Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 10, No. 5, 343-355
2026
Publisher: Learning Gate
DOI: 10.55214/2576-8484.v10i5.12935

Developing digital transformation strategies from SWOT-TOWS analysis for higher education institutions in Beijing, China

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Abstract: This study aimed to develop digital transformation strategies for higher educational institutions in Beijing, China, by applying a SWOT analysis in which educational administration was examined as the internal environment and PEST factors as the external environment. The purpose was to advance inclusive learning, strengthen knowledge exchange and partnerships, and enhance data-driven education. The study adopted a qualitative research design and collected data through semi-structured interviews with nine experts. The data were analyzed using content analysis and subsequently synthesized through a TOWS matrix to generate strategic directions. The findings identified 36 strategies across four categories: SO, ST, WO, and WT. The major strategies included leadership support, system integration, student-centered services, collaborative digital platforms, data governance, and staff capacity building. These strategies have the potential to improve accessibility and administrative coordination, strengthen collaboration with external stakeholders, and support evidence-based decision-making. The study offers a practical strategic framework for university leaders, administrators, and policymakers, while also providing a foundation for future research on digital transformation in higher education.

Keywords: *China, Digital transformation strategies, Educational administration, Higher education institutions, PEST factors, SOWT analysis, TOWS matrix.*

1. Introduction

Higher education institutions must respond to rapid technological change, evolving student expectations, and increasing demands for innovation, quality, and global competitiveness. In this context, digital transformation is not merely the adoption of new technologies but a strategic process that reshapes governance, teaching and learning, research, student services, and external engagement [1]. For universities in Beijing, this transformation is particularly significant within a highly competitive higher education environment shaped by national modernization agendas, strong policy support for educational informatization, and the growing role of data-driven and intelligent systems. As initiatives such as Education Informatization 2.0 advance digital integration, universities must adopt coherent strategies that align technological investments with institutional missions and long-term development goals [2].

To formulate such strategies effectively, analytical frameworks that connect internal institutional conditions with external environmental forces are essential. SWOT analysis provides a structured way to identify strengths, weaknesses, opportunities, and threats, while the TOWS matrix extends this analysis by translating diagnostic findings into strategic options and actionable directions [3]. Therefore, this paper aims to develop digital transformation strategies for higher education institutions in Beijing, China, by using SWOT-TOWS analysis to generate context-sensitive digital transformation strategies that support sustainable institutional innovation and competitiveness.

History: Received: 10 March 2026; Revised: 9 April 2026; Accepted: 13 April 2026; Published: 25 May 2026
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2. Literature Review

2.1. Commitments of Digital Transformation

Digital transformation in higher education is a strategic process that goes beyond technology adoption to reshape teaching, administration, collaboration, and decision-making. Its main commitments are creating inclusive learning environments, strengthening knowledge exchange and partnerships, and advancing data-driven education.

1. Inclusive learning environments focus on improving access, flexibility, and participation for diverse learners through digital tools and student-centered support systems [4].
2. Knowledge exchange and partnerships highlight how digital platforms enhance collaboration among universities, industry, government, and communities, supporting innovation and wider sharing of knowledge [5].
3. Data-driven education refers to the use of digital data and analytics to improve student support, planning, and institutional decision-making, while also requiring attention to ethics, privacy, and governance [6].

2.2. SWOT Analysis

A useful way to frame the digital transformation of higher education institutions in China is through a SWOT analysis that combines internal organizational conditions with an external PEST-based assessment of the environment. In the literature, SWOT is widely used as a strategic planning tool because it helps institutions connect their internal capabilities and limitations to broader environmental pressures and opportunities, while PEST analysis strengthens the external dimension by examining political, economic, social, and technological factors [7]. In higher education, digital transformation is not limited to the adoption of information systems; rather, it involves changes in educational administration, such as human management, finance management, academic affairs management, and data management. This broader understanding is especially important in China, where universities are expected to align digital innovation with national modernization goals, quality improvement, and global competitiveness [8].

2.2.1. Strengths in the internal environment

Human resources management is widely recognized as an important internal strength for digital transformation in Chinese higher education institutions [9]. The relatively structured administrative systems of Chinese universities can facilitate coordinated staff deployment, professional development, and leadership-led implementation of digital initiatives. This strength is further reinforced by policy support for improving faculty digital literacy, building innovation teams, and promoting continuous professional learning, all of which are critical to successful organizational change [10].

Financial management also constitutes a major strength in the digital transformation of Chinese universities. Because digital transformation requires sustained investment in infrastructure, platforms, cybersecurity, training, and organizational adaptation, institutions with stable funding channels and formal budgetary mechanisms are better positioned to implement long-term digital strategies effectively [11]. In China, national policies supporting educational informatization and smart campus development have further legitimized and directed financial resources toward digital advancement [12].

Academic affairs management represents another significant internal strength. As digital transformation increasingly affects curriculum delivery, learning management, assessment, quality assurance, and student academic support, universities with more developed academic management systems are better able to institutionalize blended learning and integrate educational technologies into routine teaching practices [13]. In the Chinese context, policy reforms promoting online and blended education have made academic affairs units central to the implementation and scaling of digital innovation [14].

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 10, No. 5: 343-355, 2026
DOI: 10.55214/2576-8484.v10i5.12935

2.2.2. Weaknesses in the internal environment

However, data management is widely recognized as a significant internal weakness in digital transformation. Although effective transformation depends on high-quality, interoperable, secure, and well-governed data, many higher education institutions face fragmented systems, poor data standards, duplicated records, and limited analytic capacity. Weak integration across academic affairs, finance, human resources, and student services further reduces the reliability of data for planning and decision-making [15]. This challenge is particularly salient in China, where large-scale digital initiatives may expand data generation without ensuring interoperability, privacy protection, or governance consistency. As Tungpantong et al. [16] note, technology adoption without strong data stewardship can increase institutional vulnerability rather than effectiveness. Therefore, data management is appropriately classified as a core weakness in the SWOT framework.

2.2.3. Opportunities in the external environment

In the external environment, political factors represent one of the strongest opportunities for the digital transformation of higher education institutions in China. Unlike contexts where digital change is driven mainly by market competition, Chinese higher education is shaped by a strong policy framework that promotes educational modernization, information infrastructure, smart governance, and digital innovation. Policies such as the *Education Informatization 2.0 Action Plan* and *China Education Modernization 2035* provide legitimacy, strategic direction, and financial support for digital transformation while aligning institutional priorities with national development goals [17].

Social factors also constitute an important opportunity. Rising expectations for flexible learning, lifelong education, employability, and digital skills are reshaping higher education globally. In China, the massification of higher education, increased participation in online learning, and strong demand for digitally competent graduates have intensified pressure on universities to modernize teaching and services. The COVID-19 period further normalized online and blended learning, while broader international trends have reinforced expectations for accessible, student-centered, and technology-enabled education [7].

Technological factors form another major external opportunity. Advances in cloud computing, artificial intelligence, learning analytics, mobile platforms, big data, and network infrastructure have expanded universities' capacity to improve teaching, management, student support, and institutional decision-making [18]. For Chinese universities, these technologies also create opportunities to integrate academic, financial, and human resource functions through unified digital systems. However, the literature emphasizes that technology becomes a genuine opportunity only when institutions possess the governance and capabilities to translate it into organizational and educational value.

2.2.4. Threats in the External Environment

By contrast, economic factors are best understood as a major external threat. Although digital transformation may improve efficiency in the long term, it requires substantial and ongoing investment in infrastructure, software, cybersecurity, staff training, maintenance, and system integration [19]. In periods of economic uncertainty, universities may face budget constraints, rising costs, unequal access to resources, and pressure to demonstrate returns on digital investment. As Cox [7] notes, uneven digital readiness can also deepen institutional inequality. In China, these pressures may slow implementation, widen gaps between institutions, and undermine the long-term sustainability of digital transformation.

Overall, the literature supports a SWOT interpretation in which the digital transformation of Chinese higher education institutions is shaped by strong internal capacities but also persistent organizational weaknesses within a generally favorable yet economically constrained external environment. Human resources management, financial management, and academic affairs management function as key strengths, while educational administration and data management remain important weaknesses. Externally, political, social, and technological factors create significant opportunities, whereas economic pressure is the principal threat. Accordingly, successful digital transformation

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depends not simply on adopting new technologies but on aligning internal reform with external opportunities and constraints.

Table 1.
Summary of SWOT Analysis.

Internal environments	**Strengths**	**Weakness**
	Human resources management	Data management
	Financial management	
	Academic affairs management	
External environment	**Opportunities**	**Threat**
	Politics	Economy
	Society	
	Technology	

2.3. Development of Digital Transformation Strategies

TOWS analysis is a strategic planning framework derived from SWOT analysis that helps organizations move from environmental scanning to strategy formulation by systematically matching internal and external factors. Rather than only listing strengths, weaknesses, opportunities, and threats, TOWS generates four types of strategic alternatives. SO strategies use internal strengths to exploit external opportunities; these are typically growth-oriented or proactive strategies. WO strategies use external opportunities to overcome internal weaknesses; these are improvement-oriented strategies aimed at capacity building or institutional development. ST strategies use internal strengths to reduce, manage, or avoid external threats; these are often protective strategies. WT strategies aim to minimize internal weaknesses and avoid external threats at the same time; these are generally defensive or risk-reduction strategies [20]. The literature considers TOWS particularly useful because it is more action-oriented than basic SWOT, making it valuable for complex institutions such as universities that must align internal capacities with rapidly changing external environments [21].

In higher education, TOWS analysis is highly relevant for developing digital transformation strategies because digital transformation is not simply the adoption of technology, but a broader organizational change process involving leadership, governance, infrastructure, digital capability, process redesign, and data use [22]. Universities must respond to external opportunities such as artificial intelligence, online and blended learning, digital partnerships, and government support, while also addressing threats such as cybersecurity risks, privacy concerns, funding pressure, and digital inequality [23]. A TOWS-based approach helps higher education institutions identify how their strengths, such as academic expertise, institutional reputation, or existing digital systems, can support innovation; how weaknesses, such as fragmented platforms or limited staff digital competence, can be improved through external opportunities; how institutional strengths can protect against environmental threats; and how weaknesses and threats can be minimized through cautious implementation and governance reform. Therefore, the literature supports TOWS as a practical and theoretically grounded framework for designing digital transformation strategies in higher education that are more structured, context-sensitive, and implementation-oriented [24].

3. Research Method

This study adopted a qualitative research design to develop digital transformation strategies for the educational administration of higher education institutions in Beijing, China. A qualitative approach was considered appropriate because the research aimed to generate in-depth, context-sensitive understandings of how institutional leaders conceptualize and prioritize digital transformation, rather than measure predefined variables. Semi-structured expert interviews were used to elicit rich, experience-based insights, which were then synthesized through a TOWS matrix to formulate strategic directions.

Edelweiss Applied Science and Technology
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Vol. 10, No. 5: 343-355, 2026
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3.1. Participate and Sampling

The key informants were university administrators working in higher education institutions located in Beijing, China. Purposive sampling was employed to identify individuals with specialized knowledge and decision-making responsibilities related to educational administration and digital transformation. Inclusion criteria were as follows: (1) holding a doctoral degree in educational administration, educational leadership, or a closely related field; (2) having at least five years of experience in an administrative position within a higher education institution; (3) being directly involved in or knowledgeable about institutional digital initiatives; and (4) being willing and available to participate in an online interview.

A total of nine experts participated in the study. The sample size was guided by the principles of information richness and thematic saturation; after the ninth interview, no substantially new strategy directions emerged, and the existing codes and categories were adequately saturated. Participants represented various positions (e.g., vice presidents, deans, directors of academic affairs or information technology) and institutional types, providing diverse perspectives on digital transformation in Beijing's higher education sector.

3.2. Research Tool

In the aforementioned literature review, the identified strengths included human resource management, financial management, and academic affairs management, while the main weakness was data management. Additionally, key opportunities arose from political, social, and technological factors. These internal strengths and weaknesses, along with external opportunities and threats, were mapped onto a TOWS matrix to develop guiding questions for four strategy categories: SO (strength–opportunity), ST (strength–threat), WO (weakness–opportunity), and WT (weakness–threat) strategies, as shown below.

Table 2.
Interview Form.

TOWS categories	Guiding Questions
SO Strategies	What digital transformation strategies should we adopt to use human resources management, financial management, and academic affairs management in higher education as internal strengths to capitalize on external opportunities from current national politics, societal conditions, and technologies to realize an inclusive learning environment, knowledge exchange, partnerships, and data-driven education in Chinese higher education?
ST strategies	What digital transformation strategies should we adopt to use human resources management, financial management, and academic affairs management in higher education as internal strengths to minimize external threats from current economic conditions, thereby realizing an inclusive learning environment, knowledge exchange, partnerships, and data-driven education in Chinese higher education?
WO strategies	What digital transformation strategies should we adopt to overcome weaknesses in data management by leveraging opportunities from current national politics, societal conditions, and technologies to realize an inclusive learning environment, knowledge exchange, partnerships, and data-driven education in Chinese higher education?
WT Strategies	What digital transformation strategies should we adopt to minimize weaknesses in data management in higher education and to avoid threats from current economic conditions, thereby realizing an inclusive learning environment, knowledge exchange, partnerships, and data-driven education in Chinese higher education?

3.3. Data Collection

Due to geographical constraints and the impracticality of conducting face-to-face interviews, this study employed online semi-structured interviews as the primary data collection method. The interviews were conducted via Tencent Meeting, a free online conferencing platform widely used in the Chinese educational context. The use of this platform provided a practical and accessible means of engaging participants located in different geographical areas while ensuring flexibility and continuity in

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Vol. 10, No. 5: 343-355, 2026
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the data collection process. During each interview, the researcher took detailed notes and, with the informed consent of the participants, audio-recorded the sessions to ensure the accuracy, completeness, and reliability of the data.

3.4. Data Analysis

The data collected from semi-structured interviews were analyzed using qualitative content analysis and thematic analysis. Qualitative content analysis is a systematic and rigorous approach to interpreting textual data through coding, categorization, and identification of patterns and themes. This method enables the researcher to reduce large volumes of qualitative data into meaningful and manageable categories while preserving the depth and context of participants' responses. Thematic analysis further supported the identification of recurrent ideas, concepts, and issues related to digital transformation strategies in higher education. To enhance the trustworthiness and validity of the findings, the researcher adopted a systematic coding procedure throughout the analysis process. The resulting digital transformation strategies were then organized and presented in table form to improve clarity and facilitate ease of interpretation.

4. Result

4.1. Theme Induction

In this study, theme induction was conducted by identifying strategy-oriented meanings from expert interview transcripts. The initial concepts were derived from the strategies proposed by the experts, while the corresponding original statements were drawn from the experts' explanatory remarks that contextualized those strategies. Through repeated refinement and adjustment, a total of 36 initial concepts were identified, laying the groundwork for the subsequent coding process.

Table 3.
Coding Conceptualization of Research Findings.

No	Initial Concept	Corresponding Original Statement
1	Develop modular curricula and micro-credentials through digital academic management systems	"Traditional programme structures are sometimes too rigid to respond to changing learner demand, so universities need more flexible academic arrangements supported by digital systems." (Expert 1)
2	Build a digital competency framework for different staff groups and link it to professional development	"Different staff groups do not have the same level of digital capability, so transformation requires a structured institutional approach to professional development." (Expert 2)
3	Prioritize strategic digital investment in high-impact infrastructure, analytics, and inclusion-supporting systems	"Because institutional resources are limited, digital spending should be directed to those areas that create the greatest academic, managerial, and student impact." (Expert 3)
4	Create an integrated digital student support platform linking advising, counseling referral, financial aid guidance, and academic alerts	"Student support is often divided across separate offices, which makes timely and coordinated intervention more difficult." (Expert 4)
5	Build an interoperable enterprise architecture with shared platforms, common identity management, and integrated service design	"Many university systems still operate separately, and this fragmentation reduces service efficiency and the quality of user experience." (Expert 5)
6	Build structured digital pedagogy development programs linked to curriculum redesign and teaching recognition mechanisms	"Teachers need systematic support if digital tools are to improve pedagogy rather than simply change the mode of delivery." (Expert 6)
7	Build digital collaboration platforms for joint teaching, research exchange, and industry-linked micro-projects	"Universities now have more opportunities to collaborate externally, but these opportunities require flexible digital channels to be sustained effectively." (Expert 7)
8	Build integrated digital resource ecosystems that combine library collections, open educational resources, and course-linked learning support	"Students and teachers increasingly need seamless access to multiple forms of learning resources, so resource provision should be connected more closely to digital learning environments." (Expert 8)

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 10, No. 5: 343-355, 2026
DOI: 10.55214/2576-8484.v10i5.12935

9	Build integrated institutional dashboards and planning routines that connect HR, finance, academic, and student indicators to strategic priorities	"Institutional planning is often weakened by disconnected information, so decision-making needs more integrated and visible evidence across key areas." (Expert 9)
10	Digitize routine academic workflows and reallocate staff effort to high-value academic support	"Academic staff spend too much time on repetitive administrative work, which reduces the time available for higher-value academic support." (Expert 1)
11	Build a multi-functional workforce through targeted digital upskilling instead of expanding staffing layers	"Under financial pressure, universities cannot continue expanding staffing structures, so they need more flexible employees who can take on multiple functions." (Expert 2)
12	Adopt priority-based digital budgeting and centralized procurement for core systems	"Economic constraints make it necessary to avoid fragmented digital spending and focus only on the most essential and strategic investments." (Expert 3)
13	Digitize routine student service processes and use case management systems for complex support needs	"Demand for student services continues to grow, but limited staffing means routine processes must be handled more efficiently so complex cases can receive proper attention." (Expert 4)
14	Adopt shared infrastructure and platform consolidation, including cloud-based services where appropriate, to reduce duplication and lifecycle costs	"Duplicated systems and overlapping infrastructure create unnecessary long-term costs that universities can no longer ignore." (Expert 5)
15	Prioritize scalable blended course redesign for large-enrollment and high-support courses	"Large-enrollment and high-support courses place heavy pressure on academic resources, so scalable redesign is needed to maintain quality under constraints." (Expert 6)
16	Use digitally supported partnership models, such as virtual joint supervision, shared seminars, and project-based collaboration, to sustain external engagement at a lower cost	"External engagement remains important, but universities need lower-cost ways to maintain partnerships and collaborative activities." (Expert 7)
17	Expand consortium-based procurement and shared digital resource planning for high-demand academic content	"The cost of academic content is increasing, and isolated purchasing is becoming less sustainable for institutions." (Expert 8)
18	Introduce evidence-based portfolio review for digital projects, academic support services, and strategic initiatives	"When financial resources are limited, institutions must be able to distinguish which projects and services genuinely provide strategic value." (Expert 9)
19	Redesign digital systems around the student lifecycle rather than separate administrative departments	"Student-related data are often separated by administrative boundaries, which makes it difficult to understand the student journey as a whole." (Expert 1)
20	Train managers and academic leaders in data literacy, governance awareness, and responsible AI use	"Many leaders and managers are still not sufficiently confident in using data for governance and decision-making." (Expert 2)
21	Establish common data standards and quality control rules before expanding analytics	"Analytics cannot be reliable if institutions do not first establish shared definitions, standards, and quality controls for their data." (Expert 3)
22	Build an early-warning and coordinated intervention system that combines academic, service, and engagement data	"Students at risk are not always identified early because academic, service, and engagement information are scattered across different systems." (Expert 4)
23	Establish a university-wide data governance framework with master data management, system integration standards, and clear ownership responsibilities	"Weak governance and unclear ownership responsibilities are among the main reasons why university data environments remain fragmented." (Expert 5)
24	Use learning analytics to support course redesign, feedback timing, and targeted intervention for disengaged learners	"Digital learning environments generate useful data, but these data are often underused in course improvement and learner support." (Expert 6)
25	Establish a digital partnership intelligence system to track collaboration activities, outcomes, and strategic value	"Partnerships are often difficult to evaluate properly because universities do not always have a systematic way to track their outcomes and strategic value." (Expert 7)
26	Integrate learning resource usage analytics into institutional teaching support and student success monitoring	"Resource usage data can show how students engage with learning materials, but these insights are not always connected to teaching support or student success efforts." (Expert 8)
27	Establish an institutional data warehouse linked to formal governance rules and a	"Disconnected systems prevent the institution from building a strong evidence base for planning, governance, and quality assurance." (Expert

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 10, No. 5: 343-355, 2026
DOI: 10.55214/2576-8484.v10i5.12935

	quality assurance review cycle	9)
28	Standardize and digitize core academic administrative processes before investing in advanced analytics and smart platforms	"Universities should not move into advanced analytics and smart platforms when their basic academic processes are still inconsistent or poorly digitized." (Expert 1)
29	Provide low-cost data literacy training for frontline managers and office heads	"Although budgets are limited, frontline managers still need a basic level of data literacy to avoid weak operational decisions." (Expert 2)
30	Use a risk-controlled, phased digital investment model with clear checkpoints before further spending	"When financial pressure is combined with weak data foundations, digital investment needs to proceed carefully and in stages." (Expert 3)
31	Prioritize a low-cost shared case-recording and referral system for high-risk student support before expanding to more advanced analytics	"The most urgent student support coordination needs should be addressed first through affordable shared processes before more advanced systems are considered." (Expert 4)
32	Phase legacy system consolidation around core data domains first, such as student, staff, finance, and curriculum data, before attempting advanced smart-campus projects	"Legacy systems create both complexity and cost, so institutions should stabilize core data domains before pursuing larger smart-campus ambitions." (Expert 5)
33	Establish common digital course templates, accessibility requirements, and basic engagement tracking across all courses before expanding to more sophisticated teaching analytics	"Meaningful teaching analytics are difficult to achieve if courses do not yet share basic standards for digital design, accessibility, and engagement monitoring." (Expert 6)
34	Introduce a staged partnership review model with simple digital performance indicators before committing larger resources	"Partnership expansion can waste limited resources if institutions do not first review collaboration value through simple performance indicators." (Expert 7)
35	Build a low-cost evidence model for resource review using shared usage standards, course relevance data, and open-access substitution analysis	"When funding is constrained, resource decisions should begin with simple and affordable evidence mechanisms rather than expensive analytical systems." (Expert 8)
36	Define a small core set of validated institutional indicators and build routine audit-and-review cycles around them before expanding analytics further	"Institutions should begin with a small number of trusted indicators instead of expanding into complex analytics before data quality and governance are mature." (Expert 9)

4.2. Themes Deductions

After extracting the initial concepts, a comparative analysis was conducted to identify their similarities, relationships, and underlying logic. Through logical induction and cluster analysis, these concepts were grouped into four sub-themes. Their hierarchical relationships were then clarified, resulting in one main theme. This process ensured the completeness and coherence of the final coding system. The overall coding results are presented in the following table.

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 10, No. 5: 343-355, 2026
DOI: 10.55214/2576-8484.v10i5.12935

Table 4.
Summarized Themes of Research Findings.

Themes	Sub-themes	Initial Concept
Digital Transformation Strategies	SO Strategies	Develop modular curricula and micro-credentials through digital academic management systems
		Build a digital competency framework for different staff groups and link it to professional development
		Prioritize strategic digital investment in high-impact infrastructure, analytics, and inclusion-supporting systems
		Create an integrated digital student support platform linking advising, counseling referral, financial aid guidance, and academic alerts
		Build an interoperable enterprise architecture with shared platforms, common identity management, and integrated service design
		Build structured digital pedagogy development programs linked to curriculum redesign and teaching recognition mechanisms
		Build digital collaboration platforms for joint teaching, research exchange, and industry-linked micro-projects
		Build integrated digital resource ecosystems that combine library collections, open educational resources, and course-linked learning support
		Build integrated institutional dashboards and planning routines that connect HR, finance, academic, and student indicators to strategic priorities
	ST Strategies	Digitize routine academic workflows and reallocate staff effort to high-value academic support
		Build a multi-functional workforce through targeted digital upskilling instead of expanding staffing layers
		Adopt priority-based digital budgeting and centralized procurement for core systems
		Digitize routine student service processes and use case management systems for complex support needs
		Adopt shared infrastructure and platform consolidation, including cloud-based services where appropriate, to reduce duplication and lifecycle costs
		Prioritize scalable blended course redesign for large-enrollment, high-support courses
		Use digitally supported partnership models, such as virtual joint supervision, shared seminars, and project-based collaboration, to sustain external engagement at a lower cost
		Expand consortium-based procurement and shared digital resource planning for high-demand academic content
		Introduce evidence-based portfolio review for digital projects, academic support services, and strategic initiatives
	WO Strategies	Redesign digital systems around the student lifecycle rather than separate administrative departments
		Train managers and academic leaders in data literacy, governance awareness, and responsible AI use
		Establish common data standards and quality control rules before expanding analytics
		Build an early-warning and coordinated intervention system that combines academic, service, and engagement data
		Establish a university-wide data governance framework with master data management, system integration standards, and clear ownership responsibilities
		Use learning analytics to support course redesign, feedback timing, and targeted intervention for disengaged learners
		Establish a digital partnership intelligence system to track collaboration activities, outcomes, and strategic value
		Integrate learning resource usage analytics into institutional teaching support and student success monitoring
		Establish an institutional data warehouse linked to formal governance rules and quality assurance review cycles
	WT Strategies	Standardize and digitize core academic administrative processes before investing in advanced analytics and smart platforms
		Provide low-cost data literacy training for frontline managers and office heads
		Use a risk-controlled, phased digital investment model with clear checkpoints before further spending

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		Prioritize a low-cost shared case-recording and referral system for high-risk student support before expanding to more advanced analytics
		Phase legacy system consolidation around core data domains first, such as student, staff, finance, and curriculum data, before attempting advanced smart-campus projects
		Establish common digital course templates, accessibility requirements, and basic engagement tracking across all courses before expanding to more sophisticated teaching analytics
		Introduce a staged partnership review model with simple digital performance indicators before committing larger resources
		Build a low-cost evidence model for resource review using shared usage standards, course relevance data, and open-access substitution analysis
		Define a small core set of validated institutional indicators and build routine audit-and-review cycles around them before expanding analytics further

4.3. Coding Conclusion

The coding results indicate that digital transformation strategies in educational administration constitute a comprehensive institutional response to the changing demands of Chinese higher education. Across the SO, ST, WO, and WT strategic dimensions, digital transformation is consistently understood not as a narrow technological upgrade but as a strategic process of administrative restructuring that strengthens academic delivery, student support, governance coordination, partnership management, and institutional decision-making. The findings show that universities seek to leverage existing strengths, respond to external pressures, correct internal weaknesses, and manage transformation risks through digitally enabled strategies such as modular curricula, integrated student support systems, workflow digitization, data governance frameworks, learning analytics, partnership intelligence, and phased implementation models. Taken together, these strategies demonstrate that educational administration is increasingly positioned as the central mechanism through which institutions organize, coordinate, and sustain digital change.

More importantly, the coding results suggest that these digital transformation strategies are directly oriented toward realizing a more inclusive learning environment, stronger knowledge exchange and partnerships, and more effective data-driven education. The emphasis on flexible learning pathways, accessibility requirements, early-warning systems, and coordinated student support reflects a commitment to inclusion and responsiveness to diverse learner needs. At the same time, collaboration platforms, digitally supported partnership models, and systematic partnership review mechanisms indicate that educational administration plays a key role in expanding institutional connectivity and knowledge exchange. Equally, the strong focus on dashboards, data standards, analytics, and evidence-based planning confirms that digital transformation is advancing a more analytical and informed model of governance. Therefore, the coding analysis supports the conclusion that digital transformation in educational administration is a strategically governed pathway through which Chinese higher education can enhance equity, collaboration, and institutional effectiveness.

5. Discussion

The findings of this study indicate that digital transformation strategies for the educational administration of higher educational institutions in Beijing should be understood as a whole-institution strategic process rather than as a narrow issue of technology adoption alone. This interpretation is strongly aligned with previous research, which argues that digital transformation involves changes in organizational structures, institutional processes, leadership, culture, and data use, not merely the installation of digital tools [25]. In higher education specifically, scholars have similarly argued that digital change becomes meaningful only when it is connected to teaching, learning, support services, and governance rather than treated as an isolated technical project [26]. Therefore, the present findings are well justified in showing that educational administration is a central institutional arena through which digital transformation can be organized to support inclusion, collaboration, and evidence-based decision-making.

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A major point of alignment with previous studies is the strong emphasis in this research on building a more inclusive learning environment through digital transformation. The identified strategies, such as modular curricula, micro-credentials, integrated student support platforms, student lifecycle-based system redesign, early-warning mechanisms, accessibility requirements, and coordinated intervention systems, correspond closely with the student success and engagement literature. Mohamed Hashim et al. [19] argue that student persistence depends heavily on institutional conditions and coordinated support rather than on student effort alone, while Ngqunguza et al. [4] show that student success is shaped by the interface between learners and institutional systems. In the same way, the findings of this study suggest that inclusive learning in higher education is not achieved solely through pedagogical intentions, but through administrative systems that enable timely support, flexibility, and coordinated responses to student needs. This makes the present findings highly consistent with previous research that positions inclusion as an institutional and systemic responsibility rather than a classroom-level issue only.

Another clear area of similarity lies in the theme of knowledge exchange and partnerships. The strategies in the research findings, such as digital collaboration platforms, virtual joint supervision, shared seminars, industry-linked micro-projects, partnership intelligence systems, staged partnership review, and consortium-based resource planning, closely reflect prior research on the networked and collaborative role of universities. Kobicheva et al. [27] describe universities as key actors in innovation systems through the interaction of university, industry, and government, while Kaputa et al. [28] show that university engagement with external partners has become a major function of contemporary higher education. The research findings align with these studies by demonstrating that digital transformation in educational administration can strengthen not only internal coordination but also external collaboration and knowledge exchange. In other words, the research supports the view that digital administration is not limited to bureaucratic efficiency; it also creates the infrastructure through which universities can sustain strategic partnerships, share expertise, and participate more effectively in wider innovation ecosystems.

The findings also show strong alignment with previous scholarship on data-driven education and institutional analytics. The repeated emphasis on common data standards, data quality-control rules, learning analytics, dashboards, data warehouses, institutional indicators, governance frameworks, and routine audit-and-review cycles is highly consistent with the literature on learning analytics and evidence-based governance in higher education. Fadli and El Mediouni [29] argue that learning analytics emerged precisely because higher education institutions increasingly need systematic evidence to improve learning and institutional performance. Akour and Alenezi [30] similarly note that learning analytics in higher education has developed around the need to understand student behavior, improve learning design, and support decision-making. The findings of this study strongly support that perspective. In particular, the recommendation to establish data standards and governance structures before expanding analytics mirrors earlier research showing that reliable analytics depend on data quality, institutional trust, and organizational capacity rather than on software alone. This makes the findings both theoretically credible and practically relevant.

6. Limitations

This study has several limitations. First, it is based on a small sample of nine experts from higher education institutions in Beijing, which may limit the transferability of the findings to other regions or national contexts. Second, the study reflects only administrators' perspectives, while the views of academic staff, students, and technical professionals were not included. Third, the proposed strategies remain conceptual and were not examined in terms of implementation or practical impact.

7. Conclusion

This study demonstrates that digital transformation in Beijing's higher education institutions requires a strategic approach aligned with internal capabilities and external conditions. Using SWOT–

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 10, No. 5: 343-355, 2026
DOI: 10.55214/2576-8484.v10i5.12935

PEST–TOWS analysis, it identified 36 actionable strategies emphasizing leadership, system integration, data governance, stakeholder collaboration, and staff development. The findings suggest that effective transformation depends not only on technology adoption but also on institutional readiness and evidence-based administration.

This study contributes by conceptualizing digital transformation as an institution-wide administrative strategy, extending SWOT–PEST–TOWS analysis to Chinese universities, and offering a practical framework for leaders and policymakers. Future research should examine implementation across contexts and over time.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 10, No. 5: 343-355, 2026
DOI: 10.55214/2576-8484.v10i5.12935