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DOCTRINE TESTING FROM A COMPLEX SYSTEMS PERSPECTIVE CONVENTIONAL VERSUS CONTEMPORARY APPROACHES IN THE AXIOM-BASED DOCTRINE TESTING MODEL AND SYSTEM RESILIENCE

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Abstrak — *This study aims to methodologically analyze the limitations of conventional doc trine testing approaches and compare them with contemporary complex systems-based approaches, using doctrinal axioms and system resilience as the basis for evaluation. Operational doctrine is traditionally tested through conventional approaches that emphasize normative compliance, historical precedent, and limited scenario-based simulations. This approach is based on the assumption of strategic and operational environmental stability and the linearity of cause-and-effect relationships. However, the dynamics of contemporary strategic and operational environments which are non-linear, adaptive, and produce emergent effects demonstrate a methodological gap between the reality of the system encountered and the doctrine testing mechanisms employed. The study uses a conceptual qualitative approach through a systemic-doctrinal analysis with a comparative method of epistemic assumptions, testing logic, and validity criteria of both approaches. The analysis shows that the conventional approach is prone to pseudo-validity because it assesses doctrine primarily based on procedural compliance, rather than systemic resilience to environmental change and operational disruption. In contrast, the contemporary approach offers a more structurally consistent evaluation framework in addressing the complexity of the strategic and operational environment. Therefore, doctrine testing needs to be reoriented from a normative verification model to a complex systems-based evaluation model as a structural methodological necessity. This research contributes to the development of a doctrine evaluation methodology that is more relevant to the study of contemporary defense doctrine and strategy.*

Keywords: *Operational Doctrine, Complex Systems, Doctrine Testing, Doctrinal Axioms, System Resilience*

1. INTRODUCTION

Developments in contemporary strategic and operational environments are characterized by increasing complexity, uncertainty, and non-linear interactions between factors and variables. In this context, operational doctrine no longer functions merely as a set of norma tive or procedural guidelines, but rather as an operational knowledge system that must be able to adapt to rapidly changing environ mental dynamics. However, doctrine testing

and validation are still largely conducted through conventional approaches that emphasize procedural compliance, historical precedent, and limited scenario based simulations. These approaches assume environmental stability and linear cause-and-effect relationships, creating a methodolo gical gap between the way doctrine is tested and the nature of the strategic and operational systems encountered.

2. METHODOLOGY

This research is designed to examine the methodology of operational doctrine testing and validation as a methodological and epistemic issue. Therefore, the research method focuses on conceptual and compa rative analysis of doctrine testing appro aches, rather than on measuring the effecti veness of specific doctrines in specific operational contexts.

2.1 Research Design

This research uses a conceptual qualitative research design with a systemic-doctrinal analysis approach. This design was chosen because the object of study is a logical methodological framework for testing doctrine, which by its nature cannot be analyzed using quantitative methods or field experiments. The systemic approach is used to view doctrine as an operational knowledge system with an internal structure, basic assumptions, and dynamic relationships with the strategic and operational environment. The doctrinal approach is used to analyze the internal logic, basic principles, and testing and validation mechanisms used in the doctrine testing approach. A comparative method is applied to systematically compare conventional doctrine testing approaches and contemporary complex systems-based doctrine testing approaches, focusing on differences in epistemic assumptions, testing logic, and doctrine validity criteria.

Komponen	Uraian
Jenis Penelitian	Kualitatif konseptual
Pendekatan	Analisis sistemik-doktrinal
Metode	Komparatif
Fokus Analisis	Metodologi pengujian dan validasi doktrin operasional
Unit Analisis	Pendekatan uji doktrin konvensional dan kontemporer
Sifat Penelitian	Analitis-metodologis (non-empiris)

Table 1. Research Design and Approach

2.2 Population and Sample

This study does not use a population or sample in the statistical sense. The object of the study is the methodology for testing and validating operational doctrine, not specific personnel, units, or organizations. The research focus is conceptual and falls within the realm of defense doctrine, strategy, and methodology. The units of analysis in this study are two approaches to doctrine testing: the conventional approach and the contem porary, complex systems-based approach, as represented in academic literature and relevant strategic documents. This research is methodologically positioned as a concep tual comparative study, not field research.

Aspek	Keterangan
Objek Penelitian	Metodologi pengujian dan validasi doktrin operasional
Lokus Penelitian	Kajian doktrin dan metodologi pertahanan
Unit Analisis	Pendekatan uji doktrin konvensional dan kontemporer
Jenis Data	Data sekunder
Sumber Data	Jurnal ilmiah, publikasi akademik, dokumen strategis

Table 2. Research Object, Locus, and Unit of Analysis

2.3 Research Instrument

The research instrument is a methodological analysis framework used to examine and compare doctrine testing approaches. This framework is based on a literature review and covers the following dimensions:

- *epistemic assumptions underlying the doctrine testing approach,*
- *testing logic used (linear and non-linear),*
- *doctrine validation mechanisms, and*
- *the testing approach's ability to assess the systemic resilience of doctrine.*

The research data is sourced from secondary sources, including scientific journals, aca demic publications, and strategic documents

relevant to the study of military doctrine, testing methodology, and complex systems.

Dimensi Analisis	Fokus Kajian
Asumsi epistemik	Cara pendekatan memahami validitas doktrin
Logika pengujian	Linier vs non-linier
Mekanisme validasi	Kepatuhan normatif vs ketahanan sistem
Kriteria keberhasilan	Prosedural vs sistemik
Ketahanan sistem	Respons terhadap perubahan dan gangguan

Tabel 3. Instrumen Analisis Metodologis

2.4 Analysis Techniques

The analysis techniques were conducted in stages and systematically. The first stage was the identification and classification of the methodological characteristics of conven tional and contemporary doctrine testing approaches. The second stage was a comparative analysis of the basic assump tions, testing logic, and validity criteria used by each approach. The third stage was an analytical synthesis to assess the structural consistency and relevance of the two approaches' logical methods to the complex strategic and operational environment. The results of the analysis were used to formulate an axiom-based doctrine evaluation frame work and system resilience as a methodo logical alternative that better aligns with the needs of developing modern defense doctrine.

Tahap	Kegiatan Analisis	Output
Tahap I	Identifikasi karakteristik metodologi uji doktrin	Klasifikasi pendekatan
Tahap II	Analisis perbandingan asumsi dan logika uji	Peta perbedaan struktural
Tahap III	Sintesis metodologis	Kerangka evaluasi alternatif
Tahap IV	Penarikan implikasi metodologis	Rekomendasi metodologi uji doktrin

Table 4. Stages of Research Analysis Techniques

3. RESEARCH RESULTS AND DISCUSSION

3.1 Results of the Conventional Approach Analysis

The analysis shows that conventional doctrine testing approaches rely predomi nantly on histo rical precedent, procedural compliance, and limited scenario-based simu lations. The validity of doctrine in this approach is determined by the degree to which it aligns with regulations, stan dard guidelines, and institutionalized past expe rience. This approach assumes that the strategic and operational environment is relati vely stable and can be adequately repre sented through predetermined scena rios. Consequently, cause-and-effect relation ships are treated linearly, and environmental changes are viewed as deviations that can be corrected through procedural adjustments. However, in the context of complex and adaptive systems, the conventional approach exhibits structural limitations. A heavy relian ce on precedent results in low methodological sensitivity to non-linear dynamics and emergent effects. Doctrine may be deemed formally valid, but it is fragile when faced with systemic changes not covered by the test scenarios. This condition results in pseudo-validity, namely, a methodological recognition of doctrine that is inconsistent with its systemic robustness. These findings demon strate the limitations of conventional appro aches when faced with systemic dynamics.

3.2 Results of the Contemporary Approach Analysis

In contrast to conventional approaches, the analysis shows that the contemporary complex systems-based approach positions doctrine as an operational knowledge system built on doctrinal axioms and tested through system resilience and internal consistency. This approach does not consider procedural compliance as the primary indicator of validity. Instead, doctrine validity is assessed based on the doctrine's ability to maintain its function and coherence in the face of environmental change, operational disrup tions, and less predictable conditions. By acknowledging the non-linear and emergent nature of strategic systems, the contem porary approach allows for more adaptive and reflective testing of doctrine in response to operational realities. The analysis demons trates that this approach has metho dological

advantages in assessing the rele vance and utility of doctrine in the medium and long term. However, the contemporary approach also demands clarity of axioms and a high level of methodological discipline to avoid falling into overly abstract or normative interpretations.

Aspek Perbandingan	Pendekatan Konvensional	Pendekatan Kontemporer
Posisi Doktrin	Artefak normatif	Sistem pengetahuan operasional
Basis Validasi	Kepatuhan prosedural	Aksioma dan ketahanan sistem
Ketergantungan Preseden	Tinggi	Rendah
Logika Sistem	Linier	Non-linier dan adaptif
Sensitivitas terhadap perubahan	Terbatas	Tinggi
Risiko utama	Validitas semu	Ambiguitas jika aksioma tidak jelas

Table 5. Comparison of Methodological Characteristics of Doctrinal Testing Approaches

3.3 Discussion

The analysis shows that the primary difference between the two approaches lies not in the degree of "modernity," but rather in their methodological suitability to the charac teristics of the system being tested. Conven tional approaches are effective in stable and controlled environments, but exhibit serious limitations when applied to complex and dynamic strategic and operational environ ments. In contrast, contemporary approaches offer a paradigm shift from normative verifica tion to systemic evaluation. By placing axioms and system robustness at the center of testing, this approach enables a more structurally consistent doctrinal assessment. However, this shift also requires a redefinition of doctrinal testing standards to ensure they remain methodologically measurable and institutionally accountable.

Dimensi	Implikasi Pendekatan Konvensional	Implikasi Pendekatan Kontemporer
Validitas Doktrin	Formal dan prosedural	Sistemik dan struktural
Daya adaptasi	Rendah	Tinggi
Relevansi jangka panjang	Cepat menurun	Lebih berkelanjutan
Kebutuhan revisi	Reaktif	Proaktif dan berkelanjutan
Kesesuaian lingkungan modern	Terbatas	Tinggi

Tabel 6. Implikasi Metodologis terhadap Pengujian Doktrin Operasional

3.4. Research Discussion

3.4.1 Filling the Research Gap

This research fills a research gap by shifting the focus of doctrine evaluation from a normative compliance-based approach to a systemic resilience-based approach. The literature and practice of doctrine testing have tended to position adherence to procedures, precedents, and standard scenarios as the primary indicators of doctrine validity. This approach has been relatively rarely questioned methodologically, even though strategic and operational environments have undergone significant changes toward more complex, dynamic, and adaptive systems. Through comparative analysis, this research demonstrates that the primary weakness of the conventional approach lies not in the lack of regulations or procedures, but rather in its underlying epistemic assumptions. By treating doctrine as a static normative artifact, the conventional approach is unable to capture the non-linear dynamics and emergent effects that characterize modern strategic systems. As a result, there is a disconnect between the formal validity of doctrine and its resilience in changing operational contexts. By positioning doctrine as an operational knowledge system, this research fills a methodological gap that has not explicitly addressed the fit between the nature of the system being tested and its testing methods. The shift in focus from compliance to systemic resilience provides a more relevant analytical framework for assessing the effectiveness and sustaina bility of doctrine in the medium and long term.

3.4.2 Methodological Implications

The primary methodological implication of this research is the need to redefine doctrine

testing and validation standards to align with the characteristics of complex systems. Doctrinal testing standards are no longer adequate if they rely solely on procedural compliance and scenario suitability, without considering systemic resilience, internal consistency, and the doctrine's adaptability to environmental changes. Methodologically, this redefinition requires a shift in doctrinal validity criteria, from normative-formal to structural-systemic. Within this framework, doctrinal axioms serve as the foundation for evaluation, while system resilience testing becomes the primary mechanism for asses sing the relevance and effectiveness of doctrine in the face of uncertainty and operational disruption. Another implication is the need for stricter methodological discipline in the design and implementation of doctrine testing. A complex systems-based approach demands conceptual clarity, transparency of assumptions, and consistency of analytical logic to ensure that doctrine testing remains institutionally and academically accountable. Thus, the transformation of the doctrine testing methodology is not intended to replace the existing normative framework, but rather to complement it with a systemic perspective more suited to the demands of the modern defense environment. It should be emphasized that the conventional doctrine testing approach is not inherently invalid, but rather has certain methodological limits of applicability. This approach remains relevant when the strategic and operational environ ment is relatively stable, cause-and-effect relationships can be mapped linearly, and disturbance variables are at predictable levels. However, when the environment exhibits the characteristics of a complex system that is adaptive, non-linear, and produces emergent effects, the use of the conventional approach as the sole basis for evaluation becomes inadequate. In such contexts, a doctrine testing approach based on axioms and system resilience is not a conceptual alternative, but rather a methodo logical necessity.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Based on the analysis, it can be concluded that the conventional doctrine testing methodology is no longer adequate for complex and adaptive strategic and opera tional environments. Reliance on normative compliance, historical precedent, and the assumption of linear causality renders doctrinal validity more formal than systemic, thus risking underestimating the doctrine's resilience and effectiveness in the face of significant environmental change.

4.2 Recommendations

This study recommends the development of an axiom-based doctrine evaluation model and system resilience testing as a new metho dological standard for testing and validating operational doctrine. This approach is expec ted to improve structur

5. *REFERENCES*

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