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Promotional Strategies for Student Affairs Informatization Management in Guangxi Higher Education Institutions

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Abstract
The full use of information technology to optimize all management services for student affairs has an important impact on talent cultivation in higher education institutions (HEIs). This study focuses on the main factors that affect student affairs informatization management in Guangxi HEIs and proposes targeted enhancement strategies. By utilizing TISM and AHP methods, this study examines hierarchical relationships among factors and combines expert and student evaluations to create an influence model. Findings reveal that coordinated development in management systems, administrators, application platforms, and data processing abilities is essential for effective informatization, providing a structured approach for universities.

Keywords: Informatization, Student affairs management, Guangxi higher education institutions

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1.0 Introduction

With the expansion of higher education institutions (HEIs), student affairs management has become increasingly complex, highlighting the crucial role of information technology in optimizing processes and supporting talent development strategies. Informatization is a technology based on modern communication, networking, and database systems that consolidates research subjects for application, enhancing efficiency and reducing costs. In this study, student affairs informatization management refers to the process by which HEIs utilize modern information technology and management concepts to optimize processes, integrate resources, and enhance managerial capabilities.

HEIs urgently require digital transformation to enhance educational quality. Regional higher education expert emphasizes that the development of higher education in China still lags behind that of developed countries, with a significant need for modernization in governance capabilities, advancing education informatization and governance modernization is a critical priority for Guangxi's higher education.

This paper examines student affairs management in HEIs, analyzing the current state of informatization, identifying key influencing factors, and proposing strategies for improvement. The study addresses the following questions: What factors influence student affairs informatization management in Guangxi HEIs? How can effective strategies be developed based on these factors? This study aims to propose a model of influencing factors for the student affairs informatization management in HEIs, elucidating the influencing factors

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and illustrating their hierarchical structure and interrelationships, thereby offering guidance for the advancement of student affairs informatization management in Chinese HEIs.

2.0 Literature Review

Scholars worldwide have extensively studied information technology management and student affairs in HEIs, with most research focusing on system and algorithm design since 2020, such as student activity management systems (Blancaflor et al., 2022). As smart campuses evolve, more HEIs are embracing digital campus transformation (Al-Shoqran & Shorman, 2021). Despite rapid growth in literature on higher education digital transformation, the overall volume remains low (Alenezi, 2021), with a notable gap compared to other sectors (Butschi, 2021). HEIs must advance informatization across strategy, management, education, and technological resources to support hybrid online and offline management (Alenezi, 2021; Crompton & Sykora, 2021).

To meet digitalization requirements, HEIs must adopt institutional and strategic approaches for informatization transformation (Faria & Nóvoa, 2017). HEIs should design a digital strategy dedicated to digital transformation (Fernández et al., 2023), with macro-level strategies to ensure active participation from administrators and users (Blancaflor et al., 2022). Developing standards for smart campuses is still a challenge (Fortes et al., 2019), and continued reliance on outdated systems will hinder resource investment in IT management and slow progress in managing affairs (F. Zhang, 2022).

Student affairs staff play a significant role in the informatization technology transformation of HEIs by providing support for students' academic, personal, and career services (Benavides et al., 2020; Chessman, 2021). Under the background of informatization, administrators play a crucial role in advancing data-driven management (H. Xiao, 2024) and must exhibit data processing competencies (Li L., 2023). To ensure successful informatization development, HEIs must allocate professional technical support resources (Chessman, 2021).

The smart campus framework requires the integration of multiple data and information systems (Silva-da-Nóbrega et al., 2022). The digital maturity model offers a theoretical framework and assessment tools for methodically advancing digital transformation in HEIs (Fernández et al., 2023). HEIs should develop integrated platforms to serve as software infrastructure, manage student data, and support teaching and research processes (Benavides et al., 2020). Awuzie and other scholars (2021) suggest that although many universities have the infrastructure of Information and Communications Technology (ICT), the existing electronic platforms are poorly integrated with the Information Technology Services (ITS), resulting in inefficient data collection, the administrator needs to spend a lot of time collecting data, and some students fail to provide complete data (Sari et al., 2020).

The digital transformation of HEIs requires data processing technologies (Teslia et al., 2020), and emerging technologies, including Artificial Intelligence (AI), are beginning to transform the management concepts and service models of student affairs (Brady, 2024). Facilitating collaboration among departments via digital tools can significantly improve the efficacy of student support services (Greenstein & Goss, 2022). In the United States, HEIs use data processing to enhance management intelligence (Yang, 2020), but many institutions still underutilize their data (Muhammad et al., 2020), which limits the effectiveness of management and decision-making (Burrell et al., 2022), while large-scale data collection raises privacy and ethical concerns (Leu, 2020).

According to this study, which is based on the TRIALSS model (Zhang P. et al., 2023) and a literature review, the four components interact with one another and significantly influence the construction of informatization, as seen in Figure 1.

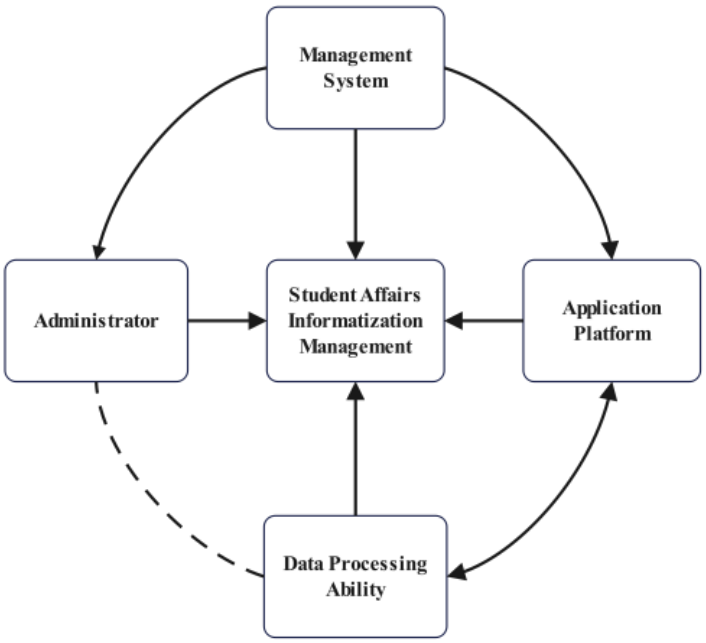

Fig. 1: The Model of Student Affairs Informatization Management in Guangxi HEIs

The management system impacts the administrator, application platform, and data processing ability, while the application platform and data processing ability have a reciprocal influence on one another.

3.0 Methodology

This study explores key factors affecting student affairs informatization management in Guangxi HEIs and proposes targeted enhancement strategies. Ten (10) key factors were identified from an initial set of thirty (30) using the Triangular Fuzzy Number (TFN). Then, it used the Analytic Hierarchy Process (AHP) and Total Interpretive Structural Modeling (TISM) to construct relationships of influencing factors.

TFN addresses uncertainty and ambiguity in decision-making. AHP efficiently prioritizes factors, while TISM visualizes and interprets causal relationships among factors. Combining TFN, AHP, and TISM better addresses the multifaceted, complicated hierarchical relationships and ambiguity in this study, while alternative methods are unsuitable due to their limitations.

3.1 Determination of Influencing Factors

This study invited 10 experts from pertinent domains in Guangxi to complete a questionnaire utilizing TFN. Each expert assesses the impact of various factors on student affairs informatization management. For each factor, three sets of values are provided: the lowest impact degree (minimum), the most likely impact degree (extreme value), and the highest impact degree (maximum). The method is as follows: (a) Calculate the average fuzzy number (calculate the average of the three scores for each factor, resulting in 30 sets and 90 values); (b) Defuzzification (take the average of the three scores for each factor); (c) Establish the triangular fuzzy number (values greater than 0.65). The final selection of influencing factors, labeled F1–F10 is in Table 1.

Table 1. Influential Factors of Student Affairs Informatization Management in Guangxi HEIs

Influencing Factors	Defuzzification	No.	References
Management System			
Risk prevention, control, and management system	0.571667		(A. Li, 2010; Ministry of Education of China, 2021; Xia, 2010)
Content publishing security check mechanism	0.700000	F1	(Ministry of Education of China, 2021)
Information construction and management system	0.600000		(Ministry of Education of China, 2021; Shen et al., 2023; Xu & Zhong, 2010; L. Zhang & Yu, 2010; N. Zhang, 2020)
Evaluation system	0.560667		(Gan & Li, 2015; Ministry of Education of China, 2021)
Safety management system	0.540000		(Gan & Li, 2015; D. Xiao & Xi, 2013; L. Zhang & Yu, 2010)
Compensation and appraisal system	0.593333		(Shen et al., 2023; N. Zhang, 2020)
Construction program	0.652000	F2	(Xia, 2010; D. Xiao & Xi, 2013; Xu & Zhong, 2010)
Information service plan and measure	0.700000	F3	(A. Li, 2010)
Administrators			
Information literacy	0.728333	F4	(Ministry of Education of China, 2021; Y. Zhang & Hu, 2020)
Organizational structure	0.575000		(Hao et al., 2018; A. Li, 2010; Ministry of Education of China, 2021; Xia, 2010; D. Xiao & Xi, 2013; L. Zhang & Yu, 2010)
Personnel team	0.665000	F5	(Hao et al., 2018; A. Li, 2010; Ministry of Education of China, 2021; Ruan, 2015; Xia, 2010; D. Xiao & Xi, 2013; Xu & Zhong, 2010; L. Zhang & Yu, 2010; Y. Zhang & Hu, 2020)
Information-based training	0.600000		(Hao et al., 2018; Xia, 2010; Xu & Zhong, 2010)
Informatization skill	0.566667		(Ruan, 2015; Xia, 2010; D. Xiao & Xi, 2013; Xu & Zhong, 2010; L. Zhang & Yu, 2010)
Application Platform			
Data center	0.716667	F6	(Ministry of Education of China, 2021; Shen et al., 2023; N. Zhang, 2020; Y. Zhang & Hu, 2020)
Campus card system	0.561667		(A. Li, 2010; Ministry of Education of China, 2021; Xia, 2010; Xu & Zhong, 2010; L. Zhang & Yu, 2010)
Information-based teaching environment	0.536667		(A. Li, 2010; Ministry of Education of China, 2021; Xia, 2010; Xu & Zhong, 2010; L. Zhang & Yu, 2010)
Information education environment	0.570000		(Ministry of Education of China, 2021)

Basic application service	0.605000		(A. Li, 2010; Ministry of Education of China, 2021)
Business services	0.571667		(Hao et al., 2018; A. Li, 2010; Ministry of Education of China, 2021; Shen et al., 2023; Xia, 2010; Xu & Zhong, 2010; N. Zhang, 2020; Y. Zhang & Hu, 2020)
Man-machine interaction interface	0.538333		(Hao et al., 2018; A. Li, 2010; Ministry of Education of China, 2021; L. Zhang & Yu, 2010)
Decision support	0.686333	F7	(Gan & Li, 2015; Ministry of Education of China, 2021)
Information system security protection	0.571667		(Ministry of Education of China, 2021)
Resource sharing	0.599667		(Gan & Li, 2015)
Data Processing Ability			
Basic Data	0.736667	F8	(Ministry of Education of China, 2021)
Service Data	0.726667	F9	(Ministry of Education of China, 2021; D. Xiao & Xi, 2013)
Digital resources	0.643333		(Gan & Li, 2015; Hao et al., 2018; A. Li, 2010; Ministry of Education of China, 2021; Shen et al., 2023; Xia, 2010; D. Xiao & Xi, 2013; L. Zhang & Yu, 2010; N. Zhang, 2020)
Information resource management services	0.616667		(Ministry of Education of China, 2021)
Data protection	0.608333		(Ministry of Education of China, 2021; Y. Zhang & Hu, 2020)
Data and technical standards	0.606667		(Ministry of Education of China, 2021)
Network Public Opinion Security	0.723333	F10	(Y. Zhang & Hu, 2020)

3.2 Assessment of influencing factors

To reduce the dependence of TISM on the subjective judgment of experts and overcome the lack of big data support for TISM, this study utilizes AHP to determine the weights of the factors and assesses the students' satisfaction with the factors through the Likert Scale as the reference data for the strategy.

i. Analytic Hierarchy Process

AHP is suitable for multi-disciplinary decision-making, such as education and public policy. The steps include (Bhadu et al., 2023): (a) constructing the hierarchy; (b) building the comparison matrix (pairwise comparison of factors); (c) finding the weight vector and the maximum eigenvalue (formula calculation); (d) consistency test (formula verifies whether CR≥0.1). Eventually, the weights of the influencing factors are shown in Table 2.

Table 2. Weights of Influencing Factors of Student Affairs Informatization Management in Guangxi HEIs

Criterion Layer	Weight of Criterion Layer	Influencing Factors in Plan Layer	No.	Weight of Influencing Factor	Combined Weight
Management System	0.5222	Content publishing security check mechanism	F1	0.5452	0.2847
		Construction program	F2	0.2092	0.1092
		Information service plan and measure	F3	0.2456	0.1283
Administrators	0.1212	Information literacy	F4	0.7471	0.0906
		Personnel team	F5	0.2529	0.0307
Application Platform	0.2015	Data center	F6	0.7643	0.154
		Decision support	F7	0.2357	0.0475
Data Processing Ability	0.1551	Basic data	F8	0.6754	0.1047
		Service data	F9	0.1649	0.0256
		Network public opinion security	F10	0.1597	0.0248

Expert scoring and weight calculations indicate that the management system has the highest weight (0.5222), highlighting its critical role in informatization. Among the 10 influencing factors, the top three are the content publishing security check mechanism (F1), data center (F6), and information service plan and measure (F3), which warrant special attention.

ii. Likert Scale

Students from five Guangxi HEIs participated in a questionnaire. According to the "Guangxi Statistical Yearbook 2023", there were 1.4075 million students registered in Guangxi HEIs as of 2022. This study utilized Raosoft and the Krejcie and Morgan Table (Krejcie & Morgan, 1970) to determine the sample size; 400 students were chosen to take the survey, and 371 valid replies were received. The validity and satisfaction of factors related to the student affairs informatization management were assessed using a Likert scale. The statistics of the questionnaire results are shown in Table 3.

Description	Scale					Mean	Rank
	Very Poor	Relatively Poor	Average	Relatively Good	Very Good		
Criterion Layer							
Management System	0.8% (3)	1.1% (4)	23.5% (87)	43.9% (163)	30.7% (114)	4.03	1
Administrators	1.1% (4)	1.1% (4)	24.0% (89)	42.3% (157)	31.5% (117)	4.02	2
Application Platform	0.8% (3)	1.3% (5)	26.4% (98)	39.9% (148)	31.5% (117)	4	3
Data Processing Ability	1.1% (4)	2.4% (9)	25.6% (95)	41.0% (152)	29.9% (111)	3.96	4
Plan Layer							
F1	0.5% (2)	0.3% (1)	21.8% (81)	42.0% (156)	35.5% (131)	4.11	2
F2	0.5% (2)	0.8% (3)	22.6% (84)	40.4% (150)	35.6% (132)	4.1	3
F3	0.3% (1)	0.8% (3)	23.7% (88)	39.6% (147)	35.6% (132)	4.09	5
F4	0.0% (0)	1.3% (5)	21.0% (78)	39.9% (148)	37.7% (140)	4.14	1
F5	0.0% (0)	0.8% (3)	22.1% (82)	43.7% (162)	33.4% (124)	4.1	4
F6	0.8% (3)	1.9% (7)	22.9% (85)	41.8% (155)	32.6% (121)	4.04	9
F7	0.3% (1)	1.6% (6)	22.9% (85)	42.9% (159)	32.3% (120)	4.05	8
F8	1.1% (4)	1.1% (4)	22.1% (82)	41.8% (155)	34.0% (126)	4.06	7
F9	1.1% (4)	1.3% (5)	21.3% (79)	41.8% (155)	34.5% (128)	4.07	6
F10	0.8% (3)	1.3% (5)	23.7% (88)	43.4% (161)	30.7% (114)	4.02	10

Table 3. Descriptive Statistics on the Factors of Student Affairs Informatization Management in Guangxi HEIs

Over 70% of respondents gave favorable ratings to the various influencing factors, indicating general student approval of the current student affairs informatization management in Guangxi HEIs. Mean rankings show that students rated the management system highest (mean is 4.03) and were less satisfied with data processing abilities (mean is 3.96).

At the plan layer, information literacy (F4), content publishing security check mechanism (F1), construction program (F2), and personnel team (F5) received the highest ratings (mean is more than 4.10), with F4 rated best (mean is 4.14). Lower ratings were given to information service plan and measure (F3), service data (F9), basic data (F8), decision support (F7), data center (F6), and network public opinion security (F10) (mean is between 4.02 to 4.09), indicating that respondents see room for improvement in application platforms and data processing capabilities.

3.3 Relationship of influencing factors

Table 4. Structural Self-interaction Matrix (SSIM)

Influencing Factors	F10	F9	F8	F7	F6	F5	F4	F3	F2	F1
F1	V	O	O	O	O	O	O	A	A	
F2	O	O	O	V	V	V	O	V		
F3	V	O	O	V	O	O	O			
F4	O	O	O	O	O	X				
F5	O	O	O	O	O					
F6	V	X	X	V						
F7	A	A	A							
F8	V	O								
F9	V									
F10										

TISM is an explanatory modeling technique used to establish hierarchical relationships between factors and has been applied across various fields, including higher education (Singh et al., 2021). It includes the following steps (Huang et al., 2021): (a) identifying key influencing factors; (b) confirming the contextual relationship of influencing factors; (c) establishing explanatory logic for pairwise

comparisons; (d) creating reachability matrix and transitivity detection; (e) dividing the level of influencing factors; (6) drawing a directed graph; (f) establishing binary interaction matrices; (g) building the model.

In this study, five (5) experts participated in a questionnaire. Based on their responses, a structural self-interaction matrix (SSIM) was constructed, as depicted in Table 4. In the SSIM, V denotes that Fij causes Fji, A denotes that Fij is caused by Fji, X denotes that there is an interaction between Fij and Fji, and O denotes that there is no interaction between Fij and Fji.According to the substitution rule and transitivity detection method (Soni & Kodali, 2016), in the reachability matrix, V, A, X, and O in the SSIM are converted to binary values by replacing them with 1 and 0. For V, F1 is replaced with 1 and F2 with 0; for A, F1 is replaced with 0 and F2 with 1; for X, both F1 and F2 are replaced with 1; for O, both F1 and F2 are replaced with 0. The final reachability matrix is presented in Table 5.

Table 5. The Final Reachability Matrix

Influencing Factors	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
F1	1	0	0	0	0	0	0	0	0	1
F2	1	1	1	0	1	1	1	0	0	0
F3	1	0	1	0	0	0	1	0	0	1
F4	0	0	0	1	1	0	0	0	0	0
F5	0	0	0	1	1	0	0	0	0	0
F6	0	0	0	0	0	1	1	1	1	1
F7	0	0	0	0	0	0	1	0	0	0
F8	0	0	0	0	0	1	1	1	0	1
F9	0	0	0	0	0	1	1	0	1	1
F10	0	0	0	0	0	0	1	0	0	1

After transforming the reachability matrix, it could obtain the Reachability set, Antecedent set, and Intersection set. The Reachability set consists of the factor itself and the other factors it influences; the Antecedent set includes the factor itself and the factors that influence it; the Intersection set contains the factors common to both the Reachability set and Antecedent set. When the Intersection Set of a factor is consistent with the Reachability Set, it is extracted and will not be used in subsequent iterations. Five iterations were conducted in this study, as shown in Table 6.

Table 6. The Level Partition

Influencing Factors	No.	Reachability Set	Antecedent Set	Intersection Set	Level
Iteration I					
Content publishing security check mechanism	F1	1,10	1-3	1	
Construction program	F2	1-3,5-7	2	2	
Information service plan and measure	F3	1,3,7,10	2,3	3	
Information literacy	F4	4,5	4,5	4,5	I
Personnel team	F5	4,5	2,4,5	4,5	I
Data center	F6	6-10	2,6,8,9	6,8,9	
Decision support	F7	7	2,3,6-10	7	I
Basic data	F8	6-8,10	6,8	6,8	
Service data	F9	6,7,9,10	6,9	6,9	
Network public opinion security	F10	7,10	1,3,6,8-10	10	
Iteration II					
Content publishing security check mechanism	F1	1,10	1-3	1	

Construction program	F2	1-3,6	2	2	
Information service plan and measure	F3	1,3,10	2,3	3	
Data center	F6	6,8-10	2,6,8,9	6,8,9	
Basic data	F8	6,8,10	6,8	6,8	
Service data	F9	6,9,10	6,9	6,9	
Network public opinion security	F10	10	1,3,6,8-10	10	II
Iteration III					
Content publishing security check mechanism	F1	1	1-3	1	III
Construction program	F2	1-3,6	2	2	
Information service plan and measure	F3	1,3	2,3	3	
Data center	F6	6,8,9	2,6,8,9	6,8,9	III
Basic data	F8	6,8	6,8	6,8	III
Service data	F9	6,9	6,9	6,9	III
Iteration IV					
Construction program	F2	2,3	2	2	V
Information service plan and measure	F3	3	2,3	3	IV

4.0 Findings

Based on the hierarchical division, this study constructed a TISM model through a directed graph to present the key influencing factors and their hierarchical relationships of student affairs informatization management in Guangxi HEIs. As shown in Figure 2.

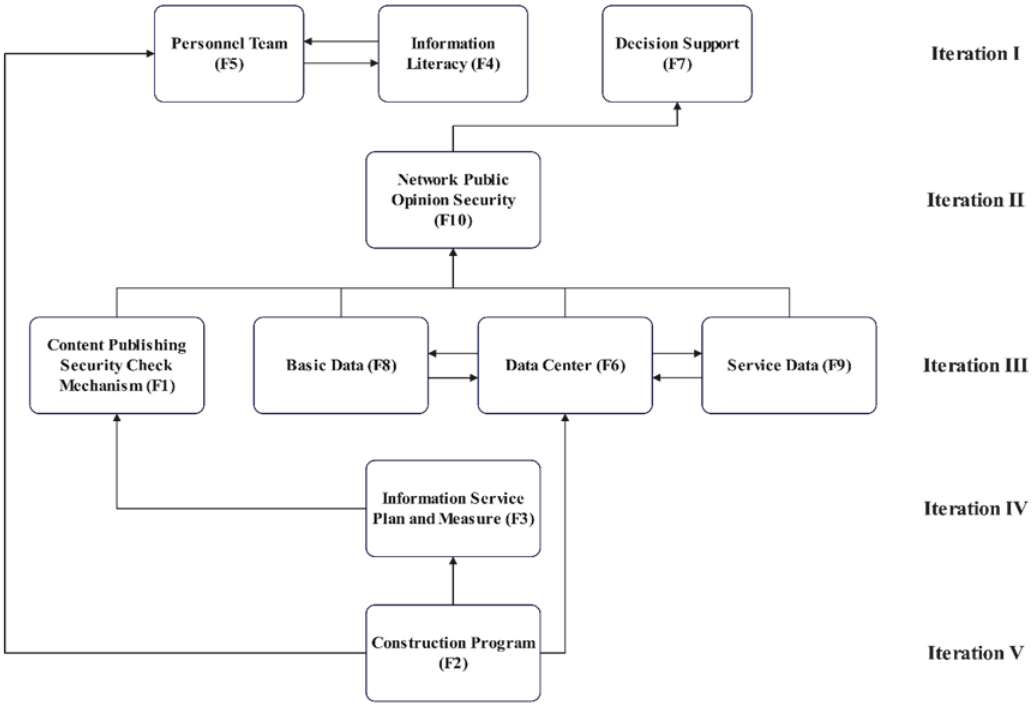

Fig. 2: TISM-based model for influencing factors of student affairs informatization management in Guangxi HEIs

The construction program (F2) has a direct impact on the information service plan and measure (F3), data center (F6), and personnel team (F5). The information service plan and measures (F3) influence the content publishing security check mechanism (F1), while basic data (F8) and service data (F9) both interact with the data center (F6). The network public opinion security (F10) is influenced by all four factors in layer III. In layer I, network public opinion security (F10) influences decision support (F7), and there is also a related influence between personnel team (F5) and information literacy (F4). The construction program (F2) is crucial to the foundation of the TISM framework, influencing other factors significantly.

The hierarchical structure of the TISM model reveals the relationships between influencing factors. Management systems play a key role; administrators ensure and promote the student affairs informatization management, but it is influenced by management systems; application platform plays a supportive role while data processing ability optimizes the student affairs informatization management, they have an interdependent relationship. Thus, it is necessary to prioritize the optimization of management systems.

5.0 Discussion

To illustrate the key influencing factors and their hierarchical relationships, this study builds a TISM model using directed graphs. The AHP analysis gives the management system the highest weight (0.5222), which is in line with Guangxi's centralised governance approach, HEI efficiency is frequently determined by the top-down system design. However, students' poorer satisfaction with data processing ability (average = 3.96), when compared to advanced HEIs like the US that prioritise real-time analysis (Yang, 2020), suggests that Guangxi's infrastructure deployment and practical utilisation are not aligned. The building of the comprehensive smart campus platform is echoed by the interplay between the data centre (F6), basic data (F8), and service data (F9) (Silva-da-Nóbrega et al., 2022). Guangxi places a high value on network security in the digital governance project, as evidenced by network public opinion security (F10) is influenced by all third-level elements.

Based on the research results, this study proposes the following strategies for improving the informatization construction of student affairs management in Guangxi HEIs:

i. Insisting on the strategic goal of digitization to support and serve universities, teachers, and students.

HEIs should thoroughly assess the business needs of student affairs management in digital transformation and prioritize the development of systematic strategic planning as a core task. They must organize information service programs, data center architecture, and information technology talent management, refine the objectives and content of every business segment, and create specific construction plans.

ii. Strengthening the unified planning for the digital construction of student management.

HEIs need to construct an integrated digital platform for student affairs that is based on strategic planning and information service strategies, beginning with enhancing the hardware configuration for student affairs management. Initially, encourage the integration and sharing of data; then integrate information technology with management practices by establishing an integrated application and decision-making platform to support personalized services; finally, focus on data privacy and network security by improving the security assessment system to ensure platform and data security.

iii. Enhancing the introduction and cultivation of management talent.

In addition to system and platform construction, HEIs should hire specialized informatization administrators and provide opportunities for their professional development. Furthermore, HEIs should optimize the organizational structure, enhance professionalism and decision-making abilities, and establish a career development system to stabilize the management team.

iv. Comprehensively coordinating and optimizing the management system, administrators, application platform, and data processing ability.

The student affairs informatization management is a systematic process. The management system determines the achievement of informatization goals; the data processing abilities provide support; the application platform integrates functions and improves the user experience; administrators ensure the implementation of the system.

6.0 Conclusion& Recommendations

This study aims to improve the informatization level of student affairs management in Guangxi HEIs to meet the development needs of teachers, students, and HEIs. By analyzing the hierarchy and relationship of influencing factors through the TISM model, combining the weights of AHP and the evaluation of student effectiveness, this study constructed an influencing factor model and proposed systematic enhancement strategies. It found that realizing the coordinated promotion of management systems, administrators, application platforms, and data processing ability is the key to improving the level of informatization management.

This study has several limitations. First, the scope is limited to Guangxi, and the applicability of the research findings and enhancement strategies to other HEIs in China has yet to be explored. Second, the research methodology is mainly based on quantitative analysis, without limited qualitative research.

Based on this study, the following suggestions are made to enhance the quality of future research: first, adopt a mixed research method to make the study more comprehensive and in-depth; second, increase the diversity of data to enhance applicability and credibility; third, carry out long-term tracking studies to enhance practicability.

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Paper Contribution to Related Field of Study

1. Establish a hierarchical model of influencing factors for student affairs informatization management in HEIs.
2. Clarify the key roles of management systems, administrators, application platforms, and data processing abilities in informatization.
3. Propose systematic improvement strategies to guide practical applications of informatization management in HEIs.

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