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The Modern University's Mission and Transformation: Addressing Challenges in a Multipolar World

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Abstract

In the modern higher education sphere, universities' ability to adapt has become more vital to their success and longevity. This study investigates the influence of leadership, technological innovation, sociopolitical engagement, skill and curriculum development, institutional collaboration, and governmental regulatory frameworks on university adaptability. Quantitative research was conducted by surveying 980 participants from various institutions in Kazakhstan, Russia, and Spain, using a standardized questionnaire. Structural equation modeling was employed to analyze variable connections. The findings suggest that leadership ($\beta = 0.32$, $p < 0.001$), technological innovation ($\beta = 0.28$, $p < 0.001$), sociopolitical engagement ($\beta = 0.19$, $p < 0.001$), and curriculum and skills development ($\beta = 0.25$, $p < 0.001$) have a substantial positive impact on the adaptability of universities. Furthermore, the mediation analysis demonstrated that institutional collaboration partially mediated the relationship between university adaptability and both leadership (indirect effect = 0.14, $p < 0.01$) and technological innovation (indirect effect = 0.12, $p < 0.01$). Additionally, moderation analysis verified that the government regulation framework substantially moderated the effects of leadership ($\beta = 0.15$, $p = 0.02$) and technological innovation ($\beta = 0.10$, $p = 0.03$) on university adaptability. These findings emphasize the importance of new technologies, effective leadership, and institutional collaboration for improving university adaptability.

Keywords:

New Concept of Universities'; Development; Leadership;
New Mission of University;
University Adaptability;
Technological Innovation;
Institutional Collaboration.

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1- Introduction

The modern world poses multiple new challenges, and higher education must adapt as institutions worldwide rethink their responsibilities to meet new complicated demands [1]. Modern universities are expected to be reconsidered in light of the growth of multiple major countries with complex geopolitical and economic linkages [2]. The traditional university model of research and education with its national aims has changed. Institutions must become lively, globally cognizant

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centers that stimulate flexibility, innovation, and social and political conversations [3]. This transformation is essential to university flexibility, which is essential in our interconnected world and refers to institutions' ability to adopt new policies and procedures in response to external factors. To overcome multipolar transition issues, universities must anticipate changes, adopt new ideas, and adapt their operations to remain relevant [4]. University adaptability depends on leadership and administration. Influential university leaders must create a vision that links institutional goals to global trends [5]. According to transformational leadership theory, university administrators may promote proactive change, strategic alignment, and inclusivity to improve adaptability [6]. To be competitive, universities need leadership that encourages collaborative decision making and can adapt to unanticipated developments. In a multipolar world with unequal power distribution and varied social and political climates, universities require strong leadership and governance structures to maximize opportunities and minimize dangers [7].

Technology has also affected the transformation of modern universities. Even at the basic level of classroom activities, the digital revolution shows changes in educational processes [8]. Universities must invest in digital infrastructure to improve their teaching and learning [9]. Aside from the natural adoption of digitalization, it can also be promoted by appropriate governmental policies [10], which may help universities increase their educational efficiency and modern transformation [11]. Despite extensive research on university adaptation to global challenges, several critical gaps remain in our understanding of how institutions can respond effectively to the complex demands of a multipolar world. While studies have examined leadership and university performance, they have largely focused on administrative or instructional aspects, overlooking the intricate dynamics of adaptive governance systems in response to social, political, and technological developments [12, 13]. Furthermore, research on technological innovation in universities has been predominantly compartmentalized, focusing on specific aspects such as e-learning or administrative technologies rather than examining the holistic technological ecosystem and its effects on research innovation and teaching methods [14-16].

Additionally, there is a notable gap in understanding how universities can effectively integrate sociopolitical engagement with their strategic objectives, while maintaining flexibility. Although some studies have acknowledged universities' roles in social transformation and public benefits, few have explored how these institutions can enhance their global responsiveness through local, national, and international participation [17, 18]. The integration of sustainability initiatives, social equity programs, and public health endeavors into university strategic frameworks for adaptability remains understudied, particularly in the context of curriculum development and institutional collaboration [19, 20]. These gaps in the literature underscore the need for a comprehensive investigation of how leadership, technological innovation, sociopolitical engagement, and institutional collaboration collectively contribute to university adaptability in the rapidly evolving global landscape.

Building on these gaps, this study adopts a comprehensive approach to examine how universities can enhance their adaptability in a multipolar world through the integration of multiple strategic dimensions. Specifically, we investigate the interconnected effects of leadership and governance structures on institutional flexibility [21, 22] while analyzing how technological innovation capabilities can be leveraged through institutional collaboration to create more resilient educational environments [23, 24]. Furthermore, this study explores the critical role of sociopolitical engagement and curriculum development within existing governmental regulatory frameworks, addressing the previously unexplored relationship between external policy environments and internal institutional mechanisms for adaptation [25-27]. By examining these elements through a mixed-methods approach across universities in Kazakhstan, Russia, and Spain, this study aims to provide actionable insights for institutional leaders and policymakers, contributing to both the theoretical understanding and practical implementation of adaptive strategies in higher education. This integrated approach not only addresses the identified research gaps, but also offers a framework for universities to navigate the complex challenges of modern higher education while maintaining their academic traditions and social responsibilities.

The remainder of this paper is organized as follows. Section 2 presents a comprehensive literature review and identifies key research gaps and theoretical foundations. Section 3 details our methodological approach, including the population selection, sampling procedures, data collection instruments, and analytical frameworks. Section 4 presents the results of our empirical analysis and discusses the implications for university adaptability. Finally, Section 5 concludes with policy recommendations and suggestions for future research while acknowledging the study's limitations and potential areas for further investigation.

2- Literature Review

In a modern multipolar world, universities must adapt to shifting technical, regulatory, and geopolitical settings to achieve success. The current research may help explain how leadership, governance, technological innovation, sociopolitical participation, curriculum design, policy frameworks, and institutional collaboration affect university adoption [28, 29]. Universities need strong leadership and governance to survive and grow amid ongoing change. Olcott et al. [21] argued that great leadership is an open and honest communication, a well-thought-out plan, and an inclusive approach that engages many university stakeholders. Leaders must make everyone feel welcomed and appreciated to

adapt. This will help administrative and academic teams collaborate and accept new ideas faster. By supporting shared responsibility, distributed leadership techniques increase institutional resilience [22]. University resilience has also been enhanced through decentralized governance. Decentralized governance gives academic departments greater decision-making power and accelerates educational innovation [30]. Adaptability is required for adjusting to global regulations, research objectives, and educational standards. Universities that adopt such governance structures often adopt new technologies, cooperate with businesses, and create new programs to meet rising requirements [31]. Adaptive governance may enhance institutions' financial resource management and purpose alignment [32]. Technological progress also affects universities' flexibility. George & Wooden [9] state that data analytics, machine learning, and AI have transformed higher education. According to Rafique [23], digital platforms can facilitate online learning, student engagement, research distribution, and administrative tasks. Chauhan et al. [24] found that technology-enabled university administrations and courses are more adaptable. This allows them to meet student needs and global norms better. R&D technology allows for global cooperation and multidisciplinary advancement of institutions. Leadership, governance, and technological innovation are crucial to flexibility; they prioritize technological advancement to make universities adaptable and contemporary.

2-1- Transformation Challenges in a Multipolar World

Universities worldwide face significant transformative challenges as the higher education landscape evolves, especially in a multipolar world in which more governments share power, influence, and academic fame [33]. As institutions navigate a complex matrix of competition and collaboration, distribution offers both opportunities and problems. Unlike Spain, which is part of the Western world, the educational environment has varied in Russia and Kazakhstan, which have emerged as initiatives to enhance their academic institutions and match global standards [34]. On the other hand, African and Latin American institutions often need better academic frameworks, facilities, and financing; otherwise, their global education participation is restricted [35, 36]. These institutions are less represented in the 2024 "Three University Missions" ranking, validating the existing issue. Disparities in university finance and administrative power are difficult to overcome in a multipolar world. Russia and Kazakhstan are catching up to Western countries such as Spain in research spending and production [37].

In particular, the new ranking system of "Three University Missions" introduced in Russia proposes a new perspective for investigating universities' roles in the modern world. The positions of the leading Russian universities in the 2024 ranking decreased, mostly because of changes in the macroeconomic situation. Nevertheless, Russia retained many of the competitive advantages recorded in previous ratings. Thus, in terms of student victories in prestigious international Olympiads, the results of Russian universities are on average two times higher than those of British universities, three times higher than those of Canadian universities, and five times higher than those of American universities. In addition, domestic education remains highly popular among foreign youth; the share of foreign students in leading Russian universities exceeds the world average of 12.2% versus 11.1%, respectively. Interestingly, the average value for the United States is significantly lower (9.3%), while the leaders in education exports are universities in the United Kingdom and Australia; every fourth student in these countries came from abroad [38].

Technological advances, alliances, and scientific competition have changed the global distribution of economic powers. Because of these changes, universities must rethink talent acquisition, faculty retention, and worldwide relationships. Universities expecting to remain current should embrace technology, foster cross-disciplinary research, and support initiatives that encourage lifelong learning. These adjustments are necessary for universities to become global leaders and to contribute significantly to a multipolar intellectual and socioeconomic environment. Table 1 illustrates the primary obstacles universities face in a globalized environment.

Table 1. Key challenges faced by universities in a multipolar world

Challenges	General Description	Relevance for University
Sociopolitical Engagement	Need for increased involvement in social issues	Enhances university relevance and public trust
Policy Constraints	Restrictive national regulations	Limits innovation and global competitiveness
Technological Advancements	Rapid changes in technology	Requires continuous adaptation and upskilling
Funding for Research	Limited financial resources for new projects	Hinders development of large-scale initiatives
Global Competition	Competing with universities worldwide	Necessitates unique programs and partnerships

Source: Adapted from the scholarly work of Jiang et al. [39].

2-2- Context for Modern University Goals

The university's roles have expanded beyond teaching. Universities are crucial for worldwide partnerships, innovative technology, strong communities, and groundbreaking research. The triple purpose of teaching, research, and community engagement has become standard for educational institutions [40]. In the 'Three University Missions" paradigm,

institutions are rated on their social effect and ability to offer inviting classrooms for all students, not only their grades [41]. Modern universities are meant to drive social and economic progress and to tackle local and global issues. A well-educated workforce is required to manage increasingly complex environments. The top universities in Kazakhstan, Russia, and Spain attract community services and academic excellence. These institutions emphasize student-led problem-solving, public policy, and commercial partnerships [42, 43]. Numerous methods are needed to achieve their aims and stand out in global academia. This is because of their commitment to developing human knowledge and satisfying society's evolving needs [44]. Institutions in the Global South, particularly those facing political or economic turmoil, may struggle to meet global standards because of resources and government constraints. These measures reflect a commitment to education and human capital [45]. However, expanding their goals to incorporate additional research and community involvement is important. Institutions in Kazakhstan have shifted their focus from educational quality to research capacity and its global importance. Universities are under pressure to adapt swiftly to a changing global society as their responsibilities increase [46]. Universities must develop adaptable courses to prepare students for their future jobs. This shift toward critical thinking, problem-solving, and cross-disciplinary knowledge is part of a larger schooling trend. Universities can improve their education, research, and society by fostering their talent.

In Russia and Kazakhstan, governments tend to establish specific higher education goals to resolve modern societal challenges. In Russia, a ranking called "Three University Goals" was created [47]. It is designed to rank higher education institutions worldwide in the context of three essential goals: educational, scientific, and successful relationships with local communities. For example, the eighth annual ranking of "Three University Missions" in 2024 includes 2,000 universities from 112 countries. Russia retained its position among the top three world leaders in terms of representation in the ranking (152 universities), second only to the United States and China (257 and 237 universities, respectively). Among Russian universities, the highest position was taken by Lomonosov Moscow State University, which retained 17th place in the final ranking, followed by St. Petersburg State University (49th place) and Moscow Institute of Physics and Technology (54th place).

Spain is one of the countries adapting "three missions" approach [48], with the most accents made on the third mission. Kazakhstan's university development strategy is mostly guided by internal challenges. Nevertheless, it is aimed at matching international standards and successful integration into the global education sphere.

Table 2 illustrates contemporary universities' strategic objectives and missions.

Table 2. Modern university missions and strategic goals

University Mission	Description and Implementation
Education	Capability of a university to provide higher education that matches international standards
Scientific research	Comprehensive scientific research activity allowing the universities to compete with independent laboratories and R&D centers
Relation between the university and the local community	Ability of a university to provide practical benefits for its region and promote its own sustainability
Development of infrastructure and digital architecture of higher education	Adapting digital technologies in favor of boosting the efficiency of educational and research processes
Internationalization of Higher and Postgraduate Education	Accessibility of a university for applicants from all over the world

2-3- The Value of Flexible Learning in Spanish, Russian and Kazakh Higher Education

Universities in Spain, Russia, and Kazakhstan should adapt their learning methods to meet their global and regional demands. In today's academic environment, when technology, economic circumstances, and teaching techniques change constantly, adaptability is an undoubtful necessity [49]. Russian universities have proven their resilience by developing blended learning programs and employing online education platforms. The pandemic has prompted rapid improvements in several sectors, highlighting the accomplishments and growth prospects. The pandemic initially boosted massive open online courses (MOOCs), but their popularity declined. Long-term methods are needed for online education to adapt to changing conditions [50].

Kazakhstan's higher-education sector tends to promote flexible learning. The educational system embraces international standards and collaborates with foreign schools. According to the 2024 "Three University Missions" rating, the presence of Kazakhstan's universities decreased from 18 to 13. Kazakhstan may prioritize technology, academic diversification, and student-centered teaching to increase learning flexibility. Promote active learning and critical thinking to empower students to handle complex and rapidly changing circumstances. Budgets and policies may affect how universities spend on faculty development, research, and instructional technology [37]. Government policies that promote academic freedom, research funding, and international collaboration are vital as institutional initiatives for learning adaptation. Flexible learning environments are created via public-private partnerships pooling financial and technological advancement resources. Interdisciplinary programs and curricula that link academic fields are essential to flexible learning. In this age of complicated global issues that demand many solutions, interdisciplinary universities should prepare their students for the workforce [51]. Data science, environmental studies, and international relations

may be incorporated into interdisciplinary Spanish, Russian, and Kazakh programs. Continuous curriculum development and openness to academic and corporate partners are crucial to this process. Finally, adaptability in education involves creating learning environments that encourage lifelong learning. To support lifelong learning, universities should encourage current students, alumni, and staff to continue learning and growth. Universities in the countries investigated can improve their academic communities and respond to future difficulties by stressing lifelong learning [52]. In a world in which both sides change, these institutions must adapt to remain competitive.

2-4- Adapting University Missions to Global Sociopolitical and Educational Challenges

Modern universities must integrate sociopolitical participation as an essential competency to adapt to a multipolar society, as they are increasingly expected to drive social change and engage with their communities locally and worldwide. Universities play a growing role in socio-politics as climate change, migration, and political instability have become global issues. Among other things, they demonstrate public services by partnering with industry, government, and organizations to address genuine issues [53]. Owing to shared resources, knowledge, and networks, national and international university collaboration simplifies social and political undertakings. According to Rådberg & Löfsten [54], institutions must foster cooperation and resource-sharing to be adaptable and effective in addressing global issues. In dynamic environments, universities focus on courses and skill development; therefore, they can offer a curriculum that encourages students to think critically, solve issues in interdisciplinary teams, and apply what they learn to real-world challenges to remain relevant. Dumitru & Halpern [55] suggest that students are better equipped for a global economy and future job markets that contain real-world challenges and foster classroom innovation. Skills-based university programs ensure that graduates can contribute to global discourse and problem-solving while being employable. A curriculum that cultivates these abilities increases an institution's flexibility by creating a feedback loop, in which instructors and students influence their destiny. Responding to global goals and labor market requirements with a flexible curriculum design may help schools produce globally competent students.

The discussion identifies the following research questions. First, ***how do leadership and governance affect university adaptations in a multipolar world?*** Strong leadership and governance are required to develop and create innovative, resilient workplaces. Answering this question reveals how a university's governance and leadership policies affect its ability to address new possibilities and challenges. Second, ***how does institutional collaboration foster technological innovation and university flexibility?*** Technological advances may help universities adapt to global trends and teach new methods. Collaboration between universities facilitates information, joint research, and resource sharing, all of which may boost creativity. Third, ***how do sociopolitical involvement, curriculum, and skills development improve universities' flexibility within the government regulations framework?*** To address this question, we must understand how government regulation frameworks control university adaptability, sociopolitical involvement, curricula, and skill development. Universities must participate in social and political initiatives, and teach practical skills to remain relevant and influential. Government regulation frameworks may assist or damage universities' capacity to adapt to new challenges. This may help us to understand when and how particular factors contribute to adaptation.

According to the research questions, this study seeks the following research objectives:

- To investigate the impact of leadership and governance on the adaptability of universities in a multipolar world.
- To examine how technology innovation impacts university flexibility, resulting in institutional collaboration mediates it.
- To assess the government regulations framework that moderates university flexibility, sociopolitical involvement, and curriculum and skill development.

2-5- Theoretical Approach

Modern universities are facing unprecedented challenges in adapting to rapid technological, social, and political changes in an increasingly multipolar world. This study draws primarily on the Organizational Adaptability Theory to understand how universities navigate these challenges. This theoretical perspective emerged from the early work on organizational change and adaptation by March and Simon [56], who argued that organizations must continuously modify their structures and processes to survive in dynamic environments. Chakravarthy [57] further developed this theory by emphasizing that organizational adaptation is not merely reactive, but involves proactive strategic choices that enable organizations to maintain alignment with their environment while preserving their core functions.

Organizational Adaptability Theory provides valuable insights into how universities balance multiple demands while preserving their core missions. As Antonopoulou et al. [17] demonstrated, universities must navigate extreme uncertainty while maintaining their essential functions and adapting to new challenges. This theoretical framework helps explain the variations in universities' success in implementing strategic changes and maintaining competitiveness in a dynamic environment. The present study extends the contemporary applications of Organizational Adaptability Theory by examining the specific mechanisms through which universities develop and maintain their adaptive capabilities. While

recent research has focused on digital transformation and structural adaptations [58], our study investigated the integrated roles of leadership, technological innovation, sociopolitical engagement, and curriculum development. This approach aligns with emerging research that emphasizes the importance of holistic adaptation strategies in higher education [40].

Our theoretical framework is enriched by complementary perspectives, including insights from institutional governance studies [30] and research on organizational innovation capabilities [16]. These complementary perspectives help contextualize how universities develop adaptive capabilities within institutional constraints and respond to external pressures in an increasingly complex educational landscape.

3- Research Methodology

3-1- Population of the Study

Academic supervisors, professors, and administrators from Russian, Kazakh, and Spanish universities participated in the study. University staff members can provide the most relevant assessment of recent trends and emerging directions for future developments.

Figure 1 illustrates the systematic approach adopted in this study. Starting with a quantitative, cross-sectional research design, the study collected data from 980 participants across eight universities in Kazakhstan, Russia, and Spain, achieving a 78.4% response rate. Data were collected using employed a standardized questionnaire that measured seven key variables on a 5-point Likert scale. The analysis phase utilized three complementary methods: reliability and validity testing (with Cronbach's Alpha > 0.70 and KMO > 0.80), factor analysis (extracting four components explaining 80% of the variance), and structural equation modeling to examine path relationships, including mediation and moderation effects.

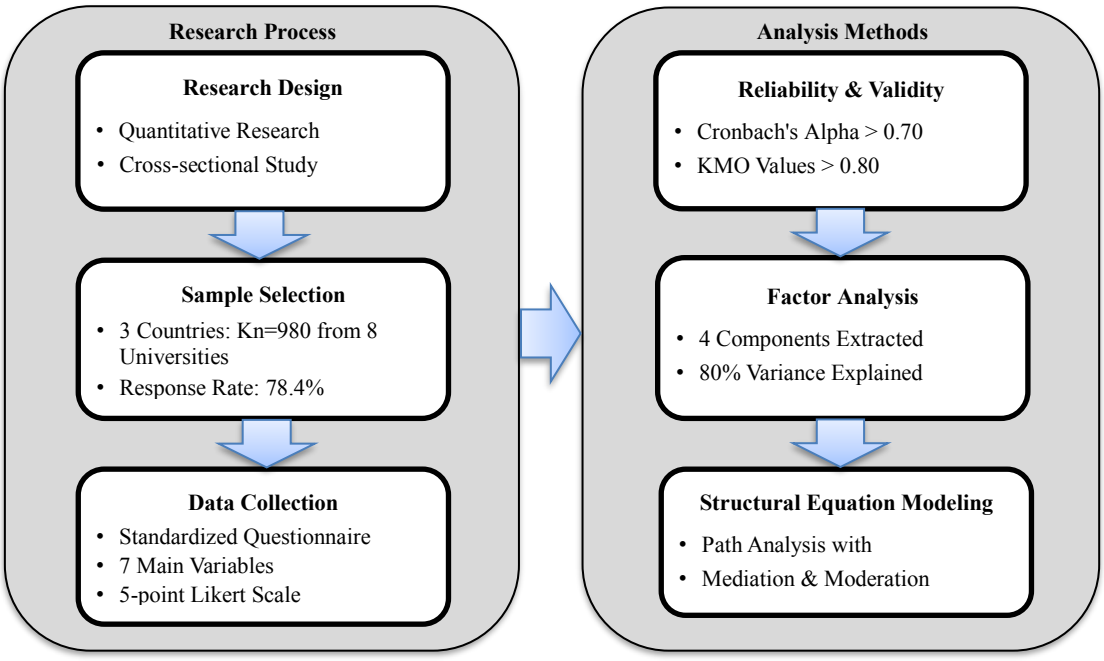

Figure 1. Research methodology flowchart for analyzing university adaptability

3-2- Sample of the Study

The universities in this study were selected primarily based on convenience sampling, as the researchers had existing academic networks and easier access to administrative permission in these institutions. The final set of participating universities represented diverse institutional characteristics: they varied in focus (from research-oriented to teaching-focused institutions), geographic location (spanning different regions within each country), specialization (including comprehensive universities, technical institutions, and specialized medical schools), and size (ranging from large universities with over 20,000 students to smaller institutions with less than 10,000 students).

Stratified random sampling was used to select the study sample and to ensure that different institutions and regions were represented. The 1,250 surveys (see the Appendix I) began with Spanish, Russian, and Kazakh higher education institutions, namely, financial universities under the Government of the Russian Federation, Lipetsk State Pedagogical P. Semenov-Tyan-Shansky University, Kazan National Research Technological University, Rostov State Medical University, International University of La Rioja, I.M. Sechenov First Moscow State Medical University, Abylkas Saginov Karaganda Technical University, and L. N. Gumilyov Eurasian National University.

This strategy was used to acquire university administration and flexibility in opinions and methodologies. The final sample comprised of 980 surveys (78.4%). This high response rate supports the findings of the study and shows the participants' interest. To analyze the data and draw conclusions, 980 samples were collected. This confidence level had a 5% margin of error and a 95% confidence level. The study required a broad sample of institutions with varying sizes, locations, and administrative systems; hence, the sample size was determined. A stratified random sample ensures that urban and rural institutions are well-represented to better study how institutional and geographic characteristics affect university adaptability. The structured questionnaire collected demographic data, including age, gender, institution position, and academic career length, to understand how these characteristics affected the replies.

3-2-1- Demographic Characteristics

A systematic questionnaire was used to collect demographic data on the respondents, including age, gender, education, and job experience. These data are required to understand the diverse perspectives of university governance and flexibility. Participants ranged in age from 25 to 65 years and were provided young and experienced teachers. This mix symbolizes a range of viewpoints and experiences, which are beneficial in educational situations that require various adaptation methods. Although the sample was balanced, a small majority of male replies were given. Studies suggest that gender affects academic leadership and decision making, making demographic data vital. This study explores the gender perspectives of leadership, governance, and adaptability to illuminate the gender dynamics in higher education. Most respondents were university administrators and teachers who directly influenced policies and the educational atmosphere. Owing to rigorous participant selection, the outcomes reflect the reality of educational program implementers and leaders. This study intends to illuminate university flexibility and offer best practices for institutions to meet global educational demands better by gathering viewpoints from these essential stakeholders. Table 3 shows the sample sizes and the demographic characteristics of the sample.

Table 3. Sample Size

University Name	Location	Type	Sample Size	Participant Roles	Age Range	Gender Distribution (%)
Financial University under the Government of the Russian Federation	Moscow, Russia	Public	150	Administrators, Faculty	30-60	Male: 60, Female: 40
Lipetsk State Pedagogical P. Semenov-Tyan-Shansky University	Lipetsk, Russia	Public	130	Administrators, Faculty	25-55	Male: 55, Female: 45
Kazan National Research Technological University	Kazan, Russia	Public	120	Administrators, Faculty	28-62	Male: 50, Female: 50
Rostov State Medical University	Rostov-on-Don, Russia	Public	110	Administrators, Faculty	30-65	Male: 65, Female: 35
International University of La Rioja	Logrono, Spain	Public	140	Administrators, Faculty	25-55	Male: 52, Female: 48
I.M. Sechenov First Moscow State Medical University	Moscow, Russia	Public	120	Administrators, Faculty	26-58	Male: 48, Female: 52
Abylkas Saginov Karaganda Technical University	Karaganda, Kazakhstan	Public	130	Administrators, Faculty	30-60	Male: 57, Female: 43
L.N. Gumilyov Eurasian National University	Almaty, Kazakhstan	Public	80	Administrators, Faculty	27-54	Male: 50, Female: 50

3-3- Data Collection Instrument

This study used a standardized questionnaire to assess university adaptation and its relationships with independent, moderating, and mediating characteristics. The questionnaire addressed leadership, governance, technological innovation, sociopolitical participation, curriculum development, government regulation frameworks, and institutional collaboration. The questionnaire included questions from existing scales to ensure the validity and reliability of measuring aspects of interest. The questionnaire was divided into parts covering one variable to fully explore relationships. The Likert scale enabled participants to rate the statements from strongly disagree to strongly agree. This format makes responses easy and provides richer data. The questionnaire's organized form makes statistical analysis more accessible and helps explain university adaptation in the context of the studied elements.

3-4- Comprehensive Methodological Framework for Assessing University Adaptability

To be relevant in today's fast-paced world, universities must adapt swiftly to global trends. University adaptability is the dependent variable. The Organizational Adaptability Scale measures an institution's ability to make strategic changes, enhance education, and stay competitive. Hanushek & Woessmann [59] found that educational institutions must reform to foster innovation and sustain its impact on academia and beyond. Therefore, investigating the impacts of internal and external factors on university operational and strategic flexibility is best done through university adaptability. Leadership and governance were the first independent factors examined in this study. They shape educational institutions' long-term goals, decision making, and adaptability. According to Tweddle [60], the Transformational Leadership Scale (TLS) is a credible leadership assessment tool. Strong leadership fosters an adaptable culture by defining a compelling vision, encouraging cooperation, and ensuring that everyone understands the

university's long-term goals. Organizational success depends on the governance structures that execute and supervise policies. This study examined how university leadership and governance affect a university's ability to anticipate and address external challenges. Technological innovation is the second independent variable, because of its expanding role in educational reform. According to Jakovljevic [61], this variable can be quantified using the Technology Acceptance Model (TAM) or the Digital Innovation Scale because of the growing use of digital resources and technologies to improve learning and operational efficiency. If universities adopt new technologies, digital cooperation, global connectivity, and remote learning become more straightforward. According to previous studies, institutions that use technology are more resilient and have improved educational outcomes. Table 4 lists these variables and their measurement scales.

Table 4. List of Variables

Variable Type	Variables	Example Items	Measurement Scale	Reference Studies
Dependent	University Adaptability	Our university is quick to adopt new strategies to respond to global shifts.	Organizational Adaptability Scale	Hanushek & Woessmann (2023) [59]
Independent 1	Leadership and Governance	University leaders have a clear vision that aligns with global developments.	Transformational Leadership Scale (TLS)	Tweddle (1995) [18]
Independent 2	Technological Innovation	Our university actively invests in digital tools to enhance learning.	Technology Acceptance Model (TAM) or Digital Innovation Scale	Jakovljevic (2020) [61]
Independent 3	Sociopolitical Engagement	We engage in social programs that address local and global challenges.	Community Engagement Scale (CES) or Public Value Scale	Leydesdorff (2020) [62]
Independent 4	Curriculum and Skills Development	Our curriculum is designed to foster critical thinking for solving global issues.	Workforce Skills for the 21st Century Scale	Jaffer et al. (2007) [63]
Moderator	Government regulations Framework	Government policies support the autonomy of our university.	Policy Environment Scale	Altbach & Yudkevich (2016) [64]
Mediator	Institutional Collaboration	Collaboration with other institutions supports resource sharing.	Collaborative Climate Scale	Snellman (2015) [65]

To properly understand university flexibility, we incorporate the third and fourth independent variables: sociopolitical participation, curriculum, and skills development. According to Leydesdorff [62], sociopolitical involvement, which can be evaluated using the Community Involvement Scale (CES) or the Public Value Scale, shows universities' roles in social concerns and community development. This statistic recognizes that political and social movement institutions have greater resources and support networks, which increases their adaptability. Jaffer et al. [63] recommended using the Workforce Skills for the 21st Century Scale to assess the curriculum and skill development. Critical thinking and current skill courses may help universities prepare students for complex real-world issues. This study is moderated by the government's regulatory framework. This framework is essential for Altbach's Policy Environment Scale [64]. This variable was selected because it affects universities' capacity to adapt to changes in policies and regulatory settings. Policies that promote autonomy, research funding, and innovation may foster workplace development and flexibility. According to previous studies, leadership, governance, and other variables may affect university flexibility, whereas supporting policy frameworks can have the opposite impact. This study finds institutional cooperation to be a mediator because it helps institutions share resources, knowledge, and innovation. The Collaborative Climate Scale of Snellman measures this indicator, emphasizing the impact of partnerships on university capacity [65]. Institutions may be more adaptive by working together to solve challenges, improve pedagogy, and adopt the best practices.

3-5- Data Analysis Techniques

The survey results were analyzed using a variety of methods. Cronbach's alpha reliability analysis was used to assess the internal consistency of the scales. It is crucial to ensure that the components of each construct evaluate the same concept. A validity investigation followed the reliability analysis to ensure that the constructs spanned the appropriate dimensions. This study examined convergent and discriminant validity. The study also utilized Factor analysis was also used to examine the data structure and uncover hidden elements in the responses. Thus, the constructs' interrelationships are better known, and the questionnaire may be refined for future investigations. Structural Equation Modeling (SEM) was used to analyze variable correlations, including moderator and mediator effects. It is a robust statistical approach that allows researchers to simultaneously study the complex relationships between several factors, which may help them understand university adaptability. This study uses cutting-edge analytical approaches to illuminate higher education governance and flexibility and inform policy and practice.

3-6- Moderation and Mediation Analysis

Mediation and moderation analyses were used to better understand the complex interactions between the variables. According to this research, leadership, governance, technological innovation, sociopolitical participation, and curriculum development all impact university adaptability depending on the government regulation framework. This study

investigated this moderating effect to determine whether these independent factors had a greater or lesser impact on adaptation outcomes. National higher education policies may affect university governance and technical progress. This study uses the moderation effect in regression models to investigate how various levels of the government regulation framework influence the stability of correlations between the variables of interest and the final result. This study uses institutional collaboration as a mediating variable to investigate how leadership and governance, technological innovation, sociopolitical participation, and curriculum and skill development influence university flexibility. This study investigates institutional cooperation to determine whether educational institutions' partnerships and joint efforts improve their adaptation to external challenges. Productive collaboration may promote knowledge exchange and resource pooling, in response to global educational trends. This mediation study explains how the independent variables influence universities and help them adapt to changing educational settings. Institutional cooperation may offer companies valuable insights.

4- Results and Discussion

Table 5 shows the respondents' demographic profiles. It investigates how universities adjust to leadership, governance, technology, sociopolitical participation, curriculum development, and government regulatory frameworks. The sample comprised of 52% males and 48% females. As previous research has shown that gender may influence attitudes toward institutional change and innovation, a balanced gender representation must comprehend both sexes' perspectives on their institutions' adaptability. A total of 39.6% were between 25 and 34, indicating an adult attitude that synchronizes with current educational trends and is open to new campus technology and practices. Early-career professionals (19-24 years old) accounted for 35.1% of the total. However, 25.3% of the respondents over 35 years of age may have a more mature perspective on institutional stability and long-term trends. Because of the broad age range represented among respondents, this study may better understand how various generations' viewpoints impact the flexibility of education institutions. Regarding educational qualifications, 41% of the respondents were undergraduates, 35.7% were graduates, and 23.3% held a PhD degree. Educational diversity is essential because of the various sources and degrees in university policies and procedural participation. University flexibility talks benefit from student perspectives on curriculum and support services and graduates' and PhD holders' perspectives on research and institutional governance. The respondents' university affiliations were as follows: 15.3% Financial University under the Government of the Russian Federation, 14.3% Lipetsk State Pedagogical P. Semenov-Tyan-Shansky University, 13.3% Kazan National Research Technological University, 12.2% Rostov State Medical University, and 16.3% International University of La Rioja. These major institutions reflect the institutional and geographical characteristics of the study sample. Additionally, 11.2% came from I.M. Sechenov First Moscow State Medical University, 10.2% from Abylkas Saginov Karaganda Technical University, and 7.1% from L.N. Gumilyov Eurasian National University. These institutions are geographically important for the results.

Table 5. Demographic Characteristics of Respondents

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	510	52.0
	Female	470	48.0
Age Group	19-24	540	35.1
	25-34	290	39.6
	35 and above	150	25.3
Education Level	Undergraduate	500	41.0
	Graduate	350	35.7
	Postgraduate	130	23.3
Universities	Financial University under the Government of the Russian Federation	150	15.3
	Lipetsk State Pedagogical P. Semenov-Tyan-Shansky University	140	14.3
	Kazan National Research Technological University	130	13.3
	Rostov State Medical University	120	12.2
	International University of La Rioja	160	16.3
	I.M. Sechenov First Moscow State Medical University	110	11.2
	Abylkas Saginov Karaganda Technical University	100	10.2
	L.N. Gumilyov Eurasian National University	70	7.1

Table 6 summarizes the descriptive statistics, reliability coefficients (Cronbach's alpha), and KMO (Kaiser-Meyer-Olkin) measure of sample adequacy for many components of this research. These metrics are necessary to assess university adaptation data and their factors. The mean values of the variables demonstrate that respondents usually prefer university adaptation ideas. Participants strongly agreed that their universities might adapt to fulfil student and global demands, with a mean score of 4.32 (SD = 0.57). Universities must swiftly adapt to new ideas and procedures to compete in an ever-changing academic environment.

Table 6. Descriptive Statistics, Cronbach's Alpha and KMO Value

Variables	Mean	SD	Cronbach's Alpha	KMO Value
University Adaptability	4.32	0.57	0.89	0.85
Leadership and Governance	4.45	0.62	0.91	0.87
Technological Innovation	4.27	0.59	0.88	0.83
Sociopolitical Engagement	4.18	0.64	0.87	0.82
Curriculum and Skills Development	4.35	0.58	0.9	0.86
Government regulations Framework	4.12	0.6	0.86	0.84
Institutional Collaboration	4.3	0.61	0.89	0.85

Leadership and Governance, with the highest mean score (4.45, standard deviation = 0.62), shows that respondents value university authorities' vision and direction. This high score emphasizes the necessity of excellent leadership in fostering innovation and adaptability due to the significant association between good governance and institutional performance and responsiveness. Respondents with an average score of 4.27 (SD=0.59) on Technological Innovation appreciated their institutions' efforts to improve learning via digital tools and resources. This highlights the expanding role of technology in shaping educational techniques and satisfying the needs of technologically savvy students, which are vital for worldwide educational standards. Survey respondents acknowledged the importance of their institutions' sociopolitical involvement in addressing local and global social issues, with a mean score of 4.18 (SD = 0.64). Universities are more than simple locations to acquire a degree; they are also centers for community involvement and social responsibility, which may help people succeed in various contexts. A mean score of 4.35 (SD = 0.58) for Curriculum and Ability Development suggests that educational programs match today's workforce skills. Most respondents appreciated that their courses educate students to think critically and solve issues, two of the most crucial skills for graduates to face current difficulties. A mean score of 4.12 (SD = 0.60) for the government regulation framework implies that people like government policies that promote academic freedom and innovation. This is significant because it suggests that respondents feel that their academies have a policy environment that fosters flexibility and student needs. Finally, respondents valued institutional cooperation with a mean score of 4.30 (SD = 0.61). This suggests that they value collaboration across institutions to increase resource-sharing and best practices. This collaboration is more critical than ever in the context of globalization, where partnerships may boost educational outcomes via innovation. Cronbach's alpha showed that the constructs were trustworthy; all values were greater than 0.70, indicating strong internal consistency in the items used to assess each variable. Leadership and Governance are the most dependable domains, with a dependability of 0.91. All constructions over 0.60 indicate that the sample is suitable for factor analysis, and the KMO values support it.

Table 7 shows the components assessing university adaptation that shared similarities after factor analysis. The results demonstrated a factor structure, and each variable was substantially loaded onto its components. The first component is highly connected to leadership and governance, accounting for 18.2% of the variance, and has a factor loading of 0.82. University adaptability depends on leadership and administration. Competent management, strategic vision, and decision making are crucial for creating a flexible learning environment. The second component explained 15.9% of the variance and measured sociopolitical participation, with a loading of 0.84. Universities that address social issues and are attentive to sociopolitical issues can thus gain credibility and stakeholder trust.

Table 7. Factor Analysis Results

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Eigenvalue	% Variance Explained
Leadership and Governance	0.82	-	-	-	3.12	18.2
Technological Innovation	0.78	0.1	-	-	2.95	17.1
Sociopolitical Engagement	-	0.84	-	-	2.87	15.9
Curriculum and Skills Development	-	-	0.8	-	2.71	14.7
Institutional Collaboration	-	-	-	0.81	2.58	14.2

According to the third component – curriculum and skill development – adaptability requires a well-designed curriculum that supports skill development. This explains 14.7% of the variance with a factor loading of 0.80. The contemporary education philosophy emphasizes courses that give students marketable skills, which increases their employability and the school's reputation. With a factor loading of 0.81, the fourth component, Institutional Collaboration, accounts for 14.2% of the total variance. This finding demonstrates that institutional interactions promote flexibility. Collaboration on innovation, resource sharing, and information transfer may help universities overcome external pressures. The eigen-values of these components, which were larger than 2.0, explained most of the variance in the dataset. These four variables explained almost 80% of the variation, demonstrating the strong component structure of the analysis. This component analysis supports the view that universities should be studied holistically and empirically and supports the concept that university adaptation is multifaceted. The findings suggest that leadership, sociopolitical engagement, curriculum and skill development, and institutional collaboration help universities to adapt to changing circumstances and demands. This information should inform future institutional development and resource allocation strategies.

Structural equation modeling (SEM) revealed the interrelationships between the factors affecting university adaptation (Table 8). Leadership considerably enhanced university adaptation, as shown by the path coefficient of 0.32 (SE = 0.04, CR = 7.89, $p < 0.001$). This indicates that institutions need strong leadership throughout their changes and volatility. Good management involves building an environment that fosters creativity and adaptability. Leaders who prioritize clear communication, vision, and strategic alignment can motivate teams, mobilize resources, and rapidly adapt to external obstacles, including economic swings, regulatory changes, and student expectations [66]. Universities must adjust to economically maintain their educational market edge. Universities must meet affordable, high-quality education before losing their enrollment and funding demands. Transformational leadership, which empowers and motivates workers, is also effective. Transformational leaders are likely to build an adaptive culture and facilitate resource acquisition, which is crucial for supporting new initiatives and research [67]. Leadership development may strengthen a university's capacity to adapt to a changing economy, which may have significant advantages. Leadership is favorably connected with university adaptability, supporting views that emphasize visionary leadership in creating an adaptable business culture [68]. Influential leaders do more than motivate staff and faculty members to embrace change and find new solutions. This alignment of leadership and flexibility boosts the university's reputation and stature in the educational community, making it appealing to prospective students and staff members. The findings show that strong leadership is essential for an organization's resilience to change and long-term success.

Table 8. Structural Equations Modeling (SEM) Results

Path	Estimates	SE	CR	p-value
Leadership → University Adaptability	0.32	0.04	7.89	<0.001
Technological Innovation → University Adaptability	0.28	0.05	6.45	<0.001
Sociopolitical Engagement → University Adaptability	0.19	0.03	5.6	<0.001
Curriculum and Skills Development → University Adaptability	0.25	0.04	6.25	<0.001

The positive relationship between technological innovation and university adaptability highlights the role of technology in helping universities to adapt to changing educational environments. Technology can enhance teaching, administration, and student involvement. Universities must invest in technology to be relevant and effective in an age where digital tools and platforms are essential for education [69]. New technologies can save institutional capital and improve efficiency. Automating administrative tasks and making data-driven choices may help universities to save money. Expanding online and hybrid learning opportunities may increase student financial support and diversity. Universities may increase their flexibility and financial sustainability in a competitive market by carefully integrating technological advancements [58]. Additionally, this research emphasizes the necessity for institutions to use technology to enhance educational achievements, and the favorable relationship between technological innovation and university flexibility supports this. Academies that integrate technology into classrooms have happier and more promising students [70]. Creating an innovative culture may also help institutions to adapt to changing educational demands. This will inspire academics and staff members to develop new instructional methods and technologies. The findings suggest that technological innovation helps universities remain adaptable, which benefits administration and the economy today [71].

Learning management systems have emerged as particularly impactful, with universities integrating comprehensive digital platforms that combine course delivery, student assessment, and academic analytics. Institutions that implemented a robust digital infrastructure supporting both synchronous and asynchronous learning demonstrated greater flexibility in educational delivery. For example, the Financial University under the Government of the Russian Federation successfully integrated a unified digital ecosystem that connected administrative systems with learning platforms, enabling data-driven decision-making and more responsive program adjustments.

Digital collaboration tools have also proved instrumental in fostering institutional adaptability. Universities that adopted integrated communication platforms to support virtual classrooms, research collaboration, and administrative functions showed an enhanced capability to adapt to changing educational demands. In Spanish institutions, the implementation of cloud-based research platforms facilitated cross-institutional collaboration and resource sharing, whereas Kazakh universities' adoption of multilingual digital learning environments significantly improved their ability to engage with international academic communities. These technological implementations are particularly effective when accompanied by comprehensive faculty training programs and clear institutional protocols for technology adoption.

Sociopolitical activity was associated with university adaptation (path coefficient = 0.19 (SE = 0.03; CR = 5.60; $p < 0.001$). Sociopolitical discourses and colonial issues may make universities more flexible. The university administration believes that participating in local and global issues builds connections with stakeholders, communities, and policymakers and establishes the institution as responsive to and responsible for its people [72]. The interplay between these elements may drive collaboration and increase institutional resilience and flexibility. Sociopolitical involvement may help universities to acquire funding and cooperation for innovation and growth. Funders, government organizations, and commercial sector partners prefer community-based programs that address social challenges. Matching their goals with the sociopolitical context may help universities adjust to a competitive environment by obtaining more funding for research, student programming, and community participation [73]. Social responsibility in higher education and student political activity are linked to institutional flexibility. When universities become active in social and political issues, their image and student and staff citizenship improve. Participants were more inclined to collaborate on shared goals after the exercise. This will help universities meet changing social demands and expectations, and continue to impact their communities. The findings suggest that sociopolitical involvement makes universities more adaptive, which benefits the economy and society [74].

Figure 2 shows that leadership ($\beta = 0.32$), Technological Innovation ($\beta = 0.28$), Curriculum and Skills Development ($\beta = 0.25$), and Sociopolitical Engagement ($\beta = 0.19$) have significant positive direct effects on University Adaptability, with all paths being statistically significant at $p < 0.001$.

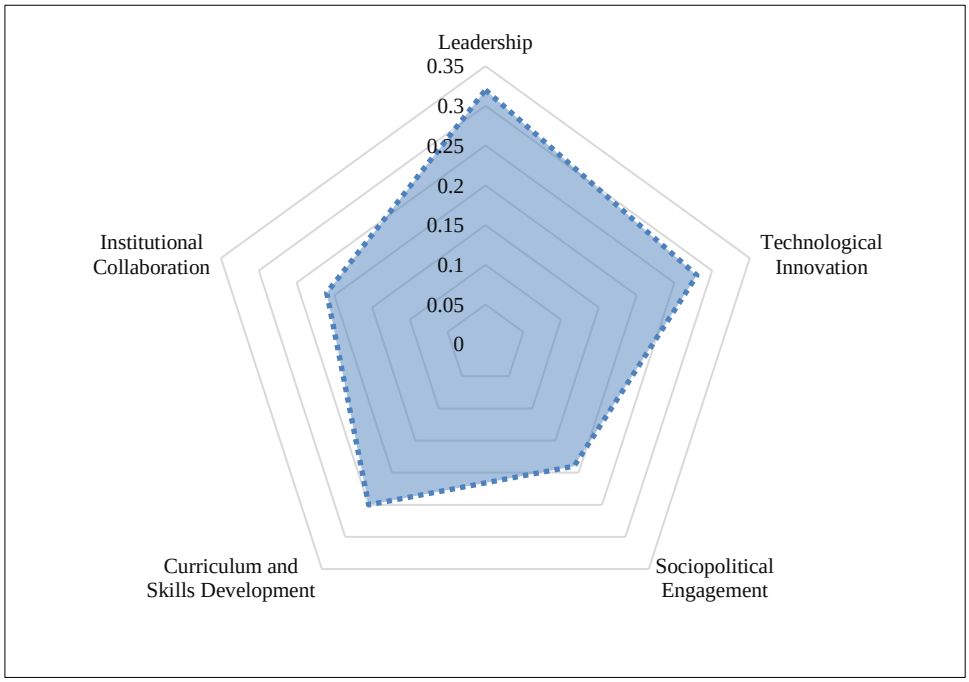

Figure 2. Path Coefficients of Direct Effects on University Adaptability

These findings demonstrate that effective governance structures significantly enhance university adaptability through systematic stakeholder engagement. Universities that implemented departmental advisory boards comprising faculty, students, and administrators showed greater agility in terms of curriculum development and policy implementation. For instance, when Russian universities adopted a multi-level feedback system in which department heads regularly consulted with student representatives and faculty committees, they demonstrated improved response times to educational challenges. This governance approach enabled the faster adoption of hybrid learning models during technological transitions.

The data further reveals that decentralized decision-making structures strengthen institutional adaptability when properly implemented. Universities that established cross-functional teams with representation from various stakeholder

groups, including academic staff, administrative personnel, and student bodies, demonstrated an enhanced capability to implement strategic changes. These teams, operating with clear mandates and reporting structures, have facilitated more effective resource allocation and faster responses to emerging educational needs. The success of this approach was particularly evident in Kazakh universities, which created joint faculty-student committees for curriculum review, resulting in more relevant and adaptable academic programs.

The curriculum and skill development significantly affects university adaptation. This emphasizes the necessity for educational institutions to adapt to student and job market expectations. An adaptive curriculum that meets industry standards may attract a more varied candidate pool, because it boosts student satisfaction and employability. Universities should emphasize skill development to prepare graduates for a changing work market [75]. Talent development and course content may boost universities' economies. Curriculum alignment with employer-sought skills may enhance graduate employment rates and enrollment. By incorporating corporate partners in curriculum creation, institutions may respond better to shifting labor needs and market trends, strengthening academic-professional connections. The community economy and institutions' capacity to compete for a significant degree for students benefit from this link [76]. Research suggests a curriculum that includes theoretical and practical abilities, consistent with the favorable link between university adaptability, curriculum, and skill development [77]. Real-world training improves job achievement and social impact. Critical thinking, problem-solving, and technical skill development may help universities adapt to changing economic and educational climates. Finally, the outcomes of skills and curriculum development show that they encourage institutions to be adaptable, which improves university administration and the higher education industry's long-term survival [78].

The moderation results show how the government regulation framework affects leadership, technological innovation, and university flexibility, as shown in Table 9. The government regulation framework positively moderates leadership in university adaptability. Stronger adaptability arises from increased leadership when national policies match universities' strategic goals. This shows that political frameworks affect educational outcomes and that universities that actively engage in and create government regulations have more flexible operational and strategic objectives [79].

Table 9. Moderation Analysis

Moderator	Path Modified	Estimates	SE	p-value
Government regulations Framework	Leadership → University Adaptability	0.15	0.03	0.02
	Technological Innovation → University Adaptability	0.11	0.04	0.03

Moderation research has found that a government regulation framework moderates the relationship between technological innovation and university adaptability. This finding indicates that a supportive government regulatory framework helps technological advances encourage adaptation. Innovation, technology, and infrastructure policies help universities change faster. This is consistent with earlier studies that emphasize the need for government support for innovation, showing that technological advances might be wasted without proper laws [80, 81]. Institutional cooperation mediates the linkages between leadership, technological innovation, and university flexibility, as shown in Table 10. Institutional collaboration partially mediates the leadership-university adaptability relationship, with an indirect effect of 0.14, SE of 0.03, and p-value of 0.01. Leadership affects university adaptability and suggests increased institutional collaboration. Strong leadership helps professors, students, and business partners to collaborate at institutions. When universities collaborate, they may respond better to external opportunities and dangers by sharing resources, knowledge, and problem-solving [82]. By working together, universities can promote resource-sharing, knowledge transmission, and innovation. Collaboration helps institutions overcome challenges and adapt to the changing educational environment by leveraging resources and expertise [83]. Collaboration with institutions can save funds and increase research and development potential. Combining resources allows universities to undertake ambitious projects. Collaboration can reveal external financing possibilities. Grantmakers appreciate programs that demonstrate teamwork and collaborative impact. When universities collaborate, they can build new programs and initiatives that increase enrollment and outside funding, helping them to survive. Research shows that partnerships improve educational outcomes and that institutional collaboration and university adaptability are positively correlated. University cooperation can improve course offerings, research, and student satisfaction [84]. Cooperation between institutions may provide more adaptable settings to meet new educational requirements and difficulties. These findings suggest that institutional cooperation is essential for institutions to remain adaptable, which benefits economic and academic collaboration.

Table 10. Mediation Analysis

Mediator	Path	Indirect Effect	SE	p-value	Mediation Type
Institutional Collaboration	Leadership → University Adaptability	0.14	0.03	0.01	Partial Mediation
	Technological Innovation → University Adaptability	0.12	0.03	0.01	Partial Mediation

The mediation analysis demonstrates that institutional collaboration partially mediates technological innovation and university adaptability, with an indirect influence of 0.12, SE of 0.03, and p-value of 0.01. This finding emphasizes the need for collaboration to use new technology to make universities more adaptable. New technologies can only reach their full potential within a collaborative framework that allows the interchange of ideas, techniques, and strategies for implementing them [85]. Collaboration-valued institutions are more flexible because they can adapt and employ new technologies to meet the changing educational demands. This is similar to past research revealing that collaborative behavior is essential to fully benefit from classroom technology [86, 87].

The statistical relationships observed in this study manifest in concrete ways in university settings. The mediating effect of institutional collaboration is particularly evident in how it enhances the impact of leadership initiatives on university adaptability. When the Financial University, under the Government of the Russian Federation, introduced a blockchain technology curriculum, its effectiveness was enhanced through collaboration with other universities. Rather than developing the curriculum in isolation, the university partnered with technical universities in Kazakhstan and Spain to share expertise, resources, and best practices. This collaboration amplified the impact of the initial leadership initiative on university adaptability, demonstrating how institutional collaboration mediates the relationship between leadership and adaptability. This mediation effect illustrates that collaboration serves as a crucial intermediate mechanism through which leadership influences institutional adaptability.

Similarly, the moderating role of government regulatory frameworks demonstrates how external policy environments can strengthen or weaken the relationship between university initiatives and adaptability. The impact of technological innovation on university adaptability varies, depending on the government's regulatory framework. When Spanish universities implemented artificial intelligence tools in their research programs, their success was significantly enhanced by supportive government regulations that provided clear guidelines for AI use in education and research. Conversely, in situations where regulatory frameworks were more restrictive or unclear, similar technological innovations had less of an impact on university adaptability. This demonstrates that government regulations moderate the relationship between technological innovation and university adaptability. Thus, the moderation effect reveals how the regulatory environment can either amplify or diminish the effectiveness of universities' innovation efforts.

5- Conclusions and Policy Recommendations

This study examines leadership, technological innovation, sociopolitical participation, skill development, institutional collaboration, and curricula to determine university adaptability. These findings demonstrate that universities need strong leadership and technical innovation to adapt to the changing educational conditions. As indicated by partial mediation by institutional cooperation, increasing stakeholder collaboration and partnerships may improve the positive effects of leadership and innovation on adaptation. These results suggest that universities must emphasize collaboration, leadership, and technological infrastructure in order to flourish in today's competitive academic environment.

While this study focuses on universities in Russia, Kazakhstan, and Spain, the findings offer valuable insights for institutions in regions with different technological and sociopolitical landscapes. The relationship between leadership and adaptability suggests that strong governance structures can enhance institutional flexibility even in resource-constrained environments. However, implementation in developing regions may require modification, with universities initially focusing on basic digital infrastructure rather than on advanced solutions. Institutional collaboration may be even more critical in these regions, where resource sharing and knowledge exchange can help overcome infrastructure limitations. While the moderating effect of government regulatory frameworks remains important, their application should be tailored to local constraints and opportunities, potentially involving phased approaches to institutional development that align with available resources.

Policymakers and university administrators should focus on many key areas to make universities more adaptive. First, it is crucial for sponsor leadership programs to help academic administrators to adjust. Leaders who can plan carefully, make sound judgments, and settle disagreements may better implement adaptation programs. Universities should encourage workers, students, and academics to participate in decision making through governance structures. This strategy promotes accountability and ownership, and ensures that the institution considers several perspectives when planning. Therefore, there is a need to promote technological innovation to make universities more adaptable. Policymakers should promote digital learning platforms and technological infrastructure investments to facilitate innovative teaching and learning. This pursuit requires relationships with key sector actors in order to increase knowledge exchange, technology transfer, and appropriate funding for R&D initiatives. New technologies in university courses should focus on training students in their future careers. Innovation centers on university campuses may also inspire students, professors, and outside groups to collaborate, fostering an entrepreneurial mindset essential for flexibility. Finally, institutional coordination must strengthen the development of a robust basis that enables institutions to adapt. Partnerships that share information and resources are desirable for corporations, academic institutions, and government organizations to collaborate. Funding initiatives that promote research and cooperation may help achieve sustainability. Universities should also develop regional and global partnerships to improve their profiles and to solve global challenges. A collaborative ecosystem and pooled capacities may help universities adapt to shifting circumstances and remain relevant to ever-changing educational environments.

This study was limited to universities in only three countries. Expanding the research to include additional institutions from different locations might help to reveal the characteristics that impact university adaptation. Qualitative research methods, such as focus groups and interviews, may help university stakeholders to understand the challenges and opportunities of flexibility. Financial stability, faculty development, and external environmental changes may affect a university's flexibility; therefore, more research is required. Future research may integrate the findings of the current study with these additional characteristics to better understand the drivers of flexibility in higher education. Academics may assist in making universities more adaptive by confronting these limits and pursuing new research ideas as the educational environment becomes more challenging and competitive.

6- Declarations

6-1- Author Contributions

Conceptualization, A.D. and N.O.; methodology, R.K. and V.P.; software, R.K.; validation, V.P., I.B., and N.S.; formal analysis, O.D., V.R.S., and N.O.; investigation, A.D., V.R.S., and V.P.; resources, N.S.; data curation, A.D.; writing—original draft preparation, A.D., N.O., V.R., R.K., V.P., I.B., N.S., and O.D.; writing—review and editing, A.D., N.O., V.R., R.K., V.P., I.B., N.S., and O.D.; visualization, I.B.; supervision, I.B.; project administration, A.D. All authors have read and agreed to the published version of the manuscript.

6-2- Data Availability Statement

The data presented in this study are available in the article

6-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6-4- Institutional Review Board Statement

Rigorous ethical guidelines were adhered to throughout the study to ensure participant privacy and data confidentiality in compliance with institutional and national research standards.

6-5- Informed Consent Statement

Participation in the study was voluntary, and informed consent was obtained from all participants prior to their involvement.

6-6- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

7- References

[1] Rahimi, R. A., & Oh, G. S. (2024). Rethinking the role of educators in the 21st century: navigating globalization, technology, and pandemics. Journal of Marketing Analytics, 12(2), 182–197. doi:10.1057/s41270-024-00303-4.

[2] Azoury, N., & Harvey, S. (2023). The Changing Role of Governance in Education. Governance in Higher Education. Palgrave Macmillan, Cham, Switzerland. doi:10.1007/978-3-031-40586-0_10.

[3] Davis, D. J., & Beck, T. E. (2023). How social media disrupts institutions: Exploring the intersection of online disinformation, digital materiality and field-level change. Information and Organization, 33(4), 100488. doi:10.1016/j.infoandorg.2023.100488.

[4] Fernández, A., Gómez, B., Binjaku, K., & Meçe, E. K. (2023). Digital transformation initiatives in higher education institutions: A multivocal literature review. Education and Information Technologies, 28(10), 12351–12382. doi:10.1007/s10639-022-11544-0.

[5] Rony, Z. T., Lestari, T. S., Ismaniah, Yasin, M., & Lubis, F. M. (2023). The complexity of leadership competence in universities in the 21st century. Cogent Social Sciences, 9(2), 2276986. doi:10.1080/23311886.2023.2276986.

[6] Habeeb, Y. O., & Eyupoglu, S. Z. (2024). Strategic Planning, Transformational Leadership and Organization Performance: Driving Forces for Sustainability in Higher Education in Nigeria. Sustainability (Switzerland), 16(11), 4348. doi:10.3390/su16114348.

[7] Chan, C. K. Y. (2023). A comprehensive AI policy education framework for university teaching and learning. International Journal of Educational Technology in Higher Education, 20(1), 38. doi:10.1186/s41239-023-00408-3.

[8] Alenezi, M., Wardat, S., & Akour, M. (2023). The Need of Integrating Digital Education in Higher Education: Challenges and Opportunities. Sustainability (Switzerland), 15(6), 4782. doi:10.3390/su15064782.

[9] George, B., & Wooden, O. (2023). Managing the Strategic Transformation of Higher Education through Artificial Intelligence. Administrative Sciences, 13(9), 196. doi:10.3390/admsci13090196.

[10] Al-Adwan, A. S., Li, N., Al-Adwan, A., Abbasi, G. A., Albelbisi, N. A., & Habibi, A. (2023). "Extending the Technology Acceptance Model (TAM) to Predict University Students' Intentions to Use Metaverse-Based Learning Platforms". Education and Information Technologies, 28(11), 15381–15413. doi:10.1007/s10639-023-11816-3.

[11] Pan, S., Hafez, B., Iskandar, A., & Ming, Z. (2024). Integrating constructivist principles in an adaptive hybrid learning system for developing social entrepreneurship education among college students. Learning and Motivation, 87, 102023. doi:10.1016/j.lmot.2024.102023.

[12] Maqbool, S., Zafeer, H. M. I., Zeng, P., Mohammad, T., Khassawneh, O., & Wu, L. (2023). The role of diverse leadership styles in teaching to sustain academic excellence at secondary level. Frontiers in Psychology, 13. doi:10.3389/fpsyg.2022.1096151.

[13] Jandigulov, A., Abdallah, A. K., Tikhonova, Y., & Gorozhanina, E. (2023). Management and leadership in online learning. Education and Information Technologies, 28(10), 13423–13437. doi:10.1007/s10639-023-11699-4.

[14] Matsieli, M., & Mutula, S. (2024). COVID-19 and Digital Transformation in Higher Education Institutions: Towards Inclusive and Equitable Access to Quality Education. Education Sciences, 14(8), 819. doi:10.3390/educsci14080819.

[15] Bai, X. (2024). Exploring music students' resistance to innovation as a moderator in the relationship between e-learning adoption and academic performance. Psychology in the Schools, 61(6), 2612–2633. doi:10.1002/pits.23181.

[16] Kruger, S., & Steyn, A. A. (2024). Developing breakthrough innovation capabilities in university ecosystems: A case study from South Africa. Technological Forecasting and Social Change, 198, 123002. doi:10.1016/j.techfore.2023.123002.

[17] Antonopoulou, K., Begkos, C., & Zhu, Z. (2023). Staying afloat amidst extreme uncertainty: A case study of digital transformation in Higher Education. Technological Forecasting and Social Change, 192, 122603. doi:10.1016/j.techfore.2023.122603.

[18] Ferreira, A., & Delgado, J. Q. (2023). The precarity paradox: the precarity-driven inefficiencies of research at a public university. Science and Public Policy, 51(2), 297–308. doi:10.1093/scipol/scad075.

[19] Wang, A., Islam, M., Xu, M., & Ren, H. (2024). Curriculum-Based Augmented Fourier Domain Adaptation for Robust Medical Image Segmentation. IEEE Transactions on Automation Science and Engineering, 21(3), 4340–4352. doi:10.1109/TASE.2023.3295600.

[20] Li, M. (2023). Adapting Legal Education for the Changing Landscape of Regional Emerging Economies: A Dynamic Framework for Law Majors. Journal of the Knowledge Economy. doi:10.1007/s13132-023-01507-2.

[21] Olcott, D., Arnold, D., & Blaschke, L. M. (2023). Leadership 2030: Renewed visions and empowered choices for European university leaders. European Journal of Open, Distance and E-Learning, 25(1), 74–92. doi:10.2478/eurodl-2023-0006.

[22] Tvedt, I. M., Tommelein, I. D., Klakegg, O. J., & Wong, J. M. (2023). Organizational values in support of leadership styles fostering organizational resilience: a process perspective. International Journal of Managing Projects in Business, 16(2), 258–278. doi:10.1108/IJMPB-05-2022-0121.

[23] Rafique, R. (2022). Using Digital Tools to Enhance Student Engagement in Online Learning: An Action Research Study. Local Research and Local Perspectives in English Language Teaching. Springer, Singapore. doi:10.1007/978-981-19-6458-9_15.

[24] Chauhan, N., Karthikeyan, A., & Ravi Kumar, N. (2024). Transforming Education: The Intersection of Education Management, Technology, Smart Universities, and the Impact of Covid-19—A Qualitative Analysis. Artificial Intelligence (AI) and Customer Social Responsibility (CSR). Studies in Systems, Decision and Control. Springer, Cham, Switzerland, doi:10.1007/978-3-031-50939-1_89.

[25] Kohtamäki, V. (2023). Strategic dependence on external funding in Finnish higher education. Cogent Education, 10(2), 2282816. doi:10.1080/2331186X.2023.2282816.

[26] Pineda, P., & Salazar Morales, D. (2023). Managerialism, accreditation and insecure academic employment across different higher education traditions. Studies in Higher Education, 49(11), 2080–2103. doi:10.1080/03075079.2023.2289087.

[27] Nichols, T. P., & Dixon-Román, E. (2024). Platform Governance and Education Policy: Power and Politics in Emerging Edtech Ecologies. Educational Evaluation and Policy Analysis, 46(2), 309–328. doi:10.3102/01623737231202469.

[28] Schophuizen, M., Kelly, A., Utama, C., Specht, M., & Kalz, M. (2023). Enabling educational innovation through complexity leadership? Perspectives from four Dutch universities. Tertiary Education and Management, 29(4), 471–490. doi:10.1007/s11233-022-09105-8.

[29] Sibhensana, B., & Maistry, S. (2021). Conceptualising public-private partnerships for social innovation through community engagement in higher education institutions. South African Journal of Higher Education, 1–21. doi:10.20853/37-1-5669.

[30] Ahlbäck Öberg, S., & Boberg, J. (2023). The decollegialization of higher education institutions in Sweden. Nordic Journal of Studies in Educational Policy, 9(2), 126–143. doi:10.1080/20020317.2023.2192317.

[31] Hmoud, H., Al-Adwan, A. S., Horani, O., Yaseen, H., & Zoubi, J. Z. Al. (2023). Factors influencing business intelligence adoption by higher education institutions. Journal of Open Innovation: Technology, Market, and Complexity, 9(3), 100111. doi:10.1016/j.joitmc.2023.100111.

[32] Heaton, S., Teece, D., & Agronin, E. (2023). Dynamic capabilities and governance: An empirical investigation of financial performance of the higher education sector. Strategic Management Journal, 44(2), 520–548. doi:10.1002/smj.3444.

[33] Holman, D., & Švejdarová, E. (2023). The 21st-Century Empowering Wholeness Adaptive (EWA) Educational Model Transforming Learning Capacity and Human Capital through Wholeness Systems Thinking towards a Sustainable Future. Sustainability (Switzerland) , 15(2), 1301. doi:10.3390/su15021301.

[34] Harden-Wolfson, E. (2024). Destruction, construction, reconstitution: The dynamics of structural reform and the creation of new higher education institutions in the former Soviet space. International Journal of Educational Research, 126, 102364. doi:10.1016/j.ijer.2024.102364.

[35] Fuchs, P. G., Finatto, C. P., Birch, R. S., de Aguiar Dutra, A. R., & de Andrade Guerra, J. B. S. O. (2023). Sustainable Development Goals (SDGs) in Latin-American Universities. Sustainability (Switzerland), 15(11), 8556. doi:10.3390/su15118556.

[36] Chiramba, O., & Ndofirepi, E. (2023). Access and success in higher education: Disadvantaged students' lived experiences beyond funding hurdles at a Metropolitan South African university. South African Journal of Higher Education, 37(6), 56-75. doi:10.20853/37-6-6021.

[37] MosIUR (2024). The Three University Missions 2024 Methodology. Moscow International University Ranking, Moscow, Russia. Available online: https://mosiur.org/files/methodology/TMU2024-Eng_Method.pdf (accessed on 6 November 2024).

[38] IRX Rating Review. (2024). The 2024 Three University Missions Ranking. IRX, Moscow, Russia. Available online: https://raex-rr.com/education/international_universities/three_missions_Russia/2024/analytics/third_mission_2024_ranking/ (accessed on November 2024). (In Russian).

[39] Jiang, C., Li, S., & Shen, Q. (2024). Science and technology evaluation reform and universities' innovation performance. Technology in Society, 78, 102614. doi:10.1016/j.techsoc.2024.102614.

[40] Thomas, E., Pugh, R., Soetanto, D., & Jack, S. L. (2023). Beyond ambidexterity: universities and their changing roles in driving regional development in challenging times. Journal of Technology Transfer, 48(6), 2054–2073. doi:10.1007/s10961-022-09992-4.

[41] Lundqvist, M., & Williams-Middleton, K. (2024). Making the whole university entrepreneurial – decades of legitimacy-building through Chalmers School of Entrepreneurship. Technovation, 132, 102993. doi:10.1016/j.technovation.2024.102993.

[42] Liu, Y., & Li, D. (2024). Unsettling academia: Academic career choices and pathways of PhD graduates in the Greater Bay Area in China. Higher Education Quarterly, 78(2), 388–403. doi:10.1111/hequ.12460.

[43] Alexeev, M., Natkhov, T., & Polishchuk, L. (2024). Institutions, abilities, and the allocation of talent: Evidence from Russian regions. Journal of Comparative Economics, 52(1), 271–296. doi:10.1016/j.jce.2023.11.003.

[44] Gómez-Espés, A., Färber, M., & Jatowt, A. (2024). Benefits of international collaboration in computer science: a case study of China, the European Union, and the United States. Scientometrics, 129(2), 1155–1171. doi:10.1007/s11192-023-04902-3.

[45] Aguiar, D., Ahmed, Y., Avcı, D., Bastos, G., Batubara, B., Bejeno, C., Camacho-Benavides, C. I., Chauhan, K., Coronado, S., Das, S., Ejarque, M., Benlisoy, Z. C. E., Güiza-Gómez, D. I., Gyapong, A. Y., Phuong Phan, H., Hassan, R., Rodríguez, C. H., Ng, H., Hussain, S. B., … Valencia-Duarte, D. M. (2023). Transforming critical agrarian studies: Solidarity, scholar-activism and emancipatory agendas in and from the Global South*. Journal of Peasant Studies, 50(2), 758–786. doi:10.1080/03066150.2023.2176759.

[46] Kim, T., Serkova, Y., & Jonbekova, D. (2024). Contributions of international education to graduate capital and employability: Evidence from social science graduates in Kazakhstan. International Journal of Educational Development, 106, 102994. doi:10.1016/j.ijedudev.2024.102994.

[47] MosIUR. (2024). Memorandum, the Three University Missions. MosIUR Moscow, Russia. Available online: https://mosiur.org/about/memorandum/ (accessed on November 2024). (In Russian).

[48] Sánchez-Barrioluengo, M. (2014). Articulating the "three-missions" in Spanish universities. Research Policy, 43(10), 1760–1773. doi:10.1016/j.respol.2014.06.001.

[49] Kaikenov, D., Otar, E., Uteubayeva, E., Abdrasheva, B., & Bukatayeva, A. (2024). Enhancing the adaptation of international students to life and study in Kazakhstan. International Review of Sociology, 1–16. doi:10.1080/03906701.2024.2383629.

[50] Nurutdinova, A. R., Shakirova, D. S., Sabaeva, E. K., & Samarkina, N. O. (2023). The content modification within the framework of the massive open online courses (case study: International and Russian practices). In Massive Open Online Courses - Current Practice and Future Trends, IntechOpen Limited, London, United Kingdom. doi:10.5772/intechopen.1001342.

[51] Yamada, A. (2023). Cultivating Future Competencies Through Interdisciplinary Education in the Society 5.0 Era. Transformation of Higher Education in the Age of Society 5.0. International and Development Education. Palgrave Macmillan, Cham, Switzerland. doi:10.1007/978-3-031-15527-7_4.

[52] Zharkynbekova, S., Tazhibayeva, S., Shakhputova, Z., Agabekova, Z., Azamatova, A., & Kuzar, Z. (2024). Transnational practices of Kazakh repatriates: the role of family in the adaptation of ethnic Kazakh students from Mongolia and China. Frontiers in Sociology, 9. doi:10.3389/fsoc.2024.1452785.

[53] Rossoni, A. L., de Vasconcellos, E. P. G., & de Castilho Rossoni, R. L. (2024). Barriers and facilitators of university-industry collaboration for research, development and innovation: a systematic review. Management Review Quarterly, 74(3), 1841–1877. doi:10.1007/s11301-023-00349-1.

[54] Rådberg, K. K., & Löfsten, H. (2023). The entrepreneurial university and development of large-scale research infrastructure: exploring the emerging university function of collaboration and leadership. The Journal of Technology Transfer, 49(1), 334–366. doi:10.1007/s10961-023-10033-x.

[55] Dumitru, D., & Halpern, D. F. (2023). Critical Thinking: Creating Job-Proof Skills for the Future of Work. Journal of Intelligence, 11(10), 194. doi:10.3390/jintelligence11100194.

[56] March, J. G., & Simon, H. A. (1958). Organizations. Wiley, New York, United States.

[57] Chakravarthy, B. S. (1982). Adaptation: A Promising Metaphor for Strategic Management. Academy of Management Review, 7(1), 35–44. doi:10.5465/amr.1982.4285438.

[58] Hill, J., & Smith, K. (2023). Visions of blended learning: identifying the challenges and opportunities in shaping institutional approaches to blended learning in higher education. Technology, Pedagogy and Education, 32(3), 289–303. doi:10.1080/1475939X.2023.2176916.

[59] Hanushek, E. A., & Woessmann, L. (2023). The knowledge capital of nations: Education and the economics of growth. MIT press, Cambridge, United States.

[60] Tweddle, S. (1995). A Curriculum for the Future: A Curriculum Built for Change. English in Education, 29(2), 3–11. doi:10.1111/j.1754-8845.1995.tb01143.x.

[61] Jakovljevic, M. (2018). A model for innovation in higher education. South African Journal of Higher Education, 32(4), 2432. doi:10.20853/32-4-2432.

[62] Leydesdorff, L. (2020). Triple Helix of University-Industry-Government Relations. Encyclopedia of Creativity, Invention, Innovation and Entrepreneurship. Springer, Cham, Switzerland. doi:10.1007/978-3-319-15347-6_452.

[63] Jaffer, S., Ng'ambi, D., & Czerniewicz, L. (2007). The role of ICTs in higher education in South Africa: One strategy for addressing teaching and learning challenges. International journal of Education and Development using ICT, 3(4), 131-142.

[64] Altbach, P. G., & Yudkevich, M. (2016). International faculty in 21st-century universities: Themes and variations. International faculty in higher education. Routledge, Milton Park, United Kingdom.

[65] Snellman, C. L. (2015). University in knowledge society: Role and challenges. Journal of System and Management Sciences, 5(4), 84-113.

[66] Brown, M. (2024). Transformational school district leaders: the characteristics of long-standing school district leaders that have successfully navigated educational reform efforts in Ohio. Ph.D. Thesis, Youngstown State University, Youngstown, United States.

[67] Huang, J. Y. H., Jiang, R., & Chang, J. Y. T. (2023). The Effects of Transformational and Adaptive Leadership on Dynamic Capabilities: Digital Transformation Projects. Project Management Journal, 54(4), 428–446. doi:10.1177/87569728231165896.

[68] Hofmeister, E. H. (2023). Leadership in Higher Education. Educational Principles and Practice in Veterinary Medicine, Wiley, Hoboken, United States. doi:10.1002/9781119852865.ch22.

[69] Kanyane, M. (2023). Digital Work – Transforming the Higher Education Landscape in South Africa. New Digital Work. Springer, Cham, Switzerland. doi:10.1007/978-3-031-26490-0_9.

[70] Abedi, E. A. (2023). Tensions between technology integration practices of teachers and ICT in education policy expectations: implications for change in teacher knowledge, beliefs and teaching practices. Journal of Computers in Education. doi:10.1007/s40692-023-00296-6.

[71] Almatrodi, I., & Skoumpopoulou, D. (2023). Organizational Routines and Digital Transformation: An Analysis of How Organizational Routines Impact Digital Transformation Transition in a Saudi University. Systems, 11(5), 239. doi:10.3390/systems11050239.

[72] Berhanu, K. Z. (2023). Practices, Challenges, and Prospects of Implementing School-Based Management (SBM) System in Ethiopian Schools: Implications for Policy Makers. Research in Educational Administration and Leadership, 8(2), 465–504. doi:10.30828/real.1275282.

[73] De Souza, D., Pablo, Z., Shevlin, M., von Fürstenberg, M. T., Banks, J., Sarker, D., Urzua, A. R., Camedda, D., & Aston, D. (2024). Preconditions influencing the development of post-secondary training programs in universities for individuals with intellectual disabilities. Journal of Intellectual & Developmental Disability, 49(1), 95–106. doi:10.3109/13668250.2023.2260584.

[74] Tahalele, M. P., & Prihatini, E. S. (2024). Adaptive methodology and intellectual activism: teaching gender in Indonesian universities. Development in Practice, 34(7), 847–856. doi:10.1080/09614524.2024.2309571.

[75] Alanazi, A. S., & Benlaria, H. (2023). Bridging Higher Education Outcomes and Labour Market Needs: A Study of Jouf University Graduates in the Context of Vision 2030. Social Sciences, 12(6), 360. doi:10.3390/socsci12060360.

[76] McCambly, H. N., Aguilar-Smith, S., Felix, E. R., Hu, X., & Baber, L. D. B. (2023). Community Colleges as Racialized Organizations: Outlining Opportunities for Equity. Community College Review, 51(4), 658–679. doi:10.1177/00915521231182121.

[77] Liu, X., Zhang, X., Dang, Y., & Gao, W. (2023). Career Education Skills and Career Adaptability among College Students in China: The Mediating Role of Career Decision-Making Self-Efficacy. Behavioral Sciences, 13(9), 780. doi:10.3390/bs13090780.

[78] Scott, T., & Guan, W. (2022). Challenges facing Thai higher education institutions financial stability and perceived institutional education quality. Power and Education, 15(3), 326–340. doi:10.1177/17577438221140014.

[79] Yue, S., Wei, J., Aziz, H., & Liew, K. (2023). A study on the effectiveness of self-assessment learning system of ideological and political education for college students. Learning and Motivation, 84, 101929. doi:10.1016/j.lmot.2023.101929.

[80] Yu, H., Wang, J., Hou, J., Yu, B., & Pan, Y. (2023). The effect of economic growth pressure on green technology innovation: Do environmental regulation, government support, and financial development matter? Journal of Environmental Management, 330, 117172. doi:10.1016/j.jenvman.2022.117172.

[81] Colombelli, A., D'Amico, E., & Paolucci, E. (2023). When computer science is not enough: universities knowledge specializations behind artificial intelligence startups in Italy. Journal of Technology Transfer, 48(5), 1599–1627. doi:10.1007/s10961-023-10029-7.

[82] Liu, Y. L. E., Lee, T. P., & Huang, Y. M. (2023). Enhancing university students' creative confidence, learning motivation, and team creative performance in design thinking using a digital visual collaborative environment. Thinking Skills and Creativity, 50, 101388. doi:10.1016/j.tsc.2023.101388.

[83] Abulibdeh, A., Zaidan, E., & Abulibdeh, R. (2024). Navigating the confluence of artificial intelligence and education for sustainable development in the era of industry 4.0: Challenges, opportunities, and ethical dimensions. Journal of Cleaner Production, 437, 140527. doi:10.1016/j.jclepro.2023.140527.

[84] Wong, W. H., & Chapman, E. (2022). Student satisfaction and interaction in higher education. Higher Education, 85(5), 957–978. doi:10.1007/s10734-022-00874-0.

[85] Ruiz-Rojas, L. I., Salvador-Ullauri, L., & Acosta-Vargas, P. (2024). Collaborative Working and Critical Thinking: Adoption of Generative Artificial Intelligence Tools in Higher Education. Sustainability (Switzerland), 16(13), 5367. doi:10.3390/su16135367.

[86] Zou, D., Xie, H., & Wang, F. L. (2022). Effects of technology enhanced peer, teacher and self-feedback on students' collaborative writing, critical thinking tendency and engagement in learning. Journal of Computing in Higher Education, 35(1), 166–185. doi:10.1007/s12528-022-09337-y.

[87] Järvelä, S., Nguyen, A., & Hadwin, A. (2023). Human and artificial intelligence collaboration for socially shared regulation in learning. British Journal of Educational Technology, 54(5), 1057–1076. doi:10.1111/bjet.13325.

Appendix I: Research Questionnaire

Part A: Demographic Characteristics of Respondents

1. **Gender:**
   - Male
   - Female
2. **Age Group:**
   - 19-24
   - 25-34
   - 35 and Above
3. **Education Level:**
   - Undergraduate
   - Graduate
   - Postgraduate
4. **University Affiliation:**
   - Financial University under the Government of the Russian Federation
   - Lipetsk State Pedagogical P. Semenov-Tyan-Shansky University
   - Kazan National Research Technological University
   - Rostov State Medical University
   - International University of La Rioja
   - I.M. Sechenov First Moscow State Medical University
   - AbylkasSaginov Karaganda Technical University
   - L.N. Gumilyov Eurasian National University

Part B: Likert Scale Questions

***Instructions*:** Please indicate your level of agreement with each statement by selecting one of the following options: 1 = Strongly Disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = Strongly Agree.

1. **University Adaptability (Dependent Variable)**
   1. My university effectively adapts to changing educational demands.
   2. The programs at my university are flexible and responsive to student needs.
   3. My university is proactive in implementing innovative practices.
   4. There is a strong focus on continuous improvement within my university.
   5. My university is prepared to face future challenges in education.
2. **Leadership and Governance (Independent Variable)**
   1. The leadership at my university effectively supports innovation and adaptability.
   2. My university's governance structure facilitates timely decision-making.
   3. University leaders actively engage with faculty and students to promote collaboration.
   4. There is clear communication from leadership regarding changes and expectations.
   5. My university's leadership demonstrates a commitment to continuous improvement.

3. Technological Innovation (Independent Variable)

1. My university regularly invests in new technologies to enhance learning.
2. The technological resources at my university are adequate for my educational needs.
3. Faculty members at my university effectively incorporate technology into their teaching.
4. A culture of innovation encourages students and staff to explore new technologies.
5. My university provides adequate training for using technological tools in education.

4. Socio-Political Engagement (Independent Variable)

1. My university encourages students to engage in socio-political discussions.
2. The university provides opportunities for students to participate in community service.
3. My university promotes awareness of social and political issues among students.
4. There are platforms for students to voice their opinions on sociopolitical matters at my university.
5. Faculty members actively discuss socio-political topics relevant to students' education.

5. Curriculum and Skills Development (Independent Variable)

1. The curriculum at my university is regularly updated to meet industry standards.
2. My university offers a variety of skill development programs and workshops.
3. The coursework at my university effectively prepares me for my future career.
4. There is a strong emphasis on practical skills alongside theoretical knowledge in my program.
5. Faculty members are approachable and supportive in helping students with skill development.

6. National Policy Framework (Moderator Variable)

1. The national policy framework positively influences my university's adaptability.
2. My university aligns its programs with national educational policies.
3. National policies support the integration of innovative practices at my university.
4. My university actively engages with policymakers to enhance educational outcomes.
5. The national policy framework encourages collaboration among educational institutions.

7. Institutional Collaboration (Mediator Variable)

1. My university collaborates effectively with other institutions to enhance educational opportunities.
2. There are partnerships between my university and industry that benefit students.
3. My university encourages faculty collaboration across departments and with external organizations.
4. Joint research projects are common at my university, fostering collaboration and innovation.
5. My university actively participates in community and regional development initiatives.