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Network Centric Operations in the Malaysian Armed Forces: An Appreciative Inquiry Approach

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Abstract: This case study uses a qualitative methodology guided by the Appreciative Inquiry model to explore the process of implementing the Network Centric Operations program in the Malaysian Armed Forces. The research aims to address four key issues through in-depth interviews with representatives from the defence industry, including the CEO and Program Directors of a company awarded the project. These issues are: How do stakeholders contribute to the success of NCO projects? How do they envision the future of NCO programs? What are their interests in NCO projects? What engagement strategies are necessary to support NCO programs? This paper examines the priorities of defence companies in NCO projects, such as collaborative stakeholder management, effective project planning, and meeting user objectives while navigating the unique challenges of defence programs. Additionally, the analysis reveals slight differences in opinions among the individuals involved, highlighting the importance of aligning strategic vision with operational execution and end-user needs. This paper focuses on the complexities and opportunities inherent in defence project management, providing valuable insights for enhancing project delivery in the Malaysian Armed Forces and beyond.

Keywords: Malaysian Armed Forces Network Centric Operations, Project Complexity, Project Success, Project Management, Stakeholder Management, Stakeholder Engagement.

1. Introduction

A paradigm shift in warfare has occurred with the advent of the digital age; conflicts are now waged not only on land, sea, and air, but also in the cyber domain and the emerging frontiers of space. In the current era of warfare, where information dominance and interconnectedness are of utmost importance roots (Jony et al., 2024; Hannay et al., 2021), the notion of Network Centric Operations (NCO) has undergone a significant transformation, surpassing its conventional military (Tóth & Farkas, 2023).

Formerly referred to as Network Centric Warfare (NCW), NCO has gained extensive recognition as a military doctrine that enhances battlefield awareness and decision-making through the seamless exchange of information (Skoryk et al., 2021; Malik, 2020; Cebrowski, Arthur K., 1998). However, the proliferation of cyber threats, the emergence of artificial intelligence, and the militarization of space have exponentially increased the complexity and reach of NCO (Brown & Lee, 2024; Tóth & Farkas, 2023; Stocchero, 2023). Presently, NCO

has expanded beyond conventional military confines to incorporate a wide range of actors, including 'netizens' and state-sponsored hackers, who can exploit networked capabilities to accomplish strategic goals.

Recognizing the transformative potential of NCO, the Malaysian Armed Forces (MAF) have initiated efforts to develop and implement this capability. The MAF strategic plan, also known as the Fourth Dimension Malaysian Armed Forces (4D MAF), delineates the development of fundamental capabilities that employ a blend of capability-based and network-enabled forces to tackle multi-spectral challenges (Ministry of Defence, 2020). The NCO project's goal is to improve combat capabilities, national security, continuous surveillance, the use of information technology, and quick deployment by adding new features to existing command, control, communications, computers, and intelligence (C4I) systems, as well as looking into possible future features that could make these areas better (MAF NCO Roadmap, 2nd Edition, 2017).

This study examines the complexities of defence management projects, with a particular emphasis on the MAF's implementation of NCO project. This paper delves into the distinctive obstacles that are intrinsic to defence initiatives, including the integration of technology, the management of stakeholders, and the ever-changing operational demands. Through an investigation of the perspectives and experiences of pivotal project stakeholders, this study seeks to identify the critical success factors that distinguish prosperous NCO projects from those that are less favourable in nature. Additionally, the research examines the utilization of Appreciative Inquiry (AI) as a strengths-based and collaborative methodology (Cooperrider et al., 2024) for project management, with a specific focus on the defence industry.

Utilizing an AI model and a qualitative methodology, this study attempts to address the following four crucial questions: How do stakeholders contribute to success? How do they envision the future of NCO programs? What are their interests? And what engagement strategies are needed to support these programs? Furthermore, what engagement strategies are required to bolster these programs? The results of this research will not solely illuminate the precise elements that contribute to the accomplishment of NCO projects but also offer practical suggestions for improving the administration and execution of forthcoming defence projects. Through the bridging of the current knowledge deficit regarding the determinants of success in NCO projects, this study seeks to furnish defence organizations with the necessary understandings and capacities to effectively manage the intricacies of contemporary warfare and execute initiatives that fortify defence capabilities and national security.

2. MAF NCO Development Program Case Study

The MAF is currently undergoing a change process with the goal of becoming a networked force by 2035, as outlined in the 4D MAF strategy. This change aims to enhance the capabilities of NCOs by utilizing information technology to improve military effectiveness (Ministry of Defence, 2020). The MAF NCO Roadmap, initially introduced in 2006 and updated in 2017, serves as a directive document that outlines the prerequisites, potential paths, and necessary steps for this process of change (MAF NCO Roadmap, 2nd Edition, 2017).

Phase 1A of the MAF NCO program began in 2010 and effectively demonstrated the feasibility of NCO capabilities. The pilot project successfully integrated specific assets, command and control (C2) systems, and sensors from the Army, Navy, and Air Force into a joint command structure. This allowed for real-time data analysis and information sharing about the current situation (MAF NCO Roadmap, 2nd Edition, 2017). The project also prioritized the development of human capital through training and knowledge-sharing programs, ensuring that the forces were able to effectively utilize the new capabilities.

Strong project management, stakeholder management, and project governance strategies contributed to the success of the MAF NCO Phase 1A project. This approach aligns with the broader project management literature, which emphasizes the importance of stakeholder participation for project success (Ciric Lalic et al., 2022; Errida & Lotfi, 2021; Herath & Chong, 2021; Pedrini & Ferri, 2019). The proactive involvement of the project team fostered a collaborative atmosphere, facilitating communication and cooperation among various groups, including military personnel, government agencies, and industry partners. This ensured that the project's objectives aligned with the requirements and expectations of different stakeholders, thereby reducing potential risks and obstacles (T. S. Nguyen et al., 2021, 2024).

While the MAF is still in the process of achieving full NCO capacity, Phase 1A represents a significant milestone in this journey. The knowledge gained from this initial step will inform future deployment stages, ensuring continuous improvement and adaptation to the changing security landscape. The implementation of NCO signifies a fundamental shift in the operational philosophy of the MAF, embracing the concept of interconnectedness to effectively address the complex security challenges of the 21st century (Ministry of Defence, 2020). However, the MAF faces numerous obstacles in realizing its NCO vision, including the need for explicit policy guidance, overcoming organizational obstacles and competition, establishing an organization with specialized expertise for competency development, securing adequate resources, and adapting to shifts in the strategic landscape (Sulaiman et al., 2020). Additionally, addressing technical factors such as data interoperability, support for ad-hoc structures, and mobility is crucial for the effective deployment of NCO (Stocchero et al., 2023; Matiuzzi Stocchero et al., 2023).

Despite these challenges, the government remains committed to investing in the MAF's NCO capabilities, recognizing their significance in safeguarding national interests and maintaining a competitive edge in modern warfare (Ismail, 2019). The Defence White Paper (DWP) reaffirmed this commitment in 2020 and outlined a comprehensive plan to transform the MAF into a fully integrated force by 2035. This plan includes enhancing collective capacities, allocating resources to cutting-edge technology, and strengthening alliances with regional and international partners (Ministry of Defence, 2020; Ismail, 2019).

The development of NCO skills extends beyond technological enhancements; it represents a profound transformation in the MAF's operational methods. By embracing the concept of interconnectedness, the MAF is preparing itself to effectively address the complex security challenges of the 21st century with agility, precision, and resilience.

3. Review of Existing Literature

In this literature review, the primary objective is to thoroughly examine the nuances of defence project management, with a specific focus on NCO. The study explores the various challenges that arise in defence projects, the potential implications of NCO, the importance of effectively managing stakeholders, and the valuable insights gained from successful NCO implementations.

3.1 Network Centric Operations

Concepts and Principles of NCO

The NCO program plays a vital role in military reform in the contemporary era. The concept proposes that extensively interconnected forces can gain an advantage through access to information, leading to enhanced decision-making and more successful operations (Stocchero et al., 2023; Malik, 2020; Cebrowski, Arthur K., 1998). There are four fundamental principles that underpin this concept: (1) enhanced dissemination of information, (2) higher quality information and shared situational awareness, (3) collaboration and self-synchronization, and (4) increased effectiveness in mission accomplishment. These principles highlight the significance of connectivity, prompt information exchange, and collaborative decision-making as key drivers of exceptional outcomes on the battlefield (Stocchero et al., 2023; Malik, 2020). According to Stocchero et al., (2023) and Fabri et al., (2023), the literature emphasizes that the NCO initiative is not solely concerned with technology but also represents a substantial transformation in military operations and structure. This approach necessitates a shift in focus from individual platforms to viewing the network as an integrated entity (Fabri et al., 2023; Hannay et al., 2021). Advancements in information technology have facilitated the integration of sensors, decision-makers, and weapon systems (Stocchero et al., 2023). To achieve remarkable results in modern combat, it is crucial to foster a shared understanding of the situation and engage in cooperative decision-making processes.

A set of principles guide the implementation of NCO, emphasizing the importance of information superiority, shared awareness, rapid decision-making, coordinated actions, distributed forces, reduced mass, comprehensive sensor coverage, and streamlined operations and levels of war (Stocchero et al., 2023). These principles provide a framework for organizing, training, and operating a network-centric force.

Benefits of NCO

The NCO program offers numerous benefits, primarily through improved information dissemination and cooperation. A well-connected forces has many advantages as outlined in the NCO plan. The seamless transmission of information enhances situational awareness and decision-making capability. This heightened awareness promotes cooperation and synchronization among troops, regardless of geographical dispersion, resulting in better adaptability, versatility, and overall objective achievement (Stocchero et al., 2023; Malik, 2020). In terms of defence projects, the NCO has the potential to significantly enhance operational capabilities. It enables faster planning cycles, more flexible task execution, and the use of integrated processes (Ministry of Defence, 2020).

The NCO program also facilitates the merging of training and operations, leading to improved authenticity and efficiency in training situations. Additionally, it improves information dissemination, coordination, and expedites reaction times in emergency scenarios (Ministry of Defence, 2020). The benefits of the NCO extend beyond the military domain. It has the potential to improve information dissemination and situational awareness in crisis management teams, enhancing reactions to disasters. Applying NCO principles to cybersecurity makes it easier to quickly identify and stop cyberattacks, thereby increasing the resilience of critical infrastructure (Jony & Hamim, 2024). However, it is important to note that these benefits do not come automatically.

Challenges of NCO

Implementing the NCO program presents numerous challenges. One of the obstacles in the technological domain is ensuring seamless interoperability among diverse systems and platforms, particularly in cases of multi-agency or inter-organizational collaborations. Compatibility problems may arise due to different technical standards and the presence of outdated systems that lack interoperability (Llopis Sanchez et al., 2021). Establishing an integrated network becomes more difficult when there is no consistent strategy for network administration (Llopis Sanchez et al., 2021). Additionally, safeguarding networks across firms with varying levels of technological proficiency and security protocols is a significant obstacle (Jony & Hamim, 2024).

Organizational elements, such as divergent agendas and an unwillingness to provide crucial information, often worsen the complex technological aspects and significantly hinder the construction of a truly integrated and efficient NCO (Jony & Hamim, 2024; Stocchero et al., 2023; Malik, 2020). Furthermore, the literature highlights numerous obstacles that may impede the effective implementation of the NCO plan. Several critical factors require consideration, including the need for comprehensive training to ensure personnel possess the necessary skills and knowledge, the necessity for a cultural transformation towards a more decentralized and collaborative approach, and the potential for information overload resulting from the substantial volume of data generated in a networked environment (Cucinschi, 2023). The financial implications of adopting and maintaining NCO technology and infrastructure are significant, requiring comprehensive cost-benefit analyses (Balakrishnan, 2021). The issues discussed in this context highlight the intricate and detailed nature of NCO implementation, necessitating examination of technological solutions in conjunction with human, organizational, and budgetary considerations. The study emphasizes the importance of embracing a holistic approach to address these complexities. It advocates for adaptability and flexibility rather than solely relying on conventional control-oriented project management approaches.

3.2 Project Management for Defence

Complexity in Defence Projects

Defence projects possess inherent complexity due to various factors. These include the integration of advanced technologies, long lead times, evolving requirements, and the involvement of numerous stakeholders with divergent interests (Azmat & Siddiqui, 2023; Bolzan de Rezende et al., 2021, 2022). Operating within a dynamic geopolitical landscape,

adhering to stringent security protocols, and incorporating cutting-edge technologies like artificial intelligence, cyber defence, and autonomous systems further exacerbate the complexities (Gottemoeller et al., 2022; Letho et al., 2023). Moreover, achieving compatibility across multiple technologies and legacy systems often necessitates adjusting the original project scope to accommodate changing strategic objectives and evolving needs (Nguyen & Tran, 2018, 2024).

The multi-faceted nature of defence programs is amplified by the involvement of multiple stakeholders. Military end users, contractors, government agencies, and foreign collaborators all have a vested interest in the project's success, even with their diverse interests and perspectives (Ciric Lalic et al., 2022). Effective stakeholder management and fostering seamless communication and collaboration are crucial for project success. Complexity-related issues have been studied in various industries, including energy, public administration, construction, new product development, and transportation (Azmat & Siddiqui, 2023; Nguyen et al., 2018, 2024). However, due to the secretive nature of the defence sector, the pool of experts is relatively small, projects are time-sensitive, new technologies constantly emerge, and political interests play a significant role, making defence projects inherently more complex (Bolzan de Rezende et al., 2021, 2022).

While challenging, effective project management has always been imperative for the successful execution of defence initiatives. Examples such as the Manhattan Project, the Polaris missile system, and other US space projects illustrate the necessity for flexibility, adaptability, and proactive risk management when navigating the complexities of defence projects (Griffin et al., 2022). Resilience engineering and systems thinking have become increasingly vital in managing complex defence projects as they enable project teams to better anticipate and address unforeseen challenges (Bolzan de Rezende et al., 2021, 2022; Griffin et al., 2022).

Successful Defence Projects

Despite their complexity, defence programs can achieve success through several crucial elements. Successfully navigating project obstacles requires clear objectives, capable leadership, efficient communication, and solid risk management r(Bolzan de Rezende et al., 2021, 2022). Early research focused on the "iron triangle" of time, budget, and quality as the primary factors for success. However, more recent studies have adopted a broader perspective. Literature on project success encompasses both tangible and intangible elements (Herath & Chong, 2021; Moradi et al., 2020;). While cost and profitability remain important financial metrics, non-financial aspects, such as employee satisfaction, competent leadership, and stakeholder support, are increasingly recognized as essential factors for success (Zid et al., 2020).

Furthermore, the concept of project success has evolved to incorporate aspects beyond mere operational considerations. It now encompasses stakeholder satisfaction and alignment with strategic goals (Herath et al. 2021; Zid et al., 2020). This comprehensive perspective underscores the need to meet the demands of multiple stakeholders and align project outcomes with broader organizational objectives. In the context of defence initiatives, simply adhering to the "iron triangle" does not guarantee success. Achieving positive results also necessitates other

elements, such as well-defined objectives, securing organizational support, establishing effective communication networks, and addressing unforeseen challenges (Herath et al. 2021; Zid et al., 2020). These findings offer valuable insights to improve the execution of future NCO programs by MAF and other defence entities.

3.3 Stakeholder Management in Defence Projects

The Foundation of Effective Engagement

Effective stakeholder management in defence projects is built upon a comprehensive and ongoing process of identification and analysis (Freeman, 2023; Gregory et al., 2020). This involves identifying all the stakeholders involved, understanding how their interests and impact may change, and mapping their complex interactions. While brainstorming and snowball sampling offer initial ideas, they have limitations for major defence projects. Therefore, a broader approach that includes both qualitative and quantitative techniques, such as surveys, interviews, focus groups, and social network research, may be necessary.

Gregory et al. (2020) emphasize the importance of identifying stakeholders early on to ensure their interests are considered from the start, leading to greater project acceptance and buy-in. However, since defence projects are dynamic in nature, an ongoing identification process is required to accommodate changes in stakeholder contributions and project requirements (Balakrishnan & Johar, 2023). Stakeholder analysis should not only focus on interests but also consider stakeholder connections, potential coalitions, and their impact on project outcomes (Bolzan de Rezende et al., 2022). Using a systematic framework for stakeholder analysis that incorporates these factors enables project managers to develop more targeted and effective engagement strategies, reducing risks and increasing the likelihood of project success.

Developing Trust, Collaboration, and Achieving Project Goals

Effective stakeholder engagement is an ongoing process that requires understanding the varying interests, influence, and power dynamics of stakeholders. According to Freeman (2023), successful stakeholder management involves building trust, cultivating positive relationships, and ensuring effective communication. This includes adapting engagement methods to meet the individual needs and expectations of diverse stakeholder groups, utilizing multiple communication channels, and fostering cooperation. By establishing strong connections with stakeholders, project managers can gain valuable insights, access critical resources, and garner support for project goals (Beam et al., 2023). Continuous participation is crucial throughout the project lifespan because stakeholder roles, viewpoints, and alliances can change as the project progresses (Beam et al., 2023; Bolzan de Rezende et al., 2022; Gregory et al., 2020).

Therefore, project managers must be adaptable and flexible to consider changing demands and interests, fostering collaboration that contributes to project success. Regular communication and feedback loops can help detect and address potential issues early on, reducing the likelihood of delays and cost overruns. Understanding and navigating power dynamics is crucial, particularly in defence projects. It is essential to recognize the distribution of power among various groups involved, including government agencies, military personnel, contractors, and the general public (Balakrishnan & Johar, 2023). This understanding allows project managers to anticipate and prevent conflicts, as well as utilize alliances to achieve

project objectives. While categorizing stakeholders as supporters, neutrals, or resisters is a helpful starting point, it is important to develop a deeper understanding of stakeholder dynamics, including the potential for coalitions and partnerships. This knowledge is necessary for effective engagement. By leveraging stakeholder influence, project managers can acquire necessary resources, overcome challenges, and ensure project success.

In the context of defence projects, effective stakeholder management is not only desirable, but also critical to project success. Proactively addressing stakeholder needs, managing expectations, and fostering strong relationships are key practices for project coordinators. These actions mitigate risks, enhance cooperation, and ensure the successful execution of defence projects that align with the needs of all stakeholders.

3.4 Successful NCO Initiatives

NCO in the Global Landscape

The global defence landscape as a whole is undergoing a shift towards NCO. The integration of networked technology has transformed global military capabilities by enhancing information sharing, situational awareness, and collaboration. Notable examples include the United States Department of Defence's (DoD) Joint All-Domain Command and Control (JADC2) program (Hoehn, 2021) and the Australian Defence Force's (ADF) Joint Project 2072 (Bergmann, 2022). These initiatives demonstrate the vast potential of NCO, highlighting how the merging of diverse sensors, platforms, and command centres can enhance operational performance. However, successful implementation of NCO necessitates addressing several challenges. According to Azmat and Siddiqui (2023), modern projects are becoming increasingly complex, requiring a comprehensive understanding of factors such as context, scale, diversity, autonomy, connection, emergence, and belonging. These factors pose various obstacles in the NCO context, including technology integration, stakeholder relationship management, and the ability to adapt to evolving operational demands.

In addition to Western initiatives, the ASEAN region is embracing NCO, with countries like Singapore, Malaysia, and Thailand actively expanding their capabilities. Nonetheless, the region faces distinct challenges such as diverse political environments, varying levels of technical infrastructure, and potential resource limitations (Caballero-Anthony, 2022; Jamin, 2021). Effective stakeholder management is crucial when navigating the intricacies of NCO implementation. Building trust, fostering teamwork, and maintaining open communication are key to achieving success. ASEAN states can enhance their military capabilities and contribute to regional security by leveraging NCO and studying effective practices from around the world to address regional challenges (Anwar, 2022). This requires actively engaging stakeholders at all levels, fostering a collaborative environment that encourages innovation and adaptation. Successful NCO deployment in the ASEAN region and beyond demands more than just technological expertise; it necessitates a holistic approach that integrates technological advancements, effective stakeholder management, and a deep understanding of regional dynamics.

Insights from NCO Implementation

The effective execution of NCO initiatives in the global military sector offers valuable insights for future undertakings. One vital lesson is the significance of developing a comprehensive

strategy that considers both technical and human factors. The complexity of the project, including its context, scale, and diversity, greatly impacts its success (Azmat and Siddiqui, 2023). It is evident that a thorough understanding and efficient management of these factors are essential for successful NCO programs. Another pivotal lesson is the imperative of effective stakeholder management, which must not be disregarded. The involvement of stakeholders from the outset and the maintenance of transparent communication throughout the duration of the project are of utmost importance. This allows for a comprehensive comprehension of their needs and concerns, as demonstrated by various studies (Freeman, 2023; Mysore et al., 2021; Pedrini & Ferri, 2019). This is especially crucial in NCO initiatives, where stakeholders encompass a diverse range of individuals and entities, including military personnel, government officials, technology vendors, and the general public.

Stakeholder management plays an indispensable role in every project. Merely identifying and researching stakeholders does not suffice; it is also imperative to develop effective approaches for engaging and managing them (Freeman, 2023). It is vital to grasp individual interests, anticipate their impacts and behaviours, and successfully handle future conflicts and collaborations (Shaukat et al., 2022). Understanding how stakeholder interests and influence evolve over the course of the project is essential for adjusting engagement strategies and maintaining stakeholder support (Freeman, 2023; T. S. Nguyen et al., 2021). Additionally, the literature underscores the significance of adaptability and flexibility in NCO initiatives. Given the rapidly evolving technology landscape and the dynamic nature of military operations, it is crucial to develop NCO systems that can swiftly adapt to new requirements and emerging threats. A project management strategy that values flexibility and responsiveness, such as agile or hybrid techniques, is imperative (Errida & Lotfi, 2021).

Furthermore, successful NCO programs highlight the importance of clear communication, strong leadership, and well-established governance mechanisms. These factors are critical for making informed decisions, optimizing resource allocation, and ensuring project success. Effective communication is pivotal in keeping all stakeholders apprised of the project's progress, challenges, and milestones. This fosters confidence and understanding among all parties involved (Freeman, 2023). Additionally, the significance of effective leadership cannot be understated in guiding the project throughout its various stages. In addition, efficient governance mechanisms play a crucial role in ensuring accountability, transparency, and streamlined decision-making.

An analysis of prior NCO endeavours allows defence organizations to enhance the implementation of future initiatives. This process entails not only addressing the technical components of NCO systems but also fostering collaboration and communication among all relevant parties. By doing so, these systems are better equipped to meet the needs of all stakeholders involved. Scholarly research suggests that adopting a comprehensive approach to stakeholder management and integrating these invaluable insights can greatly improve the success rates of NCO initiatives and enhance the overall effectiveness of military forces.

4. Research Methodology

This study examines the impact of utilizing qualitative methodology and an AI model on enhancing the comprehension of participants' experiences in Phase 1 of the MAF NCO project, thereby contributing to its success. The application of an AI model to analyse the gathered data and guide the research process reflects a strength-focused approach that uncovers and harnesses positive experiences. Furthermore, the study's findings can be extrapolated to explore significant themes or emerging trends concerning successful NCO projects in greater detail.

Applying AI in Defence Projects

AI is a collaborative technique that focuses on identifying and utilizing strengths. It is gaining popularity in several areas, including project management. Based on the principles of social constructionism, AI places importance on the influence of discourse and connections in facilitating beneficial transformation (Roberts & Ebejer, 2024; Cooperrider et al., 2024). The approach emphasizes the recognition and development of current strengths rather than fixating on weaknesses. It promotes cooperation, improves communication, and establishes an optimistic outlook for the future (Roberts & Ebejer, 2024). This technique is especially applicable in military projects, which are often characterized by high stakes, complex issues, and a wide range of stakeholders. AI's 4-D cycle, consisting of Discovery, Dream, Design, and Destiny, offers a systematic framework to effectively support beneficial transformation (Roberts & Ebejer, 2024).

Within the realm of defence, AI can be utilized in many ways. Identifying and utilizing the capabilities of the project team and stakeholders can aid in strategic planning (García, 2024). AI promotes effective team building and cooperation by fostering open communication and valuing diverse viewpoints (Roberts & Ebejer, 2024; Cooperrider et al., 2024). Moreover, AI functions as a significant research instrument, evaluating the efficiency of projects and identifying areas for improvement (García, 2024). AI helps reduce stress and pressure by emphasizing positive elements and past achievements, which promotes a positive and resilient project culture. In defence projects, it is particularly important to prioritize the identification and management of risks and potential failures due to their complexity and high stakes. The focus of AI on strengths and opportunities fosters a pleasant and encouraging atmosphere for project teams (Cooperrider et al., 2024; García, 2024).

Furthermore, AI has been shown to be a valuable asset in improving stakeholder management in defence projects. AI facilitates the alignment of the project with the needs and goals of all stakeholders by ensuring that their perspectives are heard and acknowledged. AI implementation in defence projects has the potential to greatly enhance project outcomes by cultivating a favourable and cooperative atmosphere that promotes creativity and adaptability.

Participants and Data Collection

The study involved conducting in-depth interviews with the Chief Executive Officer (CEO) of the awarded company and two Program Directors. The company, well-known in the defence sector, has a strong track record of successfully completing challenging NCO projects. These individuals were chosen because of their respective roles, direct involvement, and extensive expertise regarding the specific NCO project case study being examined. The interviews

followed a semi-structured format guided by the AI approach, which encouraged open discussion and ensured that relevant issues were addressed. The interview questions were intentionally designed to stimulate participants' reflective thinking about their experiences, gain valuable insights into the project's achievements, and elicit their perspectives on the future trajectory of NCO programs.

Data Analysis

The study used an AI model to analyse the positive aspects of project development in comparison to the achievements of NCO projects from the perspective of industry professionals. The data from semi-structured interviews was analysed using NVivo software. This analysis involved conducting theme analysis, counting word frequencies, and creating comparison maps among the interviewees.

The conversations were recorded verbatim and then subjected to theme analysis. This process involved organizing, coding, and analysing the data to identify recurring themes and patterns. Iterative coding allowed for adjustments whenever new information emerged. To ensure a comprehensive and accurate analysis, the researcher engaged in peer review and member checking. Member checking involved sharing preliminary results with the participants and seeking their feedback. The researcher ensured that the analysis aligned with the participants' experiences and perspectives.

As part of the peer review process, an additional investigator with expertise in AI models and qualitative research reviewed the coding structure and theme analysis. This provided a different perspective and helped identify any biases or errors in interpreting the data. Through collaborative efforts, the final list of themes and subthemes accurately represented all aspects of the NCO endeavour.

Ethical Considerations

Participants provided voluntary consent after receiving full information about the study's objectives. To uphold ethical standards, this study will not disclose any personally identifiable information. The collected information will be used solely for academic purposes. The study respected the thoughts and experiences of the participants.

5. Findings

The analysis of the transcripts revealed primary themes and sub-themes that highlight the most significant contributions in implementing the NCO project within the MAF, as perceived by the developer. These interconnected topics and sub-themes provide a comprehensive understanding of the project's achievements. The findings of this study offer valuable insights that emphasize the benefits of executing complex military projects, particularly NCO programs within the MAF, while outweighing the drawbacks. The prominent attributes, such as leadership, collaboration, adaptability, user-centricity, project management, communication, and commitment and responsibility, align with the scholarly literature on project management, stakeholder management, and defence projects. This alignment helps us improve our methodologies and address challenges in a new way to achieve project success, especially in defence.

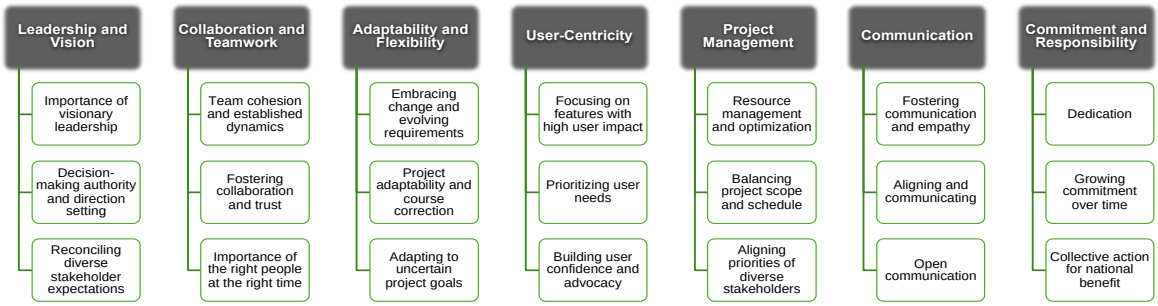

Figure 1. Coding Themes and Sub Themes.

The findings can be visually represented in a concept map, as illustrated in Figure 1, and can be further elaborated upon in Table 1.

Table 1: Description of Themes.

Themes	Descriptions
Leadership and Vision	The importance of effective leadership in achieving project success was emphasized by all three respondents. Subthemes within this overarching subject include the significance of visionary leadership, the ability to make decisions, and the capacity to meet the various demands of stakeholders. The CEO highlighted the importance of leadership in managing the complexities of defence projects by emphasizing proactive leadership throughout the project's lifecycle, while the Program Directors stressed the need for decision-making authority and setting direction.
Collaboration and Teamwork	The interviews consistently emphasized the importance of collaboration and teamwork. This main theme encompassed sub-themes such as team cohesion, cultivating collaboration and trust, and the significance of having the right individuals at the right time. The CEO stressed the value of blending technological expertise with teamwork, while the Program Directors highlighted the importance of established team dynamics and collaboration for knowledge acquisition. These perspectives underline the crucial role of collaboration in effectively accomplishing project objectives.
Adaptability and Flexibility	The nature of defence projects is characterized by constant changes, demanding adaptability and flexibility. Embracing change, adjusting project goals, and accommodating uncertain requirements are subsidiary themes that encapsulate this concept. The CEO places a high priority on project flexibility, while the Programme Directors concentrate on accepting change and new requirements. This underscores the importance of being able to adapt in order to effectively manage the uncertainties that arise in complex projects.
User-Centricity	The significance of prioritizing user needs and satisfaction was emphasized by all three respondents. This overarching theme

	comprises sub-themes such as prioritizing features with substantial user impact, giving priority to user needs, and fostering user confidence and advocacy. The CEO's strong emphasis on user ownership and delivering value to users through stakeholder alignment, coupled with the Programme Directors' focus on prioritizing user needs and satisfaction, underscores the critical importance of placing users at the core to ensure the relevance and success of the project.
Project Management	The integration of effective project management has emerged as a fundamental necessity for the successful execution of the NCO project. This comprehensive strategy encompasses multiple subthemes, such as resource management and optimization, coordination of project scope and schedule, and alignment of priorities among stakeholders. The CEO's emphasis on prioritizing resource allocation, coupled with the Programme Directors' dedication to harmonizing project scope and schedule, highlights the critical importance of proficient project management in ensuring project success.
Communication	Open and effective communication plays a pivotal role in fostering collaboration, building trust, and ensuring the successful completion of a project. Key components of this include the promotion of communication and empathy, the coordination and transmission of information, and the cultivation of open lines of communication. The emphasis placed by the CEO on delivering user value through stakeholder alignment, coupled with the unwavering commitment of the Programme Directors to fostering communication and empathy, underscores the critical importance of effective communication in achieving project objectives.
Commitment and Responsibility	The data demonstrates a strong level of commitment and responsibility from stakeholders towards the success of the NCO project. The main theme includes various sub-themes, such as unwavering dedication, a gradual increase in commitment, and collaborative efforts to improve the nation. The CEO's emphasis on steadfast dedication, along with the Programme Directors' focus on progressively increasing commitment and working together for the advancement of the national interest, underscores the significance of commitment and responsibility in driving the project's accomplishments.

5.1 Appreciative Inquiry Model Analysis

The subsequent sections will present the findings, structured around the four research questions derived from the AI model: Discovery, Dream, Design, and Destiny. Each section will delve into the key themes and subthemes that emerged, highlighting both the commonalities and unique perspectives of the CEO and Program Directors regarding the most significant attributes contribute to the accomplishment of NCO project.

Discovery Phase (Appreciation of the Best of What Is)

The data reveals that the NCO project places significant emphasis on leadership, collaboration, adaptability, and user-centricity as key strengths. The frequent use of terms such as 'leadership and vision', 'collaboration and teamwork', 'adaptability and flexibility', and 'user-centricity' highlights their importance. For example, the CEO emphasized the significance of active leadership throughout the project's lifecycle, stating, "So, very fortunate … at different stages of the project, we had very active leaders, very suitable leaders at the different stages … Kamarul Zaman happened to come in at the beginning, Sabri comes in towards the end, which was very important for us to implement and deliver… so my job is to make sure we can deliver correctly." This suggests that consistent and involved leadership is essential for navigating the complexities and uncertainties inherent in defence projects.

Although all respondents acknowledged the importance of strong leadership, collaboration, adaptability, and user-centricity, their emphasis varied. The CEO focused more on the strategic aspects, highlighting the importance of long-term value creation and alignment with stakeholders. In contrast, the Program Directors emphasized the operational aspects, such as team cohesion, user adoption, and continuous improvement. For example, the CEO stated, "Because all of us are working on this for the first time, so we are not starting from the same starting line. Some people understand it a bit more, some people don't understand it, and the challenge is how to bring everyone into a common understanding... But the only thing that binds us together was the fact that both of us were very clear about the final thing that we wanted to deliver..". On the other hand, the director emphasized the significance of collective effort in collaboration, adaptability, and user-centricity, stating, "…everybody collectively worked towards the achievement... Not just (company name), not just the project team, not just the user but also to the OEM and the suppliers as well. They.. contribute… for the success of the NCO."

Dream Phase (Imagining What Might Be)

The data reveals the stakeholders' desire for continuous improvement, long-term value creation, and the development of locally-grown capabilities. This is evident in the frequent use of phrases such as 'collaborative learning and continuous improvement', 'prioritizing long-term value over short-term goals', and 'fostering locally-grown capability'. For example, the PD2 emphasized the importance of aligning work with a long-held aspiration, stating, "...how do I visualize the future of MAFNCO… it is going to beneficial to all the services within the MAF and, … their day-to-day life… in their working life as well there's an any mission that they need to conduct or any exercise that they need to plan…". Therefore, these aspirations stem from the satisfaction and fulfilment of achieving goals, as expressed by PD2, who stated, "Hopefully, in 30 years start down the road, I can tell people; tell… younger generations that I have gone through … experiences that are not for everybody."

While all respondents envision a future of growth and evolution for NCO programs, their perspectives differ in focus. The CEO emphasizes scalability and long-term value, while the Program Directors focus on continuous improvement and user engagement. For instance, the CEO mentions, "…our main goal is when you have a very good system, we want to ensure all the features are actually fully utilized by the users…So in phase 1B and the subsequent phases,

my emphasis would be; don't develop any more features …We need to make sure, as a matter of fact, ensure that people understand these features and use that 80 percent of features… moving forward, we have two strategies; one strategy is to ensure that these deep features are extremely used by the users, and second, we expand it, meaning with the same features, we expand it to other geographies, other locations…" while PD1 highlights the importance of continuous training and awareness building, stating, "…being the initiation of a MAFNCO program Phase 1A is to be exposed to commanders both of senior level and junior level…, migrating or rather enhancing C3I into MAFNCO is incumbent … the point is we need to enhance and improve on MAFNCO module including exposures in training establishment…".

Design Phase (Determining What Should Be)

The data reveal areas that need improvement, such as resource allocation, project management, and stakeholder communication. These areas are significant because they are frequently mentioned in phrases like 'prioritizing resource allocation', 'balancing project scope and schedule', and 'reconciling diverse stakeholder expectations'. For instance, the CEO acknowledged the challenge of balancing project scope and schedule, stating, "…sometimes we are always restrained by our dreams. It is always limited by the budget we have and also the time constraints." This suggests that effective project management strategies are crucial for addressing these challenges.

Although all respondents identified areas for improvement, their priorities differed. The CEO focused on strategic issues like resource allocation and stakeholder management, while the Program Directors emphasized operational matters such as project management and user adoption. For example, the CEO mentioned, "… it's not just about the schedule, not just about cost control, not just about technology capability. These are three important ingredients, but don't forget the fourth ingredient, which is actually the people. If people don't agree, don't have chemistry, don't have the same understanding, don't have the same level of trust, any project will not be successful." Meanwhile, PD2 highlighted the importance of balancing adoption and usability, stating, "Users have to conduct that. They have to conduct along with us, … to ensure that they understand … and they need to adopt to it for their day-to-day life after this."

Destiny Phase (Creating What Will Be)

The data indicates that stakeholders are strongly committed to sustaining the positive changes and continuously improving the NCO project. This commitment is highlighted by the frequent use of words like 'dedication', 'growing commitment over time', and 'collective action for national benefit'. For example, the PD1 emphasizes the importance of collective action, stating, "…is national survival…, Malaysian Armed Forces is the government instrument…, national power,… if MAF is not able to do what is supposed to do when the need arises. Then, it is very shameful for national survival." Meanwhile, the CEO emphasizes the importance of dedication and commitment as a collective effort, stating, "…a good project is not built by a single person, it's actually built by a collective team." This suggests a shared sense of responsibility and commitment towards achieving project goals.

All respondents express a commitment to taking action and have a positive outlook for the future. However, they have different perspectives on the way forward. The CEO's emphasis on leadership and strategic decision-making suggests a top-down approach to sustaining the

project's success. This could involve establishing clear goals, providing resources, and making decisions that align with the project's long-term vision. The CEO's hands-on approach throughout the project lifecycle indicates commitment, stating, "…as a CEO is not to program. I understand, I have to challenge my people to program, but at the same time, I need to assist my people". On the other hand, the Program Director's focus on collaboration, user engagement, and continuous improvement suggests a more bottom-up approach. PD3 reflects this, stating, "…team involvement …that shows enthusiasm of individual commanders, staff and also the end users.", "…we need to raise awareness, … they need to be exposed … and to understand command and control in terms of enhancing." and "…who have been trained. They should be given enhanced and continuous training."

5.2 Word Frequency Analysis

The perceptions of the CEO and Programme Directors regarding the critical success factors (CSFs) of the NCO project are disclosed by means of word frequency analysis of the interview transcripts. This analysis focuses on the 50 most frequently used stemmed words of at least three letters, as depicted in Figure 2.

Figure 2. The results of the Word Frequency Analysis.

The analysis identifies recurring themes, which are further discussed in Table 2. These themes emphasize the importance of collaboration, user-centric approach, project management, and the specific challenges encountered in defence projects.

Table 2. Recuring Themes Description on Word Frequency Analysis.

Recurring Themes	Descriptions
Collaboration	The frequent use of terms such as "team," "work," "people," and "involvement" emphasizes the importance of collaboration and teamwork. This indicates that the success of the NCO project heavily relied on efficient coordination and cooperation among diverse stakeholders.
User-Centricity	The prioritization of user needs and comprehension is underscored by the prevalent usage of terms such as "user," "need," and "understand."

	This prominent emphasis signifies the guarantee of fulfilling the demands and expectations of end-users by the NCO system.
Project Management	The significant focus on project management processes is indicated by the presence of words such as "project," "management," "time," "phase," and "development." This implies that meticulous planning, execution, and monitoring were crucial for the success of the project.
Challenges in Defence Projects	Words such as "defence," "different," "must," "learn," and "experience" indicate the unique challenges presented by defence-related projects. To effectively address these challenges, adaptability and continuous improvement are crucial, as emphasized by the emphasis on learning and experience.
Building Capacity for Future Success	The project's commitment to improving capabilities, reaching objectives, and ensuring readiness for the future is underscored by other significant terms such as "capability," "future," "make," and "achievement."

In summary, the use of the AI model has allowed for a comprehensive data analysis, facilitating the extraction and consolidation of multiple perspectives on the successful implementation of NCO initiatives. This process has led to the identification of main themes and sub-themes, which provide a comprehensive representation of developers' experiences and shed light on the factors contributing to their sense of achievement and project success. Incorporating the developers' viewpoint enhances our understanding of the complex dynamics inherent in NCO projects. The thoroughly scrutinized and synthesized data will be thoroughly explored in relation to each research question, providing valuable insights into the diverse nature of project success. By adopting this approach, the conclusions are firmly grounded in empirical evidence, contributing to a better understanding of the factors influencing positive outcomes in NCO programs.

6. Discussion

By utilizing an AI model to analyse the findings of the study, a comprehensive understanding of the successful execution of complex tasks, specifically the NCO project within the MAF and defence sector, is provided. These findings are consistent with previous research in defence complexity, project management, and stakeholder management, highlighting the intricacies and unique challenges involved (Bolzan de Rezende et al., 2021, 2022; Herath & Chong, 2021; Nguyen et al., 2018; Pedrini & Ferri, 2019). The study emphasizes the importance of leadership, collaboration, adaptability, user-centricity, efficient project management, transparent communication, and a shared commitment to objectives. These factors align with the findings of Ciric Lalic et al. (2022), Ika & Pinto (2022), and Pirozzi, (2018), which are significant in the broader literature on project management and success.

Thematic analysis reveals that these insights are not isolated components; instead, they are interconnected and mutually reinforcing. For example, effective leadership, demonstrated by the CEO, plays a critical role in establishing a clear vision and direction, fostering team collaboration and flexibility. The prioritization of user-centricity by the Program Directors

aligns with the scholarly consensus that stakeholder satisfaction is vital for successful projects (Moradi et al., 2020; Shaukat et al., 2022). Additionally, the literature emphasizes the significance of effective project management, communication, and collective commitment to objectives in navigating the complexities of defence projects, particularly regarding NCO implementation. The study takes a comprehensive approach, considering both technical and human-centric factors (Azmat and Siddiqui, 2023). The findings of the study are consistent with previous research highlighting the importance of adaptability and flexibility in NCO programs, given the ever-evolving technological landscape and dynamic nature of military operations.

RQ1: How do stakeholders contribute to success in NCO projects?

The findings of this study demonstrate the crucial role played by stakeholders in the success of NCO projects. These stakeholders provide valuable contributions in terms of strategic leadership, operational expertise, and dedicated focus on meeting the demands of end-users. Specifically, this research examines the influence of executives, including the CEO, in shaping the strategic vision and advocating for the capabilities offered by NCO. Furthermore, they ensure that these capabilities are aligned with the broader objectives of the defence organization. The executives also provide comprehensive guidance to ensure that the project remains in line with the strategic goals of the organization. On the other hand, Program Directors serve as the operational foundation by translating strategic objectives into tangible outcomes. Their primary responsibility lies in overseeing the technical execution, integration, and rollout of NCO systems, while ensuring that the technology adequately fulfils the needs of end-users. This highlights the significance of a collaborative effort between strategic leadership and technical expertise, wherein leaders establish the course of action and Program Directors address the implementation challenges that may arise.

RQ2: How do they envision the future of NCO programs?

In reflecting on the perspective of developers regarding the effective handling of challenges in contemporary warfare, stakeholders assert that NCO programs necessitate continuous development. They emphasize the importance of consistently improving these programs to maintain a competitive advantage through adaptability and innovation. Their focus on interoperability, information sharing, and real-time decision-making illustrates their forward-looking approach to defence operations. Placing importance on the significance of "learning" underscores the need to adapt to new circumstances and devise innovative solutions to keep up with the rapidly evolving global technology landscape.

RQ3: What are their interests in NCO projects?

The interests of stakeholders in NCO programmes vary depending on their specific roles and responsibilities. Leaders prioritize the strategic impact of these projects, ensuring that they effectively contribute to the overall operational effectiveness and strategic goals of the MAF. Their main focus is on the broader framework, ensuring that the project aligns with the organization's long-term strategy and goals. Programme Directors, in addition to their strategic focus, are strongly committed to the technical achievement of NCO systems. Their primary

focus is on ensuring the reliability, safety, and user-friendliness of these systems for military use in operations. The difference in focus emphasizes the importance of understanding and aligning the diverse interests of stakeholders to ensure project success.

RQ4: What engagement strategies are needed to support NCO programs?
Efficient engagement strategies for NCO programs involve prioritizing past achievements, promoting collaboration, and recognizing successes. By highlighting positive qualities and nurturing an inspiring environment, stakeholders perceive value and agency, which leads to greater commitment and responsibility. Equally important is establishing trust and dedication among stakeholders through open communication channels, transparent decision-making processes, and opportunities for knowledge exchange. Fostering a positive and cooperative atmosphere inspires stakeholders to actively participate, generate innovative ideas, and work towards a shared objective, ultimately contributing to the success of NCO programs.

7. Limitations and Future Research

Recognizing the limitations of this study, such as the small sample size and focus on a single case study, is crucial. Nevertheless, the AI model has produced qualitative data that provides valuable insights into developers' perspectives on the successful implementation of NCO projects. To further explore these findings, future research could investigate NCO initiatives in diverse settings, consider the viewpoints of different stakeholders, and employ mixed-methods approaches to validate the results. This research will enhance our understanding of the factors that contribute to the success of NCO projects and enable the development of more effective strategies for the application of this innovative military approach.

8. Conclusion

This study comprehensively analyses the successful implementation and completion of NCO projects within the MAF. By employing a strategic mindset, the study delves into the perspectives and practical experiences of key individuals involved in a thriving NCO initiative. The findings highlight a range of interconnected factors, including effective leadership, collaboration, adaptability, user-centricity, effective project management, open communication, and a shared commitment to achieving objectives. While these factors align with existing project management literature, they acquire distinct characteristics when applied to defence projects, particularly within the unique operational and cultural context of the MAF.

The implications of this study extend beyond the MAF and provide valuable insights for other defence organizations embarking on NCO initiatives. By prioritizing key factors, cultivating a collaborative and adaptable project culture, aligning stakeholder interests, and harnessing the strengths of AI, defence organizations can enhance their prospects of successfully implementing NCO in the face of complexity. This research not only enriches scholarly comprehension of defence project management but also offers practical strategies for practitioners to navigate the dynamic landscape of network-centric warfare in the future.

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