

Environmental Uncertainty and Performance of Chinese Public Universities

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Abstract

This study mainly explored the relationship between environmental uncertainty and the performance of Chinese public universities. Data were collected through questionnaires. The census sampling method was employed to select Chinese public universities as samples. Data from 315 valid questionnaire responses were analyzed using partial least squares structural equation modeling (PLS-SEM). It was found environmental uncertainty can not impact on university performance. Apart from contributing to theories and literature, this research provided empirical insights for public universities, the public sector and other stakeholders in developing countries, particularly China. The results lead leaders to attach importance to actively improve the performance of public universities. It was also pointed out that public universities and businesses have different attitudes towards environmental uncertainty. The nature of Chinese public universities is different from that of enterprises. Therefore, environmental uncertainty cannot directly affect performance.

Introduction

Since the 21st century, Chinese higher education has ushered in a stage of large-scale development. The number of public universities in China had reached 849 as of 2020, representing the level of Chinese higher education. Universities are increasingly required to highlight their performance and demonstrate their excellence due to social, economic and political demands (Rossi et al., 2018). As a non-profit organization, public universities mainly rely on public funds to provide students and society with knowledge services. The “Double First-Class” plan was officially announced by the Chinese government in 2015. It is aimed at

establishing world-class universities and disciplines by 2050 and basically building China into a power in higher education. To date, 147 double-top universities have been founded in China (Ministry of Education of China, 2022). The plan states that the government will dynamically and conditionally adjust government funding according to the performance of universities. Besides, it stresses that universities with excellent performance will be allocated more public funds and receive more external financial resources and budgets (Nicolò, 2021).

The Chinese government has issued a series of policies and documents requiring the public sector to focus more on budget and performance. Universities have paid increasing attention to their performance since the release of the performance evaluation report of Chinese universities, the first performance evaluation report of China (National Institute of Education Sciences, 2009). However, Tsinghua University, the best university in China, had ranked only 17th in the Quacquarelli Symonds (QS) rankings and 20th in The Times rankings by 2022. Compared with overseas universities, Chinese public universities still have much room for improvement in terms of performance (The Times, THES-QS World University Rankings, 2022). Only seven Chinese universities are among the world's top 100, which is occupied by universities in the United States (US) and Europe.

In addition, some studies have begun to focus on public sector performance in recent years. The lack of stakeholder pressure weakens their incentive to make any changes in their facilitation efforts. The performance of some universities is low notwithstanding large financial allocation. Universities with more resources do not necessarily perform better than those with fewer ones (China Higher Education Development Database, 2019). As stated by Wang (2019), this is because China is vast and subject to environmental uncertainty. Owing to the unbalance of economic development between the south and the north, the southern region is economically developed, with more government subsidies, policy support and universities. The fierce competition among universities prompts them to pay more attention to budget and performance, forming a virtuous circle (Lacatus, 2013; Atici et al., 2021). The southern region has the best performance, whose input, output and performance scores are higher than those of the northern region. Therefore, it directly reflects the unbalanced distribution of Chinese higher education resources in the north and south. Universities are faced with an uncertain environment, and stakeholders have different needs for universities. The dynamic and complex environment may lead to differences between universities in the aspects of the budget and social resources. Universities capable of actively adjusting their strategies to meet the needs of society are more likely to obtain more social resources (Raimo et al., 2021). How to improve performance through environmental analysis is worth deep thinking and research.

The review of previous literature showed that performance are mostly studied in the context of enterprises. However, the literature provides little empirical evidence on whether public universities can effect performance through environmental uncertainty. This is an opportunity to build on literature, which can provide recommendations for public university administrators to improve performance. To address this problem, therefore, the research questions is "Does environmental uncertainty affect the performance of Chinese public universities?" This research provided further insights into the factors influencing the performance of Chinese public universities. From the perspective of university administrators, improving the performance of universities is urgent to pursue world-class universities and disciplines. Through the analysis of the actual reasons affecting performance, practical suggestions were made to support the practical and theoretical improvement of university performance and improve the comprehensive competitiveness of universities in China.

This paper was organized as follows: introduction, literature review and research hypotheses, framework and methodology. The results were analyzed and discussed before a summary was made.

Literature review and hypothesis development

Environmental uncertainty

Environmental uncertainty means that environmental conditions are unpredictable because of large and rapid changes (Darvishmotevali et al., 2020; Magerakis & Habib, 2021). Ezzamel (1990) divided environmental uncertainty into two dimensions: complexity and dynamics. Complexity refers to many influencing factors needing to be considered in decision-making, like the diversity of educational methods and the extremely fierce competition in higher education. According to the definition by Dess and Beard (1984), a dynamic environment is rapid and unpredictable changes that increase uncertainty for people and organizations operating in that environment. However, Li and Liu (2014) proposed that a dynamic environment is one of volatility (i.e., change speed and innovation) and unpredictability of competitor actions and customer demands. The development of modern universities is confronted with a complex environment, which is similar to that of enterprises. Cooperation and competition exist between universities and the government, universities and society, and a variety of stakeholders. The environment of universities is full of uncertainties. Macro-environmental factors such as politics, law, economy, culture and geography all affect the development of universities (Adhikara, 2022; Raimo et al., 2021). Moreover, the environment outside universities is constantly changing and interacting (Wu, 2016; Liu, 2017; Atici et al., 2021). The environmental uncertainty of Chinese public universities includes the diversity of educational methods, the development speed of the higher education industry and the growing competition among public universities. Universities should not only be mindful of the needs of stakeholders but also realize the difficulty in predicting the actions of other public universities (Chapman, 1997; Hartmann, 2011; Latan et al., 2018).

Performance

Performance is the work output of an organization or individual for a while. It is the result of the work of organizational members in management activities such as planning, investigation, coordination, monitoring, staffing, negotiation, and representation (Hariyanti et al., 2015). The performance of universities, knowledge-intensive organizations whose input and output are mainly based on the development of immaterial resources, is often reflected in intangible assets (Pedro et al., 2020). Previous studies have proposed different university performance indicators from different perspectives, including teaching (Daraio et al., 2015) and research (Rahimian, 2013; Daraio et al., 2015, Wang, 2019). In practice, whether a university is world-class can be demonstrated by the number of papers it publishes, patents it obtains, scientific awards it wins, international staff and students it owns, etc. (Song, 2018). Chinese universities should serve the interests of the country and nation. The four basic functions of Chinese universities are personnel training, scientific research, society serving and cultural inheritance (Ministry of Education of China). According to this, university performance can be classified into employee and social satisfaction, as well as teaching, research and financial performance through quantitative analysis (Chen, 2007; Sun, 2018).

Hypothesis Development

Environmental uncertainty poses both challenges and opportunities to the formulation and implementation of university strategies. Contingency theory states that the complexity and unpredictability of the environment will affect organizational performance (Nkundabanyanga et al., 2022). The uncertainty of the organizational environment can be analyzed to identify the opportunities and threats facing organizations. Timeliness and market and crisis awareness can be improved and turned into internal motivation to boost performance (Wu, 2016; Wang, 2019). For this reason, it is necessary to perceive environmental uncertainty as a factor affecting the performance of public universities. The more uncertain the environment is, the more likely managers will be to risk balancing the uncertainty and creating opportunities and benefits for enterprises. As far as the environment of universities is concerned, it is filled with uncertainties, including uncertain national policies, regional economy and social environment, imperfect market mechanisms, etc. (Nicolò et al., 2021). Universities often emphasize social and environmental sustainability as one of their core missions and take steps to improve performance (Atici et al., 2021). Nevertheless, this process is difficult and requires thoughtful support from the top management of universities, with substantial material and non-material resources applied to practices. Therefore, universities are encouraged to actively face the challenges brought by environmental uncertainty. For this purpose, the hypothesis was proposed as follows:

H: Environmental uncertainty has a positive and significant influence on the performance of universities.

Research Design and Methodology

The method used in this study is a quantitative research design. Based on a positivist philosophy, quantitative research obtains and analyzes data through quantitative analysis, and then draws conclusions. The research strategy is a questionnaire survey related to the deductive research approach. Most researchers generally believe that a majority of studies on management accounting adopt the method of a questionnaire survey to obtain data, which is an effective method of collecting information. The study population involved public universities in China, and the census sampling method was adopted in this study. The total number of public universities in China is 849. The unit of analysis was public universities, with one university for one questionnaire. A 5-point Likert scale was used as the research instrument. Questionnaire items were adapted from past related studies on environmental uncertainty and performance. However, some questions were modified to fully fit the objectives of this study. On account of the small sampling frame available and the low response rate of the predicted survey studies, the census sampling method was adopted. Finally, 315 valid questionnaires were received (a response rate of 37.1%) for analyzing data.

Table 1

Useable questionnaires

	Number of public universities
Total population and sample	849
(-) pilot test	35
Total remaining sample size	814
Total of returned questionnaires	320
Total of unusable questionnaires	5
Total of usable questionnaires	315
Response rate	37.1%

Results**Measurement Model**

Regarding partial least squares structural equation modeling (PLS-SEM) developed by Hair et al (2019), prior studies have suggested that a sample size of 100-200 cases is often a good starting point in modeling implementation (Hoyle, 1995; Hair et al., 2019). Model assessments are subjected to PLS-SEM analysis. The collected data were analyzed using Statistical Product and Service Solutions (SPSS) and PLS-SEM. When PLS-SEM is used for research, the path diagram of a structural equation should be drawn based on a literature review and an in-depth analysis of the actual environment and problems. The structural equation model is essentially a statistical analysis approach taken to address the causal relationship between different variables and express it both digitally and visually. Observable and unobservable variables are involved in the variables within the structural equation model. PLS-SEM analysis is used for evaluating the model, where measurement and structural models are assessed by a path model via Smart PLS. Notably, PLS-SEM enables the testing of more complex path models involving a large number of variables. It is widely used to test a series of hypothetical models in various research fields (Hair et al., 2019). Given its small sample size, PLS-SEM was suitable for this study. This analytical approach is also highly flexible and able to develop and display a comprehensive causality diagram, which was required in this study. As a result, PLS-SEM was adopted as a statistical tool for data analysis in this study.

Hair et al (2019) mentioned that factor loadings, average variance extracted (AVE) and composite reliability (CR) were used for testing convergent and discriminant validity. Table 3 presents the measurement model for all constructs with a Cronbach alpha of more than 0.7, AVE > 0.7 and CR > 0.9, indicating that the model was valid and reliable.

Table 2
Measurement model

struct	Con	Items	Loading	Cronbach's /ALPHA	alpha	CR	AVE	
Environmental uncertainty	Complexity of the environment	EU1	0.886	0.893	0.947	33	0.8	
		EU2	0.922					
		EU3	0.914					
		EU4	0.941					
		EU5	0.965					
		EU6	0.947					
		BP2	0.834					
		BP3	0.826					
		BP4	0.763					
		BP5	0.795					
		BP6	0.885					
		OCT9	0.963					
performance	Dynamics of the environment	OCT10	0.957	0.874	0.878	66	0.9	
		P1	0.886					
		P2	0.903					
		Employee satisfaction dimension	P3					0.888
			P4					0.828
		Teaching and research performance dimension	P5					0.925
			P6					0.933
			P7					0.924
		Social satisfaction dimension	P8					0.922
			P9					0.846
			P10					0.933
			P11					0.945
Financial Performance dimension	P12	0.887	0.911	0.879	44	0.8		

Discussion

Table 3 shows the path of environmental uncertainty and performance, whereby environmental uncertainty has no effect on performance (standardized $\beta = 0.041$, $p = 0.408$), thus failing to support hypothesis. Environmental uncertainty does not serve as a strategy for improving the performance of public universities, which is opposite to the prediction. On the one hand, most previous studies discussed environmental uncertainty and performance in enterprise settings (Magerakis & Habib, 2021; Liem & Hien, 2020). In the present study, universities were taken as the background, and it was discovered that environmental uncertainty has no impact on the performance of public universities in China. On the other hand, the environment affecting universities is constantly changing and interacting. However, Chinese public universities have been reliant on government subsidies for a long time. Despite the use of performance-based incentive strategies, scores of public universities still hold the old idea that they can receive government funding despite performing poorly. With their government funding and steady enrollment, public universities have become desensitized to

environmental uncertainty. As a result, it is considered that environmental uncertainty has no effect on university performance. This agrees with Wu's (2016) argument that universities can seize development opportunities only when being aware of the changing environment and fierce competition. In other words, it takes time for public universities to respond to the opportunities and challenges presented by environmental uncertainty. In the face of the current system with Chinese characteristics, the pressure of global competition and domestic and political demands, universities seem confused and lack the strength to make use of the environment to improve their performance (Song, 2018).

Previous scholars, including Ghozali and Diponegoro (2016); Latan et al (2018), documented a significant positive association between environmental uncertainty and performance, however, studied companies rather than universities. In this study, environmental uncertainty in public universities was explored. It can be seen that businesses and the public sector respond differently to environmental uncertainty. The research scope was enriched by studying environmental uncertainty in different types of organizations. The increasingly fierce competition between universities will make them further feel the complexity and dynamics of the surrounding environment. Therefore, future studies can pay more attention to the coping behavior of universities in the face of environmental uncertainty.

Table3

Direct Path Coefficient Result

Path coefficient	Std. beta	Std. Error	t-value	p-value	Decision
H Environmental uncertainly -> Performance	0.041	0.049	0.827	0.408	Not Supported

Summary

Through the above analysis, contrary to predictions, this study failed to support the direct effect of environmental uncertainty on performance. Because the unit of analysis is different. Most previous research analyzed employees as the unit of analysis, the background of this research is public universities. The factors affecting university performance should be understood from a more objective viewpoint. While previous studies have focused on studying companies, this study took public universities as research objects. The findings also suggest that public universities and companies have different responses to environmental uncertainty. With the support of these findings, this study provided empirical evidence and a basic understanding performance in Chinese public universities.

Moreover, one identified limitation of this study is that public universities in China were research samples. This means the applicability of the findings is limited as it is unclear whether the findings can be generalized to other industries. To examine the impact of environmental factors on performance, future research could explore other educational organizations like elementary and high schools. The objective is to probe into whether attitudes towards performance in different public sectors change under the influence of environmental uncertainty and national policies. This is because different public sectors have different understandings and behaviors on environmental certainty and performance, and policy trends will affect the decisions of decision-makers. Through research in this area, performance management in the public sector can be strengthened and emphasized. Certainly, future research can be expanded to include different types of enterprises and

different countries, and explore the regional and cultural studies of environmental uncertainty and performance.

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