

Systems Thinking as a Predictor of Security Management Effectiveness in Tertiary Institutions in Cross River State, Nigeria

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Yaksat, Emmanuel Augustine (PhD)¹, Ukpai, Eke²

¹School of Education, Educational Foundations, University of Calabar, Nigeria,

²Telecommunications, University of Cross River State, Nigeria

 YEA [0009-0007-1629-8090](https://orcid.org/0009-0007-1629-8090)

Correspondence: Yaksat, Emmanuel Augustine (PhD), emmanuelaugustine82@gmail.com

Abstract

This study investigated systems thinking as a predictor of security management effectiveness in tertiary institutions in Cross River State, Nigeria. The study was motivated by the increasing complexity of security challenges confronting tertiary institutions and the need for management approaches capable of enhancing institutional security outcomes. The study adopted a correlational survey research design. The population comprised 6,215 academic and non-academic staff of selected tertiary institutions in Cross River State, Nigeria. A sample of 376 respondents was selected using a multistage sampling procedure involving purposive, stratified, proportionate, and simple random sampling techniques. Data were collected using a researcher-developed instrument titled Systems Thinking and Security Management Effectiveness Questionnaire (STSMEQ). The instrument was validated by experts in Educational Management, Measurement and Evaluation, and Security Studies, while its reliability was established using Cronbach's Alpha reliability coefficient of 0.86. Data were analyzed using Pearson Product-Moment Correlation Coefficient and Simple Linear Regression Analysis at the 0.05 level of significance. The findings revealed a significant positive relationship between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria ($r = .624$, $p < .05$). The regression analysis further showed that systems thinking significantly predicted security management effectiveness ($\beta = .624$, $t = 15.452$, $p < .05$), accounting for 38.9% of the variance in security management effectiveness ($R^2 = .389$). The study concluded that systems thinking is a significant determinant of security management effectiveness and that institutions characterized by holistic thinking, interconnectedness awareness, feedback orientation, strategic thinking, and collaborative problem-solving are more likely to achieve effective security management outcomes. The study recommended that tertiary institutions

promote systems-thinking approaches in decision-making, security planning, policy implementation, and stakeholder collaboration to enhance campus security and institutional resilience.

Keywords: Systems Thinking, Security Management Effectiveness, Tertiary Institutions, Predictor, Holistic Thinking, Collaborative Problem-Solving, Strategic Thinking, Cross River State

INTRODUCTION

Security has become one of the most pressing concerns confronting tertiary institutions across the world. Institutions of higher learning are expected to provide a safe and conducive environment for teaching, learning, research, and community service. However, increasing incidents of theft, vandalism, cult-related activities, cybercrime, kidnapping, violent attacks, and other security threats have continued to challenge the capacity of tertiary institutions to effectively safeguard lives, property, and academic activities. These security concerns have necessitated the adoption of innovative management approaches capable of addressing the complex and dynamic nature of security challenges in contemporary educational institutions (Domínguez-Domínguez, Flores-Laguna, and del Valle-López, 2023; Agoi, Oshinowo, Adinugraha, and Agoi, 2026).

In Nigeria, tertiary institutions operate within an environment characterized by diverse security threats arising from socioeconomic, political, technological, and environmental factors. Security challenges in and around campuses have become increasingly sophisticated, requiring institutional administrators to move beyond traditional security approaches toward more integrated and proactive security management strategies. Effective security management is therefore essential for ensuring institutional stability, promoting academic excellence, and protecting stakeholders from potential security risks (Badamasi and Utulu, 2021; Mamman, 2026; Nnaji, Ayanwale, Ukeje, Ekwunife, Igwe, Okwor, and Nwuzor, 2026).

Security management effectiveness refers to the extent to which security policies, procedures, personnel, technologies, and resources successfully prevent, detect, respond to, and recover from security threats. Effective security management involves coordinated efforts aimed at minimizing risks and ensuring the safety of institutional stakeholders. It encompasses activities such as incident prevention, emergency preparedness, access control, surveillance, risk assessment, crisis response, and continuous monitoring of security conditions. The effectiveness of these activities depends not only on the availability of security resources but also on the management approaches adopted by institutional leaders (Adieme, and Oliobi, 2024; Bwiino et al., 2026; Mamman, 2026).

One management approach that has gained increasing attention in contemporary organizational studies is systems thinking. Systems thinking is a holistic approach to problem-solving that emphasizes understanding the relationships, interactions, and interdependencies among the various components of a system rather than focusing on individual elements in isolation. The approach recognizes that organizational problems are often complex and interconnected and that sustainable solutions require an appreciation of the entire system within which such problems occur. Systems thinking encourages decision-makers to identify patterns, feedback mechanisms, causal relationships, and long-term consequences of actions in order to improve organizational effectiveness (Elsawah, Ho, and Ryan, 2021; Sreenivasulu and Subramaniam, 2026; Thian, Ng, and Yoon, 2026; Albakri, 2026; Boonkwang, Jantakoon, and Laoha, 2026).

Within tertiary institutions, security management involves multiple interconnected units, including institutional leadership, security departments, academic units, student affairs divisions, information technology services, host communities, and external security agencies. Security challenges often arise

from interactions among these units and therefore require coordinated responses. Systems thinking enables institutional administrators to view security management as an integrated system in which decisions made in one area may have implications for other areas. By promoting holistic analysis, collaborative decision-making, proactive planning, and continuous learning, systems thinking may enhance the effectiveness of security management within tertiary institutions (Trujillo, Momsen, Wyse, Speth, and Long, 2026; Thian, Ng, and Yoon, 2026; Albakri, 2026).

Cross River State, Nigeria, hosts several tertiary institutions, including universities, polytechnics, and colleges of education. Like many other states in Nigeria, tertiary institutions in Cross River State face security challenges that have implications for academic activities and institutional development. Although efforts have been made to strengthen campus security through the deployment of security personnel, surveillance technologies, and institutional policies, concerns remain regarding the effectiveness of existing security management systems (Abana, Akpam, and Agabi, 2024; Wodi, and Wordu, 2024). These concerns highlight the need to explore organizational factors that may contribute to improved security outcomes.

Recent studies have emphasized the importance of systems thinking in enhancing organizational performance, strategic management, risk management, and institutional resilience. However, empirical evidence on the application of systems thinking to security management effectiveness in tertiary institutions remains limited, particularly within the Nigerian context. Most existing studies have focused on governance, leadership, security infrastructure, and risk management, while relatively little attention has been given to the predictive role of systems thinking in enhancing security management effectiveness. This gap in the literature is particularly evident in tertiary institutions in Cross River State, where limited empirical studies have examined how systems thinking influences security management outcomes.

Theoretically, the relationship between systems thinking and security management effectiveness can be explained through Systems Theory (Bertalanffy, 2020), which views organizations as collections of interrelated and interdependent subsystems working together to achieve common goals. According to the theory, the effectiveness of one subsystem is influenced by the functioning of other subsystems within the organization. Security management effectiveness therefore depends on the ability of institutional leaders and stakeholders to understand and manage the interactions among various institutional components. Systems thinking provides a practical framework for achieving such integration and coordination.

It is against this background that this study investigates systems thinking as a predictor of security management effectiveness in tertiary institutions in Cross River State, Nigeria. The study seeks to determine whether systems thinking significantly influences security management effectiveness and to provide empirical evidence that can guide institutional administrators, policymakers, and security managers in developing more effective security management strategies.

STATEMENT OF THE PROBLEM

The provision of a safe and secure environment is one of the fundamental responsibilities of tertiary institutions. Security is essential for the effective conduct of teaching, learning, research, and other academic activities. However, tertiary institutions in Nigeria have continued to experience various security challenges, including theft, cult-related activities, vandalism, cybercrime, unauthorized access to institutional facilities, violent conflicts, kidnapping, and other forms of insecurity. These security challenges have disrupted academic activities, threatened the safety of staff and students, damaged institutional property, and undermined the achievement of educational objectives.

In Cross River State, tertiary institutions are not immune to the growing security challenges confronting

educational institutions across the country. Despite efforts by institutional management to strengthen campus security through the deployment of security personnel, installation of surveillance facilities, implementation of security policies, and collaboration with external security agencies, concerns persist regarding the effectiveness of security management systems. The continued occurrence of security incidents suggests that existing approaches may not be sufficiently addressing the complex and interconnected nature of security challenges within tertiary institutions.

Security management in tertiary institutions is a multifaceted process involving various stakeholders, including institutional administrators, security personnel, academic and non-academic staff, students, host communities, and government agencies. Effective management of security challenges therefore requires a comprehensive understanding of how these various components interact and influence one another. Unfortunately, many security management approaches tend to focus on isolated aspects of security problems without adequately considering the interrelationships among institutional processes, structures, and stakeholders. This limitation may hinder the development of sustainable and effective security solutions.

Systems thinking has been identified as a management approach that enables organizations to understand complex problems holistically by recognizing patterns, interdependencies, feedback mechanisms, and relationships among system components. Through systems thinking, institutional leaders can better anticipate security risks, coordinate responses, allocate resources effectively, and develop long-term strategies for improving security outcomes. Although systems thinking has been widely recognized as a valuable tool for organizational effectiveness and problem-solving, its application to security management in tertiary institutions has received limited empirical attention, particularly within the Nigerian higher education context.

Furthermore, existing studies have focused largely on campus security challenges, security infrastructure, leadership, governance, and risk management practices, with relatively little attention given to the influence of systems thinking on security management effectiveness. Consequently, there is insufficient empirical evidence regarding whether systems thinking contributes significantly to security management effectiveness in tertiary institutions in Cross River State, Nigeria.

It is this gap in knowledge that necessitates the present study. Therefore, the problem of this study is to determine the relationship between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria, and to establish whether systems thinking significantly predicts security management effectiveness.

Research questions

The following research questions guided the study:

1. What relationship exists between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria?
2. To what extent does systems thinking predict security management effectiveness in tertiary institutions in Cross River State, Nigeria?

Research hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

H₀₁: There is no significant relationship between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria.

H₀₂: Systems thinking does not significantly predict security management effectiveness in tertiary

institutions in Cross River State, Nigeria.

LITERATURE REVIEW

Concept of Systems Thinking

Systems thinking is a holistic approach to understanding and managing complex problems by examining the relationships and interactions among various components of a system rather than focusing on individual parts in isolation. The concept originated from General Systems Theory developed by Ludwig von Bertalanffy in 1968 and has since been applied across diverse disciplines, including management, education, public administration, and organizational studies. Systems thinking emphasizes interconnectedness, feedback mechanisms, patterns of behavior, interdependence, and long-term consequences of decisions.

Recent literature has increasingly emphasized systems thinking as a critical competency for managing complex organizational challenges. Elsayah, Ho, and Ryan (2021) observed that systems thinking enhances decision-making by enabling individuals to understand causal relationships, feedback loops, and long-term consequences of actions. Similarly, Mhlango (2026) found that systems thinking promotes employee engagement and organizational effectiveness within university settings through improved collaboration and shared understanding of institutional processes. Thian, Ng, and Yoon (2026), in a systematic review, reported that systems thinking enables individuals to embrace complexity, appreciate interdependencies, and develop sustainable solutions to multifaceted problems. Furthermore, Ahsan et al. (2026) argued that institutional effectiveness in tertiary education depends largely on recognizing the interconnected nature of organizational functions and managing them as an integrated system.

According to Senge (2020), systems thinking enables organizational leaders to understand how different components of an organization influence one another and how actions in one area can produce intended or unintended consequences in another. The approach encourages decision-makers to move beyond linear thinking and adopt a broader perspective when addressing organizational challenges. Through systems thinking, managers are better able to identify root causes of problems, anticipate future challenges, and design sustainable solutions. These studies collectively suggest that systems thinking provides a valuable framework for enhancing institutional effectiveness and addressing complex security challenges in tertiary institutions.

In tertiary institutions, systems thinking involves recognizing that institutional effectiveness depends on the interactions among various subsystems such as administration, academics, finance, student affairs, information technology, and security management. Security challenges often emerge from complex interactions among these subsystems, making systems thinking an important tool for understanding and addressing security-related issues. Administrators who adopt systems thinking are more likely to coordinate resources effectively, foster collaboration among stakeholders, and implement comprehensive strategies for managing security risks.

The major dimensions of systems thinking include holistic thinking, interconnectedness awareness, feedback orientation, strategic thinking, and collaborative problem-solving. These dimensions enable institutional leaders to view security management as an integrated process requiring cooperation among multiple stakeholders and institutional units.

Concept of Security Management Effectiveness

Security management effectiveness refers to the extent to which security policies, procedures, personnel, technologies, and resources achieve the desired objective of protecting lives, property, information, and institutional activities from security threats. Effective security management involves the prevention,

detection, response, and recovery from security incidents while ensuring the continuity of institutional operations (Abana, Akpam and Agabi, 2024; Adieme and Aliobi, 2024; Wordi and Wordu, 2024).

Within tertiary institutions, security management encompasses a wide range of activities, including risk assessment, surveillance, access control, emergency preparedness, incident response, stakeholder awareness, and collaboration with external security agencies. The effectiveness of these activities determines the institution's ability to provide a safe environment for teaching, learning, research, and community service (Akomolafe and Olorunsola, 2021; Ede, Nke and Udoette, 2021; Adieme and Oliobi, 2024).

Security management effectiveness is often assessed through indicators such as incident prevention, emergency preparedness, response effectiveness, access control efficiency, and stakeholders' perception of safety. Institutions that effectively manage security risks are more likely to maintain stable academic environments and achieve their educational objectives (Dominguez-Dominguez et al., 2023; Nnaji et al., 2026).

Contemporary approaches to security management emphasize proactive rather than reactive strategies. Effective security management therefore requires continuous monitoring, information sharing, stakeholder involvement, and strategic planning. These requirements highlight the importance of management approaches that promote coordination and integration across organizational units (Badamasi and Utulu, 2021; Buino et al., 2026).

Systems Thinking and Security Management Effectiveness

The relationship between systems thinking and security management effectiveness is grounded in the understanding that security challenges are complex and multifaceted. Security issues rarely arise from a single cause; rather, they emerge from interactions among organizational structures, human behavior, environmental factors, technological systems, and institutional policies. Consequently, effective security management requires a holistic approach capable of addressing these interrelated factors (Thian et al., 2026).

Systems thinking provides a framework for understanding how different institutional components contribute to security outcomes. By recognizing interdependencies among stakeholders and organizational processes, systems thinking facilitates better communication, coordination, resource allocation, and decision-making. This holistic perspective enables institutional leaders to identify potential vulnerabilities, anticipate security threats, and implement preventive measures before problems escalate (Badamasi, and Utulu, 2021; Jones, 2026).

Furthermore, systems thinking promotes organizational learning through feedback mechanisms. Security incidents provide valuable information that can be used to improve policies, procedures, and operational practices. Institutions that adopt systems thinking are more likely to learn from past experiences and continuously improve their security management systems.

The application of systems thinking to security management also enhances collaboration among institutional stakeholders. Effective security management requires cooperation among administrators, security personnel, staff, students, host communities, and government agencies. Systems thinking encourages shared responsibility and coordinated action, thereby improving overall security effectiveness (Konček and Hnilica, 2026).

Several studies have examined the influence of systems thinking on organizational effectiveness and problem-solving. Jiang and Abdullah (2026) reported that systems-oriented approaches enhance organizational adaptability, decision-making quality, and institutional performance by enabling leaders to

understand complex relationships within organizations. The study concluded that systems thinking contributes significantly to organizational effectiveness in dynamic environments.

Jones (2026) investigated governance and institutional performance in higher education and found that holistic approaches to management improve institutional responsiveness to emerging challenges. The study emphasized that institutions adopting systems-oriented strategies are better able to coordinate resources and achieve organizational objectives.

Bingwei, Aedi, and Sururi (2026) examined systems-based governance approaches in educational institutions and reported that systems thinking promotes collaboration, strategic planning, and effective problem-solving. Their findings indicated that institutions characterized by systems-oriented leadership demonstrate higher levels of organizational effectiveness.

Konček and Hnilica (2026) developed an integrated framework for university security and sustainability and found that coordinated institutional approaches significantly enhance security outcomes. The study emphasized the importance of understanding the relationships among physical security, cybersecurity, organizational culture, and stakeholder behavior.

Bwiino et al. (2026), in a systematic review of security practices in higher education institutions, reported that effective security management depends on the integration of policies, leadership, organizational culture, and stakeholder participation. The study highlighted the need for holistic approaches that recognize the interconnected nature of institutional security systems.

Merchan-Lima et al. (2021) reviewed information security management frameworks in higher education institutions and concluded that integrated and systems-based approaches contribute significantly to effective security management. The study recommended that institutions adopt comprehensive frameworks that address multiple dimensions of security simultaneously.

Although previous studies have demonstrated the importance of systems-oriented approaches in organizational management and security administration, most existing studies have focused on governance, information security, cybersecurity, leadership, and organizational performance. Limited empirical studies have specifically examined systems thinking as a predictor of security management effectiveness in tertiary institutions, particularly within the context of Cross River State, Nigeria. This gap in the literature provides the justification for the present study.

Theoretical Framework: General Systems Theory

This study is anchored on General Systems Theory (GST), developed by Ludwig von Bertalanffy in 1968. The theory views organizations as systems composed of interrelated and interdependent parts that function together to achieve common goals. According to the theory, changes in one part of a system affect other parts, making it necessary to understand the interactions among system components when addressing organizational challenges.

General Systems Theory assumes that organizations are open systems that interact continuously with their environment. Within tertiary institutions, various subsystems such as administration, academics, finance, student affairs, and security management operate in a mutually dependent manner. The effectiveness of security management therefore depends on how well these subsystems interact and coordinate their activities.

The relevance of General Systems Theory to this study lies in its emphasis on interconnectedness, integration, feedback, and coordination. Systems thinking reflects the practical application of these principles by encouraging institutional leaders to examine security issues holistically and develop

integrated solutions. The theory therefore provides a suitable framework for understanding how systems thinking influences security management effectiveness in tertiary institutions in Cross River State, Nigeria.

METHODOLOGY

This study adopted a correlational survey research design. The design was considered appropriate because it enables the researcher to determine the nature and strength of the relationship between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria. The design also facilitates the prediction of security management effectiveness from systems thinking through the application of simple linear regression analysis without manipulating the study variables.

The study was conducted in Cross River State, Nigeria. Cross River State is located in the South-South geopolitical zone of Nigeria and hosts several tertiary institutions, including universities, polytechnics, and colleges of education. The state is known for its educational institutions and serves as an appropriate setting for examining issues relating to systems thinking and security management effectiveness in tertiary institutions.

The population of the study comprised academic and non-academic staff of selected tertiary institutions in Cross River State, Nigeria. The selected institutions included the University of Calabar, Cross River University of Technology (UNICROSS), Federal College of Education, Obudu, and the College of Health Technology, Calabar. Records obtained from the personnel units of the selected institutions indicated a total population of 6,215 academic and non-academic staff.

A sample size of 376 respondents was determined using Taro Yamane's (1967) formula for finite populations: $[n = \frac{N}{1 + N(e)^2}]$. Where: n = Sample size, N = Population size (6,215), e = Level of significance (0.05) $[n = \frac{6215}{1 + 6215(0.05)^2}] [n = \frac{6215}{16.5375}] [n \text{ approximately} = 376]$. Therefore, a sample size of 376 respondents was used for the study.

A multistage sampling procedure was adopted. First, four tertiary institutions were purposively selected based on their size, accessibility, and relevance to the study. Second, respondents were stratified into academic and non-academic staff categories. Third, a proportionate sampling technique was used to allocate the sample across the selected institutions. Finally, a simple random sampling technique was employed to select respondents from each stratum. The population and sample respectively for the institutions were distributed as follows: University of Calabar 2,580 and 156; Cross River University of Technology (UNICROSS) 1,860 and 113; Federal College of Education, Obudu 975 and 59 and College of Health Technology, Calabar 800 and 48. The total population and sample for the institutions were 6,215 and 376 respectively.

Data were collected using a structured questionnaire developed by the researcher titled Systems Thinking and Security Management Effectiveness Questionnaire (STSMEQ). The instrument consisted of three sections: Section A - Demographic information of respondents. Section B - Items measuring Systems Thinking. The section assessed respondents' perceptions of: Holistic thinking, Interconnectedness awareness, Feedback orientation, Strategic thinking, Collaborative problem-solving. Section C - Items measuring Security Management Effectiveness. The section assessed: Incident prevention, Emergency preparedness, Response effectiveness, Access control effectiveness and Safety perception. Responses were measured using a five-point Likert scale as follows: Strongly Agree (SA) = 5, Agree (A) = 4, Undecided (U) = 3, Disagree (D) = 2, Strongly Disagree (SD) = 1.

The instrument was subjected to face and content validation by three experts in Educational Management, Measurement and Evaluation, and Security Studies. Their observations and recommendations were used to improve the clarity, relevance, and adequacy of the questionnaire items before the final administration.

A pilot study was conducted using 30 respondents from a tertiary institution in Akwa Ibom State outside the study area but with similar characteristics to the target population. Data obtained from the pilot study were analyzed using Cronbach's Alpha reliability technique. The reliability coefficients obtained were: Systems Thinking was 0.87, Security Management Effectiveness was 0.84 and the overall reliability was 0.86. The coefficients exceeded the minimum acceptable value of 0.70, indicating that the instrument was reliable for data collection.

The researcher obtained letters of introduction and approval from the relevant authorities of the selected institutions. The questionnaire was administered personally with the assistance of trained research assistants. Respondents were informed about the purpose of the study and assured of confidentiality and anonymity. Completed copies of the questionnaire were retrieved, coded, and prepared for analysis.

Data collected for the study were analyzed using both descriptive and inferential statistics. The research questions were answered using Pearson Product-Moment Correlation Coefficient (PPMC) and Simple Linear Regression Analysis. Specifically, research question 1 was answered using Pearson Product-Moment Correlation Coefficient (PPMC) to determine the relationship between systems thinking and security management effectiveness. Research question 2 was answered using Simple Linear Regression Analysis to determine the extent to which systems thinking predicts security management effectiveness. The hypotheses were tested at the 0.05 level of significance as follows: Hypothesis one was tested using Pearson Product-Moment Correlation Coefficient (PPMC) while hypothesis two was tested using Simple Linear Regression Analysis. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS), version 29.

Results of findings

Research Question 1

1. What relationship exists between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria?

Pearson Product-Moment Correlation Coefficient (PPMC) was used to determine the relationship between systems thinking and security management effectiveness and the result presented in Table 1.

Table 1

Pearson Product Moment Correlation between Systems Thinking and Security Management Effectiveness

S/N	VARIABLES	N	R	p-value
1.	Systems Thinking	376	0.624	0.000
2.	Security Management Effectiveness	376		

The result revealed a moderate positive relationship between systems thinking and security management effectiveness ($r = .624$, $p < .05$). This indicates that higher levels of systems thinking are associated with higher levels of security management effectiveness in tertiary institutions in Cross River State, Nigeria.

Hypothesis One

H₀₁: There is no significant relationship between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria.

Since the p-value (.000) is less than the 0.05 level of significance, the null hypothesis was rejected. Therefore, there is a significant positive relationship between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria.

Research Question 2

1. To what extent does systems thinking predict security management effectiveness in tertiary institutions in Cross River State, Nigeria?

Simple Linear Regression Analysis was conducted to determine the predictive influence of systems thinking on security management effectiveness and the result was presented in Table 2.

Table 2

Simple Linear Regression Analysis of Systems Thinking as predictor of Security Management Effectiveness

R	R-Square	Adjusted R-Square	Std. Error of the Estimate		
.624	.389	.387	.548		
Model	Sum of Squares	Df	Mean Square	F-ratio	Sig.
Regression	72.114	1	72.114	238.761	.000
Residual	112.982	374	0.302		
Total	185.096	375			
Variable	B	Std. Error	Beta	T	Sig.
Constant	1.356	.143		9.483	.000
Systems Thinking	.587	.038	.624	15.452	.000

a. Criterion: Security Management Effectiveness.

b. Predictors: (constant), Systems Thinking.

Source: IBM SPSS Statistics Version 29.

The result showed that systems thinking accounted for approximately 38.9% of the variance in security management effectiveness ($R^2 = .389$). This implies that systems thinking is an important predictor of security management effectiveness in tertiary institutions.

The ANOVA result indicated that the regression model was statistically significant, $F(1, 374) = 238.761$, $p < .05$. This suggests that systems thinking significantly predicts security management effectiveness.

The coefficient table revealed that systems thinking significantly predicted security management effectiveness ($\beta = .624$, $t = 15.452$, $p < .05$). Specifically, a one-unit increase in systems thinking resulted in an estimated 0.587-unit increase in security management effectiveness.

Hypothesis Two

H₀₂: Systems thinking does not significantly predict security management effectiveness in tertiary

institutions in Cross River State, Nigeria.

The regression result showed that systems thinking significantly predicted security management effectiveness ($\beta = .624$, $t = 15.452$, $p = .000$). Since the p-value is less than 0.05, the null hypothesis was rejected. Therefore, systems thinking significantly predicts security management effectiveness in tertiary institutions in Cross River State, Nigeria.

Discussion of findings

The findings of this study revealed a significant positive relationship between systems thinking and security management effectiveness in tertiary institutions in Cross River State, Nigeria. The correlation analysis showed that systems thinking was positively related to security management effectiveness ($r = .624$, $p < .05$). This finding implies that tertiary institutions characterized by higher levels of systems thinking tend to exhibit greater effectiveness in managing security challenges. The result suggests that when institutional leaders and stakeholders adopt holistic approaches to problem-solving, recognize interdependencies among institutional units, and encourage collaborative decision-making, security management outcomes are likely to improve.

The finding supports the argument that security management is a complex organizational function that requires more than the deployment of security personnel and technological resources (Merchan-Lima et al., 2021; Bwiino et al., 2021; Jones, 2026; Bingwei, Aedi and Sururi, 2026). Effective security management depends on the ability of institutional leaders to understand the interconnected nature of security challenges and coordinate responses across various institutional subsystems. Systems thinking facilitates such coordination by enabling decision-makers to identify patterns, understand feedback mechanisms, anticipate potential risks, and develop comprehensive solutions to security problems (Konček and Hnilica, 2026). Consequently, institutions that embrace systems thinking are better positioned to prevent security incidents, respond effectively to emergencies, and maintain safe learning environments.

The study further revealed that systems thinking significantly predicts security management effectiveness ($\beta = .624$, $t = 15.452$, $p < .05$). The regression analysis showed that systems thinking accounted for 38.9% of the variance in security management effectiveness ($R^2 = .389$). This finding indicates that systems thinking is a substantial predictor of security management effectiveness in tertiary institutions. The implication is that improvements in systems thinking among institutional administrators and stakeholders can lead to significant improvements in the effectiveness of security management practices.

The predictive influence of systems thinking may be attributed to its emphasis on integration, collaboration, and long-term strategic planning. Security challenges within tertiary institutions often arise from multiple sources, including human behavior, organizational processes, environmental factors, technological vulnerabilities, and external influences. Systems thinking enables institutional leaders to understand how these factors interact and to design coordinated interventions that address root causes rather than symptoms. This approach enhances institutional capacity to manage security risks proactively and sustainably.

The regression analysis revealed that systems thinking accounted for 38.9% of the variance in security management effectiveness ($R^2 = .389$), leaving approximately 61.1% of the variance unexplained by the model. This suggests that while systems thinking is a significant predictor of security management effectiveness, other organizational, environmental, and managerial factors also contribute substantially to security outcomes in tertiary institutions.

The unexplained variance may be associated with factors such as leadership effectiveness, governance practices, organizational culture, security policy implementation, availability of security infrastructure,

staff and student security awareness, resource allocation, technological capabilities, collaboration with external security agencies, institutional risk management practices, communication systems, and environmental security conditions. These factors may independently or collectively influence the effectiveness of security management within tertiary institutions.

Furthermore, variations in respondents' perceptions, institutional differences, and measurement errors may also contribute to the unexplained proportion of variance. Consequently, future studies should consider incorporating additional variables into predictive models of security management effectiveness in order to provide a more comprehensive understanding of the factors influencing security outcomes in tertiary institutions.

The findings of this study are consistent with previous studies that have highlighted the importance of systems-oriented approaches in organizational management. For instance, Jiang and Abdullah (2026) reported that systems thinking improves organizational effectiveness by enhancing decision-making, adaptability, and strategic responsiveness. Similarly, Bingwei, Aedi, and Sururi (2026) found that systems-based management approaches promote institutional effectiveness through improved coordination and collaborative problem-solving. The findings also align with those of Konček and Hnilica (2026), who emphasized that integrated approaches to university security contribute significantly to improved security outcomes and institutional resilience.

Furthermore, the findings support the conclusions of Bwiino et al. (2026) and Merchan-Lima et al. (2021), who argued that effective security management in higher education institutions requires the integration of policies, leadership practices, organizational culture, and stakeholder participation. The present study extends these findings by providing empirical evidence that systems thinking serves as a significant predictor of security management effectiveness within the context of tertiary institutions in Cross River State, Nigeria.

The findings are also in agreement with the assumptions of General Systems Theory, which provided the theoretical foundation for the study. The theory posits that organizations are composed of interrelated and interdependent subsystems whose effectiveness depends on the quality of their interactions. Within tertiary institutions, security management functions as a subsystem that is influenced by administrative structures, communication processes, stakeholder relationships, resource allocation mechanisms, and organizational culture. Systems thinking reflects the practical application of these theoretical assumptions by encouraging leaders to understand and manage these interrelationships effectively. The significant relationship and predictive influence observed in this study therefore provide empirical support for the propositions of General Systems Theory.

Overall, the findings demonstrate that systems thinking is not only associated with security management effectiveness but also serves as a significant determinant of effective security management in tertiary institutions. The results underscore the need for institutional leaders to adopt systems-oriented approaches in security planning, policy formulation, implementation, and evaluation. By fostering systems thinking across institutional structures, tertiary institutions can strengthen their ability to address complex security challenges and create safer environments for teaching, learning, research, and community engagement.

CONCLUSION

This study investigated systems thinking as a predictor of security management effectiveness in tertiary institutions in Cross River State, Nigeria. The findings revealed that systems thinking has a significant positive relationship with security management effectiveness. The study further established that systems thinking significantly predicts security management effectiveness, indicating that institutions that

demonstrate higher levels of systems thinking are more likely to achieve better security management outcomes.

The findings suggest that systems thinking enhances security management effectiveness by promoting holistic problem-solving, understanding of interrelationships among institutional units, feedback-oriented decision-making, strategic planning, and collaborative approaches to addressing security challenges. These attributes enable institutional leaders and stakeholders to identify security risks proactively, coordinate security-related activities effectively, and implement sustainable solutions to complex security issues.

The study also showed that systems thinking accounted for a substantial proportion of the variance in security management effectiveness, highlighting its importance as a critical organizational factor in achieving effective security outcomes. This finding reinforces the argument that security management should not be viewed solely as a function of security personnel, equipment, or policies, but rather as an integrated institutional process that requires systems-oriented thinking and coordinated action among various stakeholders.

Based on the findings, it is concluded that systems thinking is a significant determinant of security management effectiveness in tertiary institutions in Cross River State, Nigeria. Therefore, tertiary institutions seeking to improve campus security should encourage the adoption of systems-thinking approaches in decision-making, policy formulation, strategic planning, and security management practices. By fostering a systems-oriented culture, institutions can strengthen their capacity to anticipate, prevent, and effectively respond to security challenges while creating safer and more conducive environments for teaching, learning, research, and community service.

RECOMMENDATIONS

Based on the findings and conclusion of this study, the following recommendations are made:

1. Management of tertiary institutions in Cross River State should promote the adoption of systems thinking among administrators, heads of departments, security personnel, and other stakeholders to enhance the effectiveness of security management processes.
2. Institutional leaders should organize regular training programmes, workshops, and seminars on systems thinking and strategic problem-solving to equip staff with the knowledge and skills required for managing complex security challenges.
3. Tertiary institutions should encourage collaborative decision-making and strengthen communication channels among administrative units, security departments, staff, students, and external security agencies to facilitate coordinated responses to security threats.
4. Institutional management should integrate systems-thinking principles into security policy formulation, implementation, monitoring, and evaluation in order to ensure that security challenges are addressed holistically rather than in isolation.
5. Security managers should establish effective feedback and reporting mechanisms that enable continuous assessment of security situations, identification of emerging threats, and timely implementation of corrective measures.
6. Tertiary institutions should strengthen interdepartmental cooperation and information sharing among relevant units to improve the coordination of security-related activities and enhance institutional preparedness for security emergencies.
7. Governing councils and institutional administrators should provide adequate financial, human, and technological resources to support comprehensive security management systems capable of addressing both physical and emerging security threats.

8. Collaboration between tertiary institutions and external security agencies such as the Nigeria Police Force, Nigeria Security and Civil Defence Corps (NSCDC), and community-based security organizations should be strengthened to improve intelligence gathering, risk assessment, and emergency response capabilities.
9. Institutional management should foster a culture of systems thinking by encouraging stakeholders to consider the interrelationships among organizational processes, policies, and environmental factors when addressing security issues.
10. Future researchers should investigate additional factors such as leadership effectiveness, governance practices, organizational culture, security infrastructure, and risk management practices that may account for the remaining variance in security management effectiveness not explained by systems thinking.

OPERATIONAL DEFINITION OF TERMS

Systems Thinking: Systems thinking refers to a holistic approach to understanding and addressing organizational issues by recognizing the interrelationships, interdependencies, and interactions among various components of an institution. In this study, systems thinking is operationalized in terms of holistic thinking, interconnectedness awareness, feedback orientation, strategic thinking, and collaborative problem-solving as perceived by academic and non-academic staff of tertiary institutions.

Security Management Effectiveness: Security management effectiveness refers to the extent to which security policies, procedures, personnel, technologies, and resources successfully prevent, detect, respond to, and manage security threats within tertiary institutions. In this study, it is measured through incident prevention, emergency preparedness, response effectiveness, access control effectiveness, and stakeholders' perception of safety.

Tertiary Institutions: Tertiary institutions refer to post-secondary educational institutions established to provide higher education, professional training, research, and community service. In this study, tertiary institutions include universities, polytechnics, and colleges of education located in Cross River State, Nigeria.

Holistic Thinking: Holistic thinking refers to the ability to view organizational issues as parts of a larger system rather than as isolated events. In this study, it denotes the extent to which institutional stakeholders consider the broader implications of decisions and actions on security management.

Strategic Thinking: Strategic thinking refers to the ability to anticipate future challenges, identify opportunities and risks, and develop long-term solutions to organizational problems. In this study, it relates to proactive planning and decision-making for effective security management.

Collaborative Problem-Solving: Collaborative problem-solving refers to the process of working collectively with relevant stakeholders to identify, analyze, and resolve organizational challenges. In this study, it concerns the involvement of administrators, staff, students, security personnel, and external agencies in addressing security issues.

Predictor: A predictor refers to an independent variable that is used to estimate, explain, or forecast changes in another variable. In this study, systems thinking serves as the predictor of security management effectiveness.

Cross River State: Cross River State refers to the geographical area in the South-South region of Nigeria where the selected tertiary institutions included in this study are located.

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