market dynamics. Impact socially significant, with creation field Work quality and improvement welfare public through development technology green and collaboration with institution academic. However, on the other hand, there are risk to security national needs anticipated, such as dependence on technology foreign, threat cyber, and potential decrease readiness military consequence efficiency excessive. Therefore that, is needed balance between efficiency business and needs strategic defense for security national still awake without sacrifice sustainability industry. Government and stakeholders interest industry defense must ensure that the sustainability strategy is implemented still support resilience national, guard independence technology, and improve readiness military in face various future threats.

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