

Eco-Innovative Military Procurement: An Alternative Futures Approach

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Abstract. *Military organizations must develop their capabilities to be innovative and achieve eco-innovative goals. A literature review was used as the research method to understand better how this can be done. Our approach combines existing literature from various sources to uncover new insights for military leaders. This study examines specific military literature to explore the different aspects of eco-innovation capability development within the Army. The findings can help military organizations enhance their command and supply capabilities and achieve success in their respective operational fields. We applied an alternative futures analysis to the hierarchy process to thoroughly examine the eco-innovation issue. This tool proved instrumental in formulating an initial scenario to enhance the considered capability. The resulting scenarios are critically evaluated to provide conclusive insights and address the research queries. The critical aspects synthesized for eco-leadership implementation in a military organization will be an essential extension for enabling future iterations of eco-innovation capability development processes.*

Keywords: eco-innovation, eco-leadership, military eco-leaders, development, capability.

Introduction

This section discusses the increasing importance of green practices in military operations and the need for eco-innovative implementation methods. To clearly state the purpose of the research, we aim to obtain an examination of the effectiveness, challenges, and benefits of eco-innovative procurement in the military context.

The EEAS roadmap advises EU Member States to share best practices and join existing platforms, such as EDA's Energy and Environment Working Group (EUR-Lex - 52023JC0019 - EN - EUR-Lex, n.d.). It suggests more substantial military involvement in conserving biodiversity and including environmental assessments in procurement and capability development processes. The roadmap also highlights the need to build commitment and awareness and improve data collection and analysis by providing national defense-related energy data.

The military has been observed to be hesitant in sharing their environmental policies and reporting, citing fears that it might lead to public challenges and demands for environmental performance reporting. However, including quantified environmental data that highlights

environmental, operational, and cost benefits can be advantageous for the military to make data-driven decisions.

EU policymakers have proposed a minimum standard for military environmental reporting to guarantee that the reports are pertinent. This standard should encompass environmental themes, essential performance metrics, obstacles, practical deadlines, and specifications for impartial verification. This research employs the term "capability" to encompass all the components linked to the innovative context more inclusively.

Military eco-leadership literature often lacks information about why sustainable initiatives fail. Research suggests the need to understand better eco-innovative procurement, scaling, and long-term effects. An interdisciplinary approach to scaling can provide valuable insights. It is essential to understand the impact of public procurement on eco-innovation, which is a significant gap in the field (Merisalo et al., 2023). To improve eco-innovative procurement, they identified six areas for further research: proactive dissemination of innovations, long-term impacts, knowledge transfer, interdisciplinary perspective, impact on innovation, and transformative policy.

The question guiding this study is: What are the critical aspects of eco-innovative capability development for military procurement and supply? This inquiry evaluates the feasibility of applying the eco-innovation capability development process, typically utilized in military settings, to a system synthesizing military procurement. This investigation explores this prospect in a few hypothetical scenarios where the military assumes responsibility for initiating or altering eco-innovative necessities.

Literature review

The success of highly functional organizations is attributed to their ability to cultivate a culture that prioritizes employee engagement. Research has shown that the engagement of individuals in establishing analytical, measurable objectives and managerial processes can significantly enhance their job performance (Khalid & Qureshi, 2007). Therefore, it is beneficial to consider providing opportunities for employees to perform actively in these processes.

The most recent school of thought in leadership theory emphasizes the critical competencies influential leaders require. Leadership skills can be acquired through learning, indicating that leaders are developed rather than possessed from birth (Turner & Muller, 2005). By considering prior theories on traits, behaviors, and emotional intelligence as competencies, specific competency profiles suitable for modern leaders in varying contexts are identified. Trivellas notes that leadership skill sets contribute to success in specific situations (Trivellas & Drimoussis, 2013), with soft leadership factors often being the most crucial attributes of influential leaders. Also, competency is currently defined as a quality, ability, skill, or trait connected to high job performance. Examples of competencies include analytical thinking, problem-solving, and leadership (Micik, 2016).

A recent study found a mere 1% increase in global resource efficiency over the past 30 years despite efforts by the EU and UN (Clodnițchi & Tudorache, 2022). Resource productivity correlates with carbon footprint and negatively correlates with GHG emissions. The study suggests exploring the link between its findings and eco-innovative procurement practices for future research. It provides an overview of the current situation and can guide future research to achieve eco-innovation goals.

A Portuguese study on green purchase behavior found that ecological concern, environmental attitude, behavior, and purchase intention are significant predictors. Fontes et al.

suggest that green brands focus on individuals already taking environmental actions (Fontes et al., 2021). Women's green purchase behavior is highly influenced by purchase intention and environmental behavior. The study recommends exploring the demographics and motives of green consumers in different cultural contexts to understand their behavior better. Cross-cultural studies provide valuable insights for sustainable and green marketing strategies.

The integration of military capabilities modeling into the development process has been driven by various stakeholders having different needs. These catalysts for change have had different impacts, ultimately leading to the integration of modeling into national security concerns, the complexity of tasks, the rapid pace of technological advancements, collaborative efforts, and both local and international cooperation.

To comprehend the intricate relationship between management, military culture, and positive outcomes in organizational performance, it is crucial to implement innovative change management (Pongsakorn et al., 2022). It is imperative to impart knowledge to military leaders and top management regarding the interplay between leadership, an organization's sustainable culture, and performance outcomes. This approach also highlights the importance of military leaders, potential scenarios, and the eco-innovative network, as literature is absent on this subject, as well as how to effectively manage sustainability in the military.

Engaging in ecological behavior means taking actions that protect the environment and promote its health. Examples of this mindset include reducing waste production and energy consumption (Steg & Vlek, 2009). Some researchers suggest that ecological behavior involves doing good and avoiding harmful actions (Cushman-Roisin, 2012). Creating an eco-friendly office requires considering various factors, including energy and water conservation, office design, technology, human resources management, work systems, and waste management (Pasharibu et al., 2019).

Previous studies have shown that waste management significantly impacts environmental behavior in the workplace (Luu, 2020). Ramus and Killmer proposed a perspective on pro-environmental behavior that remains relevant today. They identified three dimensions of pro-environmental behavior (Ramus & Killmer, 2007): pro-social nature, discretionary actions, and demonstrating environmental protection beyond job requirements.

In military operations, "eco-innovation capability" refers to the greening resources, equipment, and skills available to execute a task or function successfully. These tasks may include accomplishing a mission, achieving a strategic objective, or responding to a threat or challenge. An eco-innovative military capability will be crucial for ensuring national security and achieving success in combat operations (Ross, 2016). This process entails integrating various factors, such as human resources, technology, logistics, and intelligence, to reach the desired outcome. After conducting a thorough analysis, we have identified the necessary capability requirements and the current capability gaps. Our commitment is to develop and implement practical solutions to address the eco-innovation gaps and fulfill the identified requirements. This includes both material and non-material components.

Military eco-leaders refer to individuals within the military or defense sector who have taken a proactive and influential role in promoting and implementing environmentally sustainable practices and policies. These leaders recognize the importance of balancing military readiness and operations with environmental responsibility and sustainability. Military eco-leaders can have a significant impact on reducing the environmental footprint of military activities and contributing to broader sustainability goals.

Sustainable procurement positively influences environmental, economic, and social performance in Pakistan, as does sustainable packaging and distribution. Eco-innovation acts as a catalyst, while innovative sustainability-based practices offer operational benefits. A study suggests that eco-innovation mediates the relationship between sustainable procurement and operational performance (Bhatti et al., 2023). Sustainable procurement, packaging, and distribution positively impact environmental, economic, social, and operational performance. Reducing negative environmental impact is possible when manufacturers enhance their knowledge of eco-friendly practices. Collaborations with suppliers yield positive environmental, economic, and societal outcomes (Huo et al., 2014).

Military eco-leaders are crucial in aligning military operations with broader environmental and all sustainability objectives. Their efforts contribute to reducing the environmental impact of military activities, setting positive examples for other organizations, and inspiring broader societal changes toward a more sustainable future (Bădilă & Cioca, 2023). Key characteristics and actions of military eco-leaders may include features presented in Table 1.

Table 1. Key actions of military eco-leaders

Characteristic	Description of eco-innovative actions
Advocacy for Sustainability	Promote sustainability principles within the military establishment. Emphasize environmental stewardship. Advocate for energy efficiency and resource conservation.
Innovative Practices	Promote and implement innovative practices to reduce the environmental impact of military operations. Adopt eco-friendly technologies. Embrace renewable energy sources. Advocate for sustainable procurement methods.
Education and Training	Prioritize education on sustainability for military personnel. Provide training on eco-friendly practices. Integrate sustainability into military training and operations.
Policy Development	Work on developing and influencing policies that support sustainability goals in the military. Push for including sustainability metrics and targets in military planning and reporting.
Reducing Carbon Footprint	Implement measures to reduce military carbon footprint. Transition to cleaner energy sources. Improve energy efficiency. Manage waste responsibly.
Environmental Compliance	Ensure compliance with environmental regulations. Strive to exceed regulatory requirements. Prevent pollution and protect natural habitats.
Partnerships and Collaboration	Foster governmental and non-governmental collaboration, including with research organizations, and private entities. Contribute with the knowledge and best practices to achieve eco-innovative solutions.
Public Outreach	Engage with the public to communicate the military's commitment to environmental responsibility. Participate in community outreach programs and environmental education initiatives.
Leadership by Example	Lead by example by demonstrating a commitment to sustainability in actions and decisions.
Monitoring and Reporting	Establish mechanisms to monitor and report on environmental performance. Track progress toward sustainability goals and ensure transparency in reporting.

Source: Authors' own research.

Adopting eco-innovative strategies requires a significant shift in the working methods of a military unit. This involves accepting new types of tasks and responsibilities for the employees.

During the implementation of these strategies, various factors that promote innovation and hurdles of resistance are likely to be encountered.

Military procurement practices

The practice involves reaching specific points, such as assessing the structure frame, the use of resources, the results, and the exploitation risk. European strategy priorities include promoting efficient resource use and waste minimization (European Commission, 2020).

The annual financial statements present policies reflected by financial indicators that ensure comparability over time. By source of income, the accounting governance is intended for various personnel wages, administrative payments, social assistance, or other non-financial assets.

A correlation is being made with the expected revenues and expenses during the year. Emphasis is placed on the permanent collaboration between the internal structures to use the revenues economically. The command personnel are designed to bear the responsibility of transforming the procurement into results.

The primary place is occupied by those employees designated to carry out the procurement process under economy. Thus, the impact of procurement is on harmonizing modern concepts and principles of sustainable development (National Agency for Public Procurement, 2019).

The required resources are dimensioned according to their complexity, applicability, difficulty of implementation, and the training of the specialists. After exploring existing procurement practices within the military sector, we noticed some factors driving the adoption of eco-innovative practices, as seen in Table 2.

Table 2. Military common procurement principles and processes

<i>Common practice</i>	Explanation of the procurement process
<i>Needs Assessment</i>	The procurement process typically begins with a needs assessment, where military leaders and experts identify the equipment, technology, or services required to meet the military's strategic objectives. This assessment considers mission requirements, threat assessments, and budget constraints.
<i>Budgeting and Funding</i>	Military procurement relies on budget allocations from the government or defense department. Funding is allocated based on the identified needs and priorities.
<i>Request for Proposals (RFP)</i>	A formal RFP is often issued when a specific procurement requirement is identified. The RFP outlines the project's requirements, evaluation criteria, timelines, and terms and conditions. It is available to potential suppliers, who can then submit their proposals.
<i>Supplier Selection</i>	The military evaluates supplier proposals based on various criteria, including cost, technical capabilities, past performance, and compliance with security and quality standards. The selection process may involve a series of reviews, negotiations, and assessments.
<i>Contract Negotiation</i>	Once a supplier is selected, contract negotiations take place. These negotiations cover pricing, delivery schedules, warranties, intellectual property rights, and other contractual terms. The goal is establishing a mutually beneficial agreement that meets both parties' needs.
<i>Quality Assurance and Testing</i>	The military often requires rigorous quality assurance and testing procedures to ensure that procured equipment or technology meets the necessary performance, reliability, and safety standards. This can involve extensive testing and evaluation by military experts.
<i>Logistics and Supply Chain Management</i>	The military sector heavily relies on efficient logistics and supply chain management, which are crucial for mission success and operational effectiveness. This includes procuring, transporting, storing, and distributing equipment, spare parts, and consumables to support ongoing operations.
<i>Compliance and Regulations</i>	Military procurement is subject to strict regulations and compliance requirements. These may include export controls, security clearances, and adherence to international agreements and treaties.

<i>Performance Monitoring</i>	After procurement, the military monitors supplier performance to ensure that the contracted products or services meet their requirements. This can involve ongoing assessments and inspections.
<i>Contract Modifications</i>	Changes to the original contract may sometimes be necessary due to evolving military needs or unforeseen challenges. Contract modifications are typically negotiated and documented.
<i>Disposal and Decommissioning</i>	When equipment ends its operational life, the military must manage its disposal or decommissioning. It often involves considering environmental impact and implementing strict security protocols to safeguard sensitive technology.
<i>Transparency and Accountability</i>	Transparency and accountability are crucial in military procurement to prevent corruption and ensure that taxpayer funds are used efficiently. Audits and oversight mechanisms may be in place to review procurement activities.
<i>International Collaboration</i>	Many military organizations collaborate with foreign counterparts on procurement projects, which can involve joint development and production efforts to share costs and leverage each other's expertise.

Source: Authors' own research.

It is essential to prioritize eco-innovative support requests to achieve sustainable goals by developing military-technical systems authorized for implementation under NATO's four pillars of transformation (Neag & Simion, 2015). These pillars are necessary for implementing eco-friendly projects based on research and practice, doctrine and conformance, visionary expansion and testing, examination of acquired knowledge, and teaching and instruction.

In the following part of the section, we define the footprints of eco-innovative procurement in promoting military sustainability. The paper addresses guidance on evaluating eco-innovative requirements and assessing programmatic scenario risks. It helps identify the crucial factors that constitute military capability and develop a comprehensive capability package to meet relevant dimensional requirements. We strive to create a positive impact by closely aligning security cooperation investments with green priorities transcribed from national defense strategic directions.

The concept of performance represents a combination of two essential elements, namely efficiency and effectiveness. The enhancement of performance can be achieved through training, which is a crucial factor in augmenting the abilities of individuals or a group (Gikonyo, 2017).

Recently, research on sustainability-driven innovation (Schiederig et al., 2012) has gained momentum, focusing on a broader range of environmental, social, and economic aspects (Halati & He, 2018). As we continue to focus on ecological factors in innovation research, our understanding of eco-innovation has become more extensive. Previous research studies have examined various dimensions of eco-innovation. Unfortunately, these dimensions are not adequate when it comes to examining the connection between enhancing eco-innovation capabilities and procurement-driven military leadership practices. Some relevant aspects of eco-innovation capability development in the military can be observed in Figure 1.

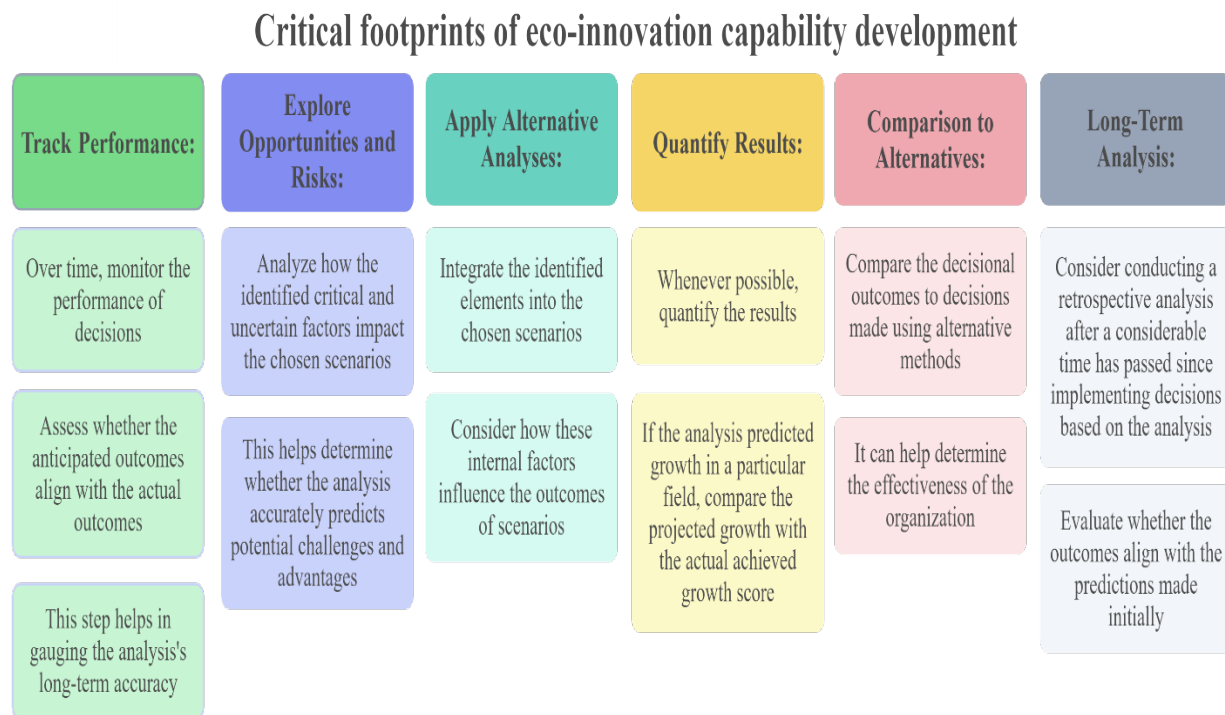


Figure 1. Critical footprints of eco-innovation capability development

Source: Authors' own contribution.

Enhancing the Army's receptiveness of capability-building can improve security cooperation procurement. This will enable eco-leaders to make informed decisions when allocating resources, authorities, and strategies to achieve their objectives more effectively. Our research hypothesis is that the Romanian Army can absorb the risks associated with a potential scenario in developing eco-innovative procurement methods.

Methodology

This section offers a narrative that presents the theme, supported by examples from the data. We provide an interpretation of scenarios and their implications for our research.

Considering potential references made to antecedent research within the preceding section, we shall elaborate upon the methodology employed for the processing of statistical data on the chosen scenarios in the ensuing section.

Steps for researching future scenarios

To conduct an effective analysis of data or develop alternative future scenarios on military eco-leadership procurement, it is imperative to follow a structured approach. The following steps should be taken into consideration for an in-depth analysis:

- Define the research objectives and scope in a clear and concise manner.
- Identify relevant and reliable data sources to support the research objectives.
- Collect and compile the data in a systematic manner.
- Clean and approve the collected information to guarantee exactness and consistency.

- Select appropriate data analysis techniques based on the research objectives and the nature of the data.
 - Employ scenario planning or forecasting methodologies to develop alternative future scenarios.
 - Engage with stakeholders to gain insights and perspectives on the research findings.
 - Conduct sensitivity analysis to understand the impact of assumptions and uncertainties on the research outcomes.
 - Clarify the results and draw conclusions based on the inquire about research intentions.
 - Document and report the research process in a detailed and structured manner.
- By following these phases, research contributes to advancing knowledge and practice in this critical domain.

Research Scope and data collection

Using Alternative Futures Approach, we want to articulate the research issue related to military eco-leadership procurement that is under current exploration. The query is how military eco-leadership procurement can evolve to enhance environmental sustainability in the next decade.

Data collection is made for relevant data and information to inform each procurement scenario. This may involve reviewing military procurement policies, analyzing NATO procurement practices, and observing military procurement and supply Romanian disposition.

Research design

In explaining the research approach, we applied a qualitative mixed method. Data analysis outlines how data is analyzed to answer the research question.

As per the data collection method, this represents a case study on the Ministry of Defense in Romania. It required fictional sampling scenarios that describe the sample size, selection criteria, and data collection procedure.

The process of Technology Innovation varies significantly from one environment to another, according to research conducted by Reger (Reger, 2001). Lichtenthal's examination of intelligence processes revealed that the focus on technology when gathering information for forecasting may not necessarily align with the needs and societal aspirations.

It is essential to remember that technological advancements often stem from previous technologies, which can result in increased capability and performance enhancement. Therefore, it is crucial to prioritize predicting synergies while considering the environmental impact, sustainability, and societal needs when gathering information for forecasting (Lichtenthaler, 2004).

Research method – Alternative Futures Analysis

The Alternative Futures Analysis (AFA) represents a technical systematic exploration of multiple logical scenarios identified for entangled and ambiguous circumstances. By its utilization, we can gain valuable creative insights of a more constructive approach towards planning.

We incorporated the thematic analysis findings into our research paper to ensure a well-structured and coherent study. The AFA serves as a visionary tool designed to evaluate the impact of planning behavior across different scenarios, considering the specific conditions presented in each scenario and a range of possible outcomes that will have the greatest impact in each area (Puglisi, 2001).

We opted for this analysis technique because of its capacity to manage intricate situations that cannot be accurately predicted with a single outcome. Additionally, this approach facilitates top-tier uncertainty management. It is worth noting, however, that this technique is not intended to forecast the future, but rather to generate hypothetical scenarios that serve as a framework for critical thinking.

Application of Alternative Futures Analysis

The application of the AFA method is adapted from The NATO Alternative Analysis Handbook Second Edition, while Further information on this scenario can be found on the Allied Command Transformation ACT's (NATO, 2017) SharePoint site. Maintaining transparency in the NATO Alliance also means that research analysis clearly describes the methods, including themes of deprival and document analysis.

As claimed, "integrating distinct approaches is crucial to achieving clarity and reducing abstraction in the realm of vision. The extent of abstraction is contingent on the timescale of the prediction, with predictions that extend further into the future being increasingly conceptual in nature" (Malhotra et al., 2014).

Making well-informed decisions requires the ability to think critically and consider diverse viewpoints. NATO has devised eco-innovative practices that can be grasped by synthesizing the AFA step. This methodological framework serves as a handy reference tool for personnel, aiding them in diagnosing issues, comprehending complex scenarios, devising eco-innovative solutions, and questioning defense planning. The key practices encompass the further explained procedure (NATO, 2017).

The process involves annotating and selecting a specific research problem to be focused on. The next step is to establish the fundamental forces and factors by brainstorming and identifying the most important ones. Once this is completed, decisive and ambiguous factors are selected, and strong and weak points are determined, with the option of establishing individual factor boundaries. The selected factors are then affiliated and crossed on axes to form a prospective quadrilateral matrix, serving as a base for describing different future substitutes. Reports are assembled for each quadrangle, defining the futures and their plausibility, with progress indicators towards or away from them for measurement. Finally, current decisions or planning are evaluated against each hypothetical future, and alternative identification offers a more practical approach to gaining insights applied across a wide range of potential future scenarios or specific ones. This approach can be precious in achieving our organizational objectives and goals.

Benefits and challenges of AFA application

The AFA analysis process provides a multitude of advantages, including:

- Encouraging individuals to question assumptions and anticipate unforeseen events enables a more resilient plan.
- Offering a reliable method for evaluating various unknowns and presenting possible outcomes.
- Generating valuable indicators for monitoring developments and assessing trends.
- Creating a comprehensive framework for assessing costs, risks, and opportunities.
- Identifying plausible combinations of uncertain factors to explore a problem entirely.
- Allowing participants to envision different scenarios by assuming supportive and opposing roles, thus avoiding adversarial dynamics.

The analysis method also has limitations. It can cause military organizations to see the circumstances as very simple and, therefore, lose sight of specific critical scenario issues that may arise due to high investment in time, resources, and budgeting.

Moreover, identifying critical and uncertain factors is subjective, as the operational field is rapidly changing. The analysis highlights the importance of these aspects but needs to establish how military eco-leaders will correctly identify them. In this context, the AFA analysis has certain limitations as the eco-leadership still needs to be regulated.

Alternative futures development

As a design method, exploring alternative futures enables systemic sustainability transitions. Extended research suggests determining the role in creating future imaginaries and back casting present actions (Angheloiu et al., 2018).

Alternative futures identification

Identifying the critical drivers and uncertainties shapes the military eco-innovative supply, such as budget constraints, regulatory changes, technological advancements, international collaboration, public awareness, and environmental crises.

The authors designed a set of alternative scenarios that represent different possible futures for the issue. We developed the following five explanatory scenarios:

- Status Quo (SQ): In this scenario, military procurement and supply practices remain unchanged, with minimal emphasis on eco-leadership and sustainability.
- Sustainable Procurement (SP): Military organizations prioritize sustainability in procurement, adopting eco-friendly technologies, and collaborating with sustainable suppliers.
- Regulatory Compliance (RC): Regulatory changes drive procurement practices, leading to increased compliance with environmental standards and regulations.
- Resource Scarcity (RS): Growing resource scarcity and environmental challenges compel the military to prioritize supply chain resilience and resource conservation.
- Crisis-Driven Procurement (CD): Environmental crises force urgent procurement and supply practices changes, focusing on crisis response and sustainability.

Alternative futures description

An Alternative Futures Analysis is a structured approach to exploring multiple possible scenarios or futures based on different assumptions, variables, and driving forces (Hassan, 2024). Scenario planning key drivers involve technology, demographics, and environmental factors. We used drivers to create five scenarios, each with different assumptions and outcomes, by exploring different possibilities and potential risks. We elaborated a simplified Alternative Futures Analysis, as seen in Figure 2.

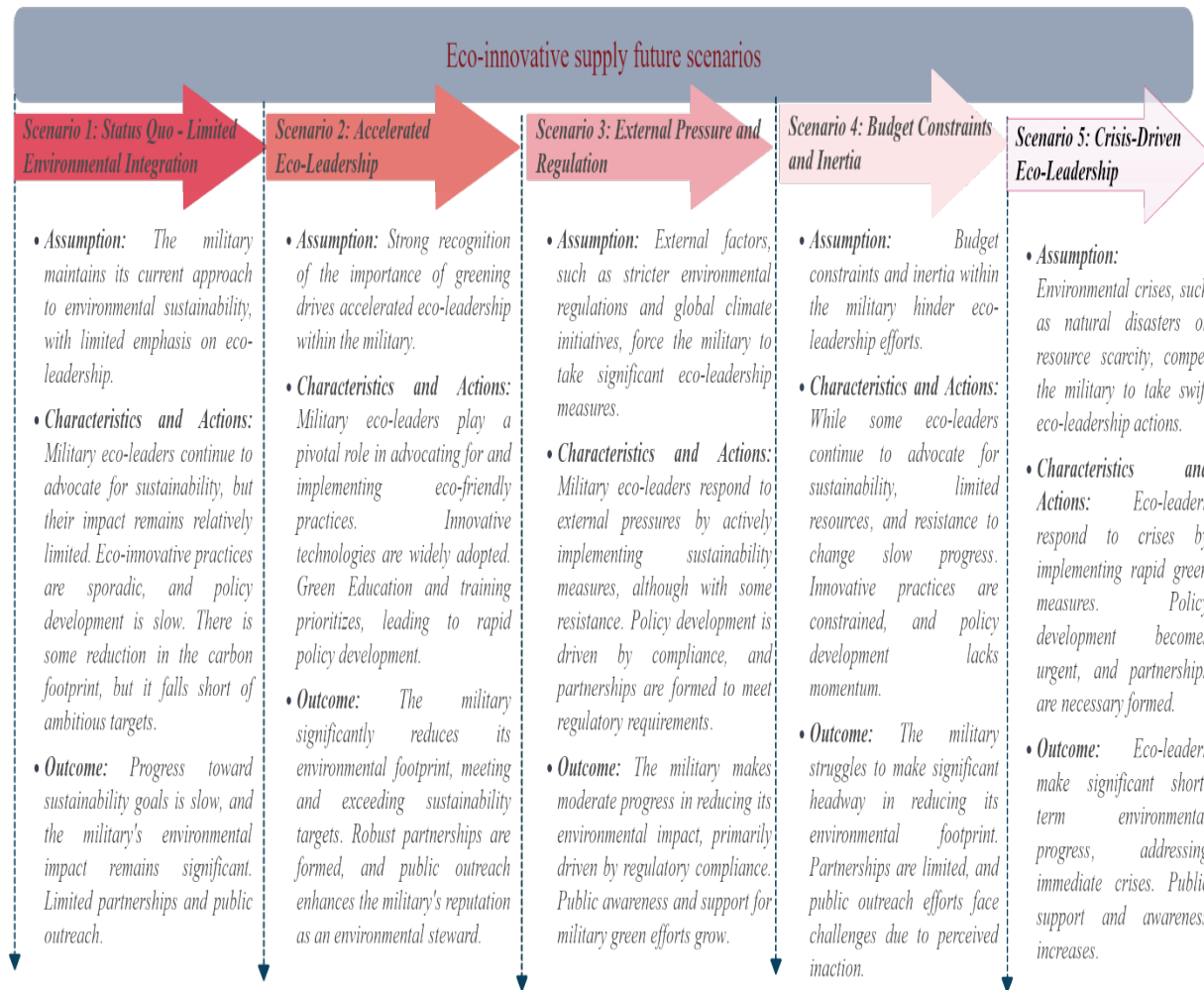


Figure 2. Eco-innovative supply alternative future scenarios

Source: Authors' own contribution.

These scenarios illustrate different eco-innovative potentials for military eco-leaders. It is important to note that a combination of scenarios or other unforeseen factors may influence the future. For military eco-leaders, we considered alternative futures that project how their actions might evolve.

Alternative Futures assessment

Developing detailed narratives for each scenario is based on describing how military eco-leaders supply evolve in each case. The impact on procurement policies, supplier relationships, technology adoption, and resource management has been illustrated accordingly.

The Alternative Futures Analysis outlined in Table 3 provides a structured approach to explore and plan for the future of military eco-innovative supply.

Table 3. Scenario structuring

<i>Criteria</i>	<i>Status Quo (SQ)</i>	<i>Sustainable Procurement (SP)</i>	<i>Regulatory Compliance (RC)</i>	<i>Resource Scarcity (RS)</i>	<i>Crisis-Driven Procurement (CD)</i>
<i>Procurement Policies</i>	Limited emphasis	Strong focus	Regulatory driven	Resource-conscious	Crisis-driven
<i>Budget Allocation for Sustainability</i>	Limited funding	Adequate funding	Regulatory-driven funding	Resource-driven funding	Emergency funding
<i>Sustainable Supplier Partnerships</i>	Limited partners	Robust partnerships	Regulatory-driven partners	Resource-focused partners	Crisis-driven partnerships
<i>Technology Adoption in Procurement Supply Chain Resilience</i>	Slow adoption	Rapid adoption	Moderate adoption	Limited adoption	Urgent adoption
	Limited resilience	Enhanced resilience	Regulatory-driven resilience	Resource-focused resilience	Crisis-driven resilience
<i>Regulatory Environment</i>	Stable regulations	Stricter regulations	Regulatory-driven policies	Resource-focused policies	Crisis-driven regulations
<i>International Collaboration</i>	Limited collaboration	Extensive international partnerships	Regulatory-driven partnerships	Limited cooperation	Crisis-driven cooperation

Source: Authors' own contribution.

Results and discussions

To assess the alternative scenarios, we considered specific characteristics and developments associated individually. Further analysis, scoring, and interpretation follow the argumentation below:

- Factor: Procurement Policies

Status Quo (SQ): Limited emphasis on eco-leadership procurement policies (Score: 2).

Sustainable Procurement (SP): Strong focus on sustainable procurement policies (Score: 5).

Regulatory Compliance (RC): Policies driven by regulatory compliance, moderate emphasis (Score: 3).

Resource Scarcity (RS): Policies become resource-conscious but need a stronger focus (Score: 4).

Crisis-Driven Procurement (CD): Policies are crisis-driven and rapidly changing (Score: 1).

- Factor: Budget Allocation for Sustainability

Status Quo (SQ): Limited funding allocated for sustainability initiatives (Score: 2).

Sustainable Procurement (SP): Adequate funding allocated for sustainability (Score: 4).

Regulatory Compliance (RC): Funding increases due to regulatory requirements (Score: 3).

Resource Scarcity (RS): Funding becomes resource-driven and increases (Score: 5).

Crisis-Driven Procurement (CD): Emergency funding is allocated for sustainability (Score: 5).

- Factor: Sustainable Supplier Partnerships

Status Quo (SQ): Limited partnerships with sustainable suppliers (Score: 2).

Sustainable Procurement (SP): Robust partnerships with sustainable suppliers (Score: 5).

Regulatory Compliance (RC): Partnerships driven by regulatory requirements (Score: 4).

Resource Scarcity (RS): Focus on resource-focused supplier partnerships (Score: 4).

Crisis-Driven Procurement (CD): Partnerships formed rapidly in response to crises (Score: 3).

- Factor: Technology Adoption in Procurement

Status Quo (SQ): Slow adoption of technology in procurement (Score: 2).

Sustainable Procurement (SP): Rapid adoption of eco-friendly technologies (Score: 5).
 Regulatory Compliance (RC): Moderate adoption to comply with regulations (Score: 3).
 Resource Scarcity (RS): Limited adoption of resource-efficient technologies (Score: 2).
 Crisis-Driven Procurement (CD): Urgent adoption of crisis-related technologies (Score: 4).

- Factor: Supply Chain Resilience

Status Quo (SQ): Limited supply chain resilience initiatives (Score: 2).
 Sustainable Procurement (SP): Enhanced supply chain resilience (Score: 4).
 Regulatory Compliance (RC): Resilience driven by regulatory requirements (Score: 4).
 Resource Scarcity (RS): Resource-focused supply chain resilience (Score: 3).
 Crisis-Driven Procurement (CD): Crisis-driven supply chain resilience (Score: 5).

- Factor: Regulatory Environment

Status Quo (SQ): Stable regulations with limited eco-leadership focus (Score: 3).
 Sustainable Procurement (SP): Stricter regulations emphasizing sustainability (Score: 4).
 Regulatory Compliance (RC): Regulations primarily focused on compliance (Score: 5).
 Resource Scarcity (RS): Regulations become resource-focused (Score: 2).
 Crisis-Driven Procurement (CD): Rapidly changing regulations in response to crises (Score: 3).

- Factor: International Collaboration

Status Quo (SQ): Limited international collaboration (Score: 2).
 Sustainable Procurement (SP): Extensive international partnerships for sustainability (Score: 5).
 Regulatory Compliance (RC): Regulatory-driven international partnerships (Score: 4).
 Resource Scarcity (RS): Limited international cooperation on resource issues (Score: 2).
 Crisis-Driven Procurement (CD): Collaboration driven by crises (Score: 3).

The cells in the matrix provide qualitative assessments of how each factor might evolve within each scenario. To score the AFA Matrix, we used a 1-5 scale to assess the level of each factor within each scenario. In our graphical representation, 1 means the least favorable or lowest level, and 5 means the most favorable or highest level. Table 4 presents the assigned scoring for each factor within each scenario.

Table 4. Research findings

Criteria	SQ	SP	RC	RS	CD
Procurement Policies	2	5	3	4	1
Budget Allocation for Sustainability	2	4	3	5	5
Sustainable Supplier Partnerships	2	5	4	4	3
Technology Adoption in Procurement	2	5	3	2	4
Supply Chain Resilience	2	4	4	3	5
Regulatory Environment	3	4	5	2	3
International Collaboration	2	5	4	2	3
	15	32	26	22	24

Source: Authors' own research results.

For efficient support, a helpful visual score representation has been assigned for each scenario. Now, we provide an overview of the matrix. Factors are crucial and uncertain elements that have a bearing on the development of military eco-leadership supply. Each column denotes a distinct future scenario, abbreviated as (SQ) Status Quo, (SP) Sustainable Procurement, (RC)

Regulatory Compliance, (RS) Resource Scarcity, and (CD) Crisis-Driven Procurement. The scores in each cell indicate the evaluation of how every factor would perform within the corresponding scenario. Higher scores indicate more favorable conditions.

Alternative futures interpretation

Our analysis indicates clear responses for each scenario. To tackle the obstacles and possibilities that arise from a particular situation or scenario, it is essential to take appropriate measures and capitalize on the available opportunities. One scenario best fits the development of green procurement practices. Nonetheless, assessment of each scenario's potential impacts should not rely only on the researched drivers. However, one should also consider sustainability, cost-effectiveness, supply chain resilience, and environmental stewardship, objective alignment.

Scenario 2 (Sustainable Procurement) generally leads to the most favorable outcomes, with solid policies, adequate funding, robust partnerships, rapid technology adoption, and enhanced supply chain resilience. There is strong support for procurement policies, adequate budget allocation for sustainability, and extensive adoption of technology in procurement. Sustainable supplier partnerships are encouraged, and supply chain resilience improves.

Scenario 4 (Resource Scarcity) strongly focuses on resource-related factors, leading to increased funding and resource-focused partnerships. Budget constraints harm eco-innovative procurement and supply in this scenario. Greening funding is reduced, technology adoption is limited, and supply chain resilience needs improvement.

Scenario 5 (Crisis-Driven Procurement) shows urgent actions in response to crises, with moderate funding allocation but limited focus on long-term sustainability. This scenario reflects a situation where external crises prompt urgent action. It results in moderate support for eco-innovative procurement, including emergency budget allocation, slow technology adoption, and a strong emphasis on supply chain resilience.

Scenario 3 (Regulatory Compliance) features regulations-driven policies, leading to high advancements in eco-leadership. External pressures, such as regulatory changes and international collaboration, drive positive developments in this scenario. There is regulatory-driven support for procurement policies, increased budget allocation for sustainability, and a growing emphasis on technology adoption. Sustainable supplier partnerships benefit from regulatory changes and enhance supply chain resilience.

Scenario 1 (Status Quo) represents the least favorable outcomes with limited emphasis on eco-leadership and innovative sustainability. In this scenario, military eco-leaders supply limited support and face restrictive procurement policies, budget allocation for sustainability, and technology barriers. Sustainable supplier partnerships are also limited, and supply chain resilience remains a concern.

As a result, the interpretation of the scores suggests that Scenario 2 (Sustainable Procurement) is the most favorable for military eco-leadership development. In contrast, Scenario 4 (Resource Scarcity) and Scenario 1 (Status Quo) represent the least favorable conditions. Scenarios 3 (Regulatory Compliance) and 5 (Crisis-Driven Procurement) offer opportunities for positive developments driven by external factors and crises, respectively.

Our research hypothesis is validated by the results obtained since the Romanian Army can absorb the risks associated with a potential scenario in developing eco-innovative procurement methods. The hypothesis is formed by a critical intelligence question to challenge conventional analytics. It is worth noting that reviewing any gaps at this stage can significantly bolster the confidence level in the assessment's information base and judgments reached.

When striving for transformation within our organization, it's crucial to acknowledge that employees' responses may only partially stem from their level of involvement. Instead, we ought to incorporate an ecologically responsible outlook for those changing. Within the realm of change management, we observe that an ethical strategy (Jacobs & Keegan, 2018), prioritizing moral incentives that prompt reactions to change, can yield positive results.

An imprint of military practice

Strategies and approaches of eco-innovative military procurement research include assumption sensitivity analysis, data triangulation, expert consultation and peer review, scenario sensitivity analysis, transparent reporting and documentation, scenario comparison and validation. Case studies for eco-innovative military procurement include practices that have been implemented by military organizations worldwide, as illustrated in Figure 3.

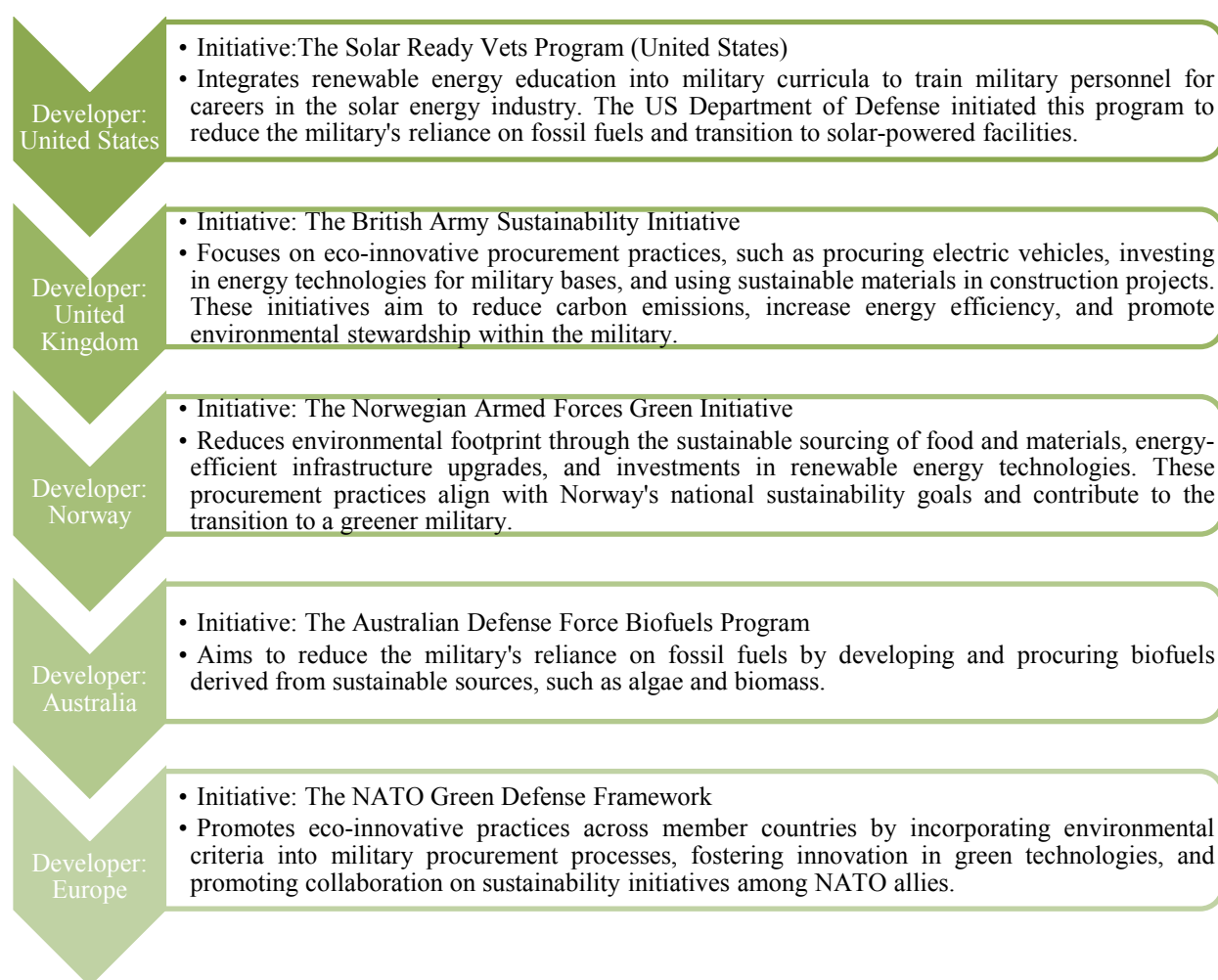


Figure 3. Eco-innovative military procurement practices

Source: Authors' own contribution.

These case studies demonstrate how military organizations worldwide adopt eco-innovative procurement practices to enhance environmental sustainability, reduce resource consumption, and promote resilience in the face of climate change. These examples provide valuable insights for

researchers and practitioners exploring the intersection of military procurement and environmental stewardship.

Military leaders should consider the impact of culture on eco-leadership practices and explore emerging technologies to make military operations more eco-friendly. Eco-leaders in the military should prepare for climate change challenges and evaluate the impact of their programs.

Collaboration among stakeholders is necessary to develop sustainable military operations while considering ethical implications. Engaging with local communities and promoting gender-inclusive leadership can help mitigate environmental risks. Innovative education and training programs for military personnel would enhance their understanding of environmental issues and sustainable practices.

Limitations and assumptions

When creating future scenarios for military eco-innovative procurement, it is essential to recognize and address certain limits that could affect the scenarios' interpretation and strength, including future trends, developments, and uncertainties, such as technology, geopolitics, environmental regulations, and military priorities. The limitations and assumptions also include:

- Simplifying complex systems and variables.
- Using available and reliable data sources to inform assumptions, model parameters, and scenario inputs.
- Acknowledging subjective judgments and interpretations by researchers.
- Recognizing the uncertainty and risk in exploring alternative future trajectories and their potential implications.
- Considering that the scenarios developed are context-specific and may not be directly generalizable to other military contexts or procurement domains.

Despite these constraints, developing future scenarios for military eco-innovative procurement is valuable for exploring alternative pathways, identifying potential challenges and opportunities, and informing strategic decision-making processes. By recognizing and addressing the risks, researchers can enhance the credibility, relevance, and utility of the scenarios presented.

The military is researching and developing energy technologies (Samaras et al., 2019). The focus now includes eco-innovative procurement, which integrates green practices into military operations. Researching future scenarios for eco-innovative procurement is challenging due to limitations such as data accessibility and biases. Addressing these limitations includes engaging experts, prioritizing data collection, and fostering interdisciplinary collaboration.

For example, early investment in renewable energy sources through eco-innovative procurement would position the military as a frontrunner in adopting sustainable energy practices when these technologies become more widely available and cost-effective. This could decrease reliance on traditional energy sources and reduce carbon emissions, aligning with broader environmental goals. Conversely, if energy security becomes a significant concern due to geopolitical instability, the military's emphasis on energy efficiency and clean technologies could enhance their operational resilience and mitigate potential disruptions in energy supply.

Eco-innovative procurement would position the military as a frontrunner in adopting sustainable energy practices. Analyzing future scenarios is crucial for understanding the implications of incorporating sustainable practices in military operations. Eco-innovative procurement generates more dependable and trustworthy insights for decision-makers and assists in strategic decision-making and long-term planning.

Conclusion

Upon the availability of the new database, we shall proceed with updating the procurement scenarios and methods to align with the preferred practices in military eco-leadership for supply. This will enable us to further contribute to improving our supply practices and showcase our commitment to sustainable procurement.

The current analysis identifies vital drivers, uncertainties, and possible future scenarios. The research steps followed a complete type of analysis described graphically. Establishing mechanisms for continuously monitoring key drivers and uncertainties will prepare military eco-leaders to adapt their strategies as new information becomes available or conditions change. The results derived from the Alternative Futures Approach advocate clear and persuasive reporting of the continuous monitorization of the key drivers and factors influencing military procurement.

Military leaders face difficulties applying a single command method for their equipment and specialized personnel due to varying situations. In practice, effective managers use combinations of techniques to achieve efficiency by justifying strategic choices and allocating the available resources. This approach helps them find different rationales to overcome challenges and achieve success.

The findings are incredibly relevant to stakeholders, decision-makers, and the broader military-leading community due to the highlighted importance of eco-leadership supply tools. Contingency plans represent a valuable method for changing operational conditions, ensuring flexibility to accommodate uncertainties.

The practical implications of the study concern military command levels but reach a broader European sustainability community. All actors, including procurement officers, environmental experts, policymakers, and military leaders, are invited to explore these methodological grounds in discussions and workshops and use the procurement scenario to evaluate their insights and feedback.

Periodically evaluating the effectiveness of the chosen procurement response leads to successful refining of future procurement planning. Applying the Alternative Futures Approach to military eco-leadership enables researchers to anticipate and prepare for potential futures in green procurement practices within the Romanian Army. It encourages strategic thinking and adaptability in addressing the challenges and opportunities of an unknown domain.

Conducting a comprehensive Alternative Futures Analysis can help military organizations anticipate potential challenges and opportunities related to eco-leadership and greening efforts in a dynamic and uncertain environment while promoting environmental responsibility.

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