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# Impact of innovative strategic management on innovative university performance: The mediating influence of human resource management

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## *ABSTRACT*

The main objective of this research is to explore the impact of innovative strategic management on innovative university performance focusing on the mediating role of human resource management. Current research on the relationship between innovation strategic management, human resource management and innovative university performance is relatively scarce. The contribution of this study is to fill this academic gap by systematically collating relevant literature and providing a theoretical basis and practical guidance for the development of innovative universities. This study explores the different dimensions of innovative strategic management, human resource management and university performance through a literature review and data analysis. The study employs questionnaires and statistical data analysis to analyse the interactions between these variables. The study designed a series of questionnaires and analyzed the results using confirmatory factor analysis with clear and concise charts and tables. The main findings of the study indicate that strategic management of innovation has a significant and positive impact on innovative university performance. Human resource management plays a key mediating role in this relationship. Universities can implement innovation strategies more effectively which in turn improves overall performance. It can provide important practical guidance and decision-making support for improving the overall innovation capacity and performance level of universities by strengthening human resource management.

**Contribution/Originality:** The link between innovative strategic management, human resource management, and innovative university performance is systematically explored and empirically analysed in the present study. These collectively deepen the understanding of how strategic management principles can be adapted to enhance the innovation capacity of universities.

## 1. INTRODUCTION

Innovative universities have become an indispensable and important part of the modern higher education system as an important transformational direction of modern universities. What is an innovative university? In his book "Creating the Entrepreneurial University", Burton Clarke defines the characteristics of an "innovative university". These are the ability to respond flexibly to changes in the surrounding environment; to cross the boundaries of the traditional university; to have a diverse and pluralistic funding base; to have a strong academic centre ground; and to have a strong entrepreneurial culture (Guerrero & Urbano, 2012). Research, innovation and entrepreneurship have an important impact on social and economic development as innovative universities display unique characteristics and potential in education. Research on innovative universities can help to promote economic



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and social development and reform of the national education system, promote scientific research and technological innovation, and strengthen international exchanges and cooperation. Therefore, an innovative university is a higher education institution with a high degree of flexibility and adaptability capable of responding to changes in the external environment while promoting innovation, research and entrepreneurship across traditional university boundaries. It provides important support for the reform of a country's education system and socio-economic progress by promoting technological innovation, fostering innovative talent and strengthening international cooperation (Garanin & Krasnova, 2021).

At the same time, innovative strategic management can help innovative universities to clarify their development direction and long-term goals. Innovative universities can focus their resources and efforts on the areas of innovation with the greatest potential and importance and avoid wasting and dispersing resources by developing a clear strategic plan. What exactly is strategic management? The representative figure of strategic management theory Steiner (2010) believes that strategic management is a process, the enterprise in determining the premise of the enterprise's mission should be the enterprise's external environment and internal conditions to set the enterprise's strategic objectives and rely on the enterprise's own strengths to ensure that the objectives of the implementation of the mission to achieve the dynamic process of change (Haberberg & Rieple, 2008). Strategic management can be the handling of the main expectations and urgent initiatives taken inside a field as well as the internal organization taken by the managing director on behalf of the owner including the use of resources to improve the company's performance in its external environment (Nag, Hambrick, & Chen, 2007). Alternatively, it refers to the use of appropriate strategic management techniques and measures to maximize the impact of the firm's innovation activities on business growth and performance (Keupp, Palmié, & Gassmann, 2012). As for university human resource management, it can be said to be the core part of university management which can achieve the effective use and development of teachers' resources and promote the rapid development of the university and it can also efficiently coordinate the work between departments optimize the staffing and rationally allocate teaching resources which has an important impact on the university's scientific research and the quality of teaching (Xu, 2023). At the heart of an innovative university is the promotion of innovative education, research and entrepreneurship through the creation and dissemination of new knowledge. Universities need a clear strategic vision and goals. Strategic management guides the long-term innovative development of the university by setting, implementing and evaluating these goals. Thus, strategic management guides the development of innovative universities.

Qi (2019) pointed out that the construction of innovative universities in universities requires the management of innovation and entrepreneurship from the perspective of strategic management which must be carried out by applying new concepts of innovation and entrepreneurship education and changing the problems that exist in traditional education so that the innovative university meets the needs of the society and the needs of modern talent demand including the strategic planning and the implementation of the strategy. Jianhua (2021) argues that examining the impact of strategic management of innovation can reveal how Szechuan University can contribute to the development of the local economy by commercializing research results and establishing spin-off companies. There is a relationship between innovative universities and strategic management.

Innovative universities usually face limited resources such as human, financial and time in their construction and development. Therefore, introducing the ideas of innovative strategic management and human resource management into the construction and development of innovative universities are not only integrating and innovative strategic management theories to deepen people's understanding of the management of innovative universities. It also helps innovative universities to optimize the allocation of resources, and helps innovative universities to formulate long-term strategic plans to better realize their innovation goals and promote scientific and technological innovation and social progress. At the same time, innovative strategic management can be used not only for the development of strategic development planning in universities but also through the development of



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human resource strategies to enable universities to gain sustainable competitive and innovative advantages (Djikhy & Moustaghfir, 2019). Yan (2022) also argues that teacher and staff behaviour is an important part of organisational culture and that this behaviour contributes to the achievement of strategic goals and the development of shared values. Therefore, the aim of this study is to analyse the mediating role of human resource management in innovative strategic management and innovative university performance. In addition, the following questions are raised: To what innovative strategic management, human resource management and innovative university performance in universities? Does innovative strategic management affect innovative university performance through human resource management in universities and how? Finally, this study provides suggestions for future research and limitations of this study.

## 2. LITERATURE REVIEW

### *2.1. Innovative Strategic Management*

Chandler (1962) first mentions the theory of strategic management in his book strategy and structure. An examination of the history of industrial enterprises in which he put forward the influence of the enterprise development environment and the enterprise organizational structure on strategic management through the study of the development history of the enterprise and argue that the organizational structure should be compatible with the development environment and strategic management of the enterprise. Later, Ansoff (1965) studied the strategic decision-making framework, construct a strategic, structural and systematic decision-making framework, and formally put forward the concept of "strategic management". Andrews (1971) further elaborated the concepts of corporate strategic thinking and strategic planning in the concept of corporate strategy. In the 1980s and 1990s, Michael Porter published his book "Competitive Strategy" in which he put forward the famous "five forces" analysis model and believes that when the enterprise in the implementation of the total cost leadership strategy, differentiation strategy, specialization strategy and other strategic objectives, it can make the enterprise's operation in the industrial competition in the first place (Michael, 1980).

The introduction of strategic management from business management into the field of higher education management is itself an innovation in the application of strategic management. Schendel and Hatten (1992) introduced strategic planning in higher education by putting forward the core idea that "strategic planning is a form of adaptive planning" in their publication "Strategic Planning and Higher Education, Concepts, Issues and Opportunities." Collier (1978) elaborated on the feasibility of strategic planning theory in the practical governance of universities and systematically demonstrates the characteristics and roles of university strategic planning which improved the theoretical system of university strategic management. Keller (2005) believed that strategic planning should focus on the interests and needs of the university through the development of a clear strategy to cope with the foreseen risks.

The components of innovative strategic management in this paper are developed based on the university identity measure. The first component is strategic planning which is a process by which an organization or business sets long-term goals and reaches those goals.

Teece (2010) divided the process of strategic management into the following four parts: situation analysis, strategic direction, strategy formulation and strategy implementation in assessing the level of strategic management in the academic field of hospitality. Subsequently, Alsharari (2024) explained the organizational change configuration through the theoretical perspectives of configuration theory and strategic typology. Similarly, many researchers have analyzed strategic planning in terms of goals, vision, mission and environment (Fen, 2015; Musa, 2023).

In addition, strategy implementation, strategic resources, management philosophy and internal organization are also part of strategic management (Abreu Pederzini, 2016; Drouin & Jugdev, 2013).



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### *2.2. Human Resources Management*

The history of human resource management in universities can be traced back to the early 20th century. At this stage, university human resource management is mainly a supportive function with the continuous development of information technology. University human resource management has been gradually digitized and computerized (Fang, 2021). Shizhen (2021) believed that the core of university human resource management is to manage and allocate teachers' resources, optimize the human resource management system, improve the human resource management system, accelerate the reform of university teaching, and give full play to the central role of teachers in teaching. Human resource management is inextricably linked to the development of universities. The components of human resource management in higher education can be analyzed based on the definition; it covers all aspects related to hiring, training, performance appraisal, employee relations, compensation and benefits, recruitment and employee development. Its goal is to ensure that organizations are able to have, attract, develop and maintain a resilient and high- performing workforce to achieve the organization's strategic objectives (Xu, 2021).

Recruiting high-level talents is crucial to the development of universities (Yihan, 2023). As for how to recruit, Lu (2021) and Tataw (2012) believed that in the recruitment process, the role of the employee is more critical with the ability to see the truth, according to the applicant's demeanor and behavior, to correctly identify the truth or not. After recruiting teachers, the university must provide appropriate pre-service training for new teachers to enhance their practical skills. At the same time, in the training process, the potential of all teachers is reasonably mobilized, resources are reasonably allocated and individual effectiveness and overall effectiveness are maximized and truly brought into play (Lawrence, 2011; Shizhen, 2021). Shengcai (2019) argued that the purpose of applying performance appraisal to human resource management in universities is to achieve motivation for employees, improve the efficiency of teachers and enable them to better adapt to the needs of their positions. Yang (2023) pointed out that innovative universities must establish the correct concept of performance to maximize value. The university should take the initiative to tilt to the front line of teaching and research and the main disciplines, and effectively safeguard the immediate interests of each staff member, so that the staff has a strong sense of belonging and a sense of honor (Fanting & Yi, 2016; Huang, 2023). At the same time, it is necessary to improve the management of teachers' compensation and benefits establish a scientific system of internal and external competition, and develop a scientific competition mechanism to meet the actual needs of teachers and stimulate their work enthusiasm (Li, 2023; Liying, 2020).

### *2.3. Innovative University Performance*

The characteristics of an innovative university performance vary because of the different research purposes. In general, innovative university performance assessment plays an important role in promoting the development of higher education, enhancing the overall capacity of universities, and strengthening the connection between universities and society. Crow and Dabars (2015) explored the design and implementation of innovative universities in designing the New American University. They propose a model of the university that is orientated towards innovation, social impact and sustainability, emphasizing the importance of interdisciplinary research, community engagement and entrepreneurship. Makieła (2021) and others have analyzed and studied 31 of the most innovative universities in the world and concluded that these universities play a significant role in promoting scientific progress, social development and technological applications. Similarly, Ammons and Spelman (2008) focused on the economic and social impacts of innovative universities. They analyzed innovative university-industry partnerships, explore successful models of university-business collaboration and argue that innovative universities can play a role in job creation, technology transfer and entrepreneurial ecosystems. Johnston and Chasdi (2011) focused on the impact of innovative universities on society.

Some researchers talk about knowledge spillovers arguing that knowledge innovations or technologies can directly affect the innovation of university-affiliated firms (Rodríguez-Gulías, Rodeiro-Pazos, & Fernández-López,



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2016; Tseng, Huang, & Chen, 2020). Jing (2016) and Wen (2006) have become one of the main ways for innovative universities to realize the goal of knowledge transfer to society. University spin-offs can bring commercial revenues for the university commercial revenues and also increase the visibility of the university and the promotion of campus culture while university spin-offs can transform academic and scientific research results into commercialized entities, promoting innovation and economic development (Jasny et al., 2017; Tseng, Huang, & Chen, 2020). Lijin (2009) and Yang (2018) thought that in the process of cultivating innovative talents, we should implement the combination of diversified talent cultivation and personalized innovation education, the organic combination of teaching and research and focus on the cultivation of innovation ability. Berestova (2009) also discussed several ways of categorizing innovations in education, i.e., according to their importance for economic growth, according to the field of results and areas of application, the needs met, the origin of the innovation, and the degree of innovation. Some researchers analyze the relationship between innovative universities and innovative cities, and conclude that innovative universities can provide innovative talents for their cities, help cultivate innovative culture and innovative spirit, and promote scientific and technological innovation and economic development while the construction of innovative cities provides innovative universities with innovative practice bases (Wen, 2006; Wu, 2022).

## 3. RESEARCH HYPOTHESES

In 2012, the Russian government issued the implementation plan for improving the international competitiveness of Russia's world- class universities. They believe innovation is regarded as an important platform to promote the transformation of scientific research results and technological innovation, thus positively affecting the economic development of universities. Innovation strategy management can effectively influence human resource management in universities and focus human resources on subject areas and projects with innovative potential and advantages (Liu, 2013). Shengming and Yue'e (2018) analyzed how universities optimize the allocation of human resources in implementing innovation strategies by conducting case studies and research on several universities. The results of the study show that strategy implementation has a significant impact on human resource management. Wei (2023) believed that in the process of university recruitment, it is necessary to do human resource planning first, strengthen the communication and coordination between departments, and improve the efficiency of recruitment. The organization, implementation and feedback of recruitment are not analyzed, summarized and an evaluation system is not formed at the end of the recruitment process. Bai (2020) believed that under the influence of an innovation-driven development strategy, sustainable development of universities is achieved by improving the level of human resource management so that the level of teachers' development meets the needs of university development. Therefore, innovative strategic management is influencing innovative university performance through human resource management. Schendel and Hatten (1992) pioneer the introduction of strategic planning into the field of higher education when they developed the core idea of "strategic planning as adaptive planning" in their publication strategic planning and higher education: concepts, issues and opportunities. The first to introduce strategic planning into the field of higher education. On the other hand, Collier (1978) elaborated on the feasibility of strategic planning theory in the practical governance of universities and systematically demonstrated the characteristics and roles of university strategic planning which improved the theoretical system of the university strategic management. Innovative strategic management will have an impact on innovative university performance. The hypotheses are as follows:

*$H_1$: Innovative strategic management has a significant impact on human resource management.*

*$H_2$: Human resource management significantly affects innovative university performance.*

*$H_3$: Innovative strategic management significantly affects innovative university performance.*

*$H_4$: Innovative strategic management positively affects innovative university performance through human resource management.*



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The relationships mentioned in the hypotheses are presented in Figure 1.

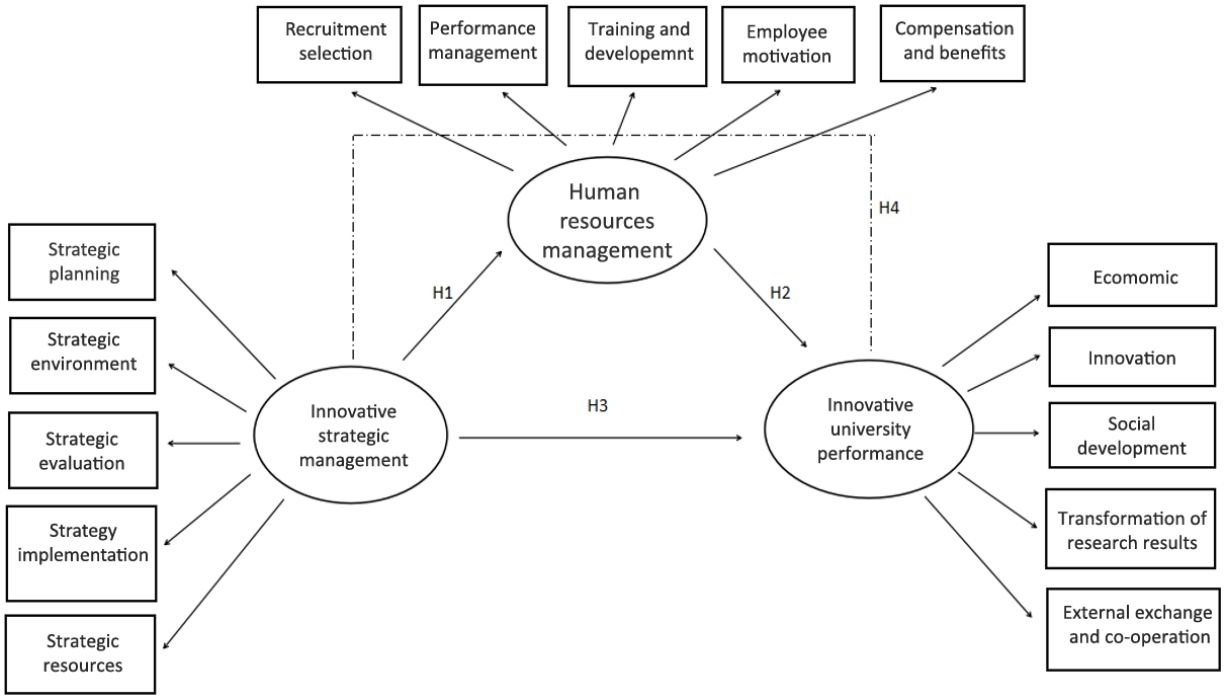


**Figure 1.** The conceptual framework

## 4. DATA ANALYSIS

### *4.1. Sample Size and Sampling Techniques*

According to the Circular on the Announcement of the List of National Innovation and Entrepreneurship Colleges and National Innovation and Entrepreneurship Education and Practice Bases Construction issued by the General Office of the Ministry of Education of China in 2022 (Statistics Sichuan Provincial Bureau, 2023), 10 innovative universities in Sichuan Province were selected as the object of the research which have a total of 30, 155 staff members. Sample size tables by Krejcie and Morgan (1970) need to be used when the exact number of samples or populations is uncertain, which results in a sample size of about 80. However, the need for a sufficient sample size must be taken into account due to the need for variables in the conceptual model and the fact that this study uses structural equation modelling for its analysis. Therefore, the sample approach proposed by Bollen (1989) and Yuan and Bentler (2000) can be used. In this study, there are 15 variables and 78 questions and the sample size taken is at 800. In the process of data collection, this paper targets teachers, middle and senior leaders of Sichuan universities to understand innovation performance under innovative strategic management and human resource management, to study in-depth the innovative strategic management, human resource management and innovation performance of Sichuan universities, and to gain a deeper understanding of how to use innovative strategic management, human resource management to improve the innovation performance of Sichuan universities. Before conducting precisely the questionnaire, experts will be invited to interview the questionnaire, test the quality of the questionnaire for compliance with the requirements of the study, modify the questions appropriately, and check the internal consistency of the items. At the same time, the instrument will be pretested, including content validity testing, and qualitative measurement items will be integrated. Experts will be invited to review and evaluate the questionnaire to determine the content validity based on the Index of Item-Objective Coherence (IOC) methodology. After the final questionnaire, it was distributed to selected universities in Sichuan Province. This study will introduce the content of this questionnaire to each respondent to ensure the accuracy of the questionnaire.



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### *4.2. Questionnaire Design and Collection*

Each question in this study was drawn from the literature review on innovative strategic management, human resource management and innovative university performance including personal information of respondents .4-6 questions were set for each latent variable. After designing the initial questionnaire, five experts were invited to analyze it using the Item-Objective Consistency (IOC) index and the questionnaire was further adapted. The final questionnaire is presented in Table 1. The questionnaires innovative strategic management (ISM) contains the following observed variables: Strategic planning (SP), strategic environment (SE), strategic evaluation (SEv), strategic implementation (SI), and strategic resource (SR). Human resource management (HRM) contains the following observed variables: recruitment selection (RS), performance management (PM), training and development (TD), employee motivation (EM), compensation and benefits (CB). Innovative university performance (IUP) contains these observed variables: economics (EC), innovations (IN), social development (SD), transformation of research results (TRR) and external exchanges and co-operation (EEC). The type of assessment used in the questionnaire was a 5-point Likert scale with 1 being the lowest and 5 being the highest. The questionnaire was distributed online using QuestionStar software and the population of the questionnaire was for the faculty members of universities in Sichuan Province. 800 copies of the questionnaire were distributed, and 705 copies were recovered with a recovery rate of 88. 1%.

**Table 1.** Constructs and items

| Constructs | Code | Items |
|---|---|---|
| Strategic Planning (SP) | SP1 | There is a need for strategic planning and management of the university's current development. |
| | SP2 | The university regularly publishes progress on the implementation of the strategic plan to all teachers and staff. |
| | SP3 | The strategic plan should be formulated in line with the long-term interests of the university and its positioning. |
| | SP4 | The university leaders actively support the content of the strategic plan. |
| | SP5 | The university regularly publishes the development of the strategic plan and the progress of its implementation to all teachers and staff. |
| Strategic Environment (SE) | SE1 | The external environment such as the economy, culture and politics of the host city has a very important influence on the innovative development of the university. |
| | SE2 | The internal environment such as technological innovation, organizational culture and management structure can significantly contribute to the transformation and development of the university. |
| | SE3 | The university's geographic location, local policies, and economic development affects the university's growth. |
| | SE4 | Local economic, social and cultural factors have a significant impact on the innovative development of the university. |
| | SE5 | Teacher development and research levels have a significant impact on the innovative development of the university. |
| Strategic Evaluation(SEv) | SEv1 | In evaluating the university's development strategy, the university leadership is able to take into account a variety of factors. |
| | SEv2 | The university has conducted consultations and thorough research within the teacher and staff prior to implementation. |
| | SEv3 | Mechanisms for the university to solicit input or feedback from stakeholders in the development of its strategic planning process. |
| | SEv4 | The university's development strategy is based on a thorough analysis of the current state of the university's development. |
| | SEv5 | The university regularly evaluates the effectiveness of the implementation of the strategy and makes adjustments or improvements to the strategy based on the evaluation results. |
| Strategy Implementation (SI) | SI1 | Before the implementation of new programmes or work, the university conducts mobilization activities such as meetings and training. |
| | SI2 | For longer-term work, the university will usually give a phased time table. |
| | SI3 | The university has set up an evaluation system for the effective implementation of the development strategy. |



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| Constructs | Code | Items |
|---|---|---|
| | SI4 | The current structure of departments and positions at the university ensures the effective implementation of the strategy. |
| | SI5 | In order to ensure the effectiveness of the implementation of the strategy, the university has carried out an integrated planning and comprehensive arrangement of work objectives. |
| | SI6 | The university has created a favourable university climate for the implementation of the strategy. |
| Strategic resource(SR) | SR1 | The university has a high proportion of highly educated and skilled personnel. |
| | SR2 | The university has close ties with government, business, and research organizations. |
| | SR3 | The university's resources such as brand, reputation and assets can contribute to the development and innovation of the university and its staff and teachers. |
| | SR4 | The university has strong financial. |
| | SR5 | The university has a clear strategic resource management policy or plan. |
| Recruitment selection（RS） | RS1 | The university's recruitment and selection process is based on fair and equal criteria, and sufficient time and resources are devoted to fulfilling them. |
| | RS2 | The university is committed to recruiting teachers and staff who are socially responsible and friendly to innovative policies. |
| | RS3 | The university focuses on innovation, teamwork and diverse backgrounds in recruitment. |
| | RS4 | When recruiting, different interview and assessment methods are used for different people. |
| | RS5 | The university provides opportunities for new teachers and staff that are conducive to development. |
| Performance management （PM） | PM1 | The university sets clear individual and team performance objectives. |
| | PM2 | The university's current performance programme adequately motivates its teachers and staff. |
| | PM3 | The university incorporates performance related to innovation and entrepreneurship into job analyses and performance appraisals. |
| | PM4 | The university has a rigorous and clear performance appraisal system and criteria which can truly and objectively reflect the actual performance of the staff and teacher. |
| | PM5 | The university's performance management provides direction to teachers and staff in their endeavors and ensures that performance goals are met. |
| Training and development | TD1 | The university focuses on teacher teamwork and leadership development. |
| (TD) | TD2 | The university encourages teachers and staff to participate in innovative activities and provides related training. |
| | TD3 | The university has a rigorous and clear performance appraisal system and criteria, which can truly and objectively reflect the actual performance of the staff and teacher. |
| | TD4 | The university provides financial support for the upgrading of the competencies and qualifications of teacher and staff, and gives priority to internal members for promotion. |
| | TD5 | The university evaluates or tracks the effectiveness of teacher participation in training. |
| Employee motivation (EM) | EM1 | The university has established a reasonable incentive mechanism for its teacher members. |
| | EM2 | The university's reward and punishment mechanisms provide greater incentives to individuals. |
| | EM3 | The existing reward and the punishment system matches work contributions. |
| | EM4 | Penalties such as deduction of bonuses and job adjustments will be applied to teachers and staff who fail to complete their job duties or make mistakes. |
| | EM5 | The university rewards or recognizes staff for academic achievement, teaching quality or innovation. |
| | EM6 | The university rewards teachers and staff members who excel in academic achievement, teaching quality, or innovation. |
| Compensation and benefits （CB） | CB1 | The university attaches importance to the issue of staff welfare and benefits. |
| | CB2 | More stable remuneration levels for the university's teachers and staff. |
| | CB3 | The university still needs to make improvements in staff remuneration and benefits. |
| | CB4 | The university's compensation and benefits is better able to enhance the motivation of teachers and staff members. |
| | CB5 | The university provides a fair and reasonable remuneration system. |



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| Constructs | Code | Items |
|---|---|---|
| Economic(EC) | EC1 | Adoption of university innovation technology has become an important way for enterprises to improve their technological level. |
| | EC2 | University innovations can bring considerable economic benefits to enterprises. |
| | EC3 | The development of the university helps to promote the transformation and upgrading of the regional economy. |
| | EC4 | The university contributes to the economic development of the region in which it is located. |
| | EC5 | The university's impact on the economy comes mainly from the transformation of research results and scientific and technological innovation. |
| Innovations （IN） | IN1 | Adoption of university innovation technology has become an important way for enterprises to improve their technological level. |
| | IN2 | University innovation technology can bring considerable economic benefits to enterprises. |
| | IN3 | The university focuses on innovation in research projects and research team building. |
| | IN4 | The university focuses on innovation in teaching mode and student training. |
| | IN5 | The university is actively involved in social service and social innovation. |
| Social development （SD） | SD1 | The university attaches importance to the social service work of universities and carries out relevant trainings. |
| | SD2 | The local government actively formulates and implements preferential policies for the university's social services. |
| | SD3 | The university encourages its students and staff to serve local social and economic development. |
| | SD4 | Faculty members of the universities participate in or are entrusted by the government to lead the preparation of various special development plans and policies. |
| | SD5 | The university provides technical guidance and support to enterprises. |
| | SD6 | The university actively carries out social welfare activities. |
| Transformation of research results（TRR） | TRR1 | Translation of universities results can boost local economies and businesses. |
| | TRR2 | The university's science and technology industry group ( technology transfer centre) has clear procedures and norms for the transfer of achievements. |
| | TRR3 | The university has incubation institutions such as science and technology parks and technology transfer centre and attaches importance to industry-university-research cooperation. |
| | TRR4 | The university provides policy, financial and other support in promoting the transformation of research results. |
| | TRR5 | The transformation of research results plays an important role in promoting industrial development and social progress. |
| External exchanges and co-operation(EEC) | EEC1 | The university organizes various academic conferences and competitions. |
| | EEC2 | The university offers a variety of international exchange programmers every year. |
| | EEC3 | International exchanges and co-operation can be useful for future development. |
| | EEC4 | The university cooperates with domestic and foreign partners in the transfer of research results, human resources training or technological innovation. |
| | EEC5 | The results of the university's co-operation and exchanges help to enhance its reputation and influence. |

### *4.3. Profile of the Respondents*

By counting the samples, in terms of gender, the study showed that 56.92 % of the respondents were male and 43.08 % were female. In terms of age, mostly 36-45 years (36.03 %) followed by 46-55 years (33.9 %), 26-35 years group (30.07 %), under 25 years and over 55 years age group (0 %). The occupation of the respondents was mostly administrators 503 (71.35%) and teachers 202 (28.65%). In terms of educational background, 441 (62.55 %) were master's degree holders and 264 (37.45 %) were Ph.D. holders.



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**Table 2.** Introduction

| Characteristics | Frequency | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 395 | 56.92% |
| | Female | 310 | 43.08% |
| Age | <25 | 0 | 0 |
| | 26-35 | 212 | 30.07% |
| | 36-45 | 254 | 36.03% |
| | 46-55 | 239 | 33.9% |
| | >55 | 0 | 0 |
| University | Sichuan University | 58 | 8.23% |
| | University of Electronic Science and Technology of China | 68 | 9.65% |
| | Southwest Jiaotong University | 62 | 8.79% |
| | Southwest Petroleum University | 66 | 9.36% |
| | Panzhihua University | 64 | 9.08% |
| | Sichuan Agricultural University | 62 | 8.79% |
| | Chengdu University of Technology | 59 | 8.37% |
| | Sichuan University of Science and Engineering | 66 | 9.36% |
| | Chengdu University of Traditional Chinese Medicine | 71 | 10.07% |
| | Southwest University of Science and Technology | 72 | 10.21% |
| | Others | 57 | 8.09% |
| Position | Teacher | 272 | 38.65% |
| | Staff | 433 | 61.35% |
| Educational background | College and below | 0 | 0 |
| | Bachelor's degree | 0 | 0 |
| | Master's degree | 441 | 62.55% |
| | Ph.D. | 264 | 37.45% |

### *4.4. Factor Test*

According to Table 3, the KMO value is 0.957 which is suitable for factor analysis. Meanwhile, analyzing the rotated component matrix, it is found that one of the factors of strategic planning (SP) has a loading value of 0.474 and it is considered to delete SP4. Strategic evaluation (SEv) has a factor loading value of 0.509 and is considered to delete SEv1. Strategy implementation (SI) has a factor loading of 0.495, delete SI5, recruitment Selection (RS) has a factor loading of 0.506, delete RS4, and performance management (PM) has a factor loading of 0.486, consider deleting PM4. Training and development (TD) has a factor loading value of 0.501, consider deleting TD2. Economic (EC) has a factor loading value of 0.460, consider deleting EC3. Social development (SD) has a factor loading value of 0.467 consider deleting SD2. Other factors have a loading value greater than 0.60. Loading values are all greater than 0.60 and there is no multiple loading indicating a good correspondence between the questions and the dimensions.

**Table 3.** KMO and Bartlett's test

| Statistical test | Value |
|---|---|
| KMO quantity of sample suitability | 0.957 |
| Approximate | |
| Chi-square | 36734.340 |
| Bartlett sphericity test (Math.) | |
| Df. | 3003 |
| Sig. | 0.000 |



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### *4.5. Convergent Validity*

Convergent validity emphasizes that measures belonging to the same factor (indicator) should fall under the same factor when measured. In conducting convergent validity analysis make, two indicators, AVE and CR can be used for the analysis, if the AVE value of each factor is greater than 0.5 and the CR value is greater than 0.7, then it indicates a good convergent validity (see Table 4).

The AVE values for strategic planning (SP), strategic evaluation (SEv), strategic environment (SE), strategic implementation (SI), and strategic resources (SR) are 0.623,0.660,0.649,0.634, and 0.625, respectively which are all greater than 0.5 and their CR values are 0.869,0.886,0.902,0.896 and 0.893, respectively which are greater than 0.7. All of them indicate the acceptability of the reliability of the structure.

The AVE values for recruitment selection (RS), performance management (PM), training and development (TD), employee motivation (EM), compensation and benefits (CB) are AVE values of 0.634,0.655,0.656,0.626, and 0.655 respectively which are all greater than 0.5. They have CR values of 0.896, 0.884, 0.884, 0.910, and 0.905 respectively which are all greater than 0.7. All of them indicate the acceptability of structural reliability.

The AVE values for economic (EC), innovation (IN), social development (SD), transformation of research results (TRR), external exchanges and co-operation (EEC) have AVE values of 0.611,0.616,0.622,0.599 and 0.609 respectively which are all greater than 0.5. They have CR values of 0.863, 0.889, 0.892, 0.882 and 0.886 respectively which are all greater than 0.7. All of them indicate the acceptability of structural reliability.

**Table 4.** Convergent validity of innovative strategic management

| Latent variable | Observed variable | Estimate | Unestimate | S.E. | T-vale | P | SMC. | C.R. | AVE |
|---|---|---|---|---|---|---|---|---|---|
| SP5 | SP | 0.804 | 1 | | | | 0.646 | | |
| SP3 | SP | 0.783 | 0.975 | 0.044 | 22.011 | *** | 0.613 | | |
| SP2 | SP | 0.788 | 1.012 | 0.046 | 21.935 | *** | 0.621 | 0.869 | 0.623 |
| SP1 | SP | 0.782 | 0.996 | 0.046 | 21.824 | *** | 0.612 | | |
| SE5 | SE | 0.809 | 1 | | | | 0.654 | | |
| SE4 | SE | 0.815 | 1.03 | 0.043 | 23.839 | *** | 0.664 | | |
| SE3 | SE | 0.813 | 0.997 | 0.043 | 23.436 | *** | 0.661 | 0.886 | 0.660 |
| SE2 | SE | 0.813 | 1.01 | 0.043 | 23.693 | *** | 0.661 | | |
| SEv5 | SEv | 0.810 | 1 | | | | 0.656 | | |
| SEv4 | SEv | 0.811 | 1.019 | 0.042 | 24.098 | *** | 0.658 | | |
| SEv3 | SEv | 0.798 | 0.966 | 0.041 | 23.467 | *** | 0.637 | 0.902 | 0.649 |
| SEv2 | SEv | 0.813 | 0.986 | 0.041 | 24.128 | *** | 0.661 | | |
| SEv1 | SEv | 0.795 | 0.959 | 0.041 | 23.631 | *** | 0.632 | | |
| SI6 | SI | 0.796 | 1 | | | | 0.634 | | |
| SI4 | SI | 0.792 | 1.002 | 0.044 | 22.776 | *** | 0.627 | | |
| SI3 | SI | 0.807 | 1.042 | 0.044 | 23.45 | *** | 0.651 | 0.896 | 0.634 |
| SI2 | SI | 0.785 | 1.022 | 0.046 | 22.382 | *** | 0.616 | | |
| SI1 | SI | 0.801 | 1.035 | 0.045 | 22.927 | *** | 0.642 | | |
| SR5 | SR | 0.800 | 1 | | | | 0.640 | | |
| SR4 | SR | 0.797 | 0.97 | 0.042 | 22.902 | *** | 0.635 | | |
| SR3 | SR | 0.779 | 0.946 | 0.042 | 22.358 | *** | 0.607 | 0.893 | 0.625 |
| SR2 | SR | 0.803 | 0.995 | 0.043 | 23.244 | *** | 0.645 | | |
| SR1 | SR | 0.775 | 0.937 | 0.042 | 22.111 | *** | 0.601 | | |
| RS1 | RS | 0.812 | 1 | | | | 0.659 | | |
| RS2 | RS | 0.817 | 1.033 | 0.043 | 23.913 | *** | 0.667 | 0.896 | 0.634 |
| RS3 | RS | 0.796 | 0.975 | 0.042 | 23.224 | *** | 0.634 | | |
| RS5 | RS | 0.824 | 1.039 | 0.043 | 24.037 | *** | 0.679 | | |
| PM1 | PM | 0.801 | 1 | | | | 0.642 | | |
| PM2 | PM | 0.802 | 1.007 | 0.044 | 22.988 | *** | 0.643 | | |
| PM3 | PM | 0.826 | 1.016 | 0.043 | 23.594 | *** | 0.682 | 0.884 | 0.655 |
| PM5 | PM | 0.809 | 1.008 | 0.044 | 23.022 | *** | 0.654 | | |
| TD1 | TD | 0.798 | 1 | | | | 0.637 | | |
| TD3 | TD | 0.814 | 1.025 | 0.044 | 23.265 | *** | 0.663 | | |
| TD4 | TD | 0.799 | 1.012 | 0.044 | 22.756 | *** | 0.638 | | |



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| Latent variable | Observed variable | Estimate | Unestimate | S.E. | T-vale | P | SMC. | C.R. | AVE |
|---|---|---|---|---|---|---|---|---|---|
| TD5 | TD | 0.829 | 1.056 | 0.044 | 23.808 | *** | 0.687 | 0.884 | 0.656 |
| EM1 | EM | 0.792 | 1 | | | | 0.627 | 0.910 | 0.626 |
| EM2 | EM | 0.811 | 1.037 | 0.044 | 23.639 | *** | 0.658 | | |
| EM3 | EM | 0.800 | 1.057 | 0.046 | 23.123 | *** | 0.640 | | |
| EM4 | EM | 0.776 | 0.966 | 0.043 | 22.274 | *** | 0.602 | | |
| EM5 | EM | 0.784 | 1.002 | 0.044 | 22.58 | *** | 0.615 | | |
| EM6 | EM | 0.785 | 1.019 | 0.045 | 22.624 | *** | 0.616 | | |
| CB1 | CB | 0.827 | 1 | | | | 0.684 | 0.905 | 0.655 |
| CB2 | CB | 0.820 | 0.96 | 0.038 | 25.272 | *** | 0.672 | | |
| CB3 | CB | 0.781 | 0.908 | 0.038 | 23.592 | *** | 0.610 | | |
| CB4 | CB | 0.797 | 0.925 | 0.038 | 24.425 | *** | 0.635 | | |
| CB5 | CB | 0.821 | 0.978 | 0.039 | 25.165 | *** | 0.674 | | |
| EC5 | EC | 0.744 | 1 | | | | 0.554 | 0.863 | 0.611 |
| EC4 | EC | 0.795 | 1.109 | 0.055 | 20.187 | *** | 0.632 | | |
| EC2 | EC | 0.770 | 1.054 | 0.054 | 19.699 | *** | 0.593 | | |
| EC1 | EC | 0.817 | 1.124 | 0.053 | 21.005 | *** | 0.667 | | |
| IN5 | IN | 0.791 | 1 | | | | 0.626 | 0.889 | 0.616 |
| IN4 | IN | 0.782 | 0.969 | 0.044 | 21.815 | *** | 0.612 | | |
| IN3 | IN | 0.774 | 0.997 | 0.046 | 21.69 | *** | 0.599 | | |
| IN2 | IN | 0.768 | 0.971 | 0.045 | 21.368 | *** | 0.590 | | |
| IN1 | IN | 0.808 | 1.008 | 0.044 | 23.093 | *** | 0.653 | | |
| TRR5 | TRR | 0.797 | 1 | | | | 0.635 | 0.892 | 0.622 |
| TRR4 | TRR | 0.769 | 0.982 | 0.045 | 21.701 | *** | 0.591 | | |
| TRR3 | TRR | 0.819 | 1.022 | 0.043 | 23.59 | *** | 0.671 | | |
| TRR2 | TRR | 0.780 | 0.969 | 0.044 | 22.141 | *** | 0.608 | | |
| TRR1 | TRR | 0.777 | 0.992 | 0.044 | 22.329 | *** | 0.604 | | |
| SD5 | SD | 0.808 | 1 | | | | 0.653 | 0.882 | 0.599 |
| SD4 | SD | 0.747 | 0.893 | 0.042 | 21.012 | *** | 0.558 | | |
| SD3 | SD | 0.801 | 0.97 | 0.042 | 23.057 | *** | 0.642 | | |
| SD1 | SD | 0.784 | 0.945 | 0.042 | 22.545 | *** | 0.615 | | |
| SD6 | SD | 0.725 | 0.848 | 0.042 | 20.296 | *** | 0.526 | | |
| EEC5 | EEC | 0.782 | 1 | | | | 0.612 | 0.886 | 0.609 |
| EEC4 | EEC | 0.756 | 0.956 | 0.046 | 20.632 | *** | 0.572 | | |
| EEC3 | EEC | 0.797 | 1.006 | 0.045 | 22.248 | *** | 0.635 | | |
| EEC2 | EEC | 0.762 | 0.948 | 0.045 | 20.989 | *** | 0.581 | | |
| EEC1 | EEC | 0.803 | 1.048 | 0.047 | 22.41 | *** | 0.645 | | |

**Note:** ***p-value <0.001 ( statistical significance at 0.001 level).

### *4.6. Discriminant Validity*

Discriminant validity can be measured by the square root of the correlation coefficient between the variables and the Average Extracted Variance (AVE) value emphasizing the differences between the underlying variables as shown in Table 5. The results show that the correlation values range from 0.528 to 0.808. The square root of the AVE value for each construct is greater than the correlation coefficient involving that construct. The results of the test show that the values obtained support the discriminant validity. Therefore, the overall discriminant validity is acceptable.

**Table 5.** Discriminant validity of innovative strategic management

| Constructs | SR | SI | SEv | SE | SP |
|---|---|---|---|---|---|
| SR | **0.791** | | | | |
| SI | 0.598 | **0.796** | | | |
| SEv | 0.582 | 0.572 | **0.806** | | |
| SE | 0.528 | 0.586 | 0.559 | **0.808** | |
| SP | 0.550 | 0.539 | 0.535 | 0.589 | **0.789** |

**Note:** Bolded text is the square root of AVE.



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According to Table 6, the results show that the correlation values range from 0.528 to 0.812. The square root of the AVE value for each construct is greater than the correlation coefficient involving that construct. The test results indicate that the values obtained support discriminant validity. Therefore, the overall discriminant validity is acceptable.

**Table 6.** Discriminant validity of human resources management

| Constructs | CB | EM | TD | PM | RS |
|---|---|---|---|---|---|
| CB | **0.809** | | | | |
| EM | 0.557 | **0.812** | | | |
| TD | 0.592 | 0.560 | **0.810** | | |
| PM | 0.528 | 0.575 | 0.600 | **0.809** | |
| RS | 0.590 | 0.541 | 0.615 | 0.544 | **0.812** |

**Note:** Bolded text is the square root of AVE.

**Table 7.** Discriminant validity of innovative university performance

| Constructs | EEC | TRR | SD | IN | EC |
|---|---|---|---|---|---|
| EEC | **0.780** | | | | |
| TRR | 0.599 | **0.789** | | | |
| SD | 0.542 | 0.556 | **0.773** | | |
| IN | 0.517 | 0.574 | 0.529 | **0.785** | |
| EC | 0.555 | 0.585 | 0.578 | 0.562 | **0.781** |

**Note:** Bolded text is the square root of AVE.

According to Table 7, the results show that the correlation values range from 0.517 to 0.789. The square root of the AVE value for each construct is greater than the correlation coefficient involving that construct. The test results indicate that the values obtained support discriminant validity. Therefore, the overall discriminant validity is acceptable.

### *4.7. Structural Equation Modeling and Hypotheses*

In this section, the proposed model is analyzed through structural equations to test the hypotheses and determine the answers to the research questions. According to previous research models, strategic innovation management affects innovative universities directly or through human resource management which plays a mediating role. Therefore, the method used to define the model is structural equation modelling. Structural equation modelling allows the simultaneous calculation of regression models for data analysis in path analysis. A goodness of fit test was conducted to measure how well the observed data corresponded to the fitted model. The criteria used to evaluate the goodness of fit are $X^2$/Df(Chi-Square Degrees of Freedom Ratio), RMSEA(Root Mean Square Error of Approximation), IFI(Incremental Fit Index), CFI(Comparative Fit Index), GFI(Goodness-of-Fit Index), NFI(Normed Fit Index), each of these fit metrics helps to assess the adequacy of the model. According to Table 8, it was found that the model fit metrics have good values with I, NFI of 0.915, RMSEA of 0.015, CFI value of 0.988, IFI value of 0.988, and GFI value of 0.974. These values are able to explain to a large extent the actual observations of the data. These values indicate that the model fit metrics are adequately related to the model and meet theoretical expectations.

The results of the hypotheses investigation are presented in Figure 2, the structural model is through human resource management (HRM) as a mediating variable with a mediation effect of 0.16 and innovative strategic management (ISM) has a positive direct effect on innovative university performance (IUP) and human resource management (HRM). Innovative strategic management (ISM) has a positive impact on human resources management (HRM), the standardized path coefficient was $\beta = 0.55$.

Human resource management (HRM) has a positive direct effect on innovative strategic management (IUP), the standardized path coefficient was $\beta = 0.29$. Innovative strategic management (ISM) has a positive impact on



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innovative strategic management (IUP), the standardized path coefficient was β = 0.39. The exogenous variables are strategic innovation management (SIM) and the endogenous variables are human resource management and innovative university performance (IUP). The standardized path coefficients of the entries to the factors to which they belonged ranged from 0.52 to 0.82 and the standardized path coefficients of the first-order factors to the second-order factors ranged from 0.72 to 0.78 which were all greater than 0.50. The results show that innovative university performance can be positively influenced through strategic planning, strategic environment, and strategic assessment. At the same time, innovative strategic management can also positively affect innovative university performance through human resource management.

**Table 8.** Structural model fit results

| Good-fit indices | $X^2$ | Df | $X^2$/Df | NFI | RMSEA | CFI | IFI | GFI |
|---|---|---|---|---|---|---|---|---|
| Adaptation results | 2682.838 | 2327 | 1.153 | 0.915 | 0.015 | 0.988 | 0.988 | 0.974 |
| Adaptation standard | | > 0 | <5 | >0.9 | <0.08 | >0.9 | >0.9 | >0.9 |

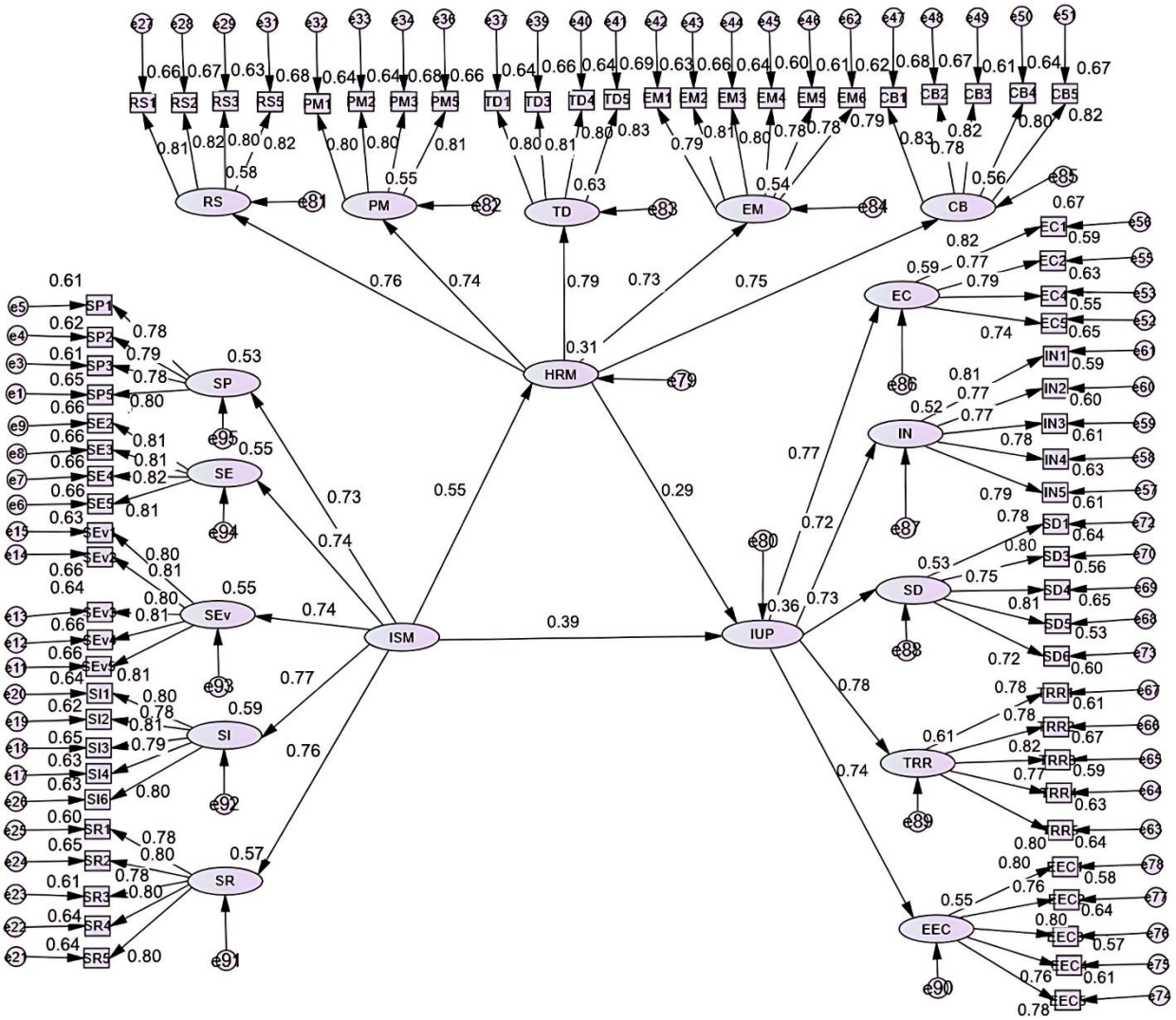


**Figure 2.** Structural model

## 5. CONCLUSION

Innovative university performance is an important indicator to assess and measure the results and effectiveness of universities in innovation. Examining the impact of innovative strategic management on university innovative



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performance can help identify potential opportunities and challenges so that more effective management strategies can be developed to enhance the level of innovative performance of universities.

The results of this empirical study aim to explore the causal relationship between innovative strategic management, human resource management and innovative university performance. Our results found that innovative strategic management can have a positive impact on human resource management. The impact of strategic management of innovation on human resource management is mainly in terms of policies, processes and culture adapted to the organization's innovation needs. It can also drive change in universities in terms of staff recruitment, performance (Huang, 2023; Qi, 2022). It is evident that innovative strategic management has a greater impact on the human resource management of organizations. Meanwhile, Liu and Qiu (2014) argued that the reward and punishment system is one of the specific means and guarantees to achieve the goals of university research management and an effective reward and punishment system can promote the innovation ability of the university. Regular academic lectures, seminars and other training activities can provide teachers with a platform for academic exchanges provide directions for the construction of innovative universities, and provide corresponding technical and economic support (Zhang, 2021). This is consistent with the results of this study on human resource management affecting the performance of innovative universities. Honore (2001) proposed that the research on university strategy should focus on strategic choice and strategic evaluation framework which shows that strategic management has an important impact on the development of universities. Meanwhile, Yang (2018) takes the management system and talent cultivation model as the target, and argues that the characteristic performance of innovative universities receives the influence of unique school philosophy and core leadership which can be summarized as the strategic planning and strategic environment proposed in this research. Strategic management also affects innovative university performance through human resource management. This is similar to the findings of Jing and Jin (2009) who point out that to scientifically manage innovative university libraries, departmental strategic development plans should be formulated in advance, and their daily service modes and management concepts should be adjusted and changed. Innovative universities need to retain high-level research and teaching talent. Human resource management must then develop effective recruitment and performance policy plans to ensure that universities can recruit faculty and researchers with innovative potential over a longer period of time (Carayannis & Campbell, 2012; Liu, 2023). This is similar to the findings of this paper.

Therefore, this paper identifies the variables related to innovative strategic management, human resource management, and innovative university performance. They are strategic planning, strategic environment, strategic evaluation, strategy implementation, strategic resources, recruitment selection, performance management, training and development, employee motivation, compensation and benefits, economic, innovation, social development, transformation of research results, external exchanges and co-operation. There is a need for strategic planning and management of the current development of the university along with mechanisms for soliciting inputs or feedback from stakeholders in the strategic planning process, and regular evaluation of the effectiveness of the implementation of the strategy to create innovative universities. At the same time, universities should set clear individual and team performance goals to encourage faculty and staff to engage in innovative activities and incorporate innovation and entrepreneurship-related performance into job analyses and evaluations.

For the results of the questionnaire, according to the results of CFA concerning the results of AVE analyses, some of the factor values were less than 0.5. Therefore, some of the factors were deleted and the reliability and validity tests were carried out through exploratory factor analyses and the corresponding first-order and second-order measurement models demonstrated a good degree of fitness and it was determined that human resource management has a mediating role indicating that strategic innovation management not only positively affects innovative university performance and human resource management but also influences innovative university performance through human resource management.



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## 6. POLICY SUGGESTIONS AND IMPLICATIONS

The study could provide new theoretical support to the field of innovative strategic management and deepen the understanding of how innovation strategies affect innovative university performance. The expansion of the theory can help academics to understand more comprehensively the key variables and mechanisms involved in the innovation process. It can also provide practical guidance to university managers to help them better develop and implement innovation strategies. Understanding the mediating role of human resource management in innovation performance will enable managers to improve their human resource management strategies in a more targeted manner to promote innovation.

This paper has certain shortcomings which are as follows: The university environment and management strategies may change over time and the timeliness of the study may be limited. Therefore, the findings of the study may need to be updated or revised in the future to reflect the changing times and the evolution of management practices in universities. Secondly, the university environment and management strategies may change over time and the timeliness of the study may be limited. Therefore, the findings of the study may need to be updated or revised in the future to reflect the changing times and the evolution of management practices in universities. Thirdly, the study reveals the relationship between innovative strategic management, human resource management and innovative university performance but does not take into account that other variables and factors may also play a role. For example, organisational culture and teachers' capacity to learn and more empirical research are needed to verify the reality of the relationship.

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