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Research-in-Progress

Bibliometric Analysis on Defence Forces Management Research Using Scopus for the Period of 2010-2024

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ABSTRACT

This study presents a comprehensive bibliometric analysis of research on defence force management, examining the funding sources, document types, leading journals, authorship networks, and subject areas contributing to this field. The data for this bibliometric analysis was retrieved from the Scopus database for the period of 2010-2024. 1495 records were retrieved and analysed in this study. The U.S. Department of Defence emerges as the top sponsor, with 16 publications focused on enhancing military management, followed by the National Institutes of Health with 13 publications, reflecting the growing intersection between military operations and health. The analysis reveals a diverse funding landscape, involving international and health-related organizations, highlighting the interdisciplinary nature of this field. Publications are predominantly articles (54.7%), followed by conference papers (27.6%), with key contributors such as Greenberg, N. and Cohen, S.P. playing significant roles in shaping the research landscape. The study also tracks publication trends, showing a significant rise in research output between 2016 and 2020, followed by a decline from 2021 onwards. The subject areas include Medicine, Engineering, Social Sciences, and Computer Science, emphasizing the holistic approach required for managing modern defence forces. Research in medical and psychological management, energy efficiency, and disaster response has been particularly prominent in recent years, reflecting the on-going evolution of defence force management research.

Keywords: Bibliometrics, Scientometrics, Strategic Management, Scopus, Military, Defence Forces.

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INTRODUCTION

Defence Force Management refers to the structured and strategic process of planning, organizing, staffing, directing, and controlling the activities and resources of military organizations to achieve national security objectives in both peacetime and wartime contexts (Balathandayutham & Muralidharan, 2021; De Ridder & Wotela, 2023; Susdarwono, 2022). It encompasses a wide range of responsibilities, including personnel management, resource allocation, procurement, operational planning, and strategy formulation. The goal is to ensure military efficiency, institutional readiness, and adaptability in response to evolving threats (Balathandayutham & Muralidharan, 2021; Susdarwono, 2022; Mohylevska, 2024).

A key characteristic of effective defence forces management is the integration of military structures with economic, educational, technological, medical, and engineering subsystems (De Ridder & Wotela, 2023; Mohylevska, 2024; Kennedy, 2016; Keathley-Herring *et al.*, 2021). This requires clearly defined command hierarchies, the application of strategic planning, and alignment of defence objectives with available resources. The implementation of performance measurement systems, transparency mechanisms, and accountability structures is essential for maintaining institutional effectiveness (Keathley-Herring *et al.*, 2021; Rova & Lundberg, 2021). At the same time, the sector must navigate on-going challenges such as organizational reforms, resource constraints, and the integration of innovation in engineering and medical readiness (Curtis, 2024; Girardi, 2024).

Leadership plays a central role in shaping human resource development, guiding educational programs, and fostering operational excellence across all levels of command (Kustiawan & G., 2025). In addition, medical management-particularly related to trauma care, psychological readiness, and battlefield recovery-is a growing focus area within modern defence research (Greenberg, as cited in Keathley-Herring *et al.*, 2021). Engineering support systems, including energy management, logistics, and infrastructure, are also increasingly emphasized in both research and strategic planning (Girardi, 2024). Altogether, Defence Force Management represents a foundational pillar for

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building and sustaining a credible, capable, and adaptive military force equipped to meet diverse and dynamic security challenges (Balathandayutham & Muralidharan, 2021; Susdarwono, 2022; Mohylevska, 2024). This study was needed because no proper study on defence forces management exists, as it does not show how different sources are influencing this.

Bibliometric analysis is a method used to evaluate and measure research trends, scholarly outputs, and the development of specific fields through the examination of publications, citations, and other academic data. In the context of defence, army, or navy management, this type of analysis offers a comprehensive view of the evolution, impact, and future directions of research in these areas. This type of analysis can give priorities that are strategic, technologically advanced, and have the best organizational practice, which can shape the face of the defence sector. This study can help policymakers gain insights into emerging areas such as cybersecurity, logistics management, strategic planning, and leadership in military contexts.

Defence forces management-encompasses elements such as resource allocation, personnel training, logistics, and technological integration, which requires a holistic understanding of scholarly work and research outputs in this field. Bibliometric analysis can help in pointing out research articles, authors, and institutions that contribute significantly to the defence sector. Also, it can help in recognizing interdisciplinary connections with fields like technology, cybersecurity, leadership, medicine, and logistics, offering a multi-dimensional view of defence and military management.

By evaluating existing research through a bibliometric analysis, one can find trends, gaps, and opportunities for future studies, providing a clearer direction for defence forces management strategies. Such an analysis is very important for future innovation and maintaining an edge in the global security and defence sector.

Objectives of the Study

The primary goal of this bibliometric analysis is to map and evaluate the research landscape in the field of *Defence Force Management*. The study is to find and provide insights into the publication trends, influential sources, year wise growth of publications, and research impact in this strategic area. The specific objectives of the study are as follows:

1. To Identify Key Funding Sponsors and Contributing Institutions

- To analyse the institutional affiliations of authors contributing to defence force management literature.
- To identify major funding agencies and defence-related organizations (national/international) supporting research in this domain.

2. To Classify and Examine the Types of Documents Published

- To categorize the different types of publications, such as research articles, reviews, conference papers, policy briefs, technical reports, and book chapters.

3. To Determine the Most Preferred and Influential Sources

- To identify the leading journals, conferences, and publishers that are most frequently chosen for publishing in the domain of defence forces management.
- To assess journal impact (through metrics like Cite Score, SJR, *h*-index, etc.) and publication frequency on the topic.

4. To Highlight the Most Influential Authors and Research Contributors

- To rank top authors by productivity (number of publications), citations, and *h*-index in the field of defence force management.
- To identify leading experts and thought leaders shaping the discourse.

5. To Analyse the Year-wise Growth of Publications

- To study the temporal growth of literature over the past decades.
- To detect any significant surges in publication activity, particularly during periods of military conflicts, global crises, or strategic defence shifts.

6. To Map the Subject Area Distribution of Defence Forces Management Research

- To classify research under broad subject areas such as Military Science, Strategic Studies, Public Administration, Policy Analysis, Operations Research, etc.
- To analyse the interdisciplinary nature of research combining defence with economics, sociology, psychology, and data science.

7. To Conduct a Citation and Impact Overview

- To identify highly cited papers and assess the average citations per document.
- To evaluate global citation trends and country-wise citation distributions.
- To examine the relationship between funding, publication type, and citation impact.

LITERATURE REVIEW

Recent literature on defence logistics reveals a multidimensional landscape involving procurement systems, stakeholder management, and civil-military coordination. Desticioglu and Ayan (2022) highlight the growing academic interest in defence procurement by examining its integration within broader supply chain frameworks, emphasizing the complexity of acquiring systems like tanks, warplanes, and electronic equipment. Keathley-Herring *et al*., (2024) contribute to this discourse by focusing on strategic stakeholder management in the defence sector, advocating a shift from bilateral relationships to ecosystem thinking and emphasizing the importance of engagement capabilities to manage diverse interests. Hellberg and Antai (2023) discussed logistics collaboration between the military and civil sectors within a Total Defence (TD) framework. They have used Sweden's COVID-19 response as a case study to show the gap between theoretical logistics points and practical applications. Meanwhile, Solanki *et al*., (2023) analyse the relationship between defence expenditure and economic development through a bibliometric study, finding significant contributions from the USA, China, and Greece, and has highlighted key research clusters and most influential authors. Together, these studies show that defence logistics has evolved beyond traditional operational concerns and has strategic, economic, and systemic considerations, though further empirical integration between theory and field practice remains necessary for further advancements.

A bibliometric analysis of military medicine gives us an important and rapidly evolving field that connects innovations from battlefield care to civilian healthcare and public health. Research highlights the significant impact of military medicine on trauma care, with advances developed during conflicts-such as in Afghanistan and Iraq-leading to dramatic reductions in battlefield mortality and thereby helping civilian medical practices and systems informed (Kellermann, Kotwal, & Rasmussen, 2023). The literature also emphasizes the unique challenges faced by military medicine, including the need to maintain combat readiness during peacetime, adapt to emerging threats like climate change, and address both physical and mental health in diverse and extreme conditions (Wang & Seah, 2022). Recent systematic reviews show growing interest in value-based healthcare within military systems, though standard terminology and benchmarking practices are still developing (Van Der Wal, Hazelzet, Engel, Hoencamp, & Duijnkerke, 2024). The field is increasingly interdisciplinary, covering topics from trauma and internal diseases to environmental and occupational health, and is shaped by both technological advances and shifting geopolitical landscapes (Shao *et al*., 2021). Despite its progress, military medicine faces on-going challenges in knowledge translation, skill retention during peacetime, and preparing for future threats, underscoring the need for continued research and collaboration between military and civilian sectors (Khorram-Manesh, Sinai, Robinson, Taube, & Arvidsson, 2023).

The addition of advanced analytical methods in military research for decision making is increasing. This helps defence personnel in giving good scholarly attention, with bibliometric studies highlighting the growing relevance of Multicriteria Decision Analysis (MCDA), Machine Learning (ML), and thematic mapping tools in the field of defence domain. De Araújo Costa *et al*., (2022) gives much emphasis on the strategic role of MCDA-particularly the Analytic Hierarchy Process (AHP)-in improving decision-making across tactical, operational, and strategic military levels. Their findings from Scopus and Web of Science databases show that AHP is the most widely used method for solving complex military problems due to its structured approach and ease in adaptation. Similarly, Carrasco, Latorre, and Galán (2022) examine the application of machine learning in the military sector, demonstrating how Machine Learning architectures can process large datasets to support predictive decision-making and virtual scenario planning. Using tools like SciMat, Excel, and VOSviewer, their bibliometric analysis helps conceptualize how Machine Learning can be taken from civilian frameworks to defence sectors use. Marsetio *et al*., (2025) explore how VOSviewer-based bibliometric mapping can be used to track the evolving role of the military in national development. Their findings suggest that the military field is interdisciplinary in nature and provides cross-domain research integration. Collectively, these studies highlight the growing methodological sophistication in military research and underscore the importance of bibliometric analysis in identifying knowledge gaps, methodological trends, and research opportunities within the defence-related field.

Defence research is increasingly evolving by thematic diversity and interdisciplinary integration; here bibliometric studies play a vital role in analysing the knowledge domains integration. Cybersecurity have mapped the integration of artificial intelligence, blockchain, quantum computing, and machine learning into military systems, revealing not only technological progress but also growing complexity in governance, threat modelling, and international cooperation (Selmic, Fard, & Khorasani, 2023; Ansar *et al*., 2023; Cho & Kim, 2025). These studies also emphasize the adoption of layered defence strategies and the emergence of open-source tools as cost-effective alternatives (Hadi *et al*., 2024).

Parallel developments are visible in military analytics, where decision-support methodologies such as the Analytic Hierarchy Process (AHP) and thematic mapping tools like VOSviewer and SciMat have been used for military operations, strategic planning, and capability development (De Araújo Costa *et al*., 2022; Carrasco, Latorre, & Galán, 2022). These tools are increasingly used to translate vast datasets into actionable intelligence data,

particularly within contexts demanding predictive precision and rapid situational awareness.

Further, military medicine is also one of the major dynamic subfields with bibliometric reviews documenting its dual role in battlefield innovation and public health. Studies have traced its impact on trauma care, climate readiness, and mental health—while also highlighting gaps in value-based care benchmarks and knowledge translation during peacetime (Kellermann, Kotwal, & Rasmussen, 2023; Wang & Seah, 2022; Van Der Wal *et al*., 2024). Likewise, the domain of defence logistics has expanded from procurement and supply chain mechanics to include stakeholder ecosystems, civil-military coordination, and the strategic lessons drawn from emergency responses, such as Sweden's total defence approach during COVID-19 (Desticioglu & Ayan, 2022; Keathley-Herring *et al*., 2024; Hellberg & Antai, 2023).

Need for this study

Despite these valuable contributions, a critical gap in existing bibliometric and scientometric studies are predominantly domain-specific, offering deep but narrow insights into discrete areas such as cybersecurity, medicine, logistics, or analytics. What remains missing is a comprehensive bibliometric analysis of "Defence Forces Management" as an integrated field—one that unifies operational, technological, strategic, medical, and logistical aspects under a broader scientific umbrella.

The current study addresses this void by focusing on funding sources, publication types, disciplinary convergence, author collaboration networks, and institutional affiliations within defence forces management literature. This macro-level exploration is intended to identify structural patterns, trace the evolution of scholarly activity, and assess the interdependence between research sectors. In doing so, it offers a consolidated view of how defence forces management knowledge is produced, disseminated, and utilized-providing actionable insights for researchers, policymakers, funding agencies, and defence organizations.

A bibliometric study of this scope is essential for identifying underexplored research clusters, informing future funding directions, fostering cross-disciplinary collaboration, and optimizing the alignment between academic research and practical defence imperatives. By studying scholarly landscapes in the defence sector, this study contributes to the strategic development of defence forces management as a coherent, data-driven, and policy-relevant research field.

METHODOLOGY

a) **Data Source:** The data for this bibliometric analysis was retrieved from the Scopus database for the period of 2010-2024. 1495 records were retrieved and analysed in this study.

b) **Keywords Used:** The search was conducted using the keywords "defence force" OR "military" AND "management" to capture relevant research in the field of military force management.

c) **Analysis Focus:** The study involved analysing various parameters including funding sources, publication types, leading journals, citation counts, authorship impact, and collaboration networks. Additionally, subject areas and year-wise trends in publications were examined to understand the growth and focus of the research overtime.

d) **Tools Used:** Bibliometric analysis tools such as Cite Score, SCImago Journal Rank (SJR), and Source Normalized Impact per Paper (SNIP) were used to assess journal impact. Author metrics like citation counts, H-Index, and co-author networks were also analysed to identify key contributors and VOSviewer.

This structured approach provides a comprehensive view of the research landscape in Defence Force Management, focusing on the intersection of military operations, health, and technological advancements.

FINDINGS AND DISCUSSION

Table 1 indicates the funding sources for research publications, with a particular emphasis on defence force management across various military branches, such as the army, navy, and air force, alongside health-related sponsors. The U.S. Department of Defence emerges as the leading sponsor with 16 publications, reflecting its significant role in supporting research relevant to military force management. This high count aligns with the department's focus on managing military advancements, operational efficiency, resource allocation, and the modernization of defence technologies. Similarly, the National Institutes of Health (NIH), with 13 publications, shows the growing intersection of military management and health, emphasizing the role of medical research in maintaining the welfare and operational readiness of military personnel. Other health organizations such as the National Institute of Diabetes and Digestive and Kidney Diseases (8 publications) and the U.S. Department of Health and Human Services (7 publications) underscore the importance of health-related research in the effective management of defence forces.

The presence of international organizations such as the Ministry of Defence (6 publications) and the National Natural Science Foundation of China (6 publications) highlights the global nature of defence force management research, with an emphasis on cross-border collaboration in military management practices. European entities like the European Commission and specific defence-related organizations such as Defence Advanced Research Projects Agency (DARPA) contribute to a diverse

funding landscape, reflecting the importance of managing military innovations, logistics, and strategic planning. Meanwhile, research sponsored by health and behavioural agencies, such as the National Center for Complementary and Integrative Health and the Office of Behavioural and Social Sciences Research, underscores the interdisciplinary nature of modern defence force management, merging operational and technological advancements with human-centric studies focused on soldier health, performance, and psychological wellbeing.

Figure 1 shows that articles are the most prominent document type, accounting for 54.7% (832 publications), reflecting the preference for detailed scholarly work in this field. Conference papers follow with 27.6% (419 publications), indicating active participation in defence-related academic and professional conferences. Book chapters and reviews make up smaller portions, with 6.7% and 6%, respectively, highlighting their role in comprehensive discussions and literature analysis. Other types, such as books, short surveys, and editorials, each contribute less than 1%, indicating limited but valuable contributions in niche areas of defence forces management research.

Table 2 enlists various sources that publish research in the field of defence force management. The Military Medicine journal leads in terms of the number of publications with 104, having a decent Cite Score of 2.2, an SJR (SCImago Journal Rank) of 0.5, and a SNIP (Source Normalized Impact per Paper) of 0.797, reflecting its prominent role in military-related health management research. The Journal of the Royal Army Medical Corps follows with 26 publications and a Cite Score of 1.5, though its SNIP data is unavailable. Other sources like the Proceedings of IEEE Military Communications Conference (MILCOM) have significant contributions (16 publications) with a Cite Score of 1.5 and an SJR of 0.265, indicating its focus on the technological and communication aspects of military management. The Journal of Military Medicine stands out with a high Cite Score of 2.6, highlighting its impact in defence health management, despite a relatively lower number of publications (14). Among specialized defence and engineering publications, the BMJ Military Health has a strong Cite Score of 3.1, indicating high-quality research, while the Naval Engineers Journal shows contributions in engineering but lacks citation metrics (blank Cite Score). Another important source, Military Psychology, contributes significantly to research in psychological aspects of military management, with a solid Cite Score of 2.3. Lastly, sources like Computers and Industrial Engineering have a remarkably high Cite Score of 12.7, reflecting the growing intersection of advanced computing and industrial management in defence operations. These diverse sources reflect a broad scope of research in Defence Force Management, spanning health, engineering, technology, and psychology.

Table 3 reflects a detailed list of authors contributing to defence force management research, showcasing their influence (citations) and collaboration efforts (co-authors). Greenberg, N. stands out with an impressive citation count of 24,841, highlighting his significant impact in this field, supported by a high H-Index of 61 and a large network of 580 co-authors. Similarly, Cohen, S.P. with 19,581 citations has a notable influence with an H-Index of 71 and 878 co-authors, reflecting a wide collaborative reach. Williamson, D.A. also shows considerable influence with 16,782 citations, supported by a high H-Index of 64 and a vast collaborative network of 2,763 co-authors. In contrast, some authors like Gong, P. and Mei, Z. have fewer citations, indicating a smaller impact or possibly more recent contributions to the field. Other notable contributors include Rasmussen, T.E., with a remarkable 14,148 citations and an H-Index of 57, emphasizing significant research output and collaborations with 1,171 co-authors. Overall, this list highlights diverse contributions from various authors with significant variations in citations and collaboration networks,

Table 1: Number of Documents by Top 22 Funding Sponsors.

Sl. No.	Funding Sponsors	Publication
1	U.S. Department of Defence	16
2	National Institutes of Health	13
3	National Institute of Diabetes and Digestive and Kidney Diseases	8
4	U.S. Department of Health and Human Services	7
5	Ministry of Defence	6
6	National Natural Science Foundation of China	6
7	National Center for Complementary and Integrative Health	5
8	Office of Behavioral and Social Sciences Research	5
9	U.S. Army	4
10	European Commission	3
11	Office of Research and Development	3
12	U.S. Air Force	3
13	U.S. Department of Veterans Affairs	3
14	Agency for Defence Development	2
15	Air Force Institute of Technology	2
16	Congressionally Directed Medical Research Programs	2
17	Defence Advanced Research Projects Agency	2
18	National Science Foundation	2
19	U.S. Army Corps of Engineers	2
20	U.S. Army Medical Command	2
21	U.S. Army Medical Research and Development Command	2
22	U.S. Department of Energy	2

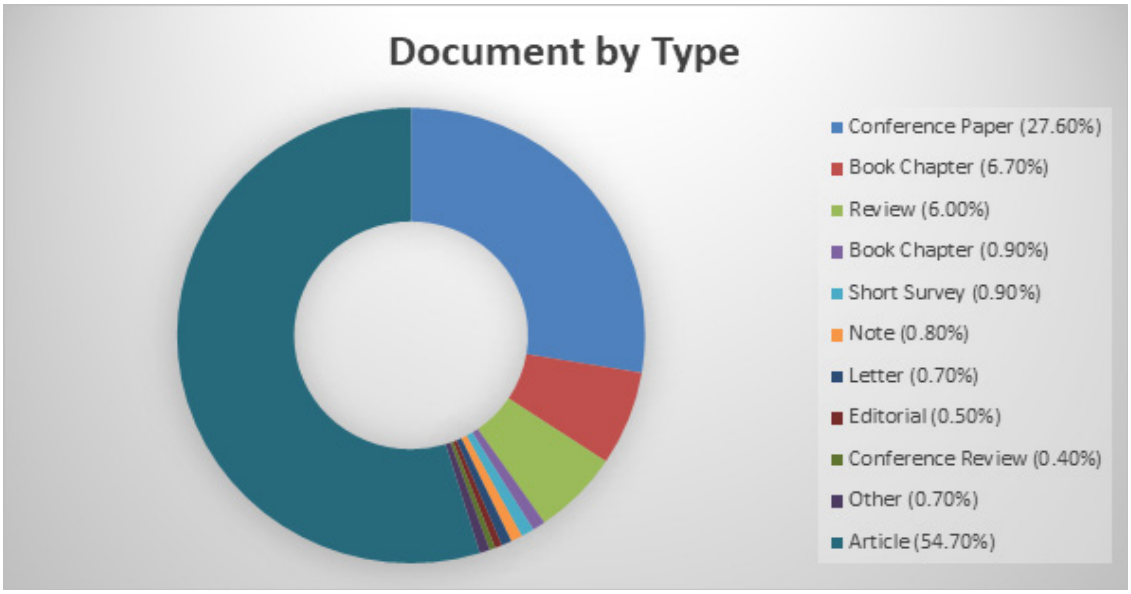

Figure 1: Distribution of Documents by Publication Types.

Table 2: Highly Preferred Sources of Publications.

Sl. No.	Source Title	No. of Publications	Cite Score	SJR	SNIP
1	Military Medicine	104	2.2	0.5	0.797
2	Journal of the Royal Army Medical Corps	26	1.5	0.217	NA
3	Proceedings IEEE Military Communications Conference MILCOM	16	1.5	0.265	0.408
4	Lecture Notes in Electrical Engineering	15	0.7	0.147	0.145
5	Journal of Military Medicine	14	2.6	0.271	0.301
6	Proceedings of SPIE the International Society for Optical Engineering	12	0.5	0.152	0.202
7	BMJ Military Health	8	3.1	0.428	0.819
8	Military Engineer	8	0	0.101	0
9	Naval Engineers Journal	8	NA	0.149	0.467
10	SAE Technical Papers	8	1	0.207	0.356
11	Voenno Meditsinskii Zhurnal	8	0.1	0.101	NA
12	Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics	7	NA	NA	NA
13	Military Psychology	7	2.3	0.432	0.727
14	United States Armed Forces Medical Journal	7	NA	NA	NA
15	AIAA IEEE Digital Avionics Systems Conference Proceedings	6	1.7	0.311	0.669
16	Autotestcon Proceedings	6	0.4	0.125	0.363
17	Journal of the Royal Naval Medical Service	6	0.3	0.115	NA
18	Journal of Trauma and Acute Care Surgery	6	6	1.317	1.636
19	Pharmaceutical Care and Research	6	0.1	0.106	0.074
20	Advanced Materials Research	5	NA	0.121	0.182

Table 3: Ranking of Authors Based on Publications.

Sl. No.	Author Name	No. of Publications	No. of Citations	Overall H Index	No. of Co- Authors
1	Gong, P.	8	8	1	31
2	Mei, Z.	8	11	1	33
3	Breeze, J.	7	13066	21	220
4	Wu, W.	7	4	1	18
5	Cao, K.	6	1	1	15
6	Tao, Y.	6	3	1	23
7	Bartczak, S.E.	5	167	5	23
8	Forgionne, G.A.	5	954	17	49
9	Greenberg, N.	5	24841	61	580
10	Mathieu, L.	5	901	16	227
11	Afari, N.	4	4936	36	622
12	Cohen, S.P.	4	19581	71	878
13	England, E.C.	4	110	5	15
14	Kerns, R.D.	4	6663	37	814
15	Midwinter, M.J.	4	6922	37	861
16	Rasmussen, T.E.	4	14148	57	1171
17	Shahin, M.Y.	4	798	9	50
18	Suppa, A.	4	6	1	6
19	Williamson, D.A.	4	16782	64	2763
20	Zardini, A.	4	1671	18	64

reflecting their varying roles and impact within Defence Force Management research.

Table 4 reveals significant growth, particularly in recent years. It also shows a comparison of publication counts along with the percentage increase or decrease for selected years compared to the previous year. Insights from the Year-wise Growth Data:

a) **Significant Growth Periods:** The year 2017 saw an enormous 1325% growth over 2016, suggesting a sudden spike in research activity, possibly linked to new global security challenges or advancements in military technology.

b) **Steady Growth (2018-2020):** From 2018 to 2020, publications grew steadily, peaking in 2020 with an 11.1% increase over 2019, possibly reflecting a focus on logistics and management challenges during the pandemic.

c) **Recent Decline (2021-2024):** A drop in publication numbers is noted in 2021 (a decrease of 36.2% from 2020) and again in 2024 (a 47.3% decrease from 2023), indicating potential shifts in research focus or other influencing factors like reduced funding or shifting defence priorities.

This analysis highlights that while defence force management research experienced robust growth during certain periods, recent years have seen a decline in output, suggesting the need to explore factors influencing this trend.

Table 5 reflects the distribution of defence forces management publications across various subject areas. A significant portion of research is concentrated in Medicine with 519 publications, suggesting a strong focus on military health and medical management. Engineering follows closely with 427 publications, highlighting the critical role of technological advancements and systems management in defence operations. The Social Sciences (251 publications) and Computer Science (195 publications) also play substantial roles, indicating the importance of understanding human factors and leveraging digital technologies in defence forces management. Fields like Business Management and Accounting (129 publications) and Environmental Science (99 publications) suggest attention to logistical, financial, and environmental aspects of managing defence forces. Additionally, areas like Psychology (54 publications) and Decision Sciences (50 publications) reflect the growing interest in human behaviour, decision-making processes, and strategic planning in military settings. Smaller but important contributions are seen in Economics, Econometrics, and Finance (38 publications), Energy (37 publications), and Materials Science (30 publications), which are essential for sustaining defence operations and innovation. Specialized areas like Neuroscience, Pharmacology, and Chemical Engineering have fewer publications but are likely focused on niche aspects related to military personnel's well-being and technological enhancements. This diverse range of subject areas shows the interdisciplinary nature of defence forces management

research, addressing medical, technical, social, and environmental challenges faced by modern military forces.

Table 6 provides a citation overview of highly cited articles on defence forces management research. Table 6 also reflects the publications' major focus areas, showing the growing interest in military-specific topics such as stress management, medical treatments, energy management, and disaster response. A few key observations include:

- **Focus on Medical and Psychological Management:** Several studies focus on the management of health-related issues like trauma, brain injury, and vascular injuries in military personnel. For instance; Virtual reality applications for stress management training in the military has shown consistent growth from 2016 to 2024, with a total of 122 publications, indicating a strong focus on psychological management in military training.
- **Energy Management:** The topic Optimized energy management system to reduce fuel consumption in remote military micro-grids reflects a growing interest in sustainability and efficient resource use, particularly from 2018 to 2024, with a total of 90 publications.
- **Disaster and Crisis Management:** Research such as Perceptions of knowledge of disaster management among military and civilian nurses in Saudi Arabia highlights the focus on disaster preparedness and crisis management, showing steady growth from 2015 onwards, culminating in 77 total publications.
- **Trauma and Injury Management:** Topics related to trauma and injury, such as Management of unilateral cervical radiculopathy in the military and the complete management of extremity vascular injury in a local population also show significant contributions, reflecting the military emphasis on improving medical outcomes for personnel.

In total, the publication trends demonstrate a broadening of defence forces management research, especially in medical, psychological, and operational management, indicating a comprehensive approach to managing the various challenges faced by modern military forces.

Term Co-Occurrence Mapping Using VOSviewer

To identify thematic patterns and conceptual structures within the literature, a term co-occurrence analysis was conducted using VOSviewer (version X.X). The data source was the Scopus database, and terms were extracted from the Title and Abstract fields of the publications. The analysis adopted the full counting method, which assigns equal weight to each co-occurrence of a term across documents. A minimum occurrence threshold of 10 was set, and 749 terms met this criterion. VOSviewer's default setting was applied to select the most relevant 60% of terms, resulting in 449 terms being included in the final visualization.

Major Term Clusters and Link Strengths

VOSviewer visualizes not only the frequency of terms but also their Total Link Strength (TLS), a metric that indicates how strongly a term co-occurs with other terms in the dataset. The key findings are summarized below:

1. Management System

- Occurrences: 249; Total Link Strength (TLS): 1913.
- Associated Terms: Officer, Soldier, Capability.
- Interpretation: "Management system" is a core organizational term, linked with administrative and personnel-related functions in military settings.

2. Patient

- Occurrences: 568; TLS: 10,368 (highest among all terms).
- Associated Terms: Technology, Vascular Injury, Casualty, Military Hospital, Intervention.
- Interpretation: The term "patient" dominates the network, particularly in the context of military medicine, trauma response, and advanced clinical interventions.

3. Disaster Management

- Occurrences: 64; TLS: 711.

Table 4: Year-Wise Distribution of Publications in Defence Force Management.

Year	No. of Publications	% Increase/Decrease
2010	52	15.6% (from 2009)
2011	59	13.5% (from 2010)
2012	51	-13.6% (from 2011)
2013	54	5.9% (from 2012)
2014	52	-3.7% (from 2013)
2015	43	-17.3% (from 2014)
2016	4	-90.7% (from 2015)
2017	57	1325% (from 2016)
2018	58	1.7% (from 2017)
2019	72	24.1% (from 2018)
2020	80	11.1% (from 2019)
2021	51	-36.2% (from 2020)
2022	74	45% (from 2021)
2023	74	0% (from 2022)
2024	39	-47.3% (from 2023)

- Associated Terms: Network, Disaster Preparedness, Nurse.
- Interpretation: Highlights a public health and emergency response dimension within the defence healthcare system.

4. Stress

- Associated Terms: Technology, Anxiety, COVID, Pandemic.
- Interpretation: Represents psychosocial aspects, especially in the context of global health emergencies and digital workplace stressors.

5. Military Personnel

- Occurrences: 122; TLS: 2096.
- Associated Terms: Technology, Stress, Treatment, Injury, Patient.
- Interpretation: Indicates strong links between military service, occupational health risks, and technological interventions.

6. Soldier

- Occurrences: 127; TLS: 1779.
- Associated With: Management System, Stress, Treatment.
- Not Associated With: Technology.
- Interpretation: Though associated with core operational themes, "soldier" lacks strong connections to digital terms, suggesting a possible thematic gap between field-level personnel and emerging technologies.

7. Military Hospital

- Occurrences: 85; TLS: 1283.
- Associated Terms: Human Resource Management, Disaster.
- Interpretation: Combines administrative and clinical preparedness aspects in response to emergencies and personnel welfare.

Emerging Terms and Relevance Scores

VOSviewer applies a relevance score to filter and display the most meaningful terms in the visualization. Even with low occurrences, some terms demonstrate high conceptual importance, suggesting specialized or emerging research areas as shown in Table 7. Relevance scores indicate how conceptually central a term is to the field, even if its frequency is lower.

Findings of Co-occurrence Network Insights

- The most dominant thematic node was "patient", with the highest TLS and co-occurrence frequency, indicating intensive research in military healthcare and trauma intervention.
- Terms like "stress", "disaster management", and "military hospital" highlight the multidimensional challenges in military environments — from psychological well-being to operational response.
- The absence of strong technological association with the term "soldier" reveals a possible disconnect in literature between frontline operations and digital integration.
- Emerging topics such as "performance management", "big data", and "sustainable development" indicate a shift toward modern, strategic, and data-driven approaches in defence forces management and health systems.

Table 5: Top Subject Areas.

Sl. No.	Broad Subject Area	No. of Publications
1	Medicine	519
2	Engineering	427
3	Social Sciences	251
4	Computer Science	195
5	Business Management and Accounting	129
6	Environmental Science	99
7	Arts and Humanities	75
8	Mathematics	64
9	Psychology	54
10	Decision Sciences	50
11	Earth and Planetary Sciences	49
12	Economics Econometrics and Finance	38
13	Energy	37
14	Physics and Astronomy	33
15	Materials Science	30
16	Agricultural and Biological Sciences	27
17	Health Professions	27
18	Nursing	27
19	Biochemistry Genetics and Molecular Biology	14
20	Pharmacology Toxicology and Pharmaceutics	13

Table 6: Citations Overview of Highly Cited Articles.

Sl. No.	Article Title	Year of Publication	Total Citations
1	Virtual reality applications for stress management training in the military.	2016	122
2	Plant uptake of trace elements on a Swiss military shooting range: Uptake pathways and land management implications.	2008	96
3	The effects of supportive management and job quality on the turnover intentions and health of military personnel.	2007	93
4	Optimized energy management system to reduce fuel consumption in remote military microgrids.	2017	90
5	Management of unilateral cervical radiculopathy in the military: the cost effectiveness of posterior cervical foraminotomy compared with anterior cervical discectomy and fusion.	2010	88
6	A cluster randomized controlled trial to determine the efficacy of Trauma Risk Management (TRiM) in a military population.	2010	87
7	The complete management of extremity vascular injury in a local population: A wartime report from the 332nd Expeditionary Medical Group/Air Force Theater Hospital, Balad Air Base, Iraq.	2007	87
8	Official position of the military TBI task force on the role of neuropsychology and rehabilitation psychology in the evaluation, management, and research of military veterans with traumatic brain injury.	2008	84
9	Force Management Decision Requirements for Air Force Tactical Command and Control.	1981	81
10	Echelons of Care and the Management of Wartime Vascular Injury: A Report From the 332nd EMDG/Air Force Theater Hospital, Balad Air Base, Iraq.	2006	80
11	A randomized controlled trial of piroxicam in the management of acute ankle sprain in Australian Regular Army recruits: The Kapooka ankle sprain study.	1997	80
12	Presentation, diagnosis, mechanisms of injury, and treatment of soldiers injured in Operation Iraqi Freedom: An epidemiological study conducted at two military pain management centers.	2005	78
13	Perceptions of knowledge of disaster management among military and civilian nurses in Saudi Arabia.	2015	77
14	Post-traumatic renal insufficiency in military casualties. II. Management, use of an artificial kidney, prognosis.	1955	70
15	The Burden and Management of Sports-Related Musculoskeletal Injuries and Conditions Within the US Military.	2014	66
16	Military- and sports-related mild traumatic brain injury: Clinical presentation, management, and long-term consequences.	2013	61
17	Feasibility of damage control surgery in the management of military combat casualties.	2000	56
18	Management of nonsevere pneumonia in military trainees with the urinary antigen test for Streptococcus pneumoniae: An innovative approach to targeted therapy.	2005	55
19	Adherence and weight loss outcomes associated with food-exercise diary preference in a military weight management program.	2009	53
20	A review of selected thermal management solutions for military electronic systems.	2003	52

Table 7: Related Terms and Relevance Scores.

Term	Occurrences	Relevance Score	Interpretation
Performance Management System	14	3.20	Indicates focused interest in HR frameworks in defence organizations.
Big Data	20	2.50	Reflects the growing role of data analytics in military operations.
Sustainable Development	11	2.38	Shows interest in aligning military practices with global development goals.
Military Logistics	14	1.92	Emphasizes the operational backbone of supply and resource management.

VOSviewer Metrics

- Occurrence = how many documents mention the term.
- Total Link Strength (TLS) = the strength of a term's co-occurrence with other terms in the dataset.
- Relevance Score = a metric VOSviewer uses to filter the *most thematically important* terms for inclusion in the map; high relevance = more specific/conceptual terms, low relevance = general words.

CONCLUSION

The bibliometric analysis on defence forces management highlights key findings across funding sources, publication types, and research focus areas. The U.S. Department of Defence leads in sponsorship with 16 publications, reflecting its emphasis on military efficiency, technology modernization, and resource allocation. Health-related agencies like the National Institutes of Health (13 publications) and National Institute of Diabetes and Digestive and Kidney Diseases (8 publications) also contribute significantly, illustrating the growing intersection of military management and health research. Research outputs are predominantly articles (54.7%), followed by conference papers (27.6%), with notable contributions from journals such as Military Medicine and BMJ Military Health, emphasizing the health and operational aspects of military management.

Key contributors, including N. Greenberg and S.P. Cohen are identified as influential researchers based on citation impact and extensive collaborative networks. The study reveals strong growth in publications between 2016 and 2020, driven by global security concerns and advancements in defence technologies. However, the decline in research output from 2021 onwards suggests a shift in priorities or funding challenges. Research focus areas like medical and psychological management, energy efficiency, and disaster response reflect the diverse and evolving nature of Defence Force Management research, which integrates insights from health, engineering, social sciences, and technology to address modern military challenges.

The term co-occurrence map provided a clear picture of how different research topics are connected. Frequently used terms formed strong links, revealing major themes and areas of focus in the literature. Some terms showed weaker connections, suggesting gaps or underexplored topics. The analysis also highlighted new and emerging concepts gaining attention in recent studies.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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