

CONVERGENCE OF THE VUCA AND BANI MODELS AS INSTRUMENTS FOR THE MULTIDIMENSIONAL ANALYSIS OF THE SECURITY ENVIRONMENT

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Abstract: *The contemporary security environment is increasingly characterized by volatility, systemic fragility, accelerated technological change, and multidimensional threats that challenge traditional strategic analysis models. This paper explores the convergence between the VUCA (Volatility, Uncertainty, Complexity, Ambiguity) and BANI (Brittle, Anxious, Non-linear, Incomprehensible) frameworks as complementary instruments for understanding and interpreting the modern security environment. The research combines a theoretical analysis of the evolution from VUCA to BANI with a bibliometric investigation conducted using VOSviewer and data extracted from the Web of Science database. Through keyword co-occurrence analysis and network visualization, the study identifies thematic clusters and conceptual intersections between the two models. The findings demonstrate that the integration of VUCA and BANI provides a more comprehensive analytical perspective on resilience, strategic adaptation, and decision-making processes in the defense and security domain.*

Keywords: BANI model, VUCA model, Security environment

1. Introduction

The international security environment is currently undergoing a period of profound metamorphosis, marked by the overlap of multidimensional crises that challenge traditional models of strategic forecasting. In this landscape dominated by unpredictability, the conceptual frameworks used to describe geopolitical reality have evolved from attempts to impose order on chaos to the recognition of human cognitive limitations. The concept of VUCA (*Volatility, Uncertainty, Complexity, Ambiguity*), introduced into military terminology by the U.S. Army War College in the late 1980s, served for decades as the foundation for understanding the post-Cold War world [1]. However, the current dynamics of conflicts, characterized by hybridization and accelerated digitalization, suggest that the mere recognition of complexity is no longer sufficient to ensure organizational and strategic survival.

At this turning point, the BANI model (*Brittle, Anxious, Non-linear, Incomprehensible*) emerges not as a replacement for the old paradigm, but as a necessary adaptation to a world on the verge of systemic collapse. As Jamais Cascio emphasized, we are entering a phase in which “*situations where conditions are not simply unstable, but chaotic, and outcomes are entirely unpredictable*” require a new set of analytical tools [2]. If VUCA taught us how to navigate uncertainty, BANI forces us to confront our own fragility. In a “*Brittle*” environment, *defence systems that appear robust may suddenly collapse under the pressure of “black swan” events, while the “Anxious” component reflects the psychological state of military decision-makers confronted with a volume of information exceeding human processing capacity* [3].

The importance of the present study lies in the need to identify the points of

convergence between these two models, thus providing an integrated vision of resilience in the defence domain. The relevance of the topic is supported by the fact that no modern threat can any longer be analysed unidimensionally; from energy security to information warfare, all phenomena display characteristics of non-linearity and incomprehensibility specific to the BANI model, while simultaneously preserving the volatility and ambiguity associated with the VUCA environment [4].

By employing modern bibliometric analysis techniques, this paper aims to demonstrate that the integration of these two perspectives is not merely an academic option, but an imperative necessity for contemporary strategic planning.

2. Theoretical Foundations and The Evolution from VUCA to BANI

2.1. The Genesis and Rise of the VUCA Model in Military Thinking

The VUCA concept did not emerge as a business instrument, but as a doctrinal response to the collapse of the bipolar order at the end of the twentieth century. Introduced by the U.S. Army War College, the model was designed to describe “*the volatile, uncertain, complex, and ambiguous strategic environment that followed the Cold War*” [1]. Each dimension of this acronym forced military planners to abandon linear certainties: Volatility described the speed and nature of change, Uncertainty reflected the lack of predictability, Complexity highlighted the multiplicity of decision-making factors, and Ambiguity emphasized the difficulty of correctly interpreting reality on the battlefield.

For decades, this framework was sufficient to guide intelligence and command processes. However, its usefulness began to be questioned as global phenomena surpassed the threshold of simple “*instability*.” As [3] argue, merely labelling a situation as “*VUCA*” risks becoming an excuse for the absence of strategy if it is not

accompanied by a clear identification of the type of complexity faced by the organization.

2.2. The Transition toward BANI: From Uncertainty to Systemic Collapse

As the twenty-first century advanced, it became evident that the global environment was no longer merely difficult to interpret but had become intrinsically fragile. Jamais Cascio argued that VUCA had begun to lose its relevance because “*the concepts became so overused that they stopped providing analytical value*” [2]. Consequently, the BANI model was proposed, offering a new set of multidimensional lenses adapted to an era of chaos.

Brittleness: In the defence domain, this translates into systems that appear robust but can collapse catastrophically (e.g., energy networks or logistical chains).

Anxiety: Reflects the constant state of tension experienced by military decision-makers who know that any decision may have disastrous consequences in an environment dominated by disinformation.

Non-linearity: Describes situations in which effort and outcome are entirely disproportionate, a defining feature of asymmetric warfare.

Incomprehensibility: Represents the final stage in which massive amounts of data (Big Data) no longer provide clarity but noise, rendering traditional logic ineffective.

2.3. The Connection between the Models and Their Relevance for Defence

The convergence of the two models in the field of defence creates a superior analytical matrix. While VUCA helps explain the external context, BANI provides tools for measuring the internal vulnerability of security systems. [4] emphasize that resilience in a BANI world is no longer based on “*shock resistance*,” but on the ability of systems to regenerate after collapse.

This theoretical evolution is crucial for defence because it transforms the way threats are perceived. We no longer analyse only what changes (volatility), but also how rapidly strategic balance can collapse

(fragility). The convergence of these models thus enables a horizon-scanning approach that incorporates both technological and psychological variables, providing a robust foundation for what will be demonstrated through the bibliometric analysis in the following chapters.

3. The Methodological Framework of Research

3.1. Purpose and Objectives of the Research

The main purpose of the research is to analyse the way in which the VUCA and BANI concepts intersect and complement one another in the specialized literature, thereby providing a theoretical basis for the development of more robust resilience strategies applicable to the defence sector.

The specific objectives are:

O1. Identifying the terminological evolution from VUCA to BANI in specialized publications;

O2. Highlighting, through network mapping, the thematic clusters where the two models converge;

O3. Evaluating the impact of these models on decision-making processes in the field of defence.

3.2. Research Hypotheses

In developing this study, the following hypotheses were formulated:

Hypothesis 1: Specialized literature reflects a clear terminological transition in which the VUCA model is gradually complemented by concepts specific to the BANI model.

Hypothesis 2: Visual analysis conducted through VOSviewer will identify points of intersection (clusters) between the dimensions of the two models, demonstrating their practical convergence.

Hypothesis 3: The combined use of the two models provides a more comprehensive analytical perspective on security threats than their individual application.

3.3. Research Instrument

To achieve the proposed objectives, the research employs VOSviewer (v.1.6.20) [5] a software tool used for constructing and

visualizing bibliometric networks. The choice of this instrument is justified by its ability to process large volumes of metadata from databases such as Web of Science or Scopus, allowing the visualization of the conceptual “distance” between key terms. Within the study, VOSviewer is used for keyword co-occurrence analysis, thereby highlighting the visible and emerging links between the dimensions of VUCA and BANI in security discourse.

4. Bibliometric Analysis of The Specialized Literature Using VOSviewer

Starting from the purpose of this study, we considered that the best method for both analysing and illustrating the connections between the two concepts under consideration was the use of the VOSviewer software.

A first step consisted of creating a database containing the main scientific papers addressing this topic. Thus, we selected from the Clarivate Web of Science bibliometric database the most representative works dealing with the two concepts.

Considering the wide range of expression modalities for the two concepts, we proceeded to specify the search variants for both concepts according to the predefined variants established by Clarivate WoS.

The search results produced the first surprise. We expected the number of search results for the VUCA model to be significantly higher than for the BANI model. Thus, the search results for the VUCA model indicated a total of 930 records covering the period 2008–2026. By contrast, for the BANI model, whose use is much more recent, the results showed 36,929 records covering the period 1975–2026.

Given the large number of records for both concepts, the refinement process continued by selecting only works published between 2022 and 2026. We further refined the selection by including only Articles, Review Articles, Proceedings Papers, Books, and Book Chapters. Consequently, the present study considered only 8,913 works related to

the BANI concept and 554 works related to the VUCA concept.

When we began introducing the data into VOSviewer for the two models, an initial result displayed the total number of

keywords. To simplify the searches, we established a co-occurrence threshold of 10, so that the data underlying our analysis regarding the two models are presented in the following table.

Table 1. Total numbers of Keywords

Model	Total number of Keywords		Co-occurrence Threshold	Final number of Keywords
VUCA	2.809		10	47
BANI	33.707		10	933

Source: own research

For the VUCA model, the graphical representation generated by VOSviewer (Figure 2) illustrates the most important co-occurrences among the 47 de keywords

associated with the model according to the strength of the links established between them.

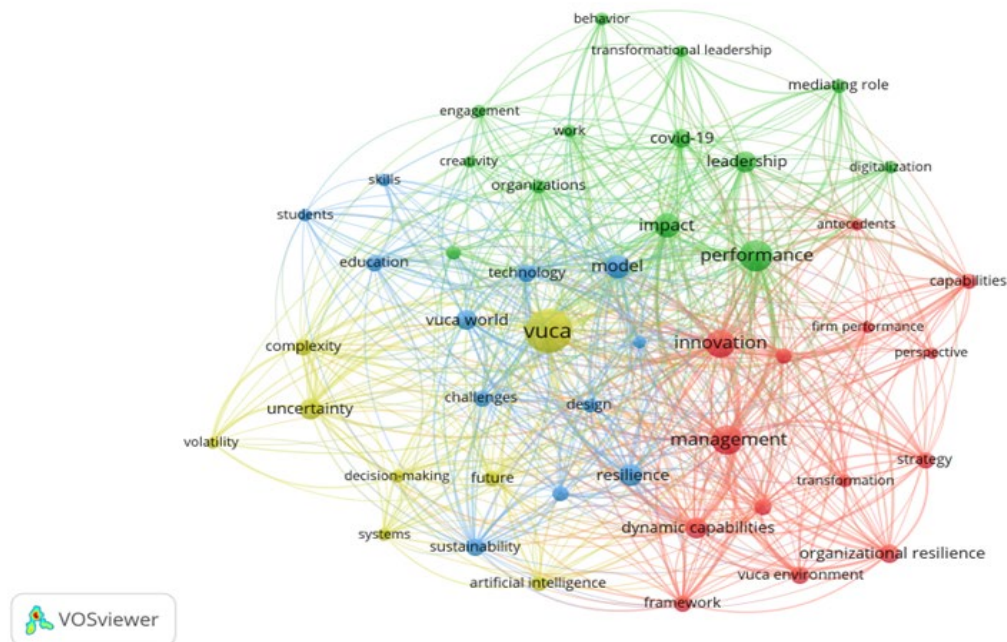


Figure 1: Main Connections between the Most Important Keywords of the VUCA model

Source: own research

By analysing the links between the keywords, their grouping into four clusters

can be observed, whose main defining characteristics are presented in Table 2.

Table 2. Main characteristics of the clusters

Cluster no.	The core keyword of the cluster	Links	Total link strenght	Occurences
1	innovation	42	204	57
2	performance	42	208	70
3	model	38	99	38
4	VUCA	608	1560	137

Source: own research

From the perspective of our analysis, we observe that three concepts associated with the defence domain are present in clusters no. 1, 2, and 4: capability, strategy, and

resilience, while the concept of capability is absent from cluster no. 3.

Regarding the BANI model, the generated model is presented in Figure 2.

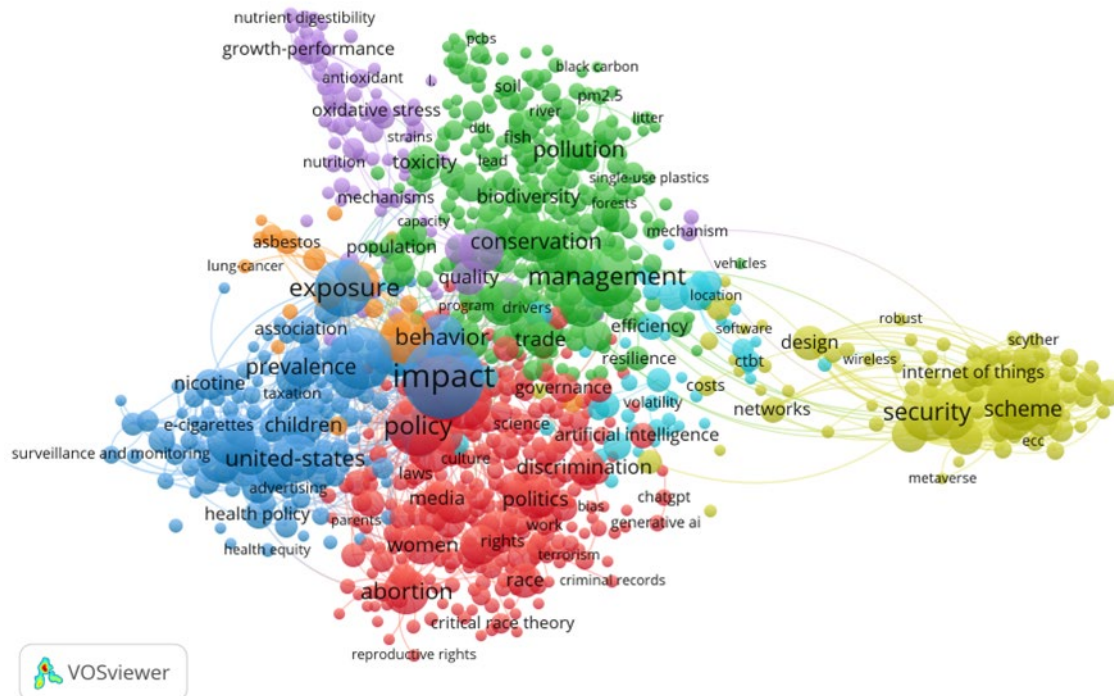


Figure 2: Main Connections between the Most Important Keywords of the BANI model

Source: own research

Approaching the analysis of the main characteristics of the BANI model using the same coordinates as those applied to the

VUCA model, we observe that this time the number of clusters is almost double.

Table no. 3. Main characteristics of the clusters

Cluster no.	The core keyword of the cluster	Links	Total link strenght	Occurences
1	policy	119	162	370
2	management	418	1017	247
3	impact	614	2135	461
4	security	171	1234	211
5	performance	249	445	141
6	system	177	283	86
7	risk	377	845	194

Source: own research

This time, only three clusters contain concepts that can be confidently associated with the defence domain, namely: “National security” in Cluster 1 (Policy); *resilience* and *strategy* in Cluster 2 (Management); and *security*, as expected, in Cluster 4 (Security).

5. Strategic Implications and Resilience in the Security Environment

The convergence of the VUCA and BANI models generates a profound shift in the interpretation of the contemporary security environment, leading to a transition from an

approach focused exclusively on managing uncertainty to one oriented toward systemic adaptability and strategic resilience. While the VUCA paradigm has for decades provided a useful framework for understanding geopolitical instability, the current dynamics of threats demonstrate that volatility and complexity are no longer the only major challenges. The fragility of critical infrastructures, the acceleration of decision-making processes, and the inability to anticipate the effects generated by seemingly minor events indicate that the current security environment is increasingly approaching the specific characteristics of the BANI model.

The results of the bibliometric analysis conducted using VOSviewer confirm this conceptual transformation. In the case of the VUCA model, the presence of keywords such as “*innovation*,” “*performance*,” “*strategy*,” “*capability*,” and “*resilience*” highlights the emphasis placed on developing organizational adaptive capacity and optimizing decision-making processes in unstable contexts. However, the analysis of the BANI model reveals a significant expansion of the conceptual spectrum, through the emergence of clusters associated with terms such as “*security*,” “*risk*,” “*system*,” “*impact*,” and “*policy*.” This evolution suggests that the specialized literature no longer analyses security solely through the lens of external threats, but also through the internal vulnerabilities of political, economic, and technological systems.

From a strategic perspective, one of the most important implications of the convergence between VUCA and BANI lies in the redefinition of the concept of resilience. In the traditional paradigm, resilience was primarily associated with a system’s ability to withstand and return to its initial state after a shock. In contrast, in a BANI environment, this approach becomes insufficient, as certain crises produce irreversible transformations. Thus, resilience no longer implies only resistance,

but the capacity for regeneration, reorganization, and continuous adaptation under conditions of permanent uncertainty. This shift has direct implications for the defense domain. Military structures and security institutions are required to develop flexible response mechanisms capable of operating in an environment characterized by non-linearity and excessive informational pressure. In contemporary conflicts, strategic advantage is no longer determined exclusively by technological or numerical superiority, but by the speed of adaptation and the ability to integrate information from multiple sources. In this context, the cognitive resilience of decision-makers becomes as important as the resilience of critical infrastructures.

At the same time, cluster analysis highlights a strong connection between the concepts of “*security*,” “*risk*,” and “*management*,” indicating an increasingly pronounced orientation toward the multidimensional management of threats. Hybrid warfare, cyberattacks, information manipulation, and energy crises demonstrate that the boundary between military and societal security is becoming increasingly blurred. Consequently, contemporary security strategies must move beyond a logic of reactive response and adopt integrated models of anticipation and response.

The convergence between VUCA and BANI thus provides a relevant analytical framework for developing security policies adapted to current realities. The complementarity of the two models allows both the understanding of the nature of external change and the assessment of internal vulnerabilities of defence systems. In this sense, integrating both perspectives can contribute to the development of more robust strategic mechanisms, oriented not only toward institutional survival, but also toward the capacity for continuous transformation in a security environment in a permanent state of reconfiguration.

6. Conclusion

The present study highlights the growing relevance of integrating the VUCA and BANI models in the analysis of the contemporary security environment. The accelerated evolution of global threats, combined with technological expansion, informational pressure, and systemic fragility, demonstrates that traditional approaches based solely on predictability and linear strategic planning are no longer sufficient. While the VUCA framework remains valuable for understanding volatility, uncertainty, complexity, and ambiguity, the BANI model complements this perspective by emphasizing fragility, anxiety, non-linearity, and incomprehensibility as defining characteristics of current geopolitical dynamics.

The bibliometric analysis conducted using VOSviewer confirmed the existence of multiple thematic intersections between the two paradigms. The identified clusters reveal that concepts such as resilience, security, strategy, management, and risk increasingly overlap in the specialized literature, indicating a transition toward multidimensional approaches to security studies. At the same time, the significantly

larger number of keywords associated with the BANI model suggests an expanding academic interest in understanding systemic vulnerability and cognitive pressure within decision-making environments.

The study also demonstrates that resilience has evolved from a passive concept of resistance to a dynamic capability of adaptation and regeneration. In a security environment shaped by hybrid threats, cyber warfare, informational manipulation, and unpredictable crises, institutions must develop flexible structures capable of rapid transformation. Consequently, strategic superiority is no longer determined exclusively by military capabilities, but also by the ability to absorb shocks, reorganize efficiently, and maintain decision-making coherence under pressure.

In conclusion, the convergence of VUCA and BANI offers a valuable analytical framework for understanding the complexity of the modern security environment and for designing more adaptive and resilient defence strategies. The integration of these models represents not only a theoretical advancement, but also a practical necessity for contemporary strategic planning in an increasingly unstable and unpredictable world.

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