

RISK MITIGATION STRATEGIES IN LATIN AMERICAN HIGHER EDUCATION INSTITUTIONS

ESTRATEGIAS DE MITIGACIÓN DE RIESGO EN LOS CENTROS DE EDUCACIÓN SUPERIOR LATINOAMERICANOS

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Abstract

Risk management represents a relevant consideration for organisational survival; it similarly should be pertinent in higher education settings. Yet in contrast with other sectors (e. g. manufacturing), for which clear risk management parameters (e. g., risk drivers, risk dimensions, mitigation strategies) have been compiled and specified, conceptual frameworks for analysing risk management do not exist for university management efforts. The peculiarities of university management make it difficult to extrapolate conclusions reached in other contexts, highlighting the need to generate conceptual frameworks that identify relevant parameters and reveal the relationships among them. In pursuit of these objectives, the current study identifies and classifies potential risks according to the three main processes of university activity (i. e. teaching, research and knowledge transfer), as well as different management practices with the potential to mitigate such risks. An empirical analysis of the effect of these practices on risk reduction in turn identifies the most effective options.

Keywords: risk management, higher education, university, risk mitigation.

JEL Codes: D810, D220, L230

Resumen

La adecuada gestión del riesgo resulta imprescindible para la supervivencia de cualquier organización. Las instituciones de educación superior no son una excepción. Sin embargo, a diferencia de otros sectores (por ejemplo, la manufactura), para los cuales se han recopilado y especificado parámetros claros de gestión del riesgo (por ejemplo, factores de riesgo, dimensiones

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del riesgo y estrategias de mitigación del riesgo), no existen marcos conceptuales claros para analizar la gestión del riesgo en el ámbito de la gestión universitaria. Las particularidades de la gestión universitaria dificultan extrapolar las conclusiones alcanzadas en otros contextos, lo que pone de manifiesto la necesidad de generar marcos conceptuales que identifiquen parámetros relevantes y revelen las relaciones entre ellos. En la consecución de estos objetivos, el presente estudio identifica y clasifica los riesgos potenciales según los tres principales procesos de la actividad universitaria (es decir, docencia, investigación y transferencia de conocimiento), así como diferentes prácticas de gestión orientadas a mitigar dichos riesgos. Un análisis empírico del efecto de estas prácticas sobre la reducción del riesgo permite, a su vez, identificar las opciones más eficaces.

Palabras clave: gestión del riesgo, educación superior, universidad, mitigación del riesgo.

Códigos JEL: D810, D220, L230

1. INTRODUCTION

Higher education today faces greater challenges than ever before. Some examples of these challenges include an increasing number of competitors, both public and private, operating on a global scale (Shanahan and McParlane, 2005; Brewer and Walker, 2011; Tilak and Kumar, 2022); more students than ever before choosing to pursue higher education in online and transnational programmes (Wessels and Sandler, 2015; Kmiotek-Meier and Powell, 2020); an increasing number of complex regulations to comply with (Cameron and Kloppe, 2015); external evaluations that put pressure on institutions to achieve certain teaching and research outcomes (Brewer and Walker, 2011; Veretennik and Okulova, 2023); a society that is increasingly demanding in terms of the knowledge transfer it expects from its higher education institutions or universities (Brewer and Walker, 2011; Tagliaventi and Carli, 2021), as well as the uncertainties arising from new technologies (Kimmons *et al.*, 2023; Setyadi *et al.*, 2025). In addition to this demanding context, some countries and regions face additional challenges such as war or lack of resources (Brewer and Walker, 2011; Jesry *et al.*, 2022). In conclusion, the risks to which universities are currently exposed and the need to manage them are receiving increasing attention.

As a result, whether required by government agencies or initiated by individual institutions, risk management is evident in universities in different regions, including the United Kingdom, Australia, Russia, Ukraine, Ecuador, Kenya, and Malaysia (Amuya and Kariuki, 2023, 2024; Anchundia *et al.*, 2018, Christopher and Sarens, 2015; Edwards, 2012; Huber, 2011; Klochkova *et al.*, 2017; Malki and Aldwais, 2019; Seale, 2017; Yokoyama, 2018; Syreyshchikova *et al.*, 2020; Khaw and Teoh, 2023). Many universities also pursue ISO 9001 certification, which includes a risk analysis requirement in its latest version. In general, then, it appears that risk management is an increasingly common consideration in the world of higher education (Syreyshchikova *et al.*, 2020), which in turn suggests the need for in-depth research into its application.

Prior risk management literature, conducted in other industry contexts, has produced a fairly well-accepted conceptual framework of critical parameters. For example, supply chain risk management studies offer typologies of risk drivers (e. g., human factors, natural factors), performance factors that may be at risk (e. g., operational, financial, reputational outcomes), and the practices or strategies that members of the supply chain can use to mitigate their risks (e. g., strategic stockpiling at different points in the supply chain, versatile work teams) (Ho *et al.*, 2015). Such broad conceptual frameworks help to provide an informed overview of the requirements for risk management. It also helps to identify the key relationships between the variables in the framework that need to be explored. But the distinctiveness of the higher

education industry, with its focus on three main missions (teaching, research, knowledge transfer), makes it difficult to extrapolate studies carried out in other sectors to this context. Rather, we need context-specific studies to identify and address the main challenges related to risk management in higher education in particular.

As some authors point out (Amuya and Kariuki, 2023; Edwards, 2012), applying a risk management lens to higher education is not straightforward. Some prior studies analyse a single type of risk, such as the regulatory burden (Edwards, 2012), cyber threat (Jesry *et al.*, 2022), human error (Johan *et al.*, 2019), work-related stress (Kinman and Court, 2010), a failure to meet quality requirements (Brewer and Walker, 2011; Edwards, 2012; Jesry *et al.*, 2022), failures in IT systems (Johan *et al.*, 2019; Aljuhami and Bamasoud, 2021), insufficient internationalization (Beecher and Streitwieser, 2019; Shanahan and McParlane, 2005), or not achieving sufficient levels of security in facilities (Bubka and Coderre, 2010). Yet, with few exceptions (Bamber and Elezi, 2024), this research domain lacks a comprehensive perspective that encompasses multiple types of risk and diverse mitigation strategies. Nor do we find many studies of the relationships of various risk management parameters that take an aggregated approach; most research remains conceptual or based on isolated case studies. To complement existing contributions, we aim to gather information from a wide range of universities in order to identify a comprehensive set of risk mitigation practices and empirically confirm their effectiveness in reducing academic risk.

Accordingly, in the next section, we review some relevant prior literature and develop our conceptual framework. In Section 3, we propose a model of practices that might mitigate the risk of not achieving adequate performance, and then Section 4 details the methodology. With Section 5, we present and discuss the results before moving to the conclusions in Section 6.

2. LITERATURE REVIEW: RISK MANAGEMENT IN HIGHER EDUCATION

Risk refers to the probability of the occurrence of adverse events or catastrophes (e. g., floods, pandemics, economic crises) that have severe impacts on desirable outcomes of any kind (e. g., health, finance, reputation) (Higher Education Funding Council for England [HEFCE], 2001; Society for Risk Analysis [SRA], 2024). Risk management in turn requires multiple activities and phases (e. g., Fan and Stevenson, 2018; Syreyschikova *et al.*, 2020), specifically, risk identification, risk assessment, and the implementation of risk mitigation strategies. To articulate or analyse risk management for any given sector of activity, we therefore must consider both a catalogue of potential risks and a catalogue of practices or strategies that offer mitigating potential.

2.1. Risks in higher education

The language of risk allows specific reference to the cause of the risk (e. g. the risk of fire in classrooms) or the consequence (e. g. the risk of not being able to teach in burnt buildings). There are several risk typologies in the risk management literature that reflect both perspectives. For example, Ho *et al.* (2015) cite risk factors, which refer to the events that cause an adverse effect, and risk types, which represent the negative consequences triggered by these events. In our analysis, we focus primarily on risks that are specific in terms of their consequences: the risk of universities not achieving their expected outcomes.

As noted, universities are responsible for providing three main services to society, which in turn can be characterised as three areas of expected outcomes or three processes to manage, namely, teaching, research, and knowledge transfer. In line with this approach, Huber (2011)

analyses the core risks facing the UK university system and identifies two types: teaching risks and research risks. Similarly, Syreyschikova *et al.* (2020), with a case study of the implementation of a university risk management system, note the provision of educational services and research and innovation activities as subject to university risk. Syreyschikova *et al.* (2020) do not further define these three risks, but we assume that innovation activities represent a form of knowledge transfer. Reviewing applications of risk management systems by Higher Education Institutions, Raanan (2008; 2017) also identifies teaching risks and research risks; Brewer and Walker (2011) mention risks associated with teaching, research, and community engagement activities, which they group in a category they call operational risks.

Some authors highlight other risks, linked to deviations from desired performance or intended university outcomes, such as reputational and financial risk (Huber, 2011; Klochkova *et al.*, 2017; Johan *et al.*, 2019), a generic risk of not reaching a certain level of quality (Edwards, 2012), the risk of failing to comply with different regulations (Klochkova *et al.*, 2017), or the risk of a poorly functioning information management system (Johan *et al.*, 2019). However, we argue that each of these situations actually arises from a malfunctioning of one of the three fundamental processes. In that sense, these considerations represent a different level of analysis.

Accordingly, for the purposes of this study, we define “teaching risk” as the probability of serious deviations from teaching performance that is deemed adequate; “research risk” as the probability of serious deviations from research performance that is deemed adequate; and “knowledge transfer risk” as the probability of serious deviations from knowledge transfer outcomes that are deemed acceptable. As existing research does not provide further detail on which specific situations reflect each type of risk, we rely on generally accepted ideas to generate the list in Table 1.

TABLE 1. TEACHING RISK, RESEARCH RISK, AND KNOWLEDGE TRANSFER RISK

TEACHING RISK
Worsening evaluations of my graduates by labour market
Reduction in the employability rate of my graduates
Loss of attractiveness/updating of degrees/educational programs
Increase in the percentage of students who abandon university degrees/educational programs without completing them
Worsening of my university’s position in teaching rankings
RESEARCH RISK
Fall in scientific production (publications, doctoral theses, etc.) of my institution’s researchers
Reduction of national and international recognition of my institution’s researchers
Worsening of my university’s position in research rankings
KNOWLEDGE TRANSFER RISK
Fall in the transfer of knowledge from my intuition to the society (e. g., royalties, patents, utility models, brands, advisory and consultancy work)
Reduction of recognition of my institution as a source of problem-solving/consultancy resources for business, institutional, and social actors
Fall in the reputation of my university as a driver of economic and social development
Worsening of the image of my university as a promoter of sustainable development goals

Source: Own elaboration.

2.2. Practices with risk mitigating potential

No agreed compilation of risk mitigation practices exists to date, so we chose to derive a list of world-class practices that appear highly valued in university accreditation processes. These practices also are aligned with the postulates of international organisations such as the European Union (EU) and United Nations Educational Scientific and Cultural Organization (UNESCO). For example, the EU highlights the importance of matching degrees to labour markets, promoting international mobility for academics and students, and developing the role of the student in the university. Furthermore, UNESCO emphasises the importance of contributing to the improvement of society and the environment. Various national and international quality certificates and accreditations also call for planning and process control and constant development and evaluations of teachers and researchers. We label these collected practices, as listed in Table 2, “advanced university management practices” (AUMPs).

TABLE 2. ADVANCED UNIVERSITY MANAGEMENT PRACTICES

PLANNING AND CONTROL
Approval and implementation of a medium-/long-term strategic plan in which the main priorities and lines of development are established
Strengthened internal and external control and audit mechanisms on administrative and management processes
DEGREES AND EDUCATIONAL PROGRAMS DEVELOPMENT
Creation and development of committees for the review and updating of educational programs/degrees
Design and implementation of educational programs/degrees taught in other languages
Design and implementation of educational programs/degrees in blended or online modalities
TEACHING STAFF DEVELOPMENT
Design and implementation of teacher training programs (e. g., courses to improve pedagogical, technological, language skills)
Setting incentives (e. g., salary supplements, reductions in teaching time, project funding) linked to teaching performance (e. g., degree of involvement, success rates, student satisfaction)
Creation and development of competitive calls to finance innovative projects proposed by instructors
Setting incentives linked to the creation and publication of teaching materials (e. g., books, videos, websites) by instructors
RESEARCH STAFF DEVELOPMENT
Design and implementation of research training programs (e. g., doctoral programs, seminars, courses in research techniques)
Creation of contracts or research grants to attract postgraduate students
Design and implementation of incentives linked to promoting collaboration with researchers in other prestigious institutions
Requirement of evidence of international research quality for the hiring and promotion of teaching staff (e. g., publications in journals indexed in Scopus/JCR, H index threshold)
RESOURCE ENDOWMENT
Strengthening investments in renewal/expansion of technologies (e. g., teaching technologies, management systems)
Strengthening investments in renovation/expansion of infrastructure (e. g., buildings, classrooms, laboratories)
Strengthening investments in renewal/expansion of bibliographic resources (e. g., databases, bibliographic funds)

(continued)

TABLE 2. ADVANCED UNIVERSITY MANAGEMENT PRACTICES (*continued*)

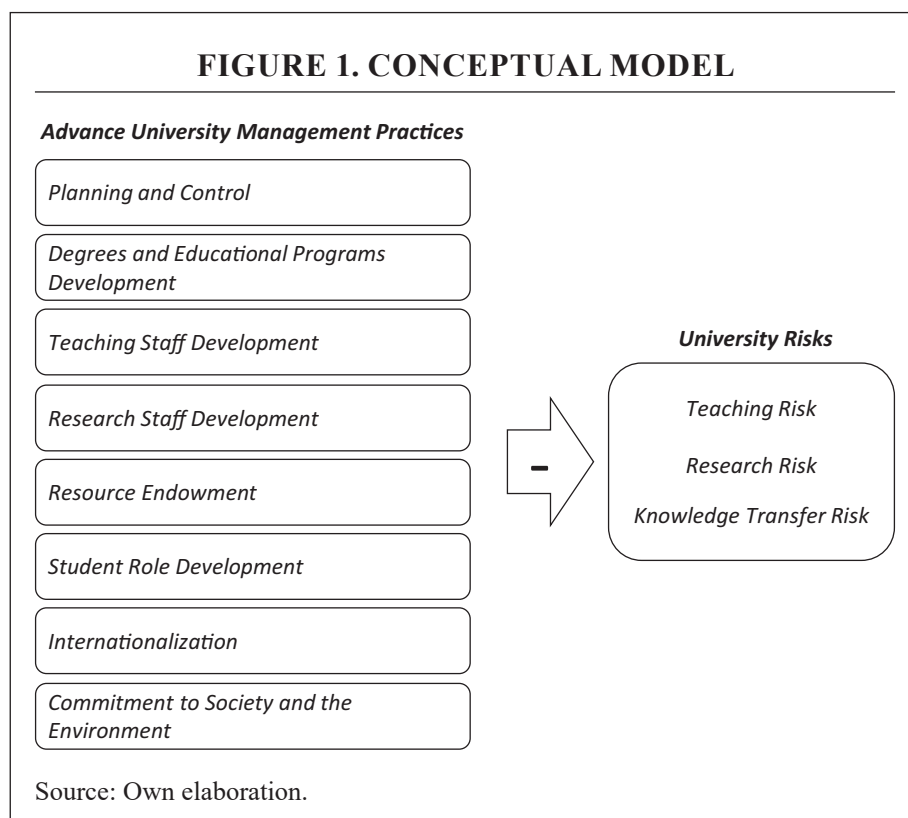
Strengthening income from patronage and sponsorships
STUDENT ROLE DEVELOPMENT
Offer scholarships to students to carry out studies at my university
Promote the participation of students in the structures and management bodies of the university
Development, continuous updating, and enhancement of my university's website
Development, updating, and strengthening the presence of my university on social networks (e. g., Instagram, Ticktock, Twitter, LinkedIn, Facebook)
INTERNATIONALIZATION
Development of grants and scholarships to students to finance stays at prestigious universities abroad
Development of grants and scholarships to academic staff to carry out research stays at prestigious universities abroad
Promotion of students' access to aid and scholarships financed by other entities (e. g., companies, the state, international organizations) to carry out studies at prestigious universities abroad
Promotion of academics' access to aid and scholarships financed by other entities (e. g., companies, the state, international organizations) to carry out teaching or research stays at prestigious universities abroad
Establishment and development of student exchange agreements with other universities abroad
Creation and development of actions to attract international students
Incorporation of stays abroad as mandatory activities in training programs
COMMITMENT TO SOCIETY AND THE ENVIRONMENT
Creation and development of university–society forums (university–company, university–different social groups)
Incentives linked to the collaboration of teaching, research, or administrative staff with companies, non-profit organizations, or different public administration entities
Incentives for transferring knowledge and creating new companies (spin-offs, start-ups) and economic activity
Design and implementation of training plans and programs for university staff (teachers and administrators) related to sustainable development objectives
Incentives for projects that support sustainable development objectives in the region

Source: Own elaboration.

3. MODEL AND HYPOTHESES

Figure 1 depicts our conceptual model, in which we propose a mitigating effect of AUMPs on teaching, research, and knowledge transfer risks.

Through planning and control, organisations can clarify their objectives and establish a time frame for their fulfilment, reducing the risk of failing to achieve teaching, research, and knowledge transfer goals effectively (Yokoyama, 2018; Khaw & Teoh, 2023). For example, by developing degree and training programs, universities can update the capacities of their graduates and ensure they are adjusted to the latest demands of the labour market and society; such developments also serve as guides for research and knowledge transfer efforts (Klochkova *et al.*, 2017). Similarly, teaching development efforts among university staff should have an evident impact on teaching but also might help identify research and knowledge transfer



needs (Khaw & Teoh, 2023; Bamber & Elezi, 2024). Encouraging teaching staff to enhance their research profile improves their chances of publications; elements of such quantitative and qualitative training also might inform their teaching and knowledge transfer activities. By developing closer links with students, staff can adjust the university to better meet their demands and those of society, which in turn reduces the risk of not adapting teaching, research, or transfers to the demands of society (Klochkova *et al.*, 2017). Because internationalisation represents a way of learning, updating, and benchmarking, with effects on all areas of university activity, it also should lower the risk of not meeting standards across the three domains of teaching, research, and knowledge transfer (Klochkova *et al.*, 2017). Finally, the services provided to society and the environment are a sources of learning; generating novel ideas can exert an impact on the university's future knowledge transfer processes and also seems likely to improve teaching activity (which increasingly must include sustainability concepts), as well as providing inspiration for research (Bamber & Elezi, 2024). On the basis of these arguments, we offer a general exploratory hypothesis.

H1: Advanced university management practices mitigate teaching, research and knowledge transfer risk.

4. METHODOLOGY

4.1. Data

To test the proposed model, we conducted a census of 379 universities in four countries in northern Latin America (Ecuador, Colombia, Venezuela, and Peru). University chancellors or members of governing boards were identified as the primary respondents, as they typically

occupy senior strategic positions within institutional management (Martínez, 2016; Sánchez, 2022; Davis, 2025). Their professional experience ensures familiarity with the variables examined and accountability for their effective implementation. Prior to data collection, both the questionnaire and the administration protocol were pilot-tested with five chancellors or vice-chancellors from Latin America and one from Europe. The methodological literature widely supports this type of procedure as a reliable source of empirical evidence (Hsu & Sandford, 2007; Okoli & Pawlowski, 2004). The survey was designed and distributed online through Qualtrics, following the Dillman Method (2000) to enhance participation rates. Initially, chancellors or governing board members from each institution were contacted by telephone to introduce the project and request an email address for sending detailed information and the survey link. Subsequently, two additional follow-up rounds were conducted by phone and email. This process resulted in a random sample of 119 valid responses, corresponding to a 29% response rate and a sampling error of 7.2% at a 95% confidence level.

To check for non-response bias, we conducted a mean difference analysis of variance, comparing the first 25 responding universities with the last 25 in terms of size, measured by the number of students and professors, which we gathered from the universities' websites. For 12 universities, this information was not available (9 universities in Venezuela, 2 in Colombia, 1 in Ecuador), so we excluded them from the analysis. However, the test revealed no significant differences between groups (Table 3), which suggests non-response bias is not a concern. In addition, we performed a Harman test with all items for the constructs in the model. The items load on 11 different factors that explain 74.077% of the variance. Thus, we can rule out common method bias in the sample.

TABLE 3. ANOVA RESULTS FOR NON-RESPONSE BIAS

	25 first vs. 25 last F
Number of Students	1.226 ($p = .274$)
Number of Academics	.740 ($p = .394$)

Source: Own elaboration.

In Table 4, we present the distribution of the sample by country, governance type, and size, measured both by the number of students and by the number of academic staff.

4.2. Measures

4.2.1. Dependent variables: Teaching, research, and knowledge transfer risk

We used three multi-item constructs to measure each of the dependent variables, consistent with concepts proposed in prior literature (Huber, 2011; Raanan 2017; Syreyschikova *et al.*, 2020). In the absence of existing scales though, we used the items in Table 1. In accordance with the generally accepted concept of risk (Baryannis *et al.*, 2019; Hallikas *et al.*, 2004; Harland *et al.*, 2003), we asked respondents to rate, on 7-point Likert scales (1 = very low, 7 = very high) the likelihood of the occurrence of each situation described by an item, as well as the seriousness or severity of each situation, in terms of the harm it could cause to the university. By multiplying the probability and severity assessments for each item, we obtained measures of

TABLE 4. CHARACTERISTICS OF THE UNIVERSITIES SAMPLED

	<i>Frequency</i>	<i>Percentage</i>
Country		
Colombia	41	38%
Ecuador	36	34%
Perú	20	19%
Venezuela	10	9%
Total	107	100%
Governance type		
Public	49	46%
Private	58	54%
Total	107	
University size (by number of students)		
<4000	31	29%
4000-12000	24	23%
12001-26000	26	24%
>26000	26	24%
Total	107	100%
University size (by number of academics)		
<200	30	28%
200-900	38	36%
901-1800	12	11%
>1800	27	25%
Total	107	100%

Source: Own elaboration.

teaching risk, research risk, and knowledge transfer risk by computing the mean of the products for each group of items. To confirm that the structure of the data conforms with the proposed measurement model, we performed a confirmatory factor analysis (CFA), the results of which are in Table 5.

The model fit indicators reach values above or very close to those recommended in the literature (.9 for goodness-of-fit index, Tucker-Lewis index, and confirmatory fit index; .8 for adjusted goodness-of-fit index; values between 1 and 3 for chi-square/degrees of freedom) (Browne and Cudeck, 1992; Chau, 1997; Hair *et al.*, 2007). The values for both the composite reliability index and Cronbach's alpha are greater than .7 (Hair *et al.*, 2007), in support of the reliability of the scale. The standardised coefficients are higher than the recommended values (.5) and significant (Chau, 1997; Hair *et al.*, 2007), confirming convergent validity. We also find evidence of discriminant validity, because the average variance extracted values exceed .5 for each construct (Fornell and Larcker, 1981). In addition, alternative CFAs that fit all items to a single factor or merge two factors provide, in all cases, poorer fit indicators. At a nomonological level, using three dimensions makes more sense than merging conceptually distinct types of risks. Therefore, taking into account the best CFA, across conceptual, nomological, and statistical aspects, we retained the three constructs initially conceived of at the theoretical level.

TABLE 5. CONFIRMATORY FACTOR ANALYSIS FOR UNIVERSITY RISK COMPONENTS

		Standardized Coefficients		
		F1	F2	F3
Teaching Risk	Worsening of the evaluation of my graduates by the labour market	.751		
	Reduction in the employability rate of my graduates	.700		
	Loss of attractiveness/updating of my degrees/ educational programs	.763		
	Increase in the percentage of students who abandon my university degrees/educational programs without completing them	.602		
	Worsening of my university's position in teaching rankings	.873		
Research Risk	Fall in scientific production (publications, doctoral theses, etc.) of my institution' researchers		.881	
	Reduction of national and international recognition my institution' researchers		.906	
	Worsening of my university's position in research rankings		.872	
Knowledge Transfer Risk	Fall in the transfer of knowledge from my intuition to the society (e. g. royalties, patents, utility models, brands, advisory and consultancy work).			.833
	Reduction of recognition of my institution as a source of problem solving/consultancy resources for the business, institutional and social actors.			.828
	Fall in the reputation of my university as a driver of economic and social development.			.949
	Worsening of the image of my university as a promoter of sustainable development goals			.927
	Model Fit Indicators	Chi-square/degrees of freedom ² /g. l. = 2.17, GFI = .867, AGFI = .796, TLI = .935, CFI = .950		
	Composite Reliability	.859	.831	.934
	Cronbach's Alpha	.863	.915	.933
	Average Variance Extracted	.552	.786	.783

Source: Own elaboration.

4.2.2. Independent variables: Advanced university management practices

To measure AUMPs, the chancellors rated, on Likert-type scales (1 = not at all, 7 = to a great extent), the degree to which each of the initiatives or strategies listed in Table 2 had been implemented at their university. These practices are not complementary; some institutions may decide to implement some of them and not others. Using the first two items in the list as an

example, we can clearly conclude that a university might work intensively on medium/long-term strategic planning but still not carry out audits and controls on administrative management processes. That is, each practice represents an alternative way to improve management and reduce university risk. But the more strategies are applied, the more developed the institution's management system should be. These practices therefore meet the definition of formative measures (Jarvis *et al.*, 2003). The measure of each strategy category detailed in Table 2 reflects the mean of the respondents' scores for the implementation of each item in that category.

4.2.3. Control variables: General and specific environmental risk

Variables other than AUMP can influence teaching, research, or knowledge transfer risk, such as the risk of external events—war, globalisation, migratory movements, financial crises, budget cuts, the emergence of new universities, cyber-attacks—in the broader environment in which each educational institution operates (Amuya and Kariuki, 2023; Jesry *et al.*, 2022; Johan *et al.*, 2019). We distinguish events that affect all organisations in the region (e. g., natural disasters; political, economic, sociological, or technological adversities) from those that particularly affect universities (e. g., adversities related to the student body, competition with other universities, suppliers). The former represent “general environment risk” and the latter are “specific environment risks” (Table 6). This typology is inspired by the popular PEST analysis (Ho, 2014) and Porter's 5 Forces analysis (Porter, 1985), frequently used to characterize the environment in which companies compete.

To measure environmental risks, in each case (general and specific), we take the average of the product of the probability of each type of risk listed in Table 6 and the degree to which this risk was serious for the university surveyed. Both these dimensions also were rated by the chancellors on 7-point Likert scales.

TABLE 6. UNIVERSITY ENVIRONMENT RISK

GENERAL ENVIRONMENT RISK
Natural disasters (e. g., floods, earthquakes, fires)
Health crises (e. g., diseases, pandemics)
Political adversities (e. g., political instability, war, terrorism, strikes, adverse laws and regulations, tariffs)
Economic adversities (e. g., crisis, inflation, financing difficulties)
Sociological adversities (e. g., adverse changes in society's behaviour, lifestyles or preferences, demographic declines, migrations)
Technological adversities (e. g., changes in technology that negatively affect me, cyber-attacks)
ESPECIFIC ENVIRONMENT RISK
Decrease in the number of new students
Sudden increase in the number of new students above the available capacity (in cases where regulations prevent limiting access)
Supply alternatives decrease and dependence on current suppliers increases (e. g., technology providers, services)
Increase in competitive aggressiveness of other higher education institutions/universities
Emergence of alternative higher education programs (e. g., non-university education, training specific to the business world, self-training)
Emergence of new competing universities

Source: Own elaboration.

4.3. Analysis

To examine the hypothesized relationships, a series of multiple regression analyses were performed. As shown in Table 7, several variables present significant intercorrelations. In order to minimize potential collinearity effects and ensure robustness in interpretation, separate regression models were estimated for the independent variables. Subsequently, a stepwise regression procedure was employed to determine which predictors contributed most strongly to explaining the variance in each dependent variable.

5. RESULTS

Tables 8–10 contain the results of the estimated regression models. In each table, Model 1 provides the results of the regression model with just the control variables, Models 2-9 indicate the results for each AUMP independently, and Model 10 depicts the results of the stepwise regression. From Table 8, we can determine which variables predict decreased teaching risk. Among the control variables, risk present in both the general university environment (political, economic, sociological, and technological issues) and its specific environment (students, suppliers, alternative training programs) exerts positive, significant effects on teaching risk. In the case of AUMPs, the following practices have negative, significant effects on teaching risk: investing in the development of teaching staff, investing in the development of research staff, improving the resource provision of teaching centres, the incremental role of students in universities, investing in internationalization, and developing programs that help improve society and the environment. In the stepwise regression model, the only significant AUMP is the development of the research staff, implying that this variable has the greatest explanatory power for reducing teaching risk. As we predicted, improving the research profile of academics reduces not only research risk, as expected, but also teaching risk. Attending doctoral programs, research techniques courses, and seminars helps researchers move closer to the frontier of knowledge. Such research development efforts can help prevent educational programs and degrees from becoming obsolete. In turn, the degrees remain attractive to students, and the degree abandonment rate should decline.

According to Table 9, pertaining to reduced research risk, perceived risk in the specific university environment has a significant and positive effect, such that more adverse conditions surrounding the specific university increase research risk. In the case of the AUMPs, we find several that exert significant and negative effects on research risk, namely, investing in the development of research staff, empowering students, internationalization and development of collaboration programs with society on social and environmental issues. The stepwise regression only includes one AUMP in its result: developing collaborative projects with other types of organizations (companies, government agencies, non-profit organizations). Expressing a commitment to society and the environment through these collaborations emerges as the variable with the greatest explanatory power for reducing research risk. Such collaborations help researchers identify the problems that society is trying to solve, such that they discover topics of interest for research and also gain access to valuable data with which to test possible models and hypotheses. These benefits help reduce the risk of poor quality publications or scoring lower in research rankings.

Finally, Table 10 reveals which variables have predictive capacity for reducing the risk surrounding knowledge transfers. Among the control variables, risk in both the general environment and the specific environment have significant and positive effects. Among the AUMPs, those with a confirmed significant, negative effect on knowledge transfer risk include improved planning and control, investing in the development of teaching staff, investing in the

TABLE 7. CORRELATIONS

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. General environment risk	1												
2. Specific environment risk	.651 ***	1											
3. Planning and control	.094	.060	1										
4. Degrees and educational program development	.040	-.062	.636 ***	1									
5. Teaching staff development	.075	-.054	.696 ***	.612 ***	1								
6. Research staff development	.053	-.071	.517 ***	.546 ***	.759 ***	1							
7. Resource endowment	.112	.033	.639 ***	.661 ***	.703 ***	.679 ***	1						
8. Student role development	.082	.047	.605 ***	.517 ***	.679 ***	.568 ***	.696 ***	1					
9. Internationalization	.085	-.114	.463 ***	.516 ***	.596 ***	.759 ***	.681 ***	.489 ***	1				
10. Commitment to society and environment	.051	-.105	.432 ***	.534 ***	.611 ***	.700 ***	.647 ***	.564 ***	.761 ***	1			
11. Teaching Risk	.507 **	.561 **	-.103	-.095	-.161+	-.242*	-.126	-.136	-.166+	-.187+	1		
12. Research risk	.346 **	.371 ***	-.057	-.093	-.113	-.227*	-.084	-.125	-.160	-.243*	.704 ***	1	
13. Knowledge transfer risk	.412 ***	.437 ***	-.134	-.120	-.164+	-.243 **	-.142	.163+	-.147	-.203*	.787 ***	.862 ***	1

* $p < .1$, ** $p < .05$, *** $p < .01$, *** $p < .001$; Pearson correlation coefficients (bilateral).
 Source: Own elaboration.

TABLE 8. EFFECT OF ADVANCED UNIVERSITY MANAGEMENT PRACTICES ON TEACHING RISK

<i>Independent Variable</i>	<i>Teaching Risk</i>									
	Mod1	Mod2	Mod3	Mod4	Mod5	Mod6	Mod7	Mod8	Mod9	Mod 10
Planning and control		-.061								
Degrees and educational program development			-.081							
Teaching staff development				-.161*						
Research staff development					-.232**					-.232**
Resource endowment						-.170*				
Student role development							-176*			
Internationalization								-.149+		
Commitment to society and environment									-.163*	
General environment risk	.246*	.252*	.257*	.277**	.286**	.273**	.262*	.287**	.280**	.286**
Specific environment risk	.401***	.401***	.389***	.373***	.359**	.389***	.399***	.357**	.362**	.359**
R2	.350	.354	.356	.375	.402	.378	.381	.353	.357	.402
ΔR ²	.350***	.004	.006	.025*	.052**	.028*	.031*	.021+	.026*	.052**
F	27.990***	18.778***	19.010***	20.625***	23.111***	20.894***	21.100***	20.250***	20.653***	23.111***
Over model		Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	

* $p < .1$, ** $p < .05$, *** $p < .01$, **** $p < .001$.
Source: Own elaboration.

TABLE 9. EFFECT OF ADVANCED UNIVERSITY MANAGEMENT PRACTICES ON RESEARCH RISK

<i>Independent Variable</i>	<i>Research Risk</i>									
	Mod1	Mod2	Mod3	Mod4	Mod5	Mod6	Mod7	Mod8	Mod9	Mod10
Planning and control		-.090								
Degrees and educational program development			-.086							
Teaching staff development				-.116						
Research staff development					-.223*					
Resource endowment						-.114				
Student role development							-.153+			
Internationalization								-.155+		
Commitment to society and environment									-.234*	-.234*
General environment risk	.182	.190	.194	.204+	.220+	.200+	.195	.225+	.230+	.230+
Specific environment risk	.253*	.253*	.240*	.232+	.212+	.245*	.251*	.207+	.197+	.197+
R2	.157	.165	.164	.170	.206	.170	.180	.156	.210	.210
ΔR ²	.157***	.008	.007	.013	.049*	.013	.023+	.023	.053	.053
F	9.664	6.774***	6.733***	7.024	8.881***	7.010***	7.535***	7.507***	9.100**	9.100**
Over model		Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	

* $p < .1$, ** $p < .05$, *** $p < .01$, **** $p < .001$.

Source: Own elaboration.

TABLE 10. EFFECT OF ADVANCED UNIVERSITY MANAGEMENT PRACTICES ON KNOWLEDGE TRANSFER RISK

<i>Independent Variable</i>	<i>Knowledge Transfer Risk</i>									
	Mod1	Mod2	Mod3	Mod4	Mod5	Mod6	Mod7	Mod8	Mod9	Mod 10
Planning and control		-.173*								
Degrees and educational program development			-.112							
Teaching staff development				-.169+						
Research staff development					-.270**					-.270**
Resource endowment						-.179*				
Student role development							-.196*			
Internationalization								-.141		
Commitment to society and environment									-.190*	
General environment risk	.221+	.237*	.237*	.253*	.268*	.249*	.238*	.260*	.261*	.268*
Specific environment risk	.293*	.293*	.276*	.263*	.244*	.281*	.291*	.252*	.248*	.244*
R2	.219	.249	.232	.247	.290	.251	.258	.238	.254	.290
ΔR ²	.219***	.030*	.012	.028+	.071**	.032*	.038*	.019	.035*	.071**
F	14.607***	11.391***	10.358***	11.278***	14.049***	11.497***	11.912***	10.723***	11.702***	14.049***
Over Model		Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	Mod1	

* $p < .1$, ** $p < .05$, *** $p < .01$, **** $p < .001$.
Source: Own elaboration.

development of research staff, increased provision of resources to university centres, increased student empowerment, and internationalization and development of collaboration programs with society (companies, government agencies, non-profit organizations). In this case, the stepwise regression only includes the development of research personnel; this AUMP offers the greatest explanatory capacity for reducing knowledge transfer risk. Developing academics' research skills can help them identify and find solutions for societal challenges.

6. CONCLUSIONS

Using a risk analysis prism, we seek to identify which practices can help mitigate the risk that a university is not able to fulfil the fundamental missions that define it: teaching, research, and the transfer of knowledge to society. In so doing, we make several contributions to university risk management literature. First, by adopting a broad perspective, this study includes many of the risk management parameters that universities may leverage. On the one hand, we recognize the three main processes that constitute university activity and accordingly account for teaching risk, research risk, and knowledge transfer risk as performance variables. On the other hand, in support of this broad analytical framework, we compile an extensive list of AUMPs, as potential risk-mitigation practices. Furthermore, we account for both risk in the general university environment (political, economic, sociological, and technological factors) and university-specific risk (adversities related to students, suppliers, existing or potential competitors that provide society with other alternatives for higher education).

Second, the empirical evidence affirms the capacity of AUMPs to mitigate risk in university performance and confirm one particular AUMP as an effective solution to teaching and knowledge transfer risk: investing in the development of research personnel. Such efforts might include the development of training programs, attracting graduate students, hiring and promoting academic staff on the basis of their research quality, or collaborating with prestigious external researchers. These practices help not only to reduce research risk, as might be expected, but also indirectly affect teaching risk and knowledge transfer risk. The development of research personnel provides tools for enhancing the attractiveness and relevance of educational offers. Likewise, developing personnel research skills with training programs or by offering incentives for research results can decrease the risk of failing to transfer knowledge to society.

Another AUMP emerges as a main mitigator of research risk: commitment to society and the environment. This commitment implies incentivising collaboration initiatives with other organizations (e. g., companies, non-profit organizations, public entities) to undertake projects linked to sustainability. These collaborations contribute directly to mitigate the risk of failing to transfer knowledge to society; they also indirectly provide research ideas and data that help mitigate research risk. Thus, the transfer of knowledge and value across the university and society works in both directions; both can benefit from collaborative projects. Beyond these two AUMPs that act as the main mitigators of university risks, our study confirms the beneficial influences of several other practices, as we summarise in Table 11.

6.1. Implications for academia

This study emphasises the need to identify, classify, and homogenise risk management analysis parameters in higher education systems into (1) risk-causing factors, (2) types of performance parameters that can be at risk, and (3) practices that act as risk mitigators. In other domains (e. g., supply chain risk management), similar parameter classifications already are well-advanced, but for university management, they have yet to be defined. Some previous

TABLE 11. MITIGATION CAPACITY OF EACH ADVANCED UNIVERSITY MANAGEMENT PRACTICE

	<i>Teaching Risk</i>	<i>Research Risk</i>	<i>Knowledge Transfer Risk</i>
Research staff development	Main Mitigator	Mitigator	Main Mitigator
Commitment to society and environment	Mitigator	Main Mitigator	Mitigator
Teaching staff development	Mitigator	---	Mitigator
Resource endowment	Mitigator	---	Mitigator
Student role development	Mitigator	Mitigator	Mitigator
Internationalization	Mitigator	Mitigator	---
Planning and control	---	---	Mitigator

Source: Own elaboration.

studies offer key contributions in this sense (e. g., Brewer and Walker, 2011), but no clear conceptual framework of risk management by universities has been established. For example, Brewer and Walker (2011) mix causes with consequences when defining a risk, such as citing strategic risk as something that affects the long-term performance of the university and is caused by external and governance factors. Separating the identification of risks that are specific to their cause, from those that are specific to their consequence, helps clarify the analysis. Furthermore, Brewer and Walker collect several different types of specific risks, but their analysis is not exhaustive, such that they analyse existing competition between universities but do not comment on other risk drivers, such as competitors' actions; number of students; or political, economic or sociological factors. Finally, they do not specify which practices can mitigate risks or provide empirical evidence on mitigating effects. Our findings thus represent an encouragement for further academic work to classify the factors and empirically verify their relationships.

6.2. Implications for managers of higher education institutions

This article provides academic managers with a broad choice of parameters they can use to assess the level of risk in the environment in which their institutions operate, the performance dimensions that are subject to risk, and the practices they can use to manage these risks. It also presents evidence of the interrelation among these parameters, revealing some less expected effects. For example, participating in different projects with other social agents (public institutions or companies) can indirectly reduce research risk—in other words, it can enhance and ensure research performance at the university.

6.3. Limitations

This study has certain limitations that point to promising avenues for future research. First, although our data do not show evidence of common method bias—as detailed in the methodological section—future studies could benefit from incorporating additional, objective

measures of the same constructs. Second, while theoretical frameworks such as institutional theory suggest that patterns observed in our geographical context may be similar to those found elsewhere, replicating this analysis across different geographical settings would represent a valuable direction for further investigation. Moreover, examining the impact of these mitigating practices on other potential dimensions of risk performance (e. g., reputational risk), and studying its links with other risk management variables (e. g., risk management formalization) would also constitute a relevant extension of this research.

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8. AUTHOR'S CONTRIBUTIONS

Conceptualization, Guevara-Piedra, W., González-Zapatero, C. y González-Benito, J.; Methodology, Guevara-Piedra, W., González-Zapatero, C. y González-Benito, J.; Data Collection, Guevara-Piedra, W.; Writing – Original Draft Preparation, Guevara-Piedra, W.; Writing – Review and Editing, González-Zapatero, C. y González-Benito, J.; Supervision, González-Zapatero, C. y González-Benito, J.

9. DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author(s).

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