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Policy

JCAS (Journal of China-ASEAN Studies) is an open-access, peer-reviewed bi-annual journal of Chinese International College, Dhurakij Pundit University. It is the premiere forum for global researchers, teachers, policy makers, leaders, managers and administrators, interested in all aspects of Southeast Asian countries and China.

JCAS will publish two volumes in June and December annually, which aims to support and inform researchers, scientists, and scholars, administrators, educators, emerging and established researchers, and policy makers interested in all facets of business, education, tourism, and arts related to Southeast Asian countries and China through the publication of original research that advances knowledge, theory and practice in the field include, Thai-China, Business Innovation, Marketing, Business & Management, Finance and Accounting, Economics, Education & Teaching, Poverty in Education, Humanities, Arts & Design, Languages, Applied Science and Engineering and Social Sciences.

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- **Review article**: The manuscripts should be about 1500-3500. The manuscripts must include the current state of understanding on a particular topic about studies of Southeast Asian countries and China by analyzing and discussing research previously published by others

Editor's Note

Dear Sir / Madam,

It is with considerable satisfaction that we disclose the publication of the fourth volume, second issue of the Journal of China-ASEAN Studies (JCAS). This publication signifies substantial progress towards our goal of Tier 2 accreditation in the Thai Citation Index (TCI), with expectations of favorable results from our concerted efforts. The international tableau is undergoing significant changes, notably with the economic scenarios in China and Southeast Asia emerging as critical influencers on the global stage. Furthermore, the emergent themes of sustainability and Sustainable Development Goals (SDGs) compel us to scrupulously assess the transformations occurring within both the macro and micro environmental contexts.

This edition features a selection of seminal research articles, which are anticipated to foster groundbreaking insights and perspectives amongst our esteemed readership. The rigorous adherence to our peer-reviewed selection protocol underscores our commitment to positioning JCAS as a journal of high repute, focusing on China and ASEAN-related studies throughout 2023 and 2024, with a steadfast aim of inclusion in foremost international academic indices such as TCI 1, TCI 2, and Scopus. Hence, we envisage continued invaluable contributions from the scholarly community, encompassing both scholars and researchers, towards our primary academic pursuits.

This novel and comprehensive scholarly periodical distinguishes itself through its extensive purview, encompassing a diverse array of academic disciplines. The journal's scope extends from contemporary workforce dynamics and Sino-Thai relations to marketing strategies, business administration, wellness paradigms, tourism and hospitality management, leisure studies, information technology, finance and accounting, communication arts, economics, educational pedagogy, humanities, arts and design, linguistics, applied sciences, and engineering. The publication's primary objective is to furnish an esteemed platform for academicians, industry professionals, and students to disseminate high-caliber conceptual and empirical research. Contributions are welcomed in both Chinese and English, fostering a multilingual discourse. By facilitating the exchange of knowledge within these multifaceted fields, the journal aspires to publish intellectually significant academic works. Moreover, this periodical functions as a preeminent forum, enabling its readership to engage with, deliberate upon, and disseminate crucial information pertaining to cutting-edge research methodologies and exemplary practices in their respective domains.

In essence, JCAS is conceptualized as an extended scholarly odyssey, progressing from an indeterminate origin to a tangible present-day manifestation. The actualization of JCAS would have remained an unrealized aspiration were it not for the concerted efforts, unwavering dedication, and substantive contributions of each constituent member of the affiliated committee. Moreover, we are compelled to express our profound gratitude to all participants and contributors, as well as those instrumental in enhancing JCAS's stature and professional repute within the academic sphere.

Yours sincerely

Editor-in-Chief
Assistant. Professor. Dr. Chun-Shuo Chen
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Contents

The Resilience of Thai MSMEs in the Valves and Pipes: EPC Procurement Process and Importing from China Manufactures

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Abstract

Global economics has been agonized of SARS-Cov-2 and been mutating to various variant, in Thailand, it's been opened borders since 1st of July in 2022. From world to ASEAN countries as to Thailand, have been suffered to economy recession, in terms of MSMEs, the decline in sales, layoffs, arrears and bankruptcy, bear the brunt and face severe difficulties. The study aims on MSMEs, leaning on EPC project of fluid control equipment in Thailand in fields of project sale to end-user in annual renewal plans, replying on import industrial goods from China as to its bidding strategy to prospect price advantages. It is acknowledged from qualitative research and in-depth interview by MAXQDA from representatives in valves and pipes, results show this industry has not been affected as predicted. The research analyses according to the obtained results, corresponding suggestions for entrepreneurs to avoid risk and improve efficiency.

Keywords: Business Impact, Bidding, MSMEs, EPC, Thai-China

1. Introduction

Under the impact of the epidemic, many companies are facing the recovery of the post-epidemic era, especially the impact on small and medium-sized enterprises is more severe. In Thailand, many MSMEs, who join EPC bidding focus more on generate profit as their main source of revenue, and large wholesalers have also begun to participate in these projects, as well as annual procurements such as large factories to compete with. In the post-epidemic era, purchasers pay more attention to price cut and quality improve, especially more price orientated. The uncertainty and changes in the overall economic environment have created a shortage of funds in corporations and a rise in operating costs. Many small and medium-sized enterprises are struggling for survival. This article is mainly aimed at EPC-related bidders in Thailand and annual procurement at the factory side participants, such as sugar mills, petrochemical, steel plants, etc., who involve annual procurement and replacement of industrial products and other procurement needs. (Bag et al., 2020) In the current situation of rising costs, most MSMEs are involved in bidding with imported goods from China, striving to reduce costs and increase profits. This study will discuss from top to bottom, starting from the general economy of Thailand to the prospect of MSMEs. (Shafi et al., 2020)

Economically, inflation after the epidemic, rising raw materials cost and oil price substantial increase since 2021, the critical issue also caused by port closure, shipping schedule

delay as well as freight rate goes up dramatically. By World Bank indicator on GDP% growth, last year in 2021 is 1.6% to forecast of 3.95% and 4.3% in coming year 2022 and 2023, which has shown the recovery is still hovering in low gear.(World Bank, 2022a)

However, imports of goods and services (% of GDP) is higher compared with 2020 to 2021, shows 46.3% to 58.5% between world average is 25.6% to 28.1%.(World Bank, 2022b)

Which indicates pointedly that for EPC bidding process by importing industrial goods and services of consulting, enterprises have faced more risk by delays of customer payment, importing from China, bank loan payback and lead-time issue once joined the EPC bidding process and annual renewal purchase scheme. From WTO trade statistics in 2020 in intermediate goods and commercial services, China has played a big role to Thailand in terms of export and import.(WTO, 2022)

The paper will be inclined on Thailand MSMEs bidding process and procurement operating method between these two countries, due to economic dependency and trading perspectives are highly correlated. (Adams & Abhayawansa, 2022) In addition, for this related industry that has participated in the EPC bidding, the study will accomplish suggestions in the post-epidemic era to reduce business risks. (Pal et al., 2017)

2. Thai Economic After Covid-19 Spillover and Recovery in 2022

In the first two years of the epidemic, Thailand experienced the closure of enterprises and the depression of tourism. However, the Thai government has taken many measures to revitalize the economy, but until the beginning of 2022, the effect is not very significant, as we can perceive from the CEIC real GDP growth chart from 2016 to 2027 forecast by IMF. (CEIC, 2022) After 2022, the growth level will return to the pre-epidemic level. Under the policy of opening to foreign tourists, the overall tourism industry will recover significantly in mid-2022. Here we could examine the growth rate of the tourism industry is estimated to 3.1% year on year in 2rd quarter of 2022 (Reuters, 2022) that refer to IMF forecast by 3.3% increase this year and the epidemic situation in the WHO Thailand region, that providing us a intuitive resolution.(WHO, 2022)

In general, Thailand's economy relies heavily on tourism and trade with China. In 2020, it experienced a sharp decline in import and export trade and GDP. However, compared with the systemic risks of large-scale financial crises such as the financial tsunami.(Jagannathan et al., 2013) At the moment when the epidemic has been raging for two years, it is even more crucial for the survival of small and medium-sized enterprises in Thailand, especially the EPC bids and production equipment of public works and factories. (Adams & Abhayawansa, 2022) Throughout literature review from EPC relative studies, the model and focus will be leaning on efficiency of bidding to delivery period (Bajomo et al., 2022), profit improvement (Ishii et al., 2014), and cost management model (Toutounchian et al., 2018). Providing process and model derivation suggestions necessary for large-scale EPC industries, the renewal and replacement of MSMEs is also to prepare for the growth of the next year. This research mainly focuses on the process management of EPC bids, and can also further explore the rebirth of MSMEs under this crisis. (Shafi et al., 2020) It raises our concern, if there’s an alternative solution and advance sales for importers main product sources from China.

3. Framework for EPC

3.1 Bidding Process

As illustration for government bidding process, while conducting procurement operations in Thailand, engineering, finance, or labor services, to ensure high-quality products and services, reasonable prices and to avoid the suspicion of profiting from specific suppliers. Once the purchase amount reaches a certain level, the bidding process must be carried out according to the law, and the relevant suppliers are invited to join the bidding and submit documents, to be honored the contract with the government agency. According to the Government Procurement Law, the bidding methods are divided into main three types: "general invitation method", "selection method" and "specific method". (Baker McKenzie, Procurement Procedures-Thailand, n.d.) Nowadays, for non-government procurement cases, selection and specific methods are common applied by factories or public companies, also cared social responsibility to environment issue as ESG concept, if the purchaser is in chemical industry, sugar mills etc., then price might not be the only consideration. (Mohammad & Wasiuzzaman, 2021)

Each invitation to tender has specific program requirements, however, three main topics are what bidders must attempt to:

(1) The key issue: Regarding tender content, what's the planned demand, final output, and the challenge behind the demand. Using an expert's point of view to break through the problem and establish professionalism and authority.

(2) Competitive advantage: Why is this case not for you? The strengths raised are best to answer the key questions or to pull back the key questions from your strengths. The analysis in place must be shown in the briefing and present the clear advantages overlap into a thick defensive barrier, making it difficult for opponents to cross.

(3) Tender briefing preparation must focus on relevant achievements: The execution of the plan is a beautiful imagination, and the relevant actual performance is the concrete reality. Evidence speaks for demonstrating that the team is good at analysis, planning, and has the pragmatic ability to implement projects.

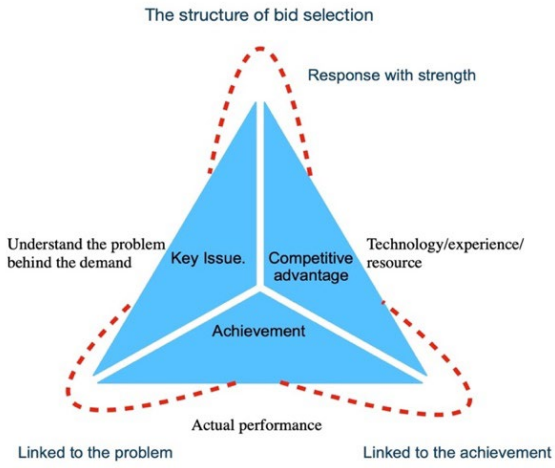

Figure 1

The Structure of Bid Selection: Three Main Topics

From figure 1, we could easily recognize that three main points are highly correlated, especially in cases related to general invitation method. Therefore, for related tenders such as EP

C from scaled factories and listed companies tend to use same method to select partners to co operate with. By adapting this concept, for most of MSMEs business entities should convert w inning projects by offering lowest price to fair quality product/services with affordable price. Surely, for enterprises who are in strong business ability and stable qualitied supply power mi ght walk away if frequent losing projects by price competition.(Jing et al., 2021) At the same t ime, the procurement and consulting teams from demand side must also have an efficient inter nal control system, which not only conforms to the ISO process, but also applies to its own ef fective implementation process. (ISO9001:2008 Quality Management Systems-Purchasing, n. d.) (ISO20400;2017 Sustainable Procurement-Guidance, n.d.)

3.2 Influence of EPC Bidding Management

As illustration for government bidding process, while conducting procurement operations in T hailand, engineering, finance, or labor services, to ensure high-quality products and services, r easonable prices and to avoid the suspicion of profiting from specific suppliers. Once the purc hase amount reaches a certain level, the bidding process must be carried out according to the l aw, and the relevant suppliers are invited to join the bidding and submit documents, in order t o be honored the contract with the government agency. According to the Government Procure ment Law, the bidding methods are divided into main three types: “general invitation method”, “selection method” and “specific method”. (Baker McKenzie, Procurement Procedures-Thail and, n.d.) Nowadays, for non-government procurement cases, selection and specific methods are common applied by factories or public companies, also cared social responsibility to envir onment issue as ESG concept, if the purchaser is in chemical industry, sugar mills etc., then pr ice might not be the only consideration. (Mohammad & Wasiuzzaman, 2021)

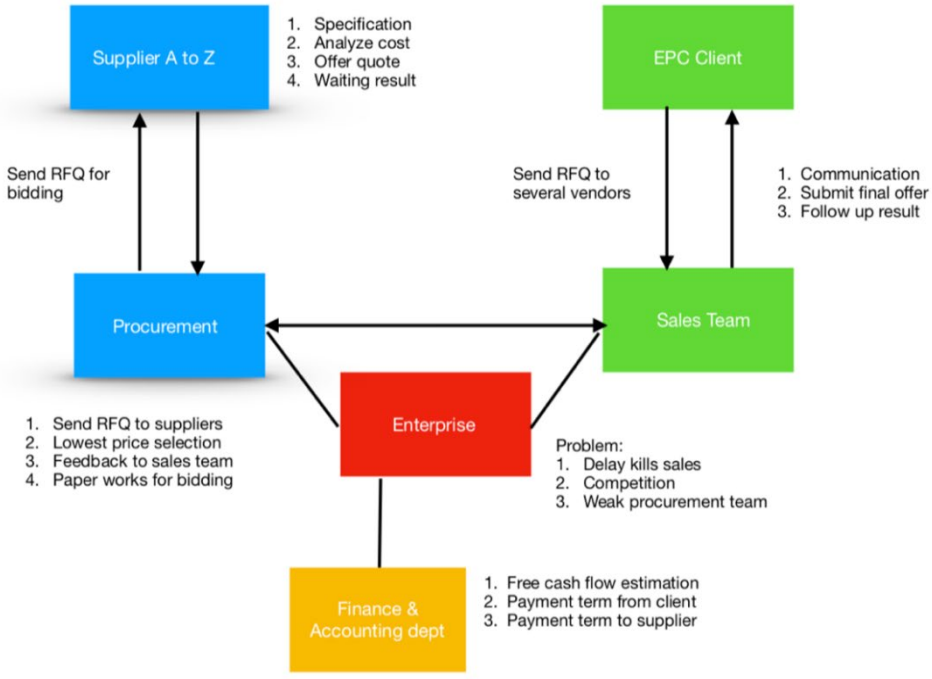

Figure 2

EPC Project Procedure and Framework (Lee et al., 2021)

4. Research Design and Methodology

4.1 Sample Description

This paper will be by qualitative approach, in order to gain a better insight of MSMEs who join the EPC project in Thailand or experience in bidding by selection and specific methods, the object will be procurement team of the corporations and entrepreneurs by semi-structure interview due to the study will be leaning on MSMEs who importing from China and join bidding, it's the niche market orientation. (Monforte & Úbeda-Colomer, 2021) As verbal exchange of idea by in-depth interview will provide us a more vivid vision in this field and expressed business strategy into key factors. (Thunberg & Arnell, 2021)

For interviews, due to they have been in the industry for a long time, and the suppliers have a deeper understanding of EPC's tenders, they are also very familiar with the process and could provide more practical implementation difficulties and insights than pure questionnaires. (Bates et al., 2017) Throughout topic-based questions, the two parties could have more detailed discussions, such as analyzing the for of bids, the rate of winning bids, its profitability and technical difficulties of product or services descriptions. Leading to the result of sharing and listening of the opinions of both parties. (Monforte & Úbeda-Colomer, 2021) (Smith, 2019) Additionally, the insight of the procedure could be diverse between business owner and procurement manager/staff.(Lyndon & Edwards, 2021) The interview questions will be applied by diffractive methodology as table 1 shown. Then, we identified and covered to our framework of EPC and bidding management to detect if entrepreneurs allied with its goal planning. (Mazzei, 2014)

Table 1

Interview Question List Refer to Research Content, Descriptions, and Code.

Question	Research Context	Description	Code
1	What's the Thailand economic change you feel from 2020-2022 to post-epidemic? (Score 1 to 5; No affect to severe)	Covid-19 impact within 2020-2022 and post-epdimic from macroeconomic perspective. Range from strong postive to negative for scale.	Economy in Thailand/ Score Problems
2	Does it affect business significantly? (Score 1 to 5; No affect to severe)	Degree of impact by sales and cost aspects by participants. Range from strong postive to negative for scale.	Business impact/ Score / Problems
3	Do you believe 2023 will be recovering soon; if not, what's your opinion? And when you think it's going to be recovery? (Score 1 to 5; Fast to slow)	Expectations in mind and if reflects the economic growth rate from MSMEs. Range from strong postive to negative for scale.	Economy in Thailand/ Score / Problems
4	Have your company implemented employee cut-off plan? If yes, what's the percentage % of it? (Score 1 to 5; 1= 0-20%, 2=21-40%, 3=41-60%, 4=61-80%, 5=81-100%)	Unemployeement and inflation problems affection in MSMEs. Range from strong postive to negative for scale.	Business impact/ Score / Solution
5	For EPC project how many cases per year in your company average? (Amount over 1 million baht) Is there any decrease (by percentage %) within 2020-2022? (Score 1 to 5; 1= 0-20%, 2=21-40%, 3=41-60%, 4=61-80%, 5=81-100%)	Understand potential risk on cash flow and examine importing goods/services from China has dropped or not? Range from strong postive to negative for scale.	EPC project impact/ Import from China/ Case number/ Score
6	Refer to point 5, what's your opinion why EPC cases have been decreased? And do you think it will be boost up or bids (tenders) keeps small in post-epidemic? (Score 1 to 5; Strong to weak demand)	Analyze the key issue from Q5. Range from strong postive to negative for scale.	Business impact/ Problem/ Score
7	In EPC bidding, what's the difficulties, your company has been facing? 1.technical support 2.product range to complete the bidding 3.price issue with competitors 4.document or paperwork efficiency 5.customer payment term 6.others Please specify	EPC bidding management by corporation. Selection to high frequency numbers to understand main issues for MSMEs bidding hardness.	EPC project impact/ Impact factor / Score / Problems / Price issue / Payment term / Others
8	Do you think your company could improve the bidding rate? How? (Score 1 to 5; Positive to negative)	The structure of bid selection and open quesiton to figure out differenct solution refer to Q7. Range from strong postive to negative for scale.	EPC project impact/ Score / Solution
9	Do you think to import products from China is still a long-term trend? What's your opinion? (Score 1 to 5; Positive to negative)	Import from China is the main trend for valves & pumps business in Thailand, is it still a long-term trend or lost of advangtages. Range from strong postive to negative for scale.	Economy in Thailand/ Import from China / Score
10	Do you look positive in your business? (Score 1 to 5; Positive to negative)	To measure business confidence in the post-pandemic era. Range from strong postive to negative for scale.	Business impact/ Score / Solution / Problmes

4.2 Data Collection and Coding

Based on research theme, our study is to measure the impact from business entity and prospect to post-epidemic EPC bidding rate, thus, our data collection is by different aspect from upper stream to lower stream companies in Thailand and China, who are in mainly import or export positions. Our interviewees have been covered by valves manufacturers, pipe suppliers, casting factories and in Thailand to wholesaler, factory-owned distributor, leading companies in public & private sectors of EPC projects (Høyland et al., 2019), also trading companies who joined small projects have been included to create matrix and layered consideration from top to bottom in valves & pipes industry in Thailand. Table 1 displays the frequency of coding with a code configuration for every interview question. The impact factor is divided into six main categories. The following table will explore the primary concerns arising from each coding, ranked by items that represent the difficulties encountered since the Covid pandemic. (Wibowo et al., 2015) Referring to Table 2, respondents chose to support procurement by using import and representative companies that were on the end-user's bid list. There is, however, a noted exception in which participating business bid on the same sorts and avoid selecting competitors. For instance, as explained in Appendix B, a single business, such as Thai Petroleum, or a sizable sugar factory was chosen for the interview from the purchase list.

Table 2

Sample Characteristics

Number	Code	Company Description	Position	Document	Length
1	A1	Thailand Trading firm target to direct and in-depth factory end user	Sales manager	Appendix-Interview A1	11:08m
2	B1	Thailand wholesaler to direct sale and customer base in Thai-China economic development Zone	Owner/ general manager	Appendix-Interview B1	12:48m
3	F1	Thailand trading firm to direct sale and customer base in Rayong economic development Zone	Owner/ general manager	Appendix-Interview F1	15:16m
4	J1	Steel piping supplier and exporter in Wenzhou, China	Owner/ purchase manager	Appendix-Interview J1	8:26m
5	K1	Valves supplier in Taiwan, China export to Thailand biggest wholesalers	Sales director	Appendix-Interview K1	N/A
6	L1	Vales supplier in China and branch in Thailand to direct users and wholesalers	General manager	Appendix-Interview L1	10:06m
7	N1	Leading conpany in Thailand of PVC valves & pipe	Owner/ purchase manager	Appendix-Interview N1	13:27m
8	T1	BOI stell piping system manufacturer in Thailand	Regional manager	Appendix-Interview T1	15:58m
9	W1	Leading company in Thailand for public company bidding and wholesaler	Purchase manager	Appendix-Interview W1	13:09m
10	W2	Leading company in Thailand for public company bidding and wholesaler	Owner	Appendix-Interview W1	12:06m

In table 3, the code relations from research question listed in table 1, the 3 major factors a re economy in Thailand, business impact and EPC project impact, from interviewees' feedbac k, we could also see the code relations with other factors we want to analyze into score, impac t factor, case number for EPC project import from China and problems are facing as well as it s solution to MSMEs entrepreneurs. (Samantha, 2018)

Table 3
Code Relation Browse

Code System	EPC...	Eco...	Busi...	Imp...	Imp...	Score	Pro...	Solu...	Cas...	Pric...	Pay...	Oth...	Tec...	Pro...	Doc...	Oth...
Others	1															
Technical support																
Product selection																
Price issue	9			9												
Documentary work																
Payment term	6			6												
Others																
Case number	7				4											
Problems	9	17	13													
Import from China	4	7							4							
Solution	11	4	5													
Impact factor	10									9	6					
Score	28	30	37													
EPC project impact			5	10	4	28	9	11	7	9	6	1				
Business impact	5					37	13	5								
Economy impact in Thailand					7	30	17	4								

The cluster of distance code map illustration clearly on its relations within 3 major factor s of impact with other factors in table 3 and code map to illustrate its relationship, that corresp ondingly in our interview records, code classification is carried out for valves and pipes relate d companies, to facilitate data analysis on the frequency of subsequent coding and digging fur ther the difficulties in EPC bidding and expose the solution. (Chesbrough, 2020) (Diego et al., 2013) From the relationship diagram of the above chart, we will next classify the three major categories of research problems. And respondents were asked to rate in several major categor ies the validity of the sample has been statistically analyzed.

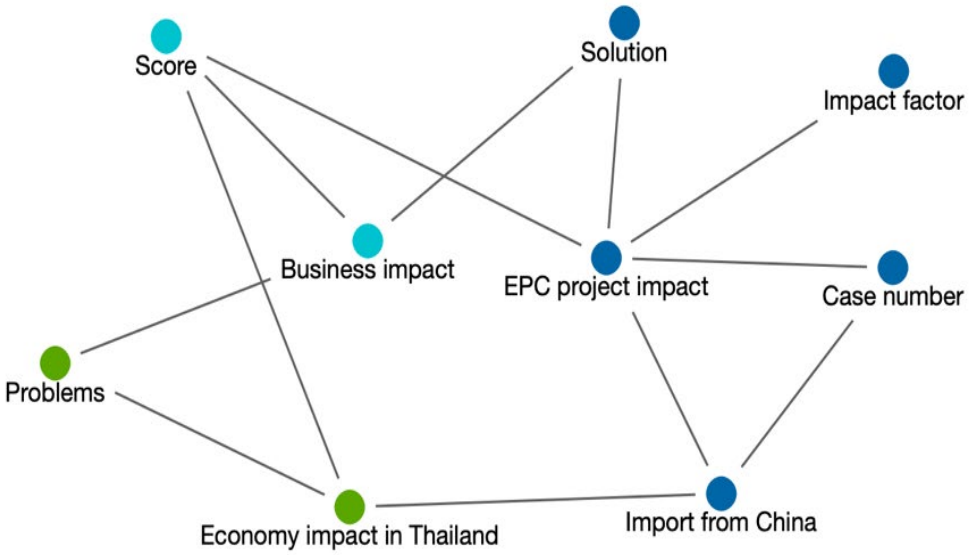

Figure 3
Code Map

4.3 Data Analysis and Results

From three major clusters, firstly we assume that the epidemic had not caused an impact on MSMEs bidding numbers for EPC, business sales turnover, and execute layoff plan as well as pessimistic reality. Second part, if entrepreneurs remain pessimistic about the future, then t he result should show the average number over benchmark. In other words, statistics for past and future expectations in this industry category should have no significant impact.

Table 4

Code Matrix Browser

No.	Code	Code Color	Description	Interview No.	A1	B1	F1	J1	K1	L1	N1	W1	W2	T1	Avg	Std	Benchmark
1	Economy impact in Thailand				4	5	2	4	4	4	3	4	4	5	3.90	0.83	3.00
2	Business impact				1	2	2	3	4	4	2	4	4	4	3.00	1.10	3.00
3	Economy impact in Thailand		Covid impact in 3 codes		2	1	3	4	3	2	3	3	2	3	2.60	0.80	3.00
4	Business impact				1	1	1	2	1	1	1	1	2	1	1.20	0.40	3.00
5	Epc project impact			Score	1	2	2	3	4	1	1	3	5	4	2.60	1.36	3.00
6	Epc project impact				2	2	3	3	3	2	2	1	2	2	2.20	0.60	3.00
8	Epc project impact		Optimism about the future in 3 codes of post-epidemic		1	2	2	2	2	2	3	2	1	4	2.10	0.83	3.00
9	Economy impact in Thailand				1	1	2	2	2	1	1	1	1	3	1.50	0.67	3.00
10	Business impact				1	2	2	3	2	3	3	1	2	2	2.10	0.70	3.00
7				Selection	3	3	3/5	6	3/5	3/5	3	3/5	3/5	3/5			

Score Definition:	
Strongly positive	1
Positive	2
Neutral	3
Negative	4
Strongly negative	5

Selection definition		No.	%
Technical support	1	0	0%
Product range to complete the	2	0	0%
Price issue with competitors	3	9	56%
Document or paperwork	4	0	0%
Customer payment term	5	6	38%
Others	6	1	6%
Frequency Distribution Table		16	100%

Ordinal scale

In terms of difficulties that business have been facing in EPC bidding, it indicates that pr oduct and technical specification are not major issues in documentation, paperwork for tender preparation, Respondents either had no other opinion, mainly issues are price competition pre ssure of competitors and the payment term of customers, which companies encounter a seriou s impact on cash flow. From figure 4, it shows 56% interviewees 'reply in price competition b etween tenders, and 38% in customer payment term, postponing to over 90 days is normal con dition. Only 6% replied other is problem in customer relation for bidding.

Therefore, excluding code 7, we divided rest of codes to two groups and assess the actual stances at the time of the outbreak of Covid within 2020-2022 and after Thailand's influenza policy of it on 1st of Oct 2022. Measuring the actual impact and expected goals of these two t ime periods to see if there's a significant impact. (Phillips-Wren & Hoskisson, 2015) This ana lysis involves forecasting and statistical modeling to identify future possibilities (Joseph & Jo hnson, 2013), determining the cause-effect relationship among our interview question setting

and striving to make a reasonable judgment on the current situation and future expectations of the industry based on the perceived external environment. Categorically, second cluster for future business positive tropism is according to corporate management and business execution capabilities of MSMEs. (Rehman et al., 2016)

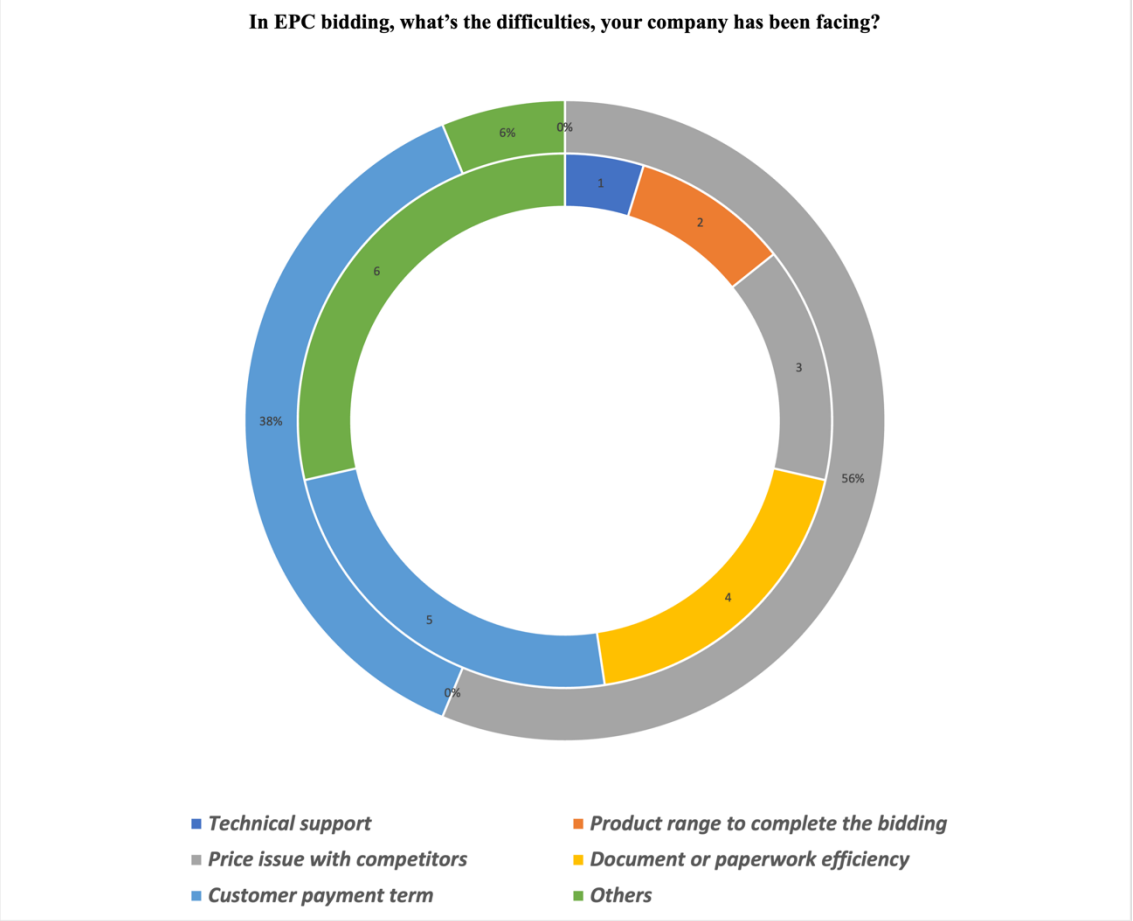

Figure 4

Major Impact Factors on EPC Bidding Refer to Question 7 Research Context.

4.4 Relative Important Index

To understand the perception and actual impact of the interviewees on the three main categories, we use the RII Likert Scale to judge the score and rank its impact. Refer to table 3, the rating we applied 5 points of score definitions and its extent as followings:

Strongly positive – 1

Positive – 2

Neutral – 3

Negative – 4

Strongly negative – 5

This is to analyze the 3 clusters (economy impact in Thailand/ EPC project impact/ Business impact) in coding system from code matrix browser, connecting to respondents' reply by further used relative important index. (Özdem, n.d.) (Samantha, 2018)

The formula is calculated by:

$$RII = \Sigma W / (A*N)$$

Where,

W is the weighting given to each score by respondent

A is the highest weighting. (Point 1 to 5 in this study)

N is number of respondents. (Total N is 90 refer o table 4)

Codes are grouped by 3 clusters by:

Economy impact in Thailand – Code 1/3/9

EPC impact – Code 5/6/8

Business impact – Code 2/4/10

Based on calculation, finding that economy impact is the most influencing factor ranked i n top at 0.53, following with EPC impact at 0.46 and last is business impact at 0.42. From the perspective of the overall economy, the public's overall perception of the external environmen t is relatively pessimistic. High frequency in the code 1 of table 4, it can be found that almost all respondents are pessimistic. However, from the perspective of EPC, the frequency of impa ct distribution is scattered but the overall impact is not large, especially from the perspective o f the proportion of layoffs in terms of the company's business impact, some companies have n ot even laid off staff, which shown in the code 4 of table 4.

What is relatively interesting in this research is that the external environment is very seve re of other consuming industries, such as retailers, food and beverage and household consump tion due to unemployment rate is high and psychological unsafety reasons. Conversely, in val ves and pipes industry is affected by the external environment at a psychological level and fee ls very bad, but in the actual EPC bidding or business activities, most of the companies haven' t been exaggerated as dramatically as it might have imagined.

4.5 Descriptive Statistics, T-Test and One-Way ANOVA

Based on descriptive statistics, the result has shown the mode is 2.6 that occurs most ofte n, and the median value is 2.2, which's skewed to the right, the majority value is less than 3. While we study the data and visualized through box-and-whisker plot in figure5. Referring to table 3 code color indicated in 3 cluster, corresponding to respondents' frequency, the rank of RII in table 4 could also be seen its trend of hierarchy- negative per external, but positive per i nternal business activities. The sample was relatively positive (M=2.3356, SD=0.8017)

Furthermore, while implementing t-test refers to table 3 data:

H0 = No impact on MSMEs for EPC bidder in valves & pipes industry

H1= Not neutral or positive/negative on business

Based on descriptive statistics, the result has shown the mode is 2.6 that occurs most ofte n, and the median value is 2.2, which's skewed to the right, the majority value is less than 3. While we study the data and visualized through box-and-whisker plot in Figure 5. Referring t o table 4 code color indicated in 3 cluster, corresponding to respondents' frequency, the rank o f RII in table 5 could also be seen its trend of hierarchy- negative per external, but positive pe r internal business activities. have no impact on MSMEs for EPC bidder in valves & pipes ind ustry. This matches the respondents' replies while we refer to table 4 of code 5, its dispersed w hile facing EPC project decrease and question 7 in table 3, that most MSMEs has common iss ues in price competitors and customer's payment term from buyers. Moreover, few of the bidd ers have encounter over 90 days customer payment term.

Table 5

Relative Important Index Refer to Table 4 Frequency

Relative Important Index

Code	Description		*Frequency*	*Total Number (N)*	*Total*	*A x N*	*RII*	*Rank*
		Strongly positive (1)	0					
		Positive (2)	1					
1		Neutral (3)	1					
		Negative (4)	6					
		Strongly negative (5)	2					
		Strongly positive (1)	1					
		Positive (2)	3					
3	Economy impact in Thailand	Neutral (3)	5	30	80	150	0.53	1
		Negative (4)	1					
		Strongly negative (5)	0					
		Strongly positive (1)	6					
		Positive (2)	3					
9		Neutral (3)	1					
		Negative (4)	0					
		Strongly negative (5)	0					
		Strongly positive (1)	3					
		Positive (2)	2					
5		Neutral (3)	2					
		Negative (4)	2					
		Strongly negative (5)	1					
		Strongly positive (1)	1					
		Positive (2)	6					
6	Epc project impact	Neutral (3)	3	30	69	150	0.46	2
		Negative (4)	0					
		Strongly negative (5)	0					
		Strongly positive (1)	2					
		Positive (2)	6					
8		Neutral (3)	1					
		Negative (4)	1					
		Strongly negative (5)	0					
		Strongly positive (1)	1					
		Positive (2)	3					
2		Neutral (3)	1					
		Negative (4)	5					
		Strongly negative (5)	0					
		Strongly positive (1)	8					
		Positive (2)	2					
4	Business impact	Neutral (3)	0	30	63	150	0.42	3
		Negative (4)	0					
		Strongly negative (5)	0					
		Strongly positive (1)	2					
		Positive (2)	5					
10		Neutral (3)	3					
		Negative (4)	0					
		Strongly negative (5)	0					

From the t-test, summarizing from three code cluster, it shows within code cluster 1-3 an

d all.

The mean is 2.05, 2.15, 1.65 and 2.16, the variance is 0.605, 0.005, 0.405 and 0.3513 res pectively. While setting alpha values equal to 0.1, 0.05 and 0.01, p-value is 0.3341, 0.0374, 0. 2048 and 0.0052. showing that EPC project impact and all codes are significant at significant level 5% and 1% and reject H0., regarding to economy impact in Thailand and business impa ct.

Table 6

Summary of Descriptive Statistics

Descriptive Statistics	
Mean	2.3556
Standard Error	0.2672
Median	2.2000
Mode	2.6000
Standard Deviation	0.8017
Sample Variation	0.6428
Kurtosis	0.7429
Skewness	0.5534
Range	2.7
Minimum	1.2
Maximum	3.9
Sum	21.2
Observations	9
Confidence (95.0%)	0.61627

Table 7

ANOVA

One-Way ANOIVA

Summary

Group	N	Sum of Score	Average	Variance
A1	9	14	1.56	1.03
B1	9	18	2.00	1.50
F1	9	19	2.11	0.36
J1	9	26	2.89	0.61
K1	9	25	2.78	1.19
L1	9	20	2.22	1.44
N1	9	19	2.11	0.86
W1	9	20	2.22	1.69
W2	9	23	2.56	2.03
T1	9	28	3.11	1.61

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-Value*	*F Critical*
Between groups	17.96	9	2.00	1.62	0.12	2.00
Within groups	98.67	80	1.23			
Total	116.62	89				

Accept H0 No difference opinion from respondents

To test whether 10 group of interviewees have no difference opinion while answering the se 9 questions (excluding question 7) from table 3 listed. Agreeing in valves & pipes industry in EPC bidding and import from China are sharing opinion in the same direction. An One-way ANOVA showed that the opinion from these MSMEs respondents was not significant, F(9,80) =1.62, p=0.12. Furthermore, there were no significant differences found in the data when the T-test was used to analyze the questionnaire's three main theme items from table 4 and shown in table 8. The interview questions are repeated in this segment as well. The majority of those involved in this business have not been greatly impacted by the pandemic and are hopeful abo ut neutral ideas and trends in the wake of it.

Table 8
T-Test of 3 Clusters

T-test : Two Sample Assuming Unequal Variances

Code Cluster	*Mean*	*Variation*	*Df*	*t -stat*	*p-value*
1 Economy impact in Thailand	2.67	1.44	2	-0.4806	0.6783
2 Epc project impact	2.30	0.07	2	-4.5826	0.0445*
3 Business impact	2.10	0.81	2	-1.7321	0.2254
4 All	2.36	0.6428	8	-2.4114	0.0424***

*** Denotes the significant is at 1% level and accept H0, P(T<=t) two-tailed

* Denotes the significant is at 5% level and reject H0, P(T<=t) two-tailed

5. Conclusion and Recommendations

As illustration for EPC bidding exertion, while conducting interview, question 7 has been excluded for statistics refer to figure 3 percentages shown, referring to code hierarchy in figu re 5, the subcode onto it, 2 major factors expressively are price issue and payment term. Com pared with other options, this is also a common difficulty encountered when fighting for EPC bids. It is said that the impact of the epidemic in this industry is relatively low, although in ter ms of end-user procurement plans and demand had declined, payment period had been extend ed, competitive price comparison is inevitable. During the nearly two-year epidemic of Covid period within 2020 to 2022, MSMEs in this industry, if the entrepreneur does not have a large amount of standard inventory prepared, the relative impact of a high EPC ratio will be greate r. The study shows that the future remains positive, even though respondents are still relativel y concerned about the exchange rate risk, Thai baht appreciation and the trend of price increas e of import from China due to manufacturing overhead rally and volatility of market price cha nge of raw materials. At the same time, all agreed that the products imported from China for c ustomer's engineering and installation have not yet been replaced by other countries or region s in the world in terms of quality, price, and delivery lead-time efficiency, consequently, they r emain high optimistic. Additionally, owners and directors proposed corresponding solution in figure 4 and figure 6. Lists as coded segments ranking, A1,38 indicates that suppliers work clo sely with better communication, that improve local user's demand and payment. B1,34/T1,41

Focus more on retailer/wholesalers' channels have less customer payment term issue. Increase inventory level and direct sales, which quick supply to users and improve cash flow status. B 1,41/F1,44/N1,37 China manufacturers product quality had been improved that price term and product range provided advantages for importers and customer selection. K1,40/L1,37 By tec hnical support and professional advice to be differential from competitors. J1,37/W1,40 Custo mer relationship improve and increase visit frequency. Obviously, the risk of exchange rates fr om importers and raw materials is relatively difficult to control, nonetheless from feedback an d business operations, it is known that increasing the inventory of basic products and increasi ng the main sales channels at a relatively good timing can relatively reduce risks in valves and pipes industry. Further than focusing solely in EPC bidding, although it provides higher proje ct in total amount, except increase cash flow risks due to longer payment term issue, a combin ation sales strategy should be implement.

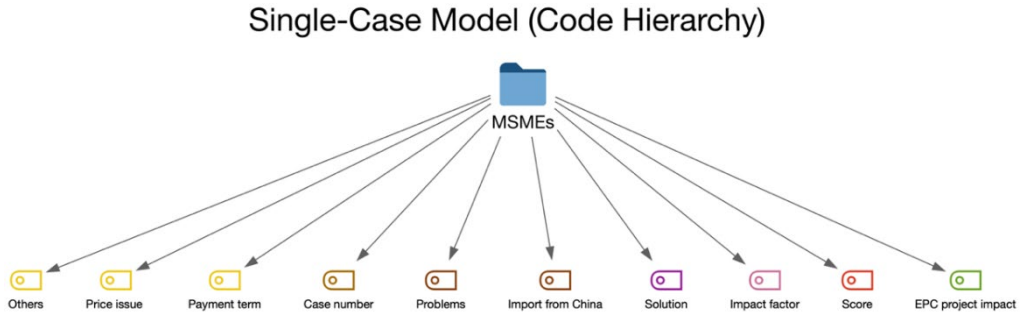

Figure 5

MSMEs-Single-Case Model (Code Hierarchy)

Codes display by 5 levels of subcodes, and 10 most frequent codes and coded segments display maximum by 5 segments. Aggregate frequencies for parent codes.

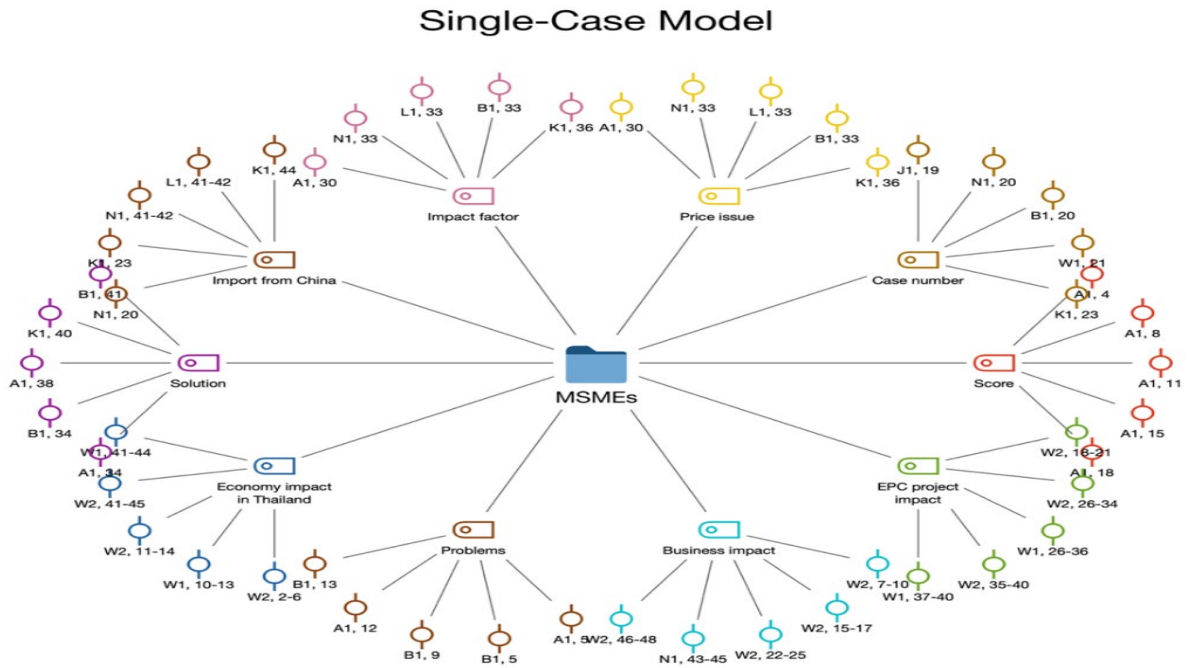

Figure 6

MSMEs - Single-Case Model (Code Segments)

Code display arranged by 10 most frequent codes and coded segments display maximum by 5 segments.

6. Declaration of Competing Interest

The authors declare that they have no competing financial interests or personal relations hips that could appeared to influence the work reported in this paper.

7. Data Availability

No data was used for the research describe in this article.

8. Appendix

Appendix A described overall of codes by MAXDQA
Appendix B interview data export listed all codes of figure 5

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Exploring the Enabling Mechanism and Implementation Path of Digital Economy on High-Quality Development in Tourism: A Case Study of Shanghai Disney Resort

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Abstract

With the in-depth development of the digital era, the close integration of the digital economy and tourism is leading the tourism industry into a new stage of development. This paper examines the theoretical framework and future development trends of the integration of digital economy development and tourism, and clarifies the complementary and synergistic relationship between them. Through intelligent service innovation, refined management optimization, and personalized experience enhancement, the digital economy has played a crucial role in promoting high-quality growth in tourism. With empirical case studies, this paper delves into the practical applications and effectiveness of digital technology in tourism, revealing how digitalization has made tourism destination promotion more precise and efficient, tourism services more convenient and speedy, and tourism experiences more diverse and enriching. At the same time, digital tourism has significantly improved the operational efficiency and management level of the tourism industry, laying a solid foundation for its sustainable development. Nevertheless, the development of the digital economy also brings many challenges and risks. To this end, this paper proposes a series of targeted strategic suggestions, including improving digital infrastructure in the tourism industry, enhancing the digital skills of practitioners, and strengthening data security and privacy protection, to ensure the steady progress of the tourism industry. In the future, with the further penetration of the digital economy, it is expected to continue driving the tourism industry towards higher levels of sustainable development. Therefore, paying attention to and addressing the challenges and risks brought by the digital economy, strengthening regulation and standardization, is crucial to ensuring that the digital economy plays a positive role in promoting the development of the tourism industry.

Keywords: Digital Economy；Digital Tourism；High-quality Development

1. Introduction

Currently, the digital economy has become a core driving force propelling the global economy forward. As an important component of the national economy, the high-quality

development of the tourism industry plays a crucial role in promoting overall economic growth and enhancing the quality of life for the public. The rapid progress of technological innovation and the continuous surge of the digital wave have gradually made the combination of the digital economy and the tourism industry a core driving force to promote the transformation, upgrading, and high-quality development of the tourism industry. This study aims to explore in depth how the digital economy can provide motivation and possibilities for the high-quality development of the tourism industry, analyze its internal mechanisms and pathways, and propose relevant strategic suggestions, hoping to provide a strong reference for the sustainable development of China's tourism industry.

The digital economy is fundamentally transforming the traditional business forms and models of the tourism industry, utilizing its unique advantages. Through the application of innovative technologies such as cloud technology, big data, and the Internet of Things (IoT), the digital economy can provide more efficient, convenient, and personalized service experiences to the tourism industry. Driven by the digital economy, the tourism industry can not only achieve precise marketing and intelligent services but also promote product innovation and improve service quality to meet the increasingly diversified and personalized needs of consumers.

Moreover, the digital economy has also opened up new opportunities for the high-quality development of the tourism industry. With the utilization of big data technology, the tourism industry can capture market dynamics more accurately and gain a deeper understanding of consumer demands and preferences, thus providing strong support for product development and market promotion. The digital economy has also given birth to emerging formats such as smart tourism and online tourism, injecting new vitality into the development of the tourism industry.

However, there are challenges in the process of the digital economy promoting the tourism industry towards high-quality development. The integration of the digital economy and the tourism industry still faces many challenges such as data security, privacy protection, and non-uniform technological standards. These challenges not only affect the effectiveness of the digital economy in the tourism industry but also limit the innovation and development quality of the tourism industry.

In light of this, this article will conduct an in-depth analysis from both theoretical and practical dimensions, exploring the mechanisms and paths of the digital economy empowering the high-quality development of the tourism industry. Firstly, establish the theoretical foundation and development trend of the combination of the digital economy and the tourism industry through literature review and theoretical elaboration. Secondly, explore the specific applications and effects of the digital economy in the tourism industry through empirical cases, summarizing effective practices and experiences. Thirdly, propose corresponding countermeasures and suggestions for existing problems and challenges, supporting the high-quality development of the tourism industry.

Overall, the combination of the digital economy and the tourism industry is a complex but important process, requiring the participation and effort of the government, enterprises, and all

sectors of society. Through strengthened collaboration and exchange, promotion of technological innovation and industrial upgrading, we have reason to believe that the digital economy will inject more vitality and momentum into the high-quality development of the tourism industry, pushing the tourism industry towards a more prosperous and sustainable development. At the same time, we should also pay attention to the risks and challenges that the digital economy may bring to the development of the tourism industry, formulate corresponding policies and measures, strengthen supervision and regulation, and ensure that the digital economy can protect tourist rights and safety while promoting the high-quality development of the tourism industry.

Looking ahead, the digital economy will continue to lead the development and innovation of the tourism industry. The continuous progress of technology and the expansion of application scenarios will undoubtedly make the digital economy play a more critical role in the tourism industry. We hope that in the future of deep integration of the digital economy and the tourism industry, more new business forms, models, and services will emerge, injecting newer and stronger vitality into the high-quality development of the tourism industry. Meanwhile, we also need to enhance international exchanges and cooperation, learn from advanced international experience and technology, and push China's tourism industry to higher levels of development on the global stage.

2. Literature Review

2.1 Theoretical Support for the Integration of Digital Economy and Tourism

With the rapid advancement of information technology and widespread coverage of the internet, the digital economy has emerged as a new engine driving global economic growth. As an important pillar of the service economy, the tourism industry is increasingly influenced by the digital economy. This section aims to analyze the theoretical foundation of the integration of the digital economy and tourism and reveal its positive role in promoting high-quality development of the tourism industry.

The digital economy has produced far-reaching and extensive impacts on traditional industries, including tourism, by significantly improving information efficiency, reducing transaction costs, and optimizing resource allocation (Zhao, 2023; Yang, 2022). As a diverse and comprehensive industry, the integration of tourism with the digital economy not only expands its development space but also provides a theoretical foundation and practical guidance for its high-quality development (Chen et al., 2023). The concept of electronic tourism further underscores the internet's crucial role in building a new tourism ecosystem, driving innovation in tourism business, and reforming management models.

Moreover, network economics, another key theory of the digital economy, advocates that network value increases with the growth of user numbers. This theory has immense market potential for the tourism industry. Online platforms can closely connect more tourism service providers with consumers, significantly improving service accessibility and convenience.

Tourism, empowered by the digital economy, also follows the principles of service science. As an interdisciplinary field, service science focuses on researching how to effectively provide services (Si, 2023). In the tourism sector, the application of service science is reflected in utilizing digital tools and methods to innovate service design, optimize customer experiences, and enhance service quality.

The digital economy has also spawned a series of innovative business and service models. For instance, the sharing economy (Jin, 2019) has demonstrated potential to disrupt traditional tourism models in areas such as accommodation (e.g., Airbnb) and transportation (e.g., Uber). These models emphasize leveraging digital platforms to achieve precise matching between resource providers and service demanders, thereby maximizing resource utilization and delivering personalized user experiences.

In recent years, the theoretical foundation for the integration of the digital economy and tourism has stemmed from the inherent demand for technological innovation and industrial upgrading. The digital economy has provided more efficient, convenient, and intelligent service methods to the tourism industry through the application of new technologies such as big data, cloud computing, the IoT, and artificial intelligence. These technologies have not only improved the quality and service level of tourism products but also optimized the allocation of tourism resources and enhanced the overall operational efficiency of the tourism industry. For instance, big data analysis has helped tourism enterprises gain insights into consumer needs, driving precision marketing and service innovation (Cui, 2023).

The theoretical foundation for the integration of the digital economy and tourism is also reflected in changes in market demand. As consumer income levels rise and consumption concepts shift, tourism demand is becoming increasingly personalized, diversified, and qualitative. The development of the digital economy aligns well with this trend, enhancing tourists' experiences and satisfaction by providing customized tourism products and services.

Furthermore, the support of industrial policies has created favorable conditions for the integration of the digital economy and tourism. While promoting the development of the digital economy, the government has issued a series of policies and measures to drive the digital transformation of the tourism industry. These policies have not only provided financial support and technical guidance to tourism enterprises but also created a favorable external environment for their integrated development (Li, 2023).

At the practical level, the integration of the digital economy and tourism has achieved remarkable results. For instance, the establishment of smart tourism platforms enables tourism destinations to monitor visitor flows in real-time, plan tourism resources rationally, and enhance management levels. Simultaneously, mobile internet-based tourism applications provide convenient services such as information inquiries, online bookings, and navigation to tourists, enhancing their travel experiences (Wang, 2022).

However, the integration of digital economy and tourism industry also faces some challenges and issues. Data security and privacy protection are important issues among them, which require strengthening technological research and development as well as the establishment of laws and regulations to address. Additionally, tourism enterprises may encounter bottlenecks in technology and talent during the process of digital transformation, necessitating increased investment and training efforts to enhance their digital capabilities (Chen et al., 2019).

In summary, the theoretical foundation for the integration of digital economy and tourism industry is solid and has important practical significance. In the future, with the continuous development of digital technologies and the continuous expansion of application scenarios, the integration of the two will become more in-depth and extensive. Therefore, it is necessary to further strengthen theoretical research and practical exploration to fully leverage the role of digital economy in promoting high-quality development of the tourism industry.

These literatures analyze the theoretical foundation and practical path of the integration of digital economy and tourism industry from multiple perspectives such as technological

innovation, market demand, and industrial policies, which are of great significance for understanding the inherent logic of the integration and promoting high-quality development of the tourism industry. Through in-depth research on the achievements of these literatures, it can provide strong theoretical support and practical guidance for the deep integration of digital economy and tourism industry.

2.2 Mechanism Analysis of the Digital Economy Empowering High-Quality Development in the Tourism Industry

As a core element of the modern economic structure, the digital economy has brought sweeping changes to the traditional tourism industry with its powerful permeability and innovative spirit. With the rapid development of new-generation information technologies such as cloud computing, big data, and the IoT, the role of the digital economy in promoting high-quality growth of the tourism industry has become increasingly prominent.

Firstly, the digital economy significantly enhances the operational efficiency of the tourism industry by improving resource allocation efficiency. Under the traditional tourism operation model, resource allocation is often constrained by multiple factors such as information asymmetry and market fragmentation, resulting in inefficient resource utilization. However, the digital economy has achieved digitalization, networking, and intelligent management of tourism resources by creating open and shared information platforms, effectively breaking information barriers and promoting optimal resource allocation. Furthermore, with the help of big data analysis, the tourism industry can more accurately grasp market dynamics, carry out targeted product and service innovations, and improve market response speed and operational efficiency.

Secondly, the digital economy injects powerful vitality into the innovative development of the tourism industry. Innovation is a key engine driving high-quality growth in tourism, and the digital economy provides rich technological support and diverse application scenarios for innovation. For example, technologies such as virtual reality and augmented reality enable the tourism industry to create immersive travel experiences, allowing tourists to experience the local customs and cultures of different regions in a virtual space. Additionally, applications such as intelligent tour guides and intelligent payment enhance the intelligence level of tourism services, improving tourist satisfaction and loyalty. Moreover, the digital economy has also promoted the deep integration of the tourism industry with other industries, spawning new business forms such as cultural tourism, sports tourism, and agricultural tourism, further expanding the development space of the tourism industry.

Thirdly, the digital economy helps to enhance the international competitiveness of the tourism industry. In the context of globalization, the tourism industry faces increasingly fierce international competition. The digital economy promotes the international development of tourism by enhancing its information and networking levels. On the one hand, the digital economy enables tourism enterprises to access the global market and resources more conveniently, explore overseas markets, and attract international tourists. On the other hand, it also facilitates international exchanges and cooperation in tourism, enhancing its international influence and competitiveness (Zhang, 2022).

Finally, while promoting high-quality growth in tourism, the digital economy also actively implements the concept of sustainable development. By applying green technologies and promoting low-carbon tourism, the digital economy helps to reduce the environmental impact of tourism and achieve coordinated economic, social, and environmental development. Additionally, it promotes the protection and inheritance of cultural heritage and natural

landscapes in tourism, providing a solid guarantee for sustainable development in the industry.

In summary, the digital economy provides powerful support for the high-quality growth of the tourism industry through multiple mechanisms such as optimizing resource allocation, promoting innovative development, enhancing international competitiveness, and implementing sustainable development concepts. Looking ahead, with the continuous advancement of digital technologies and the expansion of application scenarios, the digital economy will play a more crucial role in the development of the tourism industry, driving it towards more comprehensive, coordinated, and sustainable development.

2.3 Research on the Pathways of Digital Economy Empowering High-Quality Development in Tourism

With the rapid development of information technology, the digital economy has become a n important force driving global economic growth. As one of the industries closely integrated with the digital economy, the high-quality development of the tourism industry cannot be sepa rated from the deep integration and application of digital technology. This section aims to exp lore how the digital economy enables the high-quality development of the tourism industry th rough specific paths, providing innovative development ideas and practical guidance for the t ourism industry.

Firstly, the technology-driven path is the core of the digital economy's empowerment of to urism development. New-generation information technologies such as cloud computing, big d ata, artificial intelligence, and the IoT provide brand-new technical support for the tourism ind ustry. Through the application of these technologies, precise management of tourism resource s, deep analysis of tourist behavior, and personalized customization of tourism services can be achieved. For example, the use of big data analytics technology can deeply explore tourists' c onsumption behaviors and preferences, providing scientific evidence for the design and marke ting of tourism products (Obaidat, 2024).

Secondly, the industrial integration path is an important direction for the digital economy t o empower tourism development. The digital economy has promoted the deep integration of t ourism with other industries, forming new tourism formats and business models. For instance, the integration of tourism and the cultural industry can enrich the connotation and extension of tourism products, enhancing the cultural added value of the tourism industry. The integratio n of tourism and agriculture can promote the development of rural tourism and support the im plementation of the rural revitalization strategy.

Thirdly, the market innovation path is crucial to the digital economy's empowerment of to urism development. The digital economy has broken the boundaries of the traditional tourism market, promoting the diversified and differentiated development of the tourism market. By u tilizing digital economy platforms, tourism enterprises can expand overseas markets, attract in ternational tourists, enhance brand image and popularity, and thus enhance their competitiven ess in the international market (Fan, 2024).

Lastly, the institutional safeguard path is the foundation for the digital economy to enable tourism development. The government should strengthen the regulatory application of the dig ital economy in tourism, formulate relevant policies and standards, and ensure data security a nd user privacy. At the same time, it should encourage and support tourism enterprises in tech nological and business model innovation, creating a favorable environment for the high-qualit y development of the tourism industry.

In summary, the digital economy enables the high-quality development of the tourism ind ustry through four paths: technology-driven, industrial integration, market innovation, and ins

titutional safeguards. These four paths are interwoven and mutually reinforcing, jointly promo ting innovative development and transformation and upgrading of the tourism industry. In the future, with the further development and deepened application of the digital economy, it is bel ieved that the tourism industry will usher in broader development space and more promising prospects.

3. Case Analysis of Digital Economy Enabling High-Quality Development in the Tourism Industry

With the rapid development of the digital economy, the construction of smart tourism des tinations has become a crucial pathway for promoting high-quality development in the touris m industry. This case analysis delves into the construction process of a particular smart touris m destination, exploring the specific applications and achievements of the digital economy in driving high-quality development in tourism.

Shanghai Disneyland, as an exemplary smart tourism destination, has leveraged cutting-e dge information technologies such as big data, cloud computing, and the Internet of Things to achieve comprehensive digital management and intelligent services for tourism resources (as illustrated by the App functions in Figures 1 and 2). Here are some key measures implemente d:

(1) Digital Ticketing and Reservation System: Disneyland has introduced a digital ticket ing and reservation system through its official mobile app. Visitors can purchase tickets and re serve their rides and attractions through the app, significantly reducing waiting times and enh ancing operational efficiency.

(2) Smart Guidance System: The Disneyland app integrates mapping and location-based functionalities, assisting visitors in quickly locating themselves and their destinations. Additi onally, AI-based recommendation algorithms provide personalized itineraries based on visitor s' interests.

(3) Virtual Reality (VR) and Augmented Reality (AR) Experiences: Within specific area s and attractions, Disneyland integrates virtual reality technology to provide visitors with imm ersive experiences. Guests can use VR or AR devices to view associated movies or animated s cenes, thereby enhancing the interactivity and enjoyment of their visit.

(4) Intelligent Security Surveillance: To ensure visitor safety, Disneyland deploys numer ous intelligent cameras and sensors throughout the park for real-time monitoring of crowds an d equipment status. This data is transmitted to a central control room, enabling staff to adjust crowd flow or respond to emergencies based on real-time information.

(5) Environmental Monitoring and Energy Conservation: Disneyland utilizes a smart en vironmental protection system that monitors air quality, temperature, and other environmental factors through sensors. Based on these readings, the system automatically adjusts air conditi oning and lighting systems, providing a comfortable environment for visitors while optimizin g energy usage.

(6) Mobile Payments and Consumption Tracking: Disneyland supports various mobile p ayment methods such as Apple Pay and WeChat Pay. Visitors' purchases within the park are a utomatically recorded in the app, facilitating easy access and management of consumption rec ords.

Disney App Homepage

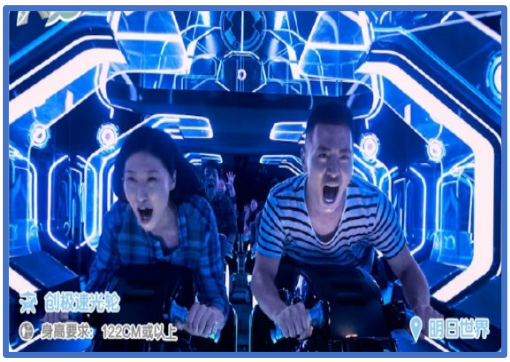
Booking System

Product Recommendations through Data Analytics

Figure 1

Disney App Homepage, Booking System, and Product Recommendation through Data Analytics

Online Map



AR Scene

Figure 2

Disney Online Map Tours and AR Scene

The smart upgrade of Shanghai Disneyland not only enhances visitor experience but also improves operational efficiency and management standards. It serves as a typical example of how the digital economy enables high-quality development in tourism. By leveraging new-generation information technologies such as big data, cloud computing, and IoT, this smart tourism destination achieves comprehensive digital management and intelligent services for tourism resources.

In terms of resource management, the destination has established a digital resource management platform that comprehensively inventories and digitally models the park's resources, facilities, and equipment. This allows management to have real-time insights into the status an

d usage of resources, enabling more precise resource allocation and optimization.

For service enhancements, the smart tourism destination utilizes big data analysis to delve into visitors' consumption needs and behavioral patterns, providing more personalized travel services. Additionally, the use of IoT technology enables real-time monitoring and early warning systems to ensure visitors' safety and comfortable experiences.

In marketing, the integration of online and offline channels has broadened the destination's marketing reach and effectiveness. Leveraging social media, travel apps, and other online platforms, the park disseminates tourism information and promotes its offerings, attracting more potential visitors.

The construction of this smart tourism destination has achieved remarkable results. Firstly, in terms of resource management, the digital management platform has improved resource utilization efficiency and reduced operational costs. Secondly, service enhancements have enhanced visitor satisfaction and loyalty, bolstering the park's reputation and influence. Finally, in marketing, the integration of online and offline channels has broadened marketing channels, improving marketing effectiveness and generating more visitor traffic and revenue for the destination.

In summary, the digital economy provides robust support for high-quality development in tourism through the construction of smart tourism destinations. By incorporating new-generation information technologies, these destinations achieve digital management and intelligent services for resources, enhancing visitor experiences and market competitiveness. As digital technologies continue to innovate and expand their application scenarios, smart tourism destinations will play an increasingly crucial role in driving high-quality development in the tourism industry.

4. Challenges and Countermeasures for High-Quality Development of the Tourism Industry Empowered by the Digital Economy

4.1 Main Challenges Faced

The digital economy, while driving the high-quality development of the tourism industry, also faces numerous challenges. These challenges primarily stem from technology, market, policy, and other aspects.

Firstly, technological challenges are an important issue faced in empowering the tourism industry with the digital economy. Although digital technologies have brought significant changes to the tourism sector, their rapid development has also resulted in pressure to update and upgrade technologies. Tourism enterprises need to continuously update and enhance their technological infrastructure to meet new market demands and technological standards. However, for many small and medium-sized enterprises (SMEs), the lack of sufficient technological investment and talent support places them in a difficult position during the digital transformation process.

Secondly, market challenges cannot be overlooked. With the deep development of the digital economy, competition in the tourism market is becoming increasingly fierce. Tourism enterprises must continually innovate their products and services to satisfy the increasingly diverse needs of consumers. However, in the intense market competition, many enterprises struggle to find a niche for differentiated competition, leading to severe homogeneity in products and services and a lack of core competitiveness.

Additionally, policy challenges are one of the factors restricting the high-quality development of the tourism industry empowered by the digital economy. Although the government has issued a series of policies and measures to support the development of the tourism industry, the legal framework and policy system in the digital economy domain are still not comprehensive. For instance, issues related to data security and privacy protection are becoming increasingly prominent, necessitating stronger regulation and standardization by the government. At the same time, for tourism enterprises, how to compliantly utilize big data and other digital technologies for precise marketing and service innovation is an urgent issue that needs to be addressed.

4.2 Countermeasures and Recommendations

In response to the main challenges faced by the tourism industry empowered by the digital economy, here are some countermeasures and recommendations:

First and foremost, strengthen technology research and development and talent cultivation. Tourism enterprises should increase their investment in digital technology R&D, enhance cooperation with universities, research institutions, etc., to promote technological innovation and technology commercialization. At the same time, intensify efforts in talent training and recruitment to improve the digital literacy and skill levels of tourism practitioners.

Secondly, drive product innovation and service upgrades. Tourism enterprises should deeply explore market demands, utilize digital technologies to create differentiated and personalized tourism products. Meanwhile, enhance service quality by optimizing tourism service processes through digital means to improve service efficiency and customer satisfaction.

Additionally, reinforce policy guidance and regulation. The government should introduce more comprehensive policies related to the digital economy, providing clearer guidance and support for tourism enterprises. At the same time, strengthen the regulation and standardization of the digital economy, ensuring data security and privacy rights, and providing a strong guarantee for the healthy development of the tourism industry.

Lastly, enhance industry collaboration and resource integration. Tourism enterprises should strengthen cooperation and resource integration with upstream and downstream industries to form a synergistic development pattern within the industrial chain. Simultaneously, actively participate in international tourism cooperation and exchanges, draw on advanced experiences and technologies, and promote the high-quality development of the tourism industry.

In summary, while the digital economy empowering the high-quality development of the tourism industry faces challenges, it is also filled with opportunities. By reinforcing technology research and development, driving product innovation, strengthening policy guidance and regulation, as well as enhancing industry collaboration and resource integration, we can effectively confront challenges and seize opportunities, propelling the tourism industry towards high-quality development.

5. Conclusion and Future Prospects

5.1 Research Conclusion

This study delves into how the digital economy empowers high-quality development in the to urism industry, revealing its internal mechanisms, application pathways, and faced challenges along with countermeasures. Through a detailed analysis of smart tourism attraction construc tion cases, we further clarified the significant role of the digital economy in promoting the tra

nsformation and upgrading of the tourism industry.

Firstly, the study indicates that through technological innovation and application, the digital economy provides the tourism industry with more efficient and precise means of resource allocation, facilitating the optimization and rational use of tourism resources. Secondly, the digital economy serves as an endless source of energy for innovative development within the tourism industry, driving the continual emergence of new products, business formats, and models. Simultaneously, the digital economy enhances tourists' experience and satisfaction by improving the level of intelligence and personalization of tourism services.

However, the research also points out that the process of enabling high-quality development in the tourism industry with the digital economy still faces many challenges. The rapid technological upgrades, fierce market competition, and imperfect policies and regulations all limit the deep application and development of the digital economy. To this end, this study proposes a series of countermeasures and suggestions, including strengthening technology R&D and talent cultivation, promoting product innovation and service upgrades, enhancing policy guidance and regulation, and reinforcing industry collaboration and resource integration.

In conclusion, the digital economy has significant advantages and huge potential in promoting high-quality development in the tourism industry. By overcoming challenges and adopting effective measures, we can further leverage the role of the digital economy to achieve more comprehensive, coordinated, and sustainable development in the tourism industry.

5.2 Research Limitations and Future Prospects

Though this study has offered some theoretical and practical insights into how the digital economy empowers high-quality development in tourism, there are still limitations and deficiencies.

First, this study primarily focuses on theoretical analysis and case studies, lacking a quantitative assessment of the application effects of the digital economy in the tourism industry. Future research could further explore how to construct a scientific and reasonable evaluation system to conduct a quantitative analysis and assessment of the practical effects of the digital economy in tourism.

Secondly, there may be certain limitations in case selection for this study. While an exemplary case was analyzed, it might not cover all types of tourism enterprises and regions. Future research could expand the scope of cases to include a wider variety of tourism businesses and areas, reflecting a more comprehensive view of the application of the digital economy in tourism.

Furthermore, with the continuous development of digital technologies and expanding application scenarios, the application of the digital economy in tourism will also face new opportunities and challenges. Future research could focus on the application prospects and potential issues of new technologies and models in tourism, providing more forward-looking guidance and suggestions for high-quality development in the industry.

In summary, the research on how the digital economy empowers high-quality development in tourism still has broad exploration space. Future research could deepen the understanding and recognition of the application of the digital economy in tourism, offering more robust theoretical support and practical guidance for innovative development in the industry.

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Intelligent Manufacturing Leads the Green Trend: An Empirical Exploration of Manufacturing Companies Listed on China's Shanghai and Shenzhen A-Share Markets

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Abstract

In the transformative era of industry driven by intelligent manufacturing, its capacity to shape corporate environmental responsibility stands as a critical concern. This study draws upon a decade of data from manufacturing firms listed on China's Shanghai and Shenzhen A-share markets, encompassing the years 2010 to 2022. Employing a two-way fixed-effects model, an empirical examination is conducted to assess the influence of intelligent manufacturing on investments in corporate environmental governance. The results reveal a significant and positive impact of intelligent manufacturing on the enhancement of corporate environmental governance investment, with the key driver being the increased investment in technological innovation by corporations. To substantiate the robustness of these findings, a series of rigorous checks were applied, encompassing two-stage least squares (2SLS) estimation, propensity score matching (PSM), the lagging of independent variables, and the system generalized method of moments (System GMM). Even amidst these exacting evaluations, the conclusions of the study have proven to be consistently robust. The implications of this research are dual-fold: it offers empirical evidence to guide corporate strategies in the domain of intelligent manufacturing and provides policymakers with a theoretical framework to advocate for industry greening and the formulation of sustainable environmental policies. This study, therefore, contributes to both the corporate strategy discourse and the policy-making arena by providing insights grounded in evidence of the pivotal role intelligent manufacturing plays in advancing environmental stewardship.

Keywords: Intelligent Manufacturing; Corporate Environmental Investment; Technological Innovation

1. Introduction

In the crucible of the 21st-century industrial revolution, intelligent manufacturing has emerged as a key driver, redirecting the course of the global manufacturing sector. Embracing the core tenets of digitalization, networking, and intelligence, these technologies are setting the stage for the industry's future, as insightfully discussed by Zhong et al. (2017), Zhou et al. (2018), and Nakandala et al. (2023). The rise of intelligent manufacturing is not just a technological milestone; it is the new battleground in the arena of international technological competition, with far-reaching effects on a nation's industrial edge and the engine for robust economic progress, as underscored by Zhong et al. (2017) and Zhou et al. (2018). Intelligent manufacturing, akin to a master artisan, is sculpting a manufacturing landscape that is smarter

and more eco-conscious, steering production towards greater efficiency, precision, and innovation, resonating with the views of Evans and Annunziata (2012) and Zhou et al. (2018).

Yet, the luminescence of intelligent manufacturing casts a long shadow that reflects the environmental challenges our planet faces, as noted by Lodeiro et al. (2021). The industry's swift ascent has come at the cost of resource exhaustion and environmental decay, as documented by Osei Opoku and Aluko (2021), Aluko et al. (2021), and Li et al. (2019). The billowing smoke from factory chimneys, the fumes from vehicle exhausts, and the outflow of industrial wastewater—all serve as stark reminders of the seemingly irreconcilable conflict between industrial development and environmental preservation. This tension poses a critical question: Can intelligent manufacturing serve as a novel solution to environmental issues? Does it hold the key to enhancing economic efficiency while fulfilling environmental responsibilities? The answers are vital for corporate longevity and have profound implications for societal welfare and our planet's sustainability.

Despite the vast potential of intelligent manufacturing, scholarly work on its environmental implications is sparse. Studies have concentrated on its macroeconomic implications for economic growth, as discussed by Li (2018), and its role in industrial upgrading, as examined by Zou and Xiong (2022). There is also a micro-level focus on corporate innovation capabilities, as explored by Ying et al. (2022), Yang et al. (2020), and Lyu et al. (2023), as well as labor productivity, and operational efficiency, as studied by Zhu et al. (2024), Yang et al. (2020), Ying et al. (2022), Lu et al. (2023), and Xi et al. (2024). However, the specific influence of intelligent manufacturing on environmental governance, especially its impact on corporate environmental governance investment, has yet to be clearly illuminated by current research.

This study aims to fill this scholarly gap by examining the influence of intelligent manufacturing on corporate environmental governance investment. We propose an intrinsic connection between intelligent manufacturing and environmental governance. From a theoretical standpoint, intelligent manufacturing can offer innovative solutions to corporate environmental governance by increasing production efficiency, optimizing resource allocation, and minimizing energy use, as suggested by Zheng et al. (2018) and Zhou et al. (2018). Furthermore, intelligent manufacturing can enhance a company's ability to identify, manage environmental risks, and improve the effectiveness of environmental governance through real-time monitoring and data analytics, as indicated by Cui et al. (2020).

Our research contributes in several significant ways. Firstly, it expands on the environmental governance impacts of intelligent manufacturing technology, presenting a fresh perspective on its potential to catalyze corporate green initiatives. Secondly, by analyzing the motivational factors for environmental governance from a strategic corporate standpoint, the study uncovers how intelligent manufacturing can encourage companies to adopt proactive environmental governance measures through improved resource efficiency and technological innovation. Additionally, the research delves into the specific mechanisms by which intelligent manufacturing influences corporate environmental performance, offering empirical support for the integration of environmental responsibility in the manufacturing industry.

The structure of the paper is as follows: the second section provides a literature review to establish a theoretical foundation; the third section postulates research hypotheses; the fourth section explains the methodology; the fifth section conducts the empirical analysis; and the sixth section concludes with a discussion of the findings and the extraction of practical implications.

2. Literature Review

2.1 Conceptualization of Intelligent Manufacturing

In the realm of industrial evolution, the advent of intelligent manufacturing, first conceptualized by American scholars Wright and Bourne, has marked a significant paradigm shift. In their foundational work "Intelligent Manufacturing," it was initially described as the employment of knowledge engineering, manufacturing software systems, and robotic vision to empower intelligent robots to undertake small-batch production autonomously. As the tide of digital and intelligent technology continues to surge, intelligent manufacturing has evolved beyond automation and unstaffed production. It has integrated production and consumption mechanisms, propelling a transition from mass production to customized production, thereby enhancing production efficiency and optimizing resource allocation. Pioneering studies predominantly concentrated on the architecture and implementation strategies of intelligent manufacturing systems. Zhou et al. (2018) emphasize that these systems should encompass cloud systems and the industrial internet to facilitate the operation of their functional components. Li et al. (2019) dissect the intelligent manufacturing system from a technology-enabled process perspective, delineating it into a technological integration framework comprising the resource layer, network layer, platform layer, and application layer. The implementation trajectory of intelligent manufacturing is driven by the propelling roles of intelligent technologies such as the Internet of Things (IoT) (Tao et al., 2014), artificial intelligence (AI) (Karabegovic et al., 2018), and big data (Zhong et al., 2017), along with the synergistic effects of these technologies in actualizing intelligent manufacturing functions. Giret et al. (2016) devised an engineering framework that converges multiple technologies to aid developers in managing and operating service-oriented intelligent manufacturing systems.

Despite the absence of a one-size-fits-all definition of intelligent manufacturing, the United States' National Institute of Standards and Technology posits it as an intelligent, integrated, collaborative system that empowers companies to fully engage in production collaboration and meet production demands in real time (Kusiak, 2018). The manufacturing execution systems within intelligent manufacturing are capable of automatically harvesting data from equipment sensors, offering real-time information to bolster enterprise resource planning. This supports managers in making informed decisions grounded in a comprehensive and precise status of the production system, achieving efficient integrated collaboration (Frank et al., 2019; Tao et al., 2018). Zhou et al. (2018) contend that intelligent manufacturing is a dynamically evolving system, distinguishable into phases such as digital manufacturing, digital networked manufacturing, and the new generation of intelligent manufacturing. The latter represents a profound integration of artificial intelligence technology with advanced manufacturing technology. The evolution from the nascent stages of computer-aided manufacturing, through the digitization, networking, and intellectualization of manufacturing processes, to the Japanese government's "New Robotics Strategy," mirrors the transformative impact of information technology on manufacturing. Artificial intelligence, as the vanguard of the new generation of information technology, converges with advanced manufacturing

technology to form the core technology underpinning the new industrial revolution. This article, referencing the "Intelligent Manufacturing Development Plan (2016–2020)," encapsulates intelligent manufacturing as "a novel production paradigm founded on the deep integration of new-generation information and communication technology with advanced manufacturing technology. This encompasses all facets of manufacturing activities, including design, production, management, and services, endowed with capabilities for self-perception, self-learning, self-decision-making, self-execution, and self-adaptation" (Zhong et al., 2017; Li, 2018)..

2.2 Measurement of Intelligent Manufacturing Indicators

In the realm of quantifying intelligent manufacturing, a variety of approaches have been posited by academicians, with three prevalent methods highlighted below. Firstly, the installation density or penetration rate of industrial robots serves as a surrogate metric to gauge the levels of automation, digitalization, and intelligence inherent in the "Second Machine Revolution" (Li et al., 2024). This metric is a tangible reflection of the integration and pervasiveness of advanced technologies within the manufacturing sector. Secondly, the implementation of intelligent manufacturing by enterprises is often operationalized as a binary variable, drawing on the pilot demonstration projects publicized by the Ministry of Industry and Information Technology. This dummy variable delineates between firms that have embraced intelligent manufacturing initiatives and those that have yet to do so (Jiang et al., 2019; Zhu et al., 2024; Wei et al., 2024), offering a clear-cut distinction for comparative analysis. Lastly, the innovative application of text mining techniques has emerged as a valuable tool for crafting indicators of intelligent manufacturing. By analyzing keyword frequency, these methods encapsulate the critical technological dimensions across the value chain, such as artificial intelligence, the Internet, big data, and intelligent manufacturing, which refers to the integration of advanced information technology with manufacturing processes to achieve greater automation, data-driven decision-making, and intelligent optimization (Lu et al., 2023; Ying et al., 2022; Zhuo and Chen, 2023). This approach provides a nuanced understanding of the multifaceted nature of intelligent manufacturing, capturing the essence of technological advancements within the industry.

2.3 Intelligent Manufacturing and Environmental Governance

Intelligent manufacturing, the linchpin of Industry 4.0, serves as a dual catalyst, propelling not only the enhancement of production efficiency but also forging new pathways for corporate green transformation, as discussed by Zhou et al. (2018). The nexus between intelligent manufacturing and the greening of corporate production and development has been a focal point of extensive scholarly inquiry and debate, particularly in the context of industrial robots, as noted by Chen et al. (2024) and Zhang et al. (2022). Industrial robots, the cornerstone of intelligent manufacturing, are increasingly emerging as a pivotal driver of green production and governance. Through automation and precision control, these robots significantly curtail energy consumption and waste generation within the production process, thereby effectively fostering resource conservation and environmental protection, as articulated by Liu (2023). The extant research suggests that industrial robots, while elevating production efficiency, also bolster corporate green innovation. This is achieved by refining product design and manufacturing processes, which in turn mitigates their adverse environmental footprint, echoing the findings of Kumar and Rodrigues (2020). As Industry 4.0 progresses, the

convergence of industrial robots with technologies such as the Internet of Things and big data analysis is set to further augment corporate capabilities in environmental monitoring and management. This integration is on track to realize more intelligent and sustainable production paradigms, as posited by Lee et al. (2015).

However, despite the existing discourse on the relationship between intelligent manufacturing and green production, there remains a relative dearth of research exploring the interplay between intelligent manufacturing and corporate environmental governance. Within the current academic landscape, Wei et al. (2024), in their research, propose that intelligent manufacturing not only streamlines production processes but also markedly ameliorates corporate environmental performance. This assertion underscores the need for further investigation into how intelligent manufacturing can be leveraged to enhance environmental governance practices within corporations.

3. Research Hypotheses and Conceptual Framework

3.1 Intelligent Manufacturing and Corporate Environmental Governance

Intelligent manufacturing, a convergence of digital technology and industrial processes, stands at the vanguard of technological progress, offering novel perspectives and tools for the realm of corporate environmental governance. From the resource-based view articulated by Barney (1991), a firm's competitive edge is derived from its unique bundle of resources and capabilities. Intelligent manufacturing, as a strategic resource, engenders a dual benefit for enterprises—enhancing environmental sustainability and economic viability by increasing resource efficiency and curtailing production costs. In tandem, transaction cost theory, as posited by Coase (1937), implies that firms can mitigate transaction costs through the internalization of transactions. Intelligent manufacturing streamlines production processes and bolsters information processing, thus reducing the costs associated with resource allocation and market transactions.

The influence of intelligent manufacturing on corporate environmental governance is channeled through a suite of internal mechanisms. Initially, by refining production processes and boosting machine efficiency, it diminishes the reliance on tangible production factors, thereby lowering labor and energy costs (Brynjolfsson & Hitt, 2000; Zhou et al., 2018). This heightened efficiency precipitates greater labor output and fortifies green total factor productivity (Kumar & Rodrigues, 2020), which is instrumental in resource conservation and environmental safeguarding. Subsequently, intelligent manufacturing harnesses data analytics and optimization algorithms, markedly improving information processing capabilities (Zhong et al., 2017; Sarbu, 2022). This empowerment enables firms to assess production capacity more precisely, forecast market demand more reliably, and achieve intelligent scheduling along with the optimal allocation of resources, thereby curtailing resource wastage and environmental strain. Moreover, intelligent manufacturing amalgamates avant-garde technologies such as the Internet of Things, big data, and cloud computing, which are adept at real-time data collection and analysis during production (Sarbu, 2022). This technological synthesis not only underpins decision-making but also erects an early warning system, enabling enterprises to swiftly detect and tackle environmental concerns, thus mitigating environmental risks. Furthermore, intelligent manufacturing nurtures green innovation, spurring enterprises to innovate environmentally benign products and processes. Artificial intelligence technologies offer a simulation platform for green technological innovation, allowing firms to leverage intelligent devices and cloud computing platforms for research and development (Wang et al., 2024). By

scrutinizing historical data from trials and errors, enterprises can refine and optimize their future trajectories of green innovation. Against this backdrop, we proffer Research Hypothesis 1:

Hypothesis 1: Intelligent manufacturing exerts a positive influence on advancing corporate environmental governance.

3.2 Intelligent Manufacturing, Technological Innovation, and Corporate Environmental Governance

As a pivotal trend in modern industrial evolution, intelligent manufacturing wields both direct and indirect influences on bolstering the capacity for corporate environmental governance. The direct impact is evident in the deployment of intelligent manufacturing technologies, which streamline production processes, curtail energy usage, and enhance the efficiency of energy utilization, thus catalyzing conservation efforts and the reduction of emissions (Zheng et al., 2018; Zhou et al., 2018; Machado et al., 2020). The indirect impact, however, stems from the impetus it provides to technological innovation, fortifying the investment and engagement of corporations in environmental preservation practices. The theory of technological spillovers underpins this study with robust theoretical grounding (Jaffe et al., 1993; Keller, 2002). It sheds light on the phenomenon where novel technologies extend beyond their immediate fields of application, permeating into other sectors and regions, and invigorating widespread economic and societal gains. Within the intelligent manufacturing paradigm, the spillover of technology not only catalyzes internal innovation within firms but also forges a cross-industry green technology network. This network, forged through technological exchanges and collaborations among businesses in the supply chain, diminishes the costs associated with environmental governance and amplifies the collective impact of such efforts (Li et al., 2012). Furthermore, the integration of cutting-edge technologies such as artificial intelligence and intelligent control within intelligent manufacturing accelerates the acquisition of new knowledge and skills by enterprises through information technology (Brynjolfsson and Mitchell, 2017). This acceleration not only fosters green technological innovation and the manufacture of eco-friendly products but also propels companies towards sustainable development. The spillover effects of intelligent manufacturing technologies, facilitated by interconnected information platforms, enhance inter-enterprise information exchange, curtail the costs of information dissemination, and stimulate regional knowledge and technological innovation, thereby accelerating the pace of innovation. Against this analytical backdrop, we propose Research Hypothesis 2:

Hypothesis 2: Intelligent manufacturing acts as a catalyst for corporate environmental governance by elevating the capabilities for technological innovation.

4. Research Design

4.1 Sample Selection and Data Sources

In this research, we have chosen manufacturing firms listed on China's Shanghai and Shenzhen A-share markets, encompassing the period from 2010 to 2022. Following the initial compilation of our sample database, a rigorous series of filters were applied to ensure the precision and integrity of the data. Firstly, we excluded companies that received the Special Treatment (ST) designation or were suspended from trading (PT) at any point during the research timeframe, in accordance with the criteria established by Chen et al. (2020) and Xu et al. (2021). This exclusion was critical to maintain the financial health and trading continuity

of the sample cohort. Secondly, we eliminated samples with incomplete data for key variables, as these omissions would compromise the robustness of our analysis. Subsequently, we conducted a thorough review to exclude firms with financial indicators that deviated significantly from the norm, thus precluding any potential skewing of our analytical outcomes due to outlier values. Post these methodical refinements, our study culminated in a curated dataset comprising 20,277 firm-year observations. To bolster the reliability of our data even further, we applied a 1% winsorization treatment to all continuous variables. This statistical technique is instrumental in muting the influence of extreme values, thereby ensuring a more representative and accurate dataset. The primary sources of our data are the China Stock Market & Accounting Research (CSMAR), a reputable repository known for its comprehensive and reliable financial data, and the annual financial reports published by the listed companies themselves, which offer a trove of publicly disclosed information.

4.2 Sample Selection and Data Sources

4.2.1 Dependent Variable

In delineating the construct of Corporate Environmental Governance Investment, colloquially denoted as 'Green' investments, this study draws upon the analytical techniques established by Zhang et al. (2019) and Fu et al. (2024). Our methodology involves a meticulous manual collection and qualitative synthesis of data extracted from the annual reports of the listed enterprises under scrutiny. To particularize, the investigation encompasses a comprehensive review of the annual reports' construction work annex tables, where we meticulously identify and catalog the financial outlays earmarked for environmental governance and green production initiatives. This includes, but is not limited to, expenditures on desulfurization and denitrification processes, wastewater management, waste gas and slag treatment, and the promotion of clean production practices. These discrete investment items are then consolidated to form a composite figure, which serves as a holistic representation of the company's fiscal commitment to environmental stewardship. To normalize this figure and render it reflective of the company's relative investment intensity in environmental governance, we divide it by the company's year-end total assets.

4.2.1 Independent Variable

Intelligent Manufacturing (IM). In this study, we leverage the scholarly insights of Yu et a1. (2020), Lu et al. (2023), Ying et al. (2022), and Zhuo and Chen (2023), employing text mining techniques to develop a suite of indicators that quantify the sophistication of intelligent manufacturing. This quantification is achieved by scrutinizing the frequency distribution of pertinent keywords. The strategic selection of keywords is paramount for the precise measurement of intelligent manufacturing's developmental status. This paper's approach to keyword selection spans three dimensions: academic literature, policy documentation, and the annual reports of listed companies. As intelligent manufacturing represents an innovative production paradigm that amalgamates cutting-edge technologies such as big data, the Internet, and artificial intelligence, our keyword selection encompasses a spectrum of elements including artificial intelligence, Internet, big data, and manufacturing technologies within the value chain. In our review of academic literature, we draw upon the research conducted by Yu et al. (2020) to initially identify specific keywords associated with the aforementioned technologies. For policy documents and research reports, we augment our keyword repository with terms related to intelligent manufacturing technology, informed by strategic initiatives

such as "Made in China 2025," the "Intelligent Manufacturing Development Plan (2016-2020)," and recent "Government Work Reports." In analyzing the annual reports of listed companies, we undertook a multi-step process to expand our keyword lexicon. Initially, we utilized the Python programming language to scrape annual reports from the CNINFO website, focusing on the "Management Discussion and Analysis (MD&A)" sections. Subsequently, we extracted intelligence-related vocabulary from pertinent policy documents and authoritative texts, creating a bespoke dictionary that was integrated into the jieba word segmentation library to perform segmentation on the MD&A texts. Ultimately, employing the word2vec word bag model, we extracted related words from the segmented texts. This automated extraction was complemented by a manual review process to refine the selection of keywords that are intimately connected to artificial intelligence, Internet, big data, and manufacturing technologies within the value chain. The culmination of these efforts resulted in a refined keyword library that is intrinsically linked to intelligent manufacturing technology, the specifics of which are elaborated in Table 1.

Table 1

Compilation of Structured Feature Vocabulary for Intelligent Manufacturing

Index	Measuring dimensions	feature words
Intelligent manufacturing	Artificial Intelligence technology	Artificial Intelligence, Intelligent Manufacturing, Intelligent Manufacturing, Active Manufacturing, Intelligent Transformation, Business Intelligence, Image Understanding, Intelligent Data Analytics, Intelligent Robotics, Manufacturing Execution System, Intelligent Manufacturing, Machine Learning, Deep Learning, Integration, Unmanned, Human-Computer Interaction, Biometrics, Face Recognition, Intelligent Terminal, Voice Recognition
	Internet technology	Industrial Internet, Mobile Internet, E-commerce, Mobile Payment, Cloud Computing, Billion Level Concurrency, Internet of Things, Information Physical Systems, Cyber Physical Systems, EB Scale Storage, Cloud Manufacturing
	Big data technology	Big Data, data mining, data visualization, virtual reality, industrial digitization, data-driven, heterogeneous data, data twins, text mining, mixed reality
	Value Chain Intelligence Technology	Planning and Scheduling, Production Execution, Equipment Operation and Maintenance, Intelligent Warehousing, Intelligent Distribution, Network Collaboration, Intelligent Marketing, Intelligent Customer Service, Intelligent Home, Intelligent Wear, Intelligent Agriculture, Intelligent Medicine

Considering the differences in the length of the "Management Discussion and Analysis (MD&A)" section in the annual reports of various listed companies, we propose a method to quantify the level of intelligent manufacturing. This method includes the following three

steps: first, calculate the ratio of the frequency of selected keyword combinations to the total number of words for the sample companies; second, compare this ratio with the total ratio of other sample companies in the same industry and year; finally, multiply this ratio by 100 to reflect the level of intelligent manufacturing of the sample companies in percentage form. If the selected keywords do not appear in a company's annual report, the intelligent manufacturing level of the company for that year is assigned a value of 0.

4.2.3 Control Variables

In this research, we adhere to the academic convention by selecting fundamental information and financial data from manufacturing companies listed on the stock exchange. We have identified a comprehensive set of control variables that encapsulate various dimensions, including the nature of the enterprise, profitability, solvency, and corporate governance. To mitigate the potential bias that may arise from individual firm characteristics and temporal trends in the estimation results, we have incorporated both individual fixed effects (i.e., entity-specific dummy variables) and temporal fixed effects (i.e., year-specific dummy variables) into our model. This methodological approach is designed to isolate the effects of our variables of interest from confounding factors that are invariant across observations within the same entity or time period. By controlling for these individual and time-specific effects, we ensure a more precise estimation of the relationships under investigation, thereby enhancing the accuracy and reliability of our analytical outcomes.

Table 2

Variable Definition Table

Variable Type	Variable	Variable Symbol	Variable Definition
Explained Variable	Environmental Governance	Green	Environmental governance inputs
Explanatory Variable	Intelligent Manufacturing	IM	as mentioned above
Control Variables	Return on Assets	ROA	Net Profit / Total Assets
	Revenue Growth Rate	Growth	Operating income growth/previous year's operating income
	State-owned Enterprise	SOE	State-owned enterprises are coded as 1, otherwise coded as 0
	Equity Balance	Balance	Sum of holdings of the second to fifth shareholders / Holding of the largest shareholder
	Duality	Dual	1 if CEO and Chairman are the same person, 0 otherwise
	Asset liability ratio	Lev	Total Liabilities / Total Assets
	Tobin Q Value	TobinQ	Company Market Value / Asset Book Value
	Enterprise Age	Age	Ln(Year - Foundation Year)
	Board Size	Board	Ln(Total Number of Board Members + 1)
	Enterprise Size	Size	Ln(Total Assets)
	Individual Fixed Effects	Firm	
	Time Fixed Effects	Year	

4.3 Model Construction

This study, aiming to investigate the impact of intelligent manufacturing on corporate environmental governance performance, employs a two-way fixed-effects model for empirical analysis. The model is articulated as follows:

$$Green_{i,t} = \beta_0 + \beta_1 IM_{i,t} + \text{Control} + \mu_i + \gamma_t + \varepsilon_{i,t} \quad (1)$$

In this model, the independent variable is denoted as Intelligent Manufacturing (IM), and the dependent variable is Corporate Environmental Governance Investment (Green). The subscripts i and t represent individual firms and time series, respectively, a convention that will persist throughout the paper. The crux of this paper is the regression coefficient β_1; if its estimated value is significantly positive, it implies that the adoption of intelligent manufacturing may foster corporate investment in environmental governance. The suite of control variables (Control) includes a variety of factors that could influence corporate environmental governance investment, thereby accounting for other underlying confounding effects. Individual fixed effects (μ_i) and time fixed effects (γ_t) are utilized to control for unobservable heterogeneity at the firm and temporal levels, respectively. The stochastic disturbance term ($\varepsilon_{i,t}$) captures the random error in the model that remains unexplained. To mitigate potential issues of serial correlation and heterogeneity, this paper primarily utilizes clustered robust standard errors at the firm level, thereby enhancing the precision and reliability of the estimation results.

$$RD_{i,t} = \beta_0 + \beta_1 IM_{i,t} + \text{Control} + \mu_i + \gamma_t + \varepsilon_{i,t} \quad (2)$$

$$Green_{i,t} = \beta_0 + \beta_1 IM_{i,t} + \beta_2 RD_{i,t} + \text{Control} + \mu_i + \gamma_t + \varepsilon_{i,t} \quad (3)$$

To probe whether technological innovation acts as a mediator between intelligent manufacturing and corporate environmental governance investment, Models (2) and (3) are constructed based on the pre-existing Model (1). Model (2) concentrates on the influence of intelligent manufacturing (IM) on corporate technological innovation (RD), with IM as the independent variable and corporate technological innovation as the dependent variable. Subsequently, Model (3) incorporates technological innovation as a mediating variable on the right side of Model (1) to scrutinize its potential influence on the nexus between intelligent manufacturing and corporate environmental governance investment. According to mediating effect theory, if the independent variable intelligent manufacturing in Model (1) significantly affects corporate environmental governance investment, and IM in Model (2) significantly impacts technological innovation, with the mediating variable technological innovation in Model (3) also notably influencing corporate environmental governance investment, then a mediating effect can be preliminarily inferred. Moreover, if the regression coefficient of intelligent manufacturing in Model (3) remains significant, this suggests that technological innovation plays a partial mediating role in the process of intelligent manufacturing's impact on corporate environmental governance investment; if the coefficient of intelligent manufacturing becomes insignificant, it may suggest a full mediating effect.

5. Empirical Analysis

5.1 Descriptive Statistics

Table 3 presents a comprehensive descriptive statistical analysis of the key variables under investigation. The data reveal a notable degree of variability in corporate investment in environmental governance, denoted as 'Green,' with values spanning a range from 0.0165 to

1.2840. This variation underscores the diverse investment approaches toward environmental governance demonstrated by the sample companies throughout the research period. Intelligent manufacturing (IM) also exhibits a spectrum of application levels, with a mean score of 2.8750 and a standard deviation of 1.2898. This dispersion highlights the variability in the adoption and utilization of intelligent manufacturing technologies across different companies, indicative of a broad distribution. Among the control variables, the state-owned enterprise (SOE) indicator has a mean of 0.2644 and a standard deviation of 0.4410, with values ranging from 0 to 1. This statistic suggests that, within the sample, state-owned enterprises constitute roughly 26.44% of the companies, a finding that resonates with previous research (Kang and Kim, 2012). The debt ratio (Lev), a measure of financial leverage, has a mean of 0.3936 and a standard deviation of 0.1918, with the minimum and maximum values recorded at 0.0555 and 0.9073, respectively. These figures indicate a range in the reliance on debt across the sample companies, with an average debt level that is somewhat elevated, as suggested by the mean value approaching 0.4 (Iqbal et al., 2022). The standard deviation adds further nuance to this picture by showcasing the variability in the financial structures of the companies.

Table 3

Descriptive Statistical Results

Variable	Obs	Mean	Std.dev.	Min	Max
Green	20277	0.1665	0.1285	0.0165	1.2840
IM	20277	2.8750	1.2898	0	5.8289
ROA	20277	0.0392	0.0678	-0.3559	0.2188
Growth	20277	0.1817	0.4217	-0.6575	3.4567
SOE	20277	0.2644	0.4410	0	1
Balance	20277	0.7554	0.5923	0.0318	2.8353
Dual	20277	0.3243	0.4681	0	1
Lev	20277	0.3936	0.1918	0.0555	0.9073
Tobin Q	20277	2.1362	1.3370	0.8384	8.8879
Age	20277	2.0520	0.7752	0.6931	3.3673
Board	20277	2.2248	0.1691	1.7918	2.7726
Size	20277	22.0386	1.1514	19.8793	26.2430

5.2 Correlation Analysis

Table 4 meticulously presents the Pearson correlation coefficient matrix among the variables under investigation. The analysis indicates a statistically significant positive correlation between Intelligent Manufacturing (IM) and Corporate Environmental Governance (CEG), with a correlation coefficient of 0.022 that passes the significance test at the 1% confidence level. This result underscores a pronounced positive association between the two constructs. Moreover, the majority of the other pairwise correlations within the correlation matrix have attained statistical significance, providing preliminary evidence for further regression analysis. To delve deeper into the potential issue of multicollinearity among variables, this study conducted a Variance Inflation Factor (VIF) analysis, the outcomes of which are consolidated in Table 5. According to the criterion for VIF analysis, a value exceeding 5 suggests the presence of substantial multicollinearity among variables. However, in this study, the average VIF value is 1.34, significantly below the threshold of 5. This indicates the absence of severe multicollinearity among the variables in the research model, thereby ensuring the reliability of the regression analysis outcomes.

Table 4

Correlation Coefficient Matrix

Variable	Green	IM	ROA	Growth	SOE	Balance
Green	1					
IM	0.022***	1				
ROA	-0.257***	-0.049***	1			
Growth	-0.122***	0.021***	0.232***	1		
SOE	-0.072***	-0.077***	-0.074***	-0.038***	1	
Balance	0.058***	0.054***	-0.017**	0.032***	-0.194***	1
Dual	0.047***	0.058***	0.022***	0.019***	-0.288***	0.038***
Lev	-0.193***	0.046***	-0.374***	0.054***	0.258***	-0.095***
Tobin Q	0.235***	-0.001	0.174***	0.058***	-0.075***	0.025***
Age	-0.076***	-0.047***	-0.169***	-0.060***	0.460***	-0.161***
Board	-0.077***	-0.066***	0.023***	0.002	0.269***	0.005
Size	-0.320***	0.061***	0.054***	0.076***	0.307***	-0.082***
Variable	Green	IM	ROA	Growth	SOE	Balance
Dual	1					
Lev	-0.103***	1				
Tobin Q	0.037***	-0.217***	1			
Age	-0.244***	0.352***	-0.013*	1		
Board	-0.178***	0.131***	-0.088***	0.169***	1	
Size	-0.142***	0.451***	-0.293***	0.445***	0.232***	1

Note: ***, **, * respectively indicate passing the significance tests at the 1%, 5%, and 10% levels.

Table 5

Variance Inflation Factor Analysis

Variable	VIF	1/VIF
Size	1.85	0.54
Lev	1.64	0.61
Age	1.63	0.61
SOE	1.44	0.69
ROA	1.44	0.70
Tobin Q	1.19	0.84
Board	1.14	0.88
Dual	1.13	0.89
Growth	1.1	0.91
IM	1.09	0.91
Balance	1.07	0.94
Mean VIF	1.34	

5.3 Baseline Regression Analysis

5.3.1 Intelligent Manufacturing and Corporate Environmental Governance

The inaugural column of Table 6 delineates the regression outcomes pertaining to the influence of intelligent manufacturing on corporate environmental governance investment. A discernible positive regression coefficient for intelligent manufacturing (IM) of 0.0059 emerges, attaining significance at the 1% level. This result points to a constructive impact of

intelligent manufacturing on the investment enterprises make towards environmental governance, corroborating our initial hypothesis. The implication is that the adoption of intelligent manufacturing practices could stimulate greater corporate investment in environmental stewardship, a notion that aligns with existing scholarly discourse on the subject of technological progress enhancing corporate environmental performance (Bloom et al., 2010; Shapiro and Walker, 2018).

Regarding the control variables, the return on assets (ROA) exhibits a negative coefficient (-0.4583), which is in concordance with literature that proposes a trade-off between corporate financial performance and environmental investment (Orlitzky et al., 2003). This suggests a potential corporate strategy of prioritizing financial success over environmental expenditure. The growth rate of operating income (Growth; -0.0258) also presents a negative coefficient, echoing findings that firms in swift growth phases might incline towards allocating resources to expansion rather than environmental governance (Aragón-Correa and Sharma, 2003). The debt ratio (Lev; -0.0416) shows a negative coefficient, indicating that companies with elevated financial leverage might curtail their environmental governance investments, a phenomenon that resonates with the theory of financial constraints (Fazzari et al., 1988). This theory suggests that companies with higher debt levels might face limitations in funding for environmental governance due to their capital structure (Klassen and McLaughlin, 1996). Conversely, the positive coefficient of Tobin's Q (Tobin Q; 0.0074) implies that firms with higher market valuations could be inclined to augment their environmental governance investment. This may signify the market's favorable reception to corporate social responsibility and a predisposition towards evaluating companies on the merit of their long-term value and commitment to sustainable development (Orlitzky et al., 2003). The coefficients for firm age (Age) and board size (Board) are statistically significant but economically modest, suggesting a nuanced impact of company maturity and board dimensions on environmental governance investment. Lastly, the negative coefficient of firm size (Size; -0.0259) indicates that larger firms might be inclined to invest more in environmental governance, a finding that is congruent with the resource-based theory. This theory posits that larger firms possess greater resources to bolster their environmental governance endeavors.

5.3.2 The Mediating Role of Technological Innovation

Having established the affirmative influence of intelligent manufacturing on corporate environmental governance, our investigation delves into the underlying mechanisms that drive this relationship. The mediating effect analysis, detailed in the subsequent Table 6, uncovers the potential intermediary role of technological innovation (RD) in this dynamic. Building upon the prior analysis that substantiated the significantly positive impact of intelligent manufacturing (IM) on corporate environmental governance (Green), the second and third columns of Table 6 shed further light on the mediating influence of RD. Specifically, Model (2) in Table 6 affirms the positive influence of IM on technological innovation, with a regression coefficient of 0.0010, attaining significance at the 5% level. This suggests that the deployment of intelligent manufacturing technologies not only fosters corporate environmental governance directly but may also enhance environmental governance indirectly through the advancement of technological innovation. In Model (3), when accounting for the effects of both IM and RD on corporate environmental governance, the regression coefficient for RD is 1.1542, significant at the 1% level. This finding reinforces the mediating role of RD between IM and corporate environmental governance. It is

noteworthy that the incorporation of RD as a mediating variable attenuates the direct impact of IM on corporate environmental governance. Nonetheless, the regression coefficient remains significant, indicating that the mediating effect of RD is partial. This suggests that IM might influence corporate environmental governance investment through a variety of mechanisms, with technological innovation being one, among others. These findings resonate with existing scholarly discourse that identifies technological innovation as a pivotal catalyst for corporate environmental performance (e.g., Ahuja and Lampert, 2001; Rothaermel and Deeds, 2004). Concurrently, they underscore the multifaceted role of intelligent manufacturing in propelling corporate sustainable development. Intelligent manufacturing contributes not solely by bolstering production efficiency and resource utilization but also by spurring innovative activities, thereby indirectly fostering environmental governance.

Table 6

Regression Results of Intelligent Manufacturing, Technological Innovation, and Corporate Environmental Governance Investment

Variable	(1) Green	(2) RD	(3) Green
RD			1.1542*** (12.34)
IM	0.0059*** (4.31)	0.0010** (2.53)	0.0048*** (3.71)
ROA	-0.4583*** (-14.98)	-0.0778*** (-11.87)	-0.3685*** (-13.21)
Growth	-0.0258*** (-9.73)	-0.0054*** (-9.79)	-0.0196*** (-7.92)
SOE	0.0036 (0.56)	-0.0013 (-0.59)	0.0051 (0.78)
Balance	0.0037 (0.98)	0.0011 (1.08)	0.0024 (0.72)
Dual	-0.0029 (-1.04)	-0.0008 (-1.08)	-0.0020 (-0.74)
Lev	-0.0416*** (-2.66)	-0.0203*** (-6.19)	-0.0182 (-1.21)
Tobin Q	0.0074*** (4.87)	-0.0003 (-1.12)	0.0078*** (5.22)
Age	-0.0131*** (-2.93)	-0.0039*** (-3.31)	-0.0086** (-2.02)
Board	-0.0112 (-1.01)	0.0050** (1.98)	-0.0169 (-1.61)
Size	-0.0259*** (-7.00)	0.0028*** (2.58)	-0.0291*** (-8.23)
Constant	0.7811*** (9.65)	-0.0221 (-0.95)	0.8066*** (10.65)
Observations	20,277	20,277	20,277
R-squared	0.286	0.144	0.349

Note: ***, **, * respectively indicate passing the significance tests at the 1%, 5%, and 10% levels, with the values in parentheses representing t-values, the same below.

5.4 Robustness Test and Endogeneity Issue Explanation

To affirm the robustness of the baseline regression findings, this study undertook a series of supplementary tests:

5.4.1 Two-Stage Least Squares (2SLS) Instrumental Variable Estimation

Acknowledging the potential endogeneity between intelligent manufacturing (IM) and corporate environmental governance, we resorted to an instrumental variable approach for a more rigorous analysis. We designated the annual-industry mean of intelligent manufacturing as the instrumental variable, leveraging its direct relevance to IM while ensuring its exogeneity, meaning this variable does not independently influence corporate environmental governance. The initial two columns of Table 7 exhibit the instrumental variable method's estimation outcomes. In the first column, the regression coefficient for the instrumental variable (intelligent manufacturing annual-industry mean) is 0.6010, significant at the 1% level, indicating a substantial correlation with the independent variable. The second column reveals a regression coefficient for intelligent manufacturing of 0.0448, also significant at the 1% level, substantiating the exogeneity assumption and aligning with the baseline regression findings. This outcome underscores that the positive influence of intelligent manufacturing on corporate environmental governance is resilient and significant, even when accounting for potential endogeneity.

5.4.2 Propensity Score Matching (PSM)

To address the potential impact of sample selection bias on the study's conclusions, we employed the Propensity Score Matching (PSM) technique for robustness checks. The essence of PSM lies in balancing key covariates between the treatment group—companies that have adopted intelligent manufacturing—and the control group—companies that have not, by matching on propensity scores. The procedure is as follows: Initially, the likelihood of a company adopting intelligent manufacturing technology, its propensity score, is determined through a Logit regression model, factoring in a suite of covariates that might influence the adoption decision. This model forecasts the probability of a company being in the treatment or control group. Subsequently, using the calculated propensity scores, the nearest neighbor matching method (1:1 nearest neighbor matching with replacement) is applied to select the most analogous unmatched samples from the control group. Post-matching, regression analysis on the matched samples was performed to evaluate the precise impact of intelligent manufacturing on corporate environmental governance investment. The third column of Table 7 shows that the impact coefficient of intelligent manufacturing (IM) on corporate environmental governance investment (Green) is 0.0062, and this effect is statistically significant ($p < 0.001$). This finding is in concordance with the baseline regression analysis, corroborating that intelligent manufacturing significantly and positively influences corporate environmental governance investment, an effect that endures even after considering potential sample selection bias.

5.4.3 Lagged Effect Analysis of the Independent Variable

Acknowledging the possible time lag in the influence of intelligent manufacturing on corporate environmental governance investment, this study incorporates a one-period lagged intelligent manufacturing variable into the regression analysis. This modification is designed to capture any potential delayed impacts of intelligent manufacturing. The fourth column of Table 5 displays the regression outcomes for the lagged effect. Even when accounting for

potential lagged effects, the regression coefficient for intelligent manufacturing (L.IM) is 0.0028, significant at the 10% level, thereby providing further evidence that the positive effect of intelligent manufacturing on corporate environmental governance investment is robust.

5.4.4 System Generalized Method of Moments Estimation (SYS-GMM)

To address the dynamic panel data model and counteract the potential influence of prior environmental governance on the current period, this study employs the System Generalized Method of Moments (SYS-GMM). SYS-GMM, introduced by Blundell and Bond (1998), permits the inclusion of lagged dependent variables, effectively mitigating endogeneity concerns that traditional Ordinary Least Squares (OLS) regression may not surmount. The SYS-GMM of Arellano and Bover (1995) circumvents biases associated with small sample sizes and weak instruments, augmenting the precision and reliability of the estimation. Wintoki et al. (2012) have noted that SYS-GMM offers more robust estimations for dynamic panel data compared to OLS. The fifth column of Table 7 illustrates the SYS-GMM estimation results. The Arellano-Bover autocorrelation test indicates no second-order serial correlation in the difference equation residuals (p-value > 0.1), suggesting that the model passes the autocorrelation test. Concurrently, the Hansen test validates the instrumental variables (p-value > 0.1), indicating their statistical soundness. Adhering to Roodman's (2009) recommendations, the number of instrumental variables is capped at 45 to ensure their validity. These findings indicate that our model estimation fulfills the criteria for generalized moment estimation, demonstrating a high level of consistency and reliability. The SYS-GMM estimation reveals that the impact coefficient of intelligent manufacturing (IM) on corporate environmental governance investment (Green) is 0.0681, statistically significant ($p < 0.01$). This finding aligns with the baseline regression results, further corroborating that intelligent manufacturing significantly and positively affects corporate environmental governance, an effect that persists even after considering endogeneity.

Table 7

Robustness Test (Below)

	(1)	(2)	(3)	(4)	(5)
	Instrumental Variable Method		PSM	Lagged Independent Variable by One Period	System GMM
Variable	IM	Green	Green	Green	Green
IV	0.6010***				
	(13.21)				
IM		0.0448***	0.0062***		0.0681*
		(4.76)	(4.05)		(1.75)
L.IM				0.0028*	
				(1.78)	
L.Green					0.5373***
					(7.32)
ROA	0.1513	-0.4635***	-0.4470***	-0.4578***	-0.0217
	(1.33)	(-14.98)	(-14.22)	(-14.78)	(-0.09)
Growth	0.0133	-0.0265***	-0.0260***	-0.0259***	-0.0747***
	(0.94)	(-9.64)	(-9.30)	(-9.60)	(-3.39)
SOE	-0.1002*	0.0077	0.0020	0.0035	0.1745**
	(-1.88)	(1.09)	(0.30)	(0.50)	(2.28)
Balance	0.0395	0.0019	0.0032	0.0042	-0.0104
	(1.50)	(0.50)	(0.77)	(1.07)	(-0.65)
Dual	0.0333	-0.0044	-0.0031	-0.0028	0.0014
	(1.52)	(-1.52)	(-1.01)	(-0.94)	(0.12)
Lev	-0.2053**	-0.0335**	-0.0409**	-0.0448***	0.0019
	(-2.38)	(-2.03)	(-2.36)	(-2.75)	(0.03)
TobinQ	-0.0019	0.0074***	0.0080***	0.0068***	-0.0124***
	(-0.27)	(4.93)	(4.80)	(4.25)	(-2.85)
Age	0.0494	-0.0148***	-0.0172***	-0.0161***	0.0264
	(1.38)	(-3.14)	(-3.47)	(-3.35)	(1.61)
Board	0.0885	-0.0147	-0.0109	-0.0139	0.2585
	(1.20)	(-1.31)	(-0.90)	(-1.17)	(1.07)
Size	0.2472***	-0.0358***	-0.0268***	-0.0257***	-0.0896***
	(9.79)	(-7.32)	(-6.45)	(-6.52)	(-3.25)
Constant	-4.5747***	0.9242***	0.8000***	0.7999***	1.2279**
	(-8.42)	(9.67)	(8.77)	(9.13)	(2.36)
Firm	Control	Control	Control	Control	Control
Year	Control	Control	Control	Control	Control
AR(1)					0.00
AR(2)					0.65
Hansen test p-value					0.15
Number of instruments					45
Observations	20,277	20,277	17,153	19,061	18,969
R-squared	0.469	0.216	0.299	0.287	

6. Results and Discussion

6.1 Research Findings

This study investigates the influence of intelligent manufacturing on corporate environmental governance and the mechanisms underpinning this relationship. The results demonstrate a significant positive impact of intelligent manufacturing on the advancement of corporate environmental governance, predominantly through the enhancement of technological innovation capabilities. This outcome is in harmony with existing literature that highlights the role of technological innovation in fostering corporate environmental performance, thereby emphasizing the critical function of technological progress in the sustainable development trajectory of corporations (Bloom et al., 2010; Shapiro and Walker, 2018). Following a comprehensive suite of robustness tests, including Two-Stage Least Squares (2SLS), Propensity Score Matching (PSM), analysis with a one-period lagged independent variable, and the System Generalized Method of Moments (SYS-GMM) approach, our findings have proven to be highly robust. These methodologies have not only mitigated potential endogeneity concerns but have also taken into account temporal lag effects and the intrinsic characteristics of dynamic panel data. This multifaceted approach has fortified the statistical validation of the research conclusions. Moreover, this study echoes the Porter Hypothesis, which suggests that stringent environmental regulations can act as a catalyst for corporate innovation, leading to concurrent environmental and economic advantages (Porter and Van der Linde, 1995). The study's findings extend this hypothesis, illustrating that intelligent manufacturing, as an emergent production paradigm, offers the dual benefit of enhancing production efficiency and fostering corporate environmental governance through the agency of technological innovation.

6.2 Practical Implications

The findings of this study carry substantial practical implications for both the corporate sector and policymakers. Initially, for corporate decision-makers, this research underscores the critical role of intelligent manufacturing technology in bolstering the efficacy of corporate environmental governance. It is imperative for businesses to regard intelligent manufacturing as a vital instrument in the pursuit of sustainable development goals. This involves formulating long-term strategies that leverage intelligent systems for optimized resource allocation, mitigating environmental risks, and bolstering corporate competitiveness in green markets. Subsequently, the study illuminates the mediating function of technological innovation in the nexus between intelligent manufacturing and investment in environmental governance. This revelation offers businesses a definitive developmental trajectory. Companies are encouraged to dedicate resources to technological innovation, particularly in the research and development of intelligent manufacturing solutions, to nurture the implementation and proliferation of eco-friendly technologies. For policymakers, this study provides empirical evidence that can inform the creation and refinement of industrial policies. Governments can stimulate the adoption of intelligent manufacturing technologies by businesses through incentives such as tax relief, financial assistance, and green financing mechanisms. These measures can propel the industry towards a more environmentally conscious and sustainable trajectory. Furthermore, this study holds instructive value for industry associations and non-governmental organizations. These entities can harness the insights from this research to craft and execute pertinent training initiatives and promotional campaigns. By doing so, they can aid enterprises in gaining a deeper comprehension of intelligent manufacturing technologies and facilitate their utilization in achieving

environmental governance objectives.

6.3 Management Inspiration

This study imparts a spectrum of policy implications that are crucial for both regulators and corporate entities. Firstly, it is imperative for policymakers to acknowledge the transformative potential of intelligent manufacturing technology in enhancing corporate environmental governance. Secondly, corporate management should accord significant value to the intermediary role that technological innovation plays in the dynamic interplay between intelligent manufacturing and environmental governance. Businesses are encouraged to amplify their research and development (R&D) expenditures, with a particular focus on technological domains that are conducive to environmental sustainability. Moreover, companies ought to adopt a long-term investment perspective when assessing their commitments to environmental governance. It is essential to regard environmental governance not as a mere short-term expenditure but as a strategic long-term investment. Such an investment is poised to yield enduring benefits for the corporation by enhancing its reputation, mitigating potential environmental risks, and curtailing compliance costs.

6.4 Limitations and Future Prospects

This study has indeed advanced our comprehension of how intelligent manufacturing influences corporate investment in environmental governance, but it also recognizes its inherent limitations and suggests opportunities for future inquiry. Initially, the study's focus on Chinese manufacturing firms listed in Shanghai and Shenzhen presents a starting point for research expansion. Future studies should consider a more expansive and varied sample, encompassing companies across diverse geographies and industries to enhance the generalizability and comparative scope of the findings. Building upon the multidimensional nature of intelligent manufacturing, this study has primarily examined its aspects related to artificial intelligence, the Internet, big data, and value chain technologies. Future research is encouraged to delve deeper into less explored facets of intelligent manufacturing, such as supply chain management and customer relationship management, to uncover their distinct influences on environmental governance. This approach will add layers to our understanding of intelligent manufacturing's comprehensive impact. Moreover, while this study has illuminated the immediate effects of intelligent manufacturing on corporate environmental investments, it also paves the way for investigations into the enduring consequences and broader benefits of these investments. Longitudinal studies could reveal how a company's ongoing dedication to environmental governance influences its financial health, market standing, and societal influence over time. Lastly, although technological innovation has been considered as a mediating variable in this study, the complex interplay between intelligent manufacturing and environmental governance likely involves additional mechanisms. Future research should aim to incorporate a wider array of potential mediators, such as organizational culture, leadership behaviors, and employee engagement, to shed light on the intricate pathways through which intelligent manufacturing shapes corporate environmental governance.

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Research on the Influencing Factors of Rural Tourism Behavioral Intention: An Exploration Based on the Theory of Planned Behavior

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Abstract

This study aims to explore the influencing factors of rural tourism behavioral intention, particularly focusing on consumers in Meizhou City, which possesses significant practical and theoretical values. Through purposive sampling combined with online and offline questionnaire surveys, a total of 202 valid responses were collected. Utilizing the Theory of Planned Behavior as a framework, the study thoroughly analyzed the impacts of variables such as rural tourism attitude, subjective norms, perceived behavioral control, and social support on behavioral intention. In the research process, statistical software such as SPSS was employed to conduct empirical analysis on the collected data, ensuring the scientific rigor and accuracy of the study. The findings revealed that rural tourism attitude, subjective norms, perceived behavioral control, and resource conditions within social support have significant positive effects on rural tourism behavioral intention. Additionally, political systems and resource conditions, as aspects of social support, positively influence behavioral perception factors. Based on these results, the study suggests that managers and operators of rural tourism should actively guide the public to adopt a positive attitude towards rural tourism. At the same time, a comprehensive social support system should be established to promote the sustainable development of rural tourism and the realization of rural revitalization.

Keywords: Theory of Planned Behavior; Rural Tourism; Behavioral Intentions; Social Support

1. Introduction

With the global flourishing of rural tourism, its significance in promoting rural economic growth, driving rural revitalization, and facilitating cultural exchange and inheritance has become increasingly evident. In China, rural tourism, as an essential branch of the tourism industry, plays an active role in promoting the adjustment of rural industrial structure, increasing farmers' income, and satisfying urban residents' leisure needs. However, the development of rural tourism also faces numerous challenges, such as effectively motivating consumers' behavioral intention towards rural tourism and promoting its sustainable development. Therefore, a profound exploration of the influencing factors of rural tourism behavioral intention holds significant theoretical and practical implications for promoting rural tourism development and supporting rural revitalization.

Existing research has accumulated rich theoretical and practical experiences in investigating tourism behavioral intention. Among them, the Theory of Planned Behavior

(TPB), a classic theory in the field of social psychology, has been widely applied in the study of tourism behavioral intention. According to this theory, individuals' behavioral intention is influenced by three core variables: attitude, subjective norms, and perceived behavioral control. Additionally, social support, as an external environmental factor, may also have a significant impact on individuals' behavioral intention. In the context of rural tourism, these theoretical achievements provide a solid theoretical foundation and important references for the research presented in this paper.

This study focuses on consumers in Meizhou City to deeply investigate the factors influencing rural tourism behavioral intention. Specifically, this paper aims to address the following questions:

1. How do rural tourism attitude, subjective norms, and perceived behavioral control affect rural tourism behavioral intention?

2. Which factors within social support (such as resource conditions, political systems, etc.) significantly impact rural tourism behavioral intention?

3. How can the development of rural tourism and rural revitalization be promoted by guiding the public's positive attitude towards rural tourism and improving the social support system?

This study is expected to reveal the influence mechanism of rural tourism behavioral intention, providing useful references for managers and operators in rural tourism. Specifically, this research will help understand the formation process of consumers' rural tourism behavioral intention, revealing the extent and mechanisms through which different factors affect behavioral intention. Meanwhile, this study will also propose targeted policy recommendations and management strategies, offering scientific evidence and theoretical support for guiding the public's positive attitude towards rural tourism and establishing a comprehensive social support system. Through this research, we aim to promote the sustainable development of rural tourism and the comprehensive advancement of rural revitalization.

2. Literature Review

2.1 Research on Rural Tourism

The development of rural tourism has promoted the transformation and upgrading of agriculture, enabling farmers to convert agricultural resources into tourism resources, such as through farm stays, picking gardens, and sightseeing farms, thereby enhancing the added value of agricultural products and increasing farmers' income. Rural tourism, as a multidimensional and complex research field, its definition and connotation have been continuously enriched as research deepens. Scholars such as Rosalina, P. D. (2021) have revealed four key factors of rural tourism: location, sustainability, community-based characteristics, and experience. They argue that any tourism activity related to the culture, environment, and resources of rural areas can be categorized as rural tourism. Furthermore, rural tourism is not limited to various tourism activities in rural areas, but also encompasses broader economic, cultural, social, and other multidimensional aspects, as proposed by Bramuell, B. (1994). Nilsson (2021) further clarifies the conceptual scope of rural tourism by distinguishing it from activities such as wilderness

exploration and leisure sightseeing.

The positive role of rural tourism in promoting rural economies has been widely recognized. Wang Bing Zhao (2023) points out that rural tourism has become an essential driving force for rural economic development and urban-rural integration. In this context, the distinction between rural tourism and traditional agriculture and leisure agriculture forms has become increasingly prominent. Tang Song (2023) believes that rural tourism is still in its development stage but has tremendous potential and is significant for promoting rural economic development. Peng Shun sheng (2023) further states that although Chinese rural tourism still lags behind developed countries, its development model is sound and has enormous potential for growth.

The international research on rural tourism exhibits a diverse range of characteristics. According to Ruiz-Real, J. L. et al. (2022), rural tourism and its impact on rural economic development have been a significant and dynamic research area. While the research primarily focuses on locations such as Spain, Romania, and China, the most prolific authors originate from Portugal, China, the United Kingdom, and the United States. However, due to political and religious factors, there is a notable scarcity of research targeting African, Asian, and Latin American countries. Despite this, the global importance and emerging nature of rural tourism, particularly in countries like Romania and China, cannot be ignored.

There exists a profound relationship between rural tourism and the rural revitalization strategy. Yang, J. et al. (2021) examined the morphological and social evolution of rural communities from a tourism perspective and analyzed its driving factors. They found that the increase in the proportion of non-agricultural employment and the emergence of tourism as a leading industry support the positive role of the rural revitalization strategy in promoting economic development and growth in non-urban communities in China. Consequently, rural tourism is viewed as one of the strategies to promote sustainable rural development in developing countries, and it is also an inevitable trend under the global urbanization trend. Against this backdrop, understanding and grasping the key success factors of rural tourism is of significant importance in driving rural economic development and achieving rural revitalization. Rural revitalization is not only a strategy to promote sustainable rural development in developing countries, but also an inevitable trend of global urbanization. Tourism is the best means to revitalize the tourism economy, thus, it is crucial to deeply understand and grasp its key success factors.

2.2 Related Research on Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is a theoretical framework further developed and refined by educational scholars Fishbein and Ajzen in the 1980s, based on the Theory of Reasoned Action (TRA). TRA posits that individuals' behavioral intention is jointly determined by behavioral attitudes and subjective norms, but it neglects the complete autonomy of individual behavior. To overcome this limitation, Ajzen introduced the new concept of "Perceived Behavior Control" (PBC) in his studies in 1988 and 1991. Ajzen (2020) emphasized the technical and frequency aspects of this theory, with PBC highlighting individuals' perceived ability and sense of control to execute a specific behavior, making TPB able to explain and predict individual behavior more comprehensively.

With the widespread introduction and application of TPB at home and abroad, it has demonstrated strong explanatory and predictive power in the field of individual behavior research. A meta-analysis by Conner and Armitage (1998) pointed out that behavioral attitudes, subjective norms, and perceived behavior control in TPB can explain 39% to 50% of changes in behavioral intention, while behavioral intention and perceived behavior control jointly

account for 20% to 40% of changes in actual behavior. This indicates the high effectiveness of TPB in understanding and predicting individual behavior.

In tourism and related fields, TPB has also been widely applied and validated. Scholars such as Yao Yanhong and Luo Yan first introduced TPB into the tourism industry, exploring the complexity of tourists' destination choices and proposing a new extended model based on TPB. Wang, Q., Liao, Y. E., & Gao, J. (2022) examined the impact of rural residents' attitudes towards PPT (Participatory Tourism), their perceived support for PPT, and their perceived behavioral control over PPT participation on their willingness to participate in PPT in southern Xinjiang, China. Through a household survey of six national PPT pilot villages in southern Xinjiang, 112 valid questionnaires were collected. The results showed that locals' attitudes towards PPT and their perceived behavioral control over PPT participation had positive effects on their willingness to participate in PPT. Guo, et al. () conducted in-depth research on rural tourism behavior intention, revealing the fundamental factors and their mechanism of influence on rural tourism intention. Furthermore, Zhang, et al. (2023) studied rural tourists' behavioral intention using the TPB and TSR (Theory of Self-Regulation) models, providing valuable references and suggestions for the development of rural tourism. These studies not only enrich the theoretical connotation of TPB but also provide powerful tools and methods for research in tourism and related fields.

2.3 Research on the Correlation Between Perceived Behavioral Factors and Rural Tourism Intention

Perceived behavioral control is an important concept in tourism behavior research, referring to an individual's perception of the ease or difficulty of performing a specific behavior. In the context of rural tourism, perceived behavioral control has a significant impact on tourists' behavioral intention.

An empirical study on rural tourism (Lin Tie et al., 2019) found that perceived behavioral control has a significant positive effect on the willingness and behavior of rural tourism operators to participate in online marketing. The study analyzed the influence of cultural level, income level, risk type, behavioral attitude, subjective norm, and perceived behavioral control on the willingness to participate in online marketing through a questionnaire survey of rural tourism operators. The results indicate that perceived behavioral control is one of the important factors affecting the willingness and behavior of rural tourism operators to participate in online marketing.

In the study of rural tourists' behavioral intention, perceived behavioral control also plays an important role. Rural tourists often need to consider factors such as time, money, physical strength, and information, all of which can affect their perceived behavioral control over rural tourism. If tourists believe they have enough time and money, are physically strong, and have sufficient information, they are more likely to develop an intention to engage in rural tourism.

In the study of rural tourism intention, perceived behavioral factors are considered core variables affecting tourist decision-making and behavioral tendencies. These perceived factors mainly include three dimensions: attitudes towards rural tourism, subjective norms, and perceived behavioral control. Together, these three dimensions constitute a comprehensive cognition and evaluation of an individual's rural tourism behavior.

Rural tourism attitude and behavioral intention, within the Theory of Planned Behavior, an individual's attitude towards a behavior itself is regarded as a key factor directly affecting their behavioral intention. Specifically, in the field of rural tourism, tourists' attitudes towards rural tourism activities will directly affect their behavioral intention. Specifically, when tourists hold a positive attitude towards rural tourism, they are more likely to have a strong intention to

participate; conversely, their willingness to participate may be weakened. Based on this theoretical logic, this study proposes research hypothesis H1: Attitudes towards rural tourism have a significantly positive impact on rural tourism behavioral intention.

Subjective norms and behavioral intentions, as social creatures, humans are often influenced by the opinions and behaviors of those around them when making decisions. Subjective norms reflect this social influence mechanism. In the context of rural tourism, tourists often consider the opinions and suggestions of relatives, friends, companions, or social groups when deciding whether to participate in rural tourism activities. These subjective norms affect tourists' cognition and attitudes, thereby acting on their behavioral intentions. Therefore, this study proposes research hypothesis H2: Subjective norms regarding rural tourism have a significantly positive impact on rural tourism behavioral intention.

Perceived behavioral control is another important dimension in the Theory of Planned Behavior, focusing on an individual's perception of the resources, opportunities, and capabilities needed to perform a behavior. In the field of rural tourism, when tourists believe they have sufficient resources, abilities, and opportunities to participate in rural tourism activities, they are more likely to have a strong intention to participate; conversely, if they perceive insufficient resources, abilities, and opportunities, their willingness to participate may be reduced. Empirical research by Ajzen (1991) also supports this view, indicating that the higher the perceived behavioral control, the stronger the behavioral intention. Based on the above analysis, this study proposes research hypothesis H3: Perceived behavioral control has a significantly positive impact on rural tourism behavioral intention.

2.4 Related Research on Social Support

In academic research, the concept of social support is endowed with rich connotations. Scholar Caplan particularly highlights the diversity of social support forms, arguing that such support not only originates from family, friends, and neighbors, but also encompasses emotional, cognitive, and other significant forms. This diversity reflects the comprehensive care that social support provides to individuals in different contexts. Caplan's perspective reveals that social support, as a multidimensional concept, plays a crucial role in individuals' lives and development.

The comprehensiveness and subjective perceptions of social support, furthermore, have attracted the attention of Prosidano and Heller, who shifted their focus to individuals' subjective satisfaction with received interpersonal interactions. This provides a new perspective for understanding social support. Meanwhile, Linnetar proposes that social support should be viewed as a comprehensive action spanning individuals, organizations, groups, and even entire social networks. He emphasizes that such support can help people gain access to more resources, thereby improving their quality of life and social status. This perspective not only emphasizes the broadness of social support but also highlights its positive role in enhancing individual well-being and social functioning.

In terms of the practical significance and construction of social support, the research of scholars Hu Xiangming (1996) and Hou Lijie (2009) has further enriched the theoretical connotations of social support. Hu Xiangming argues that social support encompasses both the humanistic care and material support that individuals obtain in social relationships, as well as practical assistance. Both forms of support are significant for individuals to fulfill their social responsibilities, acquire resources, and achieve their social value. On the other hand, Hou Lijie emphasizes that social support is a recipient-centered interpersonal network, whose construction involves three aspects: objectivity, initiative, and effective utilization by the recipient. These studies not only reveal the practical significance of social support but also

provide new ideas for understanding and constructing social support networks.

2.5 Related Research on Social Support Factors and Behavioral Intentions in Rural Tourism

From the perspective of tourists' needs, when engaging in tourism activities, tourists first face issues related to time and money, followed by transportation, then accommodation, basic physiological necessities such as sustenance, and finally leisure and entertainment. The spiritual and material support provided by various social sectors (including the government) to meet these needs constitutes a vast and complex social support system. From the perspective of the source and role of social support, it can be divided into two dimensions: policy institutions and rural tourism conditions.

Rural tourism policy institutions primarily refer to macro policies or systems adopted by government departments or enterprise organizations that can promote or inhibit the development of rural tourism. These include national paid leave policies, social security systems, rural tourism industry plans, as well as the intensity of implementation of paid leave systems, welfare benefits, and working environments by enterprise organizations. With the development of the national market economy, the improvement of the statutory holiday system, and the introduction of the "Regulations on Paid Leave for Employees," especially the mandatory implementation of the leave system in government departments, enterprises, and institutions, the economic strength of urban residents has continuously increased, and their leisure time has gradually increased. Consequently, the demand for tourism among the public has also correspondingly strengthened. Moreover, with the gradual improvement of the social security system, people need not invest excessive worries and savings into their old age, leaving them with more energy and financial resources for essential travel resources. If enterprise organizations, in pursuit of greater profits, disregard the national paid leave system and directly or indirectly require employees to work overtime on weekends or statutory holidays, further increasing work intensity, this leads to irregular working hours, increased work pressure, and a blurring of work and leisure time. This scenario results in employees having neither the time nor the leisure to engage in recreational activities, thus reducing their intention to participate in rural tourism. Additionally, government promotion and sales activities as well as the formulation of relevant preferential policies can effectively encourage urban residents to pay attention to and participate in rural tourism, creating a social atmosphere that positively stimulates the needs of various potential tourists and enhances their intention to engage in rural tourism. Therefore, this study posits that the degree of perfection of policy institutions directly affects rural tourism behavioral intentions. The more comprehensive the policy institutions are, the stronger the individual's intention to engage in rural tourism; conversely, the weaker the intention. Based on this, the following hypothesis is proposed: H4: Policy institutions have a positive and significant impact on rural tourism behavioral intentions.

Rural tourism resource conditions refer to various tangible or intangible resources and conveniences that influence tourists' decisions to visit rural tourism destinations, such as the tourism transportation system, service levels and facilities, rural environments and products, and security conditions. In recent years, the deteriorating urban ecological environment and the accelerating pace of urban life have made more and more urban residents aspire to the rural atmosphere close to nature and the simple and serene living environment. Rural resource conditions serve as the carrier of market demand for rural tourism, with its unique selling point being its "rurality," which is the uniqueness displayed by rural areas in terms of landscape, society, and culture, distinguishing them from urban areas. This uniqueness is the primary attraction for urban residents. The enhancement of attractiveness is primarily achieved through the creation of rural environments, the enrichment and updating of rural tourism products, the

improvement of infrastructure in rural tourism destinations (including basic service facilities such as sanitation, transportation, and communications), as well as increased promotion and introduction of rural tourism. Through the improvement of these resource conditions, the charm of rural landscapes can be enhanced, the accessibility, comfort, and convenience of urban residents participating in rural tourism can be improved, further stimulating the enhancement of demand. With the construction of "Beautiful Villages" and the "City of Leisure" in Hangzhou, rural tourism attracts an increasing number of urban residents due to its convenient transportation, beautiful environment, rich resources, and good security conditions.

Therefore, this study posits that the quality of resource conditions has a direct impact on behavioral intentions in rural tourism. The more comprehensive the resource conditions are, the stronger the individual's behavioral intention towards rural tourism; conversely, the weaker the behavioral intention towards rural tourism. Consequently, it can be hypothesized that: H5: Resource conditions have a positive and significant impact on behavioral intentions in rural tourism.

2.6 Related Research on Behavioral Intentions

The Centrality of Behavioral Intentions in the Theory of Planned Behavior. In recent years, the concept of behavioral intentions has gained increasing attention in behavioral science research. Bosnjak, Ajzen, and Schmidt (2020) in their study delved deeply into the latest advancements and applications of the Theory of Planned Behavior (TPB), clearly indicating that behavioral intentions play a pivotal role in this theoretical framework. Behavioral intentions are not only considered as a key variable in predicting actual behaviors, but they also exert a significant influence in tourism decision-making and practice. They reflect individuals' expectations and tendencies towards specific behaviors, thus influencing their choice and execution of actual actions.

The Theoretical Foundation and Multidimensional Interpretation of Behavioral Intentions. Since Smith (1983) introduced the concept of behavioral intention based on Engel's attitude theory, research in this field has gradually enriched. Bai Lin (2009) emphasized the importance of behavioral intention as a tendency for future decision-making, while Li Huamin (year not mentioned) further applied this concept to the tourism field, pointing out that tourists' choice of tourism activities is deeply influenced by their behavioral intentions. International scholars Eamon and Peter (1996) also noted that personal behavioral intentions have a significant impact on the likelihood of executing a specific action in the future. Minyard and Engle (2001) defined behavioral intention from the perspective of subjective evaluation, emphasizing its subjective predictive value for people's future behaviors. Additionally, Chen Lianyu (2004) and Yi Ying (2006) explored the multidimensional meanings of behavioral intention from the perspectives of consumers and product services, further enriching the theoretical system in this field.

Analysis on the Correlation between Behavioral Intention and Actual Behavior, Ulker-Demirel and Ciftci (2020) pointed out in their study that people tend to act on their intentions when they have sufficient practical control over their behavior. Ajzen (2019a) also emphasized that intention is assumed to be the direct antecedent of behavior, while perceived behavioral control serves as a proxy for actual control, aiding in the prediction of related behaviors. This viewpoint has been validated in research within the tourism sector. For instance, Pujiastuti et al. (2017) discovered in their study on rural tourism in Indonesia that customer experience significantly impacts both trust and behavioral intention, with customer trust acting as a precursor to behavioral intention. This study not only reveals the correlation between customer experience, trust, and behavioral intention but also further proves the significant role of behavioral intention in predicting actual tourism behavior.

Application Value of Behavioral Intention in Sustainable Tourism Development

The study by Joo, Seok, and Nam (2020) unveiled the role of social media in the decision-making process of rural tourism and emphasized the driving effect of social atmosphere and personal circumstances on the willingness to visit. This discovery provides new perspectives for the formulation of tourism marketing strategies; that is, marketers should focus on cultivating a social atmosphere related to subjective norms and showcase the functional benefits of rural/sustainable tourism itself to attract potential visitors. Furthermore, the study highlighted the impact of motivation on behavioral intention and the driving role of behavioral intention on actual behavior. Therefore, to achieve the growth of sustainable tourism, tourism destinations (TR) should seek social support factors, including improving tourism regulatory systems, exploring cultural and natural resource advantages, and encouraging tourists to share their travel experiences. These measures will help increase potential tourists' attention and participation, thereby promoting the sustainable development of the tourism industry.

2.7 Relevant Research on Social Support Factors and Behavioral Perception Factors

In the research field of rural tourism, social support factors play a crucial role. Drawing from the research of Hong Zhen (2012), this study recognizes that individuals' perception of social support systems significantly positively influences their attitudes towards leisure tourism, behavioral control perception, and subjective norms. Combining the specific context of rural tourism, the social support factors for rural tourism are further refined into two major aspects: national or corporate policy systems and rural tourism resource conditions. These two aspects not only reflect the external environment for rural tourism development but also directly influence tourists' willingness to participate and their experience.

Policy systems are the core component of social support factors, encompassing national paid leave systems, social security systems, as well as the implementation of paid leave systems and the degree of flexibility in the work environment within corporate organizations. The soundness of policy systems directly relates to the allocation of resources such as time, money, and energy for individuals to participate in rural tourism. For instance, comprehensive paid leave systems and social security systems can provide individuals with ample leisure time and financial security, thus increasing their likelihood of participating in rural tourism. Similarly, the implementation of paid leave systems, employee welfare, and the completeness of the work atmosphere within corporate organizations also influence individuals' willingness and ability to participate in rural tourism. Therefore, this study argues that the soundness of policy systems has a significant positive impact on the formation of individuals' attitudes towards rural tourism, the strength of subjective norms, and the perception of behavioral control. Based on this, the study proposes three hypotheses: H6a: Policy systems have a positive and significant impact on attitudes towards rural tourism; H6b: Policy systems have a positive and significant impact on subjective norms; H6c: Policy systems have a positive and significant impact on perceived behavioral control.

In addition to policy systems, the conditions of rural tourism resources are also crucial factors influencing individuals' participation in rural tourism. These resource conditions include tourism transportation, facilities, services, and a stable and harmonious social environment for rural tourism development. The quality of these resource conditions directly affects individuals' evaluation and perception of rural tourism, as well as the attitudes and perspectives of surrounding groups towards rural tourism. Specifically, the better the transportation conditions, service facilities and levels, and security situation in rural tourism destinations, the more positive individuals and surrounding groups will be towards rural tourism. Additionally, the intensity of promotion and marketing efforts in rural tourism

destinations also affects the ease of individuals accessing information about rural tourism. Therefore, this study believes that the quality of resource conditions has a significant positive impact on the formation of individuals' attitudes towards rural tourism, the strength of subjective norms, and the perception of behavioral control. Based on this, this study proposes three hypotheses: H7a: Resource conditions have a positive and significant impact on attitudes towards rural tourism; H7b: Resource conditions have a positive and significant impact on subjective norms; H7c: Resource conditions have a positive and significant impact on perceived behavioral control.

In summary, social support factors play an indispensable role in rural tourism. Both policy systems and resource conditions directly influence individuals' willingness to participate in rural tourism and their overall experience. Future research can further explore how to optimize policy systems and enhance resource conditions to attract more tourists to participate in rural tourism and enhance their satisfaction. At the same time, this study also needs to pay attention to the different needs of different tourist groups and formulate corresponding strategies to meet their diverse demands.

3. Research Design and Methodology

3.1 Theoretical Model Construction

This paper introduces social support factors into the theoretical model, establishing a linkage between the perception of the external environment and personal behavior (individual perception) to explore the internal mechanisms that influence behavioral intentions in rural tourism. The study focuses on social support factors and characteristics of rural tourism, aiming to enrich the research in the fields of the Theory of Planned Behavior (TPB) and rural tourism. Furthermore, it provides recommendations for rural tourism managers and operators. The research model proposed in this paper is depicted in Figure 3.1.

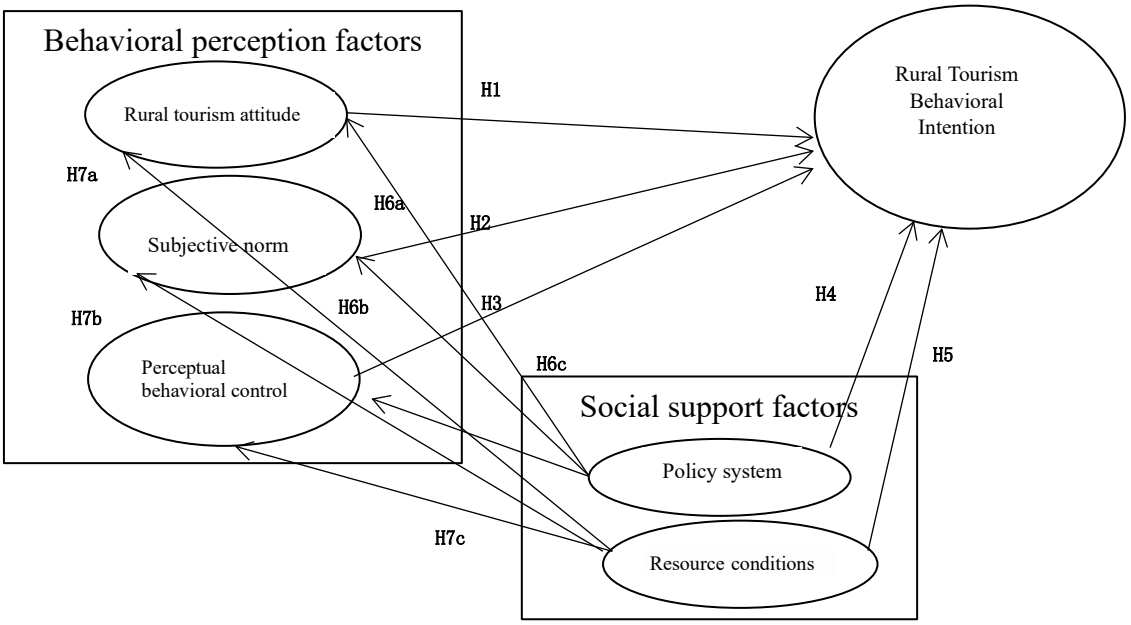

Figure 1

Model of Influencing Factors of Rural Tourism Behavior Intention

3.2 Definition and Measurement of Research Variables

In this study, established scales were adapted from questionnaires designed by scholars such as Fishbein, Ajzen, Hong Zhen, and Li Huamin, who tailored their measurement tools according to specific dimensions. The adapted scales were modified accordingly to measure the influencing factors of behavioral intentions related to rural tourism, ensuring their suitability for use among residents in Meizhou.

3.2.1 Behavioral Perception Scale

The behavioral perception scale is based on a validated scale that has been optimized and modified to reflect the actual conditions of rural tourism. Three variables are considered in this scale: the rural tourist's attitude, subjective norm, and perceived behavioral control. This adaptation aims to better capture the behavioral characteristics of rural tourists, as illustrated in Table1.

Table1

Behavioral Perception Scale

Variables	Sub-dimensions	Measurement items	Source of items
Rural tourism attitude	Emotional attitude	1. I believe that rural tourism can alleviate stress and bring joy to the body and mind. 2. I consider rural tourism as a way to enjoy life. 3. I am full of interest in rural tourism.	Guo et al. (2013), Shi (2013), Wu et al. (2003), Hong (2013)
	Cognitive attitude	4. I believe rural tourism is conducive to promoting rural development. 5. Rural tourism allows one to experience different cultural and lifestyles.	Guo et al. (2013), Xu (2014)
Subjective norm	**Attitude**	6. My family supports my participation in rural tourism. 7. My friends support my participation in rural tourism. 8. My colleagues (classmates) support my participation in rural tourism. 9. My leaders (teachers) support my participation in rural tourism.	Wu et al. (2003), Li (2007)
	Behavior	10. My family members often participate in rural tourism. 11. My friends often participate in rural tourism. 12. My colleagues (classmates) often participate in rural tourism. 13. My leaders (teachers) often participate in rural tourism.	Wu et al. (2003), Hong (2013)
Perceived behavioral control	Control beliefs	14. I have sufficient ability to handle problems that arise during rural tourism. 15. I can autonomously decide whether to participate in rural tourism. 16. I am in good physical condition to participate in rural tourism.	Cao (2013), Zeng (2011), Xu (2014), Li (2007), Hong (2013)
	Facilitating Conditions	17. I have adequate income to participate in rural tourism. 18. I have enough time to participate in rural tourism. 19. I can conveniently obtain relevant information about rural tourism.	Li (2007), Guo et al. (2013), Xu (2014), Zeng (2011), Shi (2013)

3.2.2 Social Support Scale

The social support system relied on by rural tourism encompasses multiple dimensions such as the macro environment, legal policies, industrial factors, and infrastructure, which include aspects like political systems and resource conditions. Social support, as an essential regulatory mechanism, is closely related to tourism development, serving as one of the effective tools to promote sustainable rural tourism development. In previous research, the measurement of social support variables was not commonly encountered. Therefore, we have referenced past research outcomes in this scale and designed a new measurement indicator for social support, as presented in Table 2-3.

Table 2

Social Support Scale

Variables	Sub-dimensions	Measurement items	Source of items
Policy System	National policy	1. The state encourages rural revitalization and the development of rural tourism. 2. With a robust social security system in place, there is no need for excessive future savings.	Hong (2013)
	Related promotion	3. There is a strong effort in promoting and introducing rural tourism. 4. Meizhou boasts a well-developed tourism transportation system. 5. Meizhou offers a diverse range of rural tourism routes and products to choose from.	Wu (2003), Hong Zhen (2012), Li (2007), Fan (2011), Shi (2013)
Resource Conditions	Environmental service	6. The surrounding rural tourism destinations in meizhou have good environmental conditions. 7. The service level of rural tourism professionals in meizhou is high. 8. The service facilities in the surrounding rural tourism destinations in meizhou are complete.	Wu (2003), Hong (2013), Li (2007)
	Public security management	9. The management level of the rural tourism destinations around meizhou is high. 10. The social security situation in the rural tourism destinations around meizhou is good.	Wu (2003), Hong (2013), Li (2007), Fan (2011)

3.2.2 Behavioral Intention Scale

Table 3

Behavioral Intention Scale

Variables	Sub-dimensions	Measurement items	Source of items
Rural Tourism Behavioral Intention		11. Under the current conditions, I am willing to engage in rural tourism. 12. I have already planned to participate in rural tourism. 13. I will try rural tourism within the next year.	Fan (2011), Wu (2013), Hong (2013), Wu (2003)

3.3 Research Subject and Sampling Method

Meizhou city in Guangdong Province of China, leveraging comprehensive tourism, combined with rural revitalization and the construction of "beautiful villages", integrated into the Guangdong "Yue Mei Village" brand, has created a batch of distinctive rural tourism in Meizhou to promote the orderly development of rural tourism. This study aims to survey residents in Meizhou City using non-probability sampling techniques within random sampling methods. An electronic questionnaire was produced using Questionnaire Star and distributed on social networking platforms such as WeChat, ultimately successfully collecting 202 valid questionnaires. The scale used in this study adopts the Likert scale, divided into five levels from strong to weak, with scores ranging from 5 to 1 indicating "strongly agree", "agree", "somewhat agree", "disagree" or "strongly disagree". The higher the score, the more agreement; the lower the score, the less agreement.

4. Empirical Analysis and Hypothesis Testing

4.1 Descriptive statistical analysis of demographic variables

In this study, the demographic variable of female ratio comprises approximately 52.97% of the total sample, with males accounting for 47.03%, maintaining a relatively balanced state. Age distribution indicates that those aged 45 and below constitute a significant portion, accounting for 87.13%. As per the survey results, the education levels of consumers are predominantly undergraduate and college degrees, accounting for 39.11% and 24.75% respectively. Regarding occupation, workers and self-employed individuals hold a relatively larger share, at 19.8% and 16.34% respectively. From the perspective of family structure, married individuals with minor children constitute the largest proportion, accounting for 39.6%. Overall, the questionnaire data collected for this study on the influencing factors of rural tourism behavior intentions among Meizhou residents indicates that there are more female consumers than male consumers, and the majority of consumers hold undergraduate and college degrees. This trend is highly aligned with the consumption characteristics of the target population, thus contributing significantly to drawing meaningful research conclusions.

4.2 Descriptive Statistical Analysis of Variables

The questionnaire for this study comprised 32 items. Using SPSS 27, descriptive statistics were conducted on the collected sample data, including the mean, standard deviation, skewness, and kurtosis of the three dimensions: behavioral perception factors, social support factors, and

rural tourism behavior intention. The standard deviation of each indicator was greater than 0.6, and there were no significant differences among the indicators. Judging from the indicators such as deviation, peak, and skewness among various variables, the sample data used in this paper is both representative and reliable.

4.3 Reliability and Validity Analysis

Reliability refers to the internal consistency of measurement scales. The overall Cronbach's Alpha coefficient for this study is 0.968. The reliability of each construct has been analyzed, as detailed in the table below. All sub-constructs and the overall Cronbach's Alpha values exceed 0.7, indicating a high level of reliability. This demonstrates the reliability and stability of the items in the questionnaire, which meet the requirements of general academic research.

All variables in this study have been empirically validated through literature, and the content of the measurement targets can effectively cover the research topics to be discussed. Additionally, before the testing phase of this study, every item was discussed by two scholars and experts in relevant fields, ensuring that the measurement tools used in this study possess good content validity.

When the KMO value exceeds 0.6, researchers consider that there is a high correlation and high validity among all variables. Furthermore, when the significance level of the Bartlett's test of sphericity is below 0.05, it indicates the effectiveness of factor analysis. In addition, there is a strong correlation among the items. As shown in the figure below, the KMO value in this study is 0.954, and the results of the Bartlett's test of sphericity are highly significant, indicating a high correlation among the variables and suitability for extracting common factors. Therefore, the measurement tools used in this study possess good discriminant validity.

4.4 Regression Analysis

4.4.1 Collinearity Test

The collinearity test results for the behavioral perception factors and social support factors in the equation predicting rural tourism behavior intention indicate that the tolerance values are all greater than 0.1, and the VIF (Variance Inflation Factor) for both factors is greater than 5. The conditional index for social support factors is less than 30, as shown in Table 4.

Table4

Scale Behavior Perception factors and Social Support Factors on Rural Tourism Behavior Intention Equation Collinearity Test Table

variable	Collinearity statistics		eigenvalue	Conditional indicators	Proportion of variation		
	Tolerance	VIF			(constant)	Social support	Behavioral perception
			2.979	1.000	0.00	0.00	0.00
Social support	0.196	5.108	0.018	12.854	0.99	0.04	0.06
Behavioral perception	0.196	5.108	0.003	31.987	0.01	0.96	0.94

4.4.2 Verification of Hypotheses on the Impact of Behavioral Perception Factors on Rural Tourism Behavior Intention (H1, H2, H3)

In the regression analysis of rural tourism attitude and rural tourism behavior intention, the Bata coefficient is 0.089, T is 1.334, and the significant P-value is 0.184 (greater than 0.05). This indicates that the influence of rural tourism attitude on rural tourism behavior intention is not significant, thus hypothesis H1 is rejected. In the regression analysis of subjective

norms and rural tourism behavior intention, the Bata coefficient is 0.182, T is 2.228, and the significant P-value is 0.027 < 0.05. This suggests that subjective norms have a positive impact on rural tourism behavior intention, and thus hypothesis H2 is supported.
The regression analysis of perceived behavioral control and rural tourism behavior intention shows a Bata coefficient of 0.591, T of 6.901, and a significant P-value of 0.027 < 0.05. This indicates that perceived behavioral control has a positive impact on rural tourism behavior intention, thus hypothesis H3 is supported, as presented in Table 5.

Table5

Regression Analysis Table for Hypothesis Validation of H1, H2, and H3

Independent variable	R^2	$\triangle R_2$	F	Significance	Unstandardized B value	Standardized B value	T-value	P-value
constant			142.063	0.000b	0.164		0.912	0.363
Tourism attitude					0.091	0.089	1.334	0.184
Subjective norms					0.202	0.182	2.228	0.027
Behavioral control	0.683	0.678			0.667	0.591	6.901	0.000

Dependent variable: intention to engage in rural tourism behavior.

4.4.3 Verification of Hypotheses on the Impact of Social Support Factors on Rural Tourism Behavior Intention (H4, H5)

In the regression analysis of policy institutions and rural tourism behavior intention, the Bata coefficient is 0.123, T is 1.632, and the significant P-value is 0.104 (greater than 0.05). This demonstrates that the influence of policy institutions on rural tourism behavior intention is not significant; therefore, hypothesis H4 is rejected. In the regression analysis of resource conditions and usage intention, the Bata coefficient is 0.707, T is 39.397, and the significance level is 0.000 (less than 0.05), confirming that resource conditions have a positive impact on rural tourism behavior intention; thus, hypothesis H5 is supported, as shown in Table 6.

Table 6

Regression Analysis Table for Hypothesis Validation of H4 and H5

Independent variable	R^2	$\triangle R^2$	F	Significance	Unstandardized B value	Standardized B value	T-value	P-value
constant			192.928	0.000b	0.035		0.179	0.858
Policy system					0.135	0.123	1.632	0.104
Resource conditions	0.66	0.656			0.857	0.707	9.397	0.000

Dependent variable: intention to engage in rural tourism behavior.

4.4.4 Verification of Hypotheses on the Impact of Social Support Factors on Behavioral Perception Factors (H6a, H6b, H6c, H7a, H7b, H7c)

In the regression analysis of social support factors and rural tourism attitudes, R2 = 0.614, indicating that the factors can explain 61.4% of the variance. The Bata coefficients of policy institutions and resource conditions are 0.224 and 0.587, respectively, with T-values of

1.511 and 2.803, and significance levels of 0.006 and 0.000 (less than 0.05). This confirms that social support factors have a positive impact on rural tourism attitudes, thus supporting hypotheses H6a and H7a, as shown in Table 7.

Table 7

Regression Analysis Table for Verifying the Attitude of Social Support Towards Rural Tourism

Independent variable	R^2	△ R^2	F	Significance	Unstandardized B value	Standardized B value	T-value	P-value
constant			158.543	0.000b	0.304		1.511	0.132
Policy system					0.241	0.224	2.803	0.006
Resource conditions	0.614	0.611			0.694	0.587	7.326	0.000

Dependent variable: intention to engage in rural tourism behavior.

In the regression analysis of social support factors and subjective norms, R2 = 0.696, indicating that the factors can explain 69.6% of the variance. The Bata coefficients of policy institutions and resource conditions are 0.341 and 0.528, respectively, with T-values of 4.803 and 7.429, and significance levels of 0.000 (less than 0.05) for both. This confirms that social support factors have a positive impact on subjective norms, thus supporting hypotheses H6b and H7b, as shown in Table 8.

Table 8

Regression Analysis Table for Verifying Subjective Normative Hypotheses Through Social Support

Independent variable	R^2	△ R^2	F	Significance	Unstandardized B value	Standardized B value	T-value	P-value
constant			228.138	0.000b	0.299		1.812	0.071
Policy system					0.339	0.341	4.803	0.000
Resource conditions	0.696	0.693			0.577	0.528	7.429	0.000

Dependent variable: subjective norm

In the regression analysis of social support factors and perceived behavioral control, R2 = 0.793, indicating that the factors can explain 79.3% of the variance. The Bata coefficients of policy institutions and resource conditions are 0.365 and 0.562, respectively, with T-values of 6.225 and 9.583, and significance levels of 0.000 (less than 0.05) for both. This confirms that social support factors have a positive impact on perceived behavioral control, thus supporting hypotheses H6c and H7c, as shown in Table 9.

Table 9

Regression Analysis Table for Verifying the Hypothesis of Social Support on Perceptual Behavior Control

Independent variable	R^2	△ R^2	F	Significance	Unstandardized B value	Standardized B value	T-value	P-value
constant			380.973	0.000b	0.145		1.081	0.281
Policy system					0.356	0.365	6.225	0.000
Resource conditions	0.793	0.791			0.604	0.562	9.583	0.000

Dependent variable: Perceived behavioral control

4.5 Analysis of verification results

This paper bases its validation of the hypotheses on the correlation analysis between behavioral perception and rural tourism behavior intention, social support and rural tourism behavior intention, and social support and behavioral perception. Building upon the empirical analysis above, the paper consolidates and discusses the hypothesis testing and arrives at the conclusions shown in Table 10.

Table 10

A Table of Results for the Testing of Research Hypotheses

Research Hypothesis		Normalized Beta	T-value	p-value	Hypothesis results
H1	Attitude has a positive impact on behavioral intention	0.089	1.334	0.184	Hypothesis Not true
H2	Subjective norms have a positive impact on behavioral intentions	0.182	2.228	0.027	Hypothesis true
H3	Perceptual control has a positive impact on behavioral intention	0.591	6.901	0.000	Hypothesis true
H4	Policies and systems have a positive impact on behavioral intentions	0.123	1.632	0.104	Hypothesis Not true
H5	Resource conditions have a positive impact on tourism behavior intention	0.707	9.397	0.000	Hypothesis true
H6a	Policies and institutions have a positive impact on attitudes	0.224	2.803	0.006	Hypothesis true
H6b	Policies and systems have a positive impact on subjective norms	0.341	4.803	0.000	Hypothesis true
H6c	The policy system has a positive impact on perceptual control	0.365	6.225	0.000	Hypothesis true
H7a	Resource conditions have a positive impact on attitudes	0.587	7.326	0.000	Hypothesis true
H7b	Resource conditions have a positive impact on subjective norms	0.528	7.429	0.000	Hypothesis true
H7c	Resource conditions have a positive impact on perceptual control	0.562	9.583	0.000	Hypothesis true

5. Conclusions and Suggestions

This study, grounded in the theoretical perspective of the Theory of Planned Behavior and integrated with social support factors, delves into the influencing factors of consumers'

intention to engage in rural tourism in Meizhou City. Through purposive sampling, data were collected and analyzed using the statistical software SPSS, yielding a series of significant conclusions.

In the aspect of basic information statistics, the study found that the gender ratio of the respondents is basically balanced, with the age mainly concentrated between 31 and 45 years old. The majority hold a bachelor's degree, and their occupations are widely distributed. This basic information provide crucial context for subsequent analysis.

In this paper, the Theory of Planned Behavior (PBT) provides a robust theoretical framework to underpin the empirical investigation of factors influencing intention towards rural tourism behavior. The Theory of Planned Behavior posits that an individual's behavioral intention is determined by three core factors: attitude, subjective norms, and perceived behavioral control. These factors interact, affecting an individual's predisposition to perform a certain behavior.

Firstly, rural tourism attitude refers to the positive or negative valuation that consumers hold towards rural tourism. Through survey questionnaires, this study discovered that consumers' positive attitudes significantly enhance their behavioral intentions. This aligns with the attitude component in PBT, indicating that a positive evaluation of rural tourism can promote consumer participation willingness.

Secondly, subjective norms reflect the social pressure perceived by consumers, namely whether they believe that friends, family, or social groups expect them to participate in rural tourism. In this study, subjective norms had a positive influence on rural tourism behavioral intentions, implying that when potential tourists feel societal expectation and approval, they are more likely to choose to participate in rural tourism. This is also consistent with the theoretical expectations of PBT.

Furthermore, perceived behavioral control describes the extent to which individuals believe they can control and successfully execute a particular behavior. In this study, perceived behavioral control had a significant positive impact on rural tourism behavioral intention, implying that potential tourists' perception and confidence in their ability to participate in rural tourism directly affects their behavioral intention. This is also a crucial factor emphasized in PBT.

Additionally, this study explored the influence of social support factors, particularly resource availability and political institutions, on rural tourism behavioral intention. As external conditions, these factors positively influence potential tourists' behavioral perceptions. When potential tourists believe that there are sufficient resource support and a favorable policy environment, they are more likely to develop positive behavioral intentions towards rural tourism. This finding aligns with the extended theory of PBT, suggesting that external conditions can indirectly influence behavioral intention by affecting behavioral perception factors.

In summary, the empirical study presented in this paper is well-supported by the Theory of Planned Behavior. By applying the framework and core concepts of PBT, this study has provided a profound understanding of the factors influencing consumers' behavioral intention towards rural tourism, and offered targeted suggestions for the development of rural tourism.
Based on the above conclusions, this study proposes the following recommendations:

Firstly, the government and rural tourism operators should intensify their promotion efforts for rural tourism, enhancing consumers' awareness and favorable impression of rural tourism. Through organizing rural tourism festivals, introducing preferential policies, and other means, more consumers can be attracted to participate in rural tourism activities.

Secondly, the government and rural tourism operators should improve the infrastructure and service quality of rural tourism. This includes strengthening transportation facilities, optimizing accommodation and dining conditions, and enhancing the professional qualifications of tour guides and reception personnel, providing consumers with a comfortable, convenient, and high-quality rural tourism experience. Finally, the government and rural tourism operators should pay attention to consumers' personalized needs and develop diversified rural tourism products. By deeply understanding consumers' interests and needs and combining local cultural and resource characteristics, attractive and competitive rural tourism products can be developed to meet the needs of different consumers.

In summary, this study has empirically analyzed and revealed the key factors influencing rural tourism behavioral intention, and provided targeted recommendations for the government and rural tourism operators. These recommendations will contribute to the healthy development of rural tourism and promote the effective implementation of the rural revitalization strategy.

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A Multidimensional Empirical Analysis of University Undergraduates' Satisfaction: A Case Study of BeiSe University in China

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Abstract

Against the backdrop of the undergraduate teaching and educational assessment at BeiSe university in China, a satisfaction survey questionnaire developed by the Ministry of Education of China was employed to conduct a university undergraduate satisfaction survey at BeiSe university. Data analysis was conducted using SPSS software. In order to understand students' needs for school teaching resources, teacher instruction, communication and collaboration, and skills enhancement, and to improve teaching quality. The results show that: 1. There are significant differences in overall satisfaction and gender in five dimensions. females' evaluation of each variable is higher than that of males. 2. Different grades have significant differences in five dimensions of university education and teaching, and the evaluation of higher students is higher than those of lower grades. 3. students with different scores have significant differences in five dimensions of university education and teaching, and the evaluation of the higher score students is lower than those with poor academic performance. 4. Different dimensions of satisfaction evaluation are related to the overall satisfaction of the university, and there is a positive linear relationship.

Keywords: Satisfaction Evaluation, Questionnaire Method, A University Undergraduate

1. Introduction

With the increasing scale of higher education in China, the total number of higher education students exceed 44.3 million by 2020. At the same time, the higher education enrollment rate has increased from 30 percent in 2012 to 57.8 percent in 2021, achieving a historic leap. With the expansion of the scale of China's higher education, students have more choices to enroll, which brings some difficulty to the enrollment of universities(The Ministry of Education of the People's Republic of China, 2020). Therefore, universities constantly innovate in the mode of education, school-running mode, management system, guarantee mechanism and other aspects.

Higher education is increasingly recognizing it as a service industry with more emphasis on meeting student expectations and needs (Cheng & Tam, 1997). Students are no longer regarded as simple learners, believing that students are the consumers of school services, and consumers have a great say in a good product. Therefore, the measurement of student satisfaction can test the quality of school education management. In addition, the quality of higher education is also related to the growth of students. The effectiveness of higher education

services is very important in the 21st century, and higher authorities are increasingly willing to understand students' expectations, academic preferences and their views on the quality of the educational environment. So the study proposes that universities are providing educational services according to students' needs and requirements.

Numerous studies show that student satisfaction directly affects the public image and reputation of schools (Ijazet al., 2011). The education satisfying the people reflects the people-centered government philosophy of the Party and the government, which has appeared in many places in the party Congress reports and government work reports in recent years, and has become an important value orientation and goal for the development of education in China. Student satisfaction is the basis and premise of people's satisfaction education, and is an important measure of the quality of education. The satisfaction survey of higher education directly reflects the students' satisfaction with the teaching management of university education, and also reflects the implementation of the national macro higher education management policy from the side. It is an important way and tool for the quality guarantee and improvement of higher education, and the evaluation of the policy effect(Kanwar & Sanjeeva, 2022).

University students are satisfied or not satisfied with the school education, how the satisfaction degree, which aspects are satisfied and not satisfied, and how the satisfaction appears all affect the quality of school education and teaching, in order to improve the teaching quality and realize the connotation development, it is very necessary to carry out the satisfaction survey of students.

According to Hunt (1977), satisfaction is the evaluation of the whole service process and outcome experience after purchase. It is a state that has reached or exceeded emotional reactions, consumer requirements, wishes and expectations that have been met or exceeded in the process of service experience. Student satisfaction is the application of customer satisfaction to students and schools, which is the expectation of students with different educational backgrounds and experiences for effective learning and achieving career goals (Elliott & Healy, 2001).

Student satisfaction refers to the degree of subjective evaluation of various outcomes and experiences related to education (Oliver & DeSarbo, 1989). Furthermore, the campus environment appears to be an interconnected network of experiences that overlap and influenced overall student satisfaction. What happens to a student in the classroom is not only experiences related to campus life. De Oliveira Santini et al. (2017) found that global satisfaction with the university was driven by student assessment of course quality and other course-related factors relevant to the university. The research also concluded that the possibility of students recommending universities to friends and relatives largely implied the degree of interaction between students and university staff. To study the evaluation of students' satisfaction with schools, it is beneficial to improve the quality of education. Understanding students' satisfaction with the school can help educators find the problems and deficiencies in the process of education, so as to take corresponding measures to improve the quality of education. The second is to promote the development of students. Students' satisfaction with the school is closely related to their learning motivation, academic performance and mental

health. Research shows that students with higher satisfaction tend to have higher learning motivation and better academic performance. In addition, students with higher satisfaction are more likely to maintain a positive attitude in the face of frustration and stress, which is conducive to their mental health. Third, to improve the reputation of the school. Students' satisfaction with the school is an important indicator to measure the quality of school education and service level. Schools with higher satisfaction tend to attract more excellent teachers and students and improve the reputation and competitiveness of the schools. Fourth, to optimize the allocation of resources through the study of students' satisfaction with the school, educators can learn which resources and services are welcomed by students, and which resources and services need to be improved or increased. This helps schools to allocate resources reasonably and improve the efficiency of resource utilization. Fifth, it provides a basis for policy formulation. The study of students' school satisfaction can provide a basis for the government and education departments to formulate relevant policies. For example, the government can adjust the education input and improve the school hardware facilities according to the research results; the education department can adjust the curriculum according to the research results to meet the needs of students.

Moreover, researchers contend that individual factors also contribute to satisfaction. Individual factors include age, gender, employment status, preferred learning method, and student GPA, while institutional factors encompass the quality of teaching, timeliness of teacher feedback, clarity of expectations, and teaching style(Appleton-Knapp & Krentler ,2006).

In short, the study of students' satisfaction with schools is of great significance to improving the quality of education, promoting the development of students, improving the reputation of schools, optimizing the allocation of resources, and providing the basis for policy making.

The survey of university satisfaction has been widely paid attention to and implemented at home and abroad, especially in some developed countries such as the UK and the United States, which has become an important index and reference basis for universities to evaluate and improve the service quality of higher education. In 1993, the United States established the "college Student Survey" measurement index system. In 1994, the United States conducted the first nationwide student satisfaction survey. Subsequently, different educational institutions in the United States conducted 13 surveys. The United States has formed a management model based on the student satisfaction survey to improve the quality of teaching by changing the student satisfaction. In 1995, the first student satisfaction inventory (SSI) scale to measure student satisfaction was designed by Laur and Stephanie. The measures of the scale include: campus atmosphere, campus support services, personal attention, education effectiveness, security, service quality, academic service, campus life and other contents. In 2006, the UK conducted the widest range of student satisfaction survey, involving more than 279,000 students (Yang, 2008). In addition, many universities in the UK organize self-assessment in order to better identify and solve problems, and to improve the quality of teaching services.

Although the introduction of satisfaction surveys in China started relatively late, higher education institutions are increasingly aware of the importance of conducting student satisfaction surveys for school management, and many scholars are also keen on this research. For example, some studies have developed questionnaires, investigating the service satisfaction of university students in China; Chen and Zhang (2019) focus on the measurement and influencing factors of university student satisfaction, via the empirical data and Herzberg's two-factor theory, which has examined the association between relevant variables and student self-reporting ability development and student institution satisfaction; The China Higher Education Research Group implemented the third round of national Higher Education satisfaction survey in 2021, which fully reflects the implementation of the macro-policy of higher education; In 2021, the Ministry of Education issued the Implementation Plan for the Examination and Evaluation of Undergraduate Education and Teaching in Regular Institutions of Higher Learning (2021-2025) (namely "Examination and Evaluation"). The program represents an indicator of students (postgraduates and undergraduates) satisfaction with learning and growth, and the establishment of this index represents the student satisfaction survey becomes one of the important criteria for Chinese universities to judge the teaching quality. Based on above, the study takes a university in Guangxi participating in examination and evaluation as a sample, with the Ministry of Education to carry out the student satisfaction survey tool. In order to better understand the university course teaching, teachers' teaching, teaching resources, communication and cooperation, quality promotion construction, the study aims to provide the basis for management decision in universities, improve teaching quality, realize the connotation development, and to provide reference for similar universities.

2. Methodology

2.1 Research Participants

This study was conducted on Beijing Normal University in China, with questionnaires dis tributed among students via the internet. In total, 6,850 questionnaires were collected, with 5, 762 being deemed valid. This questionnaire includes demographic information and satisfactio n scale two parts. The demographic information includes gender, grade, ranking, and others. S atisfaction scale includes: course teaching, teacher teaching, teaching resources, cooperation a nd communication, and the improved ability of quality, with a total of 33 items. The topic des ign use five-point scale of Likert. There were 1,929 boys students, accounting for 33.5%, and 3,833 girls, accounting for 66.5%. The participants were 2,729 freshmen accounting for 47.36 %, 1,410 sophomores accounting for 24.47%, 1,300 juniors accounting for 22.56%, and 323 s eniors accounting for 5.6%. The top 10 students were 1070, accounting for 18.57%; the middl e students were 3992, accounting for 69.28%; the bottom 10 students were ranked in 700 stud ents, accounting for 12.15 students.

2.2 Research Tool

This study is based on a new round of undergraduate education and teaching audit and eva luation proposed by the Ministry of Education in 2021. In order to grasp the situation of educa tion and teaching in various universities, the Ministry of Education has compiled a satisfactio n questionnaire. Using this questionnaire as an instrument, with good reliability and validity, t herefore, it was not tested in this study. The 33 items in this questionnaire all use the Likert 5-point scale, and 1-5 represent "completely dissatisfied, relatively dissatisfied, general, relative

ly satisfied and completely satisfied" respectively. The higher the score, the better the evaluati on of the satisfaction of the university.

2.3 Statistical Method

In this study, SPSS 2.0 software is used to conduct data statistics and analyze the nature o f educational services of higher education institutions; understanding whether the evaluation o f school satisfaction is different by different gender, grade and student performance, to unders tand the overall influence of each dimension of satisfaction on satisfaction, so as to provide de cision-making basis for the later teaching management of the school.

3. Research Analysis

3.1 Test and Analysis of Male and Female Students in Each Dimension of Satisfaction

According to Table 1, students of different genders have significant differences in course teaching, teacher teaching, teaching resources, cooperation and communication, and the improved ability of quality. And the evaluation of males on each variable is higher than that of females.

Table 1

Verification of Gender Differences in each Dimension

Dimension	Male		Female		*t*	Difference Comparison
	M	*SD*	*M*	*SD*		
course teaching	2.049	0.690	2.132	0.593	-4.495	significance
teacher teaching	1.922	0.657	2.012	0.606	-5.025	significance
teaching resources	2.189	0.810	2.292	0.686	-4.825	significance
cooperation and communication	2.141	0.648	2.257	0.568	-6.685	significance
the improved ability of quality	2.015	0.371	2.096	0.595	-4.521	significance

3.2 A Single Factor Analysis of Different Dimensions of University Satisfaction in Different Grades

According to Table 2, students in the senior, junior, sophomore and freshman grades have significant differences in the four dimensions of course teaching, teacher teaching, teaching resources, communication and cooperation, and quality and ability. Further use of Tamhane method for ex post comparisons shows that senior students are more satisfied with these four dimensions than juniors, sophomores and freshmen.Senior, junior, sophomore and freshmen students are significant in the overall satisfaction of the university. After the comparison, the overall satisfaction evaluation of the university was higher than that of the junior, sophomore and freshman students.

Table 2
A Single Factor Analysis of each Dimension in Different Grades

Dimension	Grade	*n*	*M*	*SD*	*F*	Post-hoc
course teaching	senior	323	2.291	0.676	13.467***	senior> junior, senior>sophomore, senior> freshman
	junior	1300	2.136	0.646		
	sophomore	1410	2.096	0.603		
	freshman	2729	2.070	0.622		
teacher teaching	senior	323	2.158	0.713	15.823***	senior> junior, senior>sophomore, senior> freshman
	junior	1300	2.021	0.630		
	sophomore	1410	1.997	0.608		
	freshman	2729	1.934	0.615		
teaching resources	senior	323	2.497	0.840	16.648***	senior> junior, senior>sophomore, senior> freshman
	junior	1300	2.303	0.733		
	sophomore	1410	2.225	0.703		
	freshman	2729	2.214	0.725		
cooperation and communication	senior	323	2.299	0.648	3.051***	senior> junior, senior>sophomore, senior> freshman
	junior	1300	2.189	0.572		
	sophomore	1410	2.220	0.572		
	freshman	2729	2.222	0.618		
the improved ability of quality	senior	323	2.322	0.743	29.804***	senior> junior, senior>sophomore, senior> freshman
	junior	1300	2.126	0.627		
	sophomore	1410	2.070	0.599		
	freshman	2729	2.011	0.606		
satisfaction	senior	323	2.299	0.641	18.834***	senior> junior, senior>sophomore, senior> freshman
	junior	1300	2.139	0.565		
	sophomore	1410	2.106	0.544		
	freshman	2729	2.067	0.559		

3.3 Variance Analysis of Different Achievements in Different Dimensions of Satisfaction

According to Table 3, there are significant differences among the top ten, middle and bottom ten students in course teaching, teacher teaching, teaching resources, communication and cooperation, and quality and ability. Further using Tamhane method compares the top ten students, in the middle and lower ten of each variable. There were significant differences in the overall satisfaction of the top ten, middle and last ten students. The Tamhane method was used to compare the satisfaction of the top 10 scores less than the middle and the bottom ten students.

Table 3
A Single Factor Analysis of Different Ranking for Variables

Dimension	Ranking	*n*	*M*	*SD*	*F*	Post-hoc
course teaching	the top ten students	1070	2.062	0.660	5.286***	the top ten students<the middle students, the top ten students<the bottom 10 students
	the middle students	3992	2.105	0.612		
	the bottom 10 students	700	2.261	0.662		
teacher teaching	the top ten students	1070	1.929	0.651	6.744***	the top ten students<the middle students, the top ten students<the bottom 10 students
	the middle students	3992	1.986	0.607		
	the bottom 10 students	700	2.038	0.679		
teaching resources	the top ten students	1070	2.236	0.781	0.975***	the top ten students<the middle students, the top ten students<the bottom 10 students
	the middle students	3992	2.258	0.711		
	the bottom 10 students	700	2.286	0.768		
cooperation and communication	the top ten students	1070	2.085	0.606	8.622***	the top ten students<the middle students, the top ten students<the bottom 10 students
	the middle students	3992	2.214	0.578		
	the bottom 10 students	700	2.445	0.639		
the improved ability of quality	the top ten students	1070	2.028	0.660	5.348***	the top ten students<the middle students, the top ten students<the bottom 10 students
	the middle students	3992	2.069	0.604		
	the bottom 10 students	700	2.127	0.658		
satisfaction	the top ten students	1070	2.050	0.595	11.869***	the top ten students<the middle students, the top ten students<the bottom 10 students
	the middle students	3992	2.106	0.549		
	the bottom 10 students	700	2.183	0.594		

3.4 Descriptive Statistics and Correlation Matrix between Variables

As can be seen from Table 4, course teaching, teacher teaching, teaching resources, cooperation and communication, quality and ability are significantly and positively correlated

with overall satisfaction. The above correlation analysis shows that students' satisfaction with the university increases with the enhancement of students' satisfaction with the course teaching, teacher teaching, teaching resources, cooperation and communication, quality and ability.

Table 4
Correlation Analysis of the Study Variables

Dimension	1	2	3	4	5	6
course teaching	-					
teacher teaching	0.837***					
teaching resources	0.781***	0.746***				
cooperation and communication	0.531***	0.481***	0.464***			
the improved ability of quality	0.864***	0.867***	0.852***	0.510***		
satisfaction	0.926***	0.922***	0.886***	0.642***	0.958***	-

4.Conclusion and Suggestion

4.1 Overall Satisfaction and the Five Dimensions with Significantly Different in Gender

The results show that there are significant differences between males and females in the evaluation of school education and teaching, course teaching, teacher teaching, teaching resources, communication and cooperation, quality and ability, and the evaluation of school education and teaching is significantly better than that of males. Females have high satisfaction with teachers' teaching, course teaching, teaching resources and communication and cooperation. This may be because females usually pay more attention to details and are more sensitive to teachers' teaching methods, teaching content and interactions with classmates. In addition, females may be more likely to get help from teaching resources, such as books and experimental equipment, so as to improve their satisfaction with school education and teaching.

On the other hand, males have higher satisfaction in teaching resources, communication and cooperation than other variables, which may be because males usually pay more attention to practical operation and skill training, and are more satisfied with the practical activities and skill training in the school. At the same time, due to personality reasons, males may have relatively weak mastery and application ability of theoretical knowledge. Therefore, males have certain challenges in course learning, resulting in low satisfaction with course teaching.

In short, the differences between male and female students in the evaluation of school education and teaching satisfaction and course teaching, teacher teaching, teaching resources, communication and cooperation, quality and ability are mainly due to the differences in gender characteristics and interests and hobbies. Therefore, universities should fully consider these differences and take targeted measures to improve the satisfaction of education and teaching of all students.

4.2 The Evaluation of University Education and Teaching and the Five Dimensions with Significantly Different

The results show that students in different grades have significantly different satisfaction in the five dimensions of school education, and senior students have higher satisfaction with school education than lower grade students. Senior students are more satisfied with curriculum teaching, teaching resources and communication and cooperation than other variables, which may be because with the accumulation of learning experience. Senior students are more sensitive to school curriculum, teaching content and communication and interaction with classmates, and can better understand and master knowledge. In addition, senior students may be easier to get help from teaching resources, such as books, experimental equipment, etc., to improve their satisfaction with school education and teaching. Junior students may be in the course teaching, teacher teaching has certain challenges, mainly due to students just from high school to university, the university courses, teacher teaching, teaching resources do not adapt. Universities should take strategic measures to improve students' adaptation to college life and course study, so as to improve students' satisfaction with the school.

To sum up, the differences in students' satisfaction of different grades with school education and teaching and the five dimensions are mainly due to the differences in learning experience and interests. Therefore, universities should fully consider these differences and take targeted measures to improve the satisfaction of education and teaching of all students.

4.3 Analysis of School Teaching and Five Dimensions of Students with Different Ranking

The results show that the students' academic performance has a significant impact on the teaching evaluation of the university, but the better the student performance, the lower the satisfaction evaluation of the school.

There may be several possible reasons that below:

1. Students with high scores have higher requirements for university education and teaching. Students with high scores usually have higher academic expectations and standards, and they may have higher requirements on the quality of teaching, curriculum, teacher level, etc. Therefore, even if the university does well in these areas, high-score students may give lower satisfaction ratings because of their high expectations.

2. High score students pay more attention to personal development. Students with high score students tend to pay more attention to their academic and personal development, and they may think that university education and teaching should focus more attention on cultivating students' innovative and critical thinking skills, rather than just imparting knowledge. Therefore, if the university does not do well in these areas, high score students may give lower satisfaction ratings.

3. Students with high scores may have different evaluation standards for school education and teaching: different students may have different evaluation standards for school education and teaching. Students with high scores may pay more attention to teaching quality and curriculum setting, while students with low scores may pay more attention to teachers' attitude, classroom atmosphere and other aspects. Therefore, the high score students gave

lower satisfaction ratings than the achievement students.

In conclusion, students' academic performance has a significant impact on the evaluation of school education and teaching, but the low score of students' school satisfaction may be due to their higher expectations of school education and teaching, personal development, and easily susceptible to other factors.

4.4 Analysis on the relationship between dimensions and general satisfaction

The results show that the five dimensions (curriculum teaching, teacher teaching, teaching resources, communication and cooperation, and quality and ability) have a significant positive prediction effect on the overall satisfaction of students.

First, curriculum teaching is one of the important factors affecting students' overall satisfaction with the university. A quality curriculum and teaching method can improve students' learning effect and interest. Therefore, universities should focus on the design and improvement of the curriculum, and provide diverse and challenging teaching content to meet the learning needs of different students.

Second, teacher teaching is also an important factor affecting the overall students' satisfaction. Excellent teachers can stimulate students' enthusiasm for learning, provide personalized guidance and support, and help students to make progress. Therefore, universities should strengthen teacher training and development, and improve teachers' teaching ability and professional quality.

Third, teaching resources also have a significant positive impact on overall student satisfaction. Adequate teaching resources can provide students with the required learning materials and equipment to create a good learning environment. Therefore, universities should invest enough resources to improve teaching facilities and teaching tools to ensure that students can make full use of these resources to learn.

Fourth, exchanges and cooperation also play an important role in the overall satisfaction of students. Universities should encourage cooperative learning and communication among students and provide opportunities to engage students in various academic and cultural activities. This can enhance students' social skills and teamwork spirit, and improve their satisfaction with the university.

Finally, literacy ability is an important predictor of students' overall satisfaction with the university. Universities should pay attention to cultivating students' comprehensive quality, including thinking ability, innovation ability, communication ability and so on. This can help students to better adapt to the future social development and improve their satisfaction with the university.

To sum up, the five dimensions course teaching, teacher teaching, teaching resources, communication and cooperation, and quality and ability have a significant positive effect on predicting students' overall satisfaction.Universitie should strengthen the development of these aspects, constantly improve the quality of education and teaching, and improve students' satisfaction.

4.5 Research Suggestions

Satisfaction survey is one of the measures in China to implement the student-oriented education concept and pay attention to students' needs. Students' satisfaction evaluation with the university changes with their educational experience, practical experience and job-hunting needs. Regular follow-up survey of the samples to test whether the improved services meet the needs of students, so as to gradually improve the university management, curriculum construction, teacher development, resource allocation, etc. In addition, it is necessary to consider the evaluation of university education and teaching by the characteristics of different majors, and clarify the commonness and differences of students' satisfaction in different majors, In order to effectively guide teaching management and better serve students.

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Deciphering the Dynamics: A Self-Report Correlational Investigation into Workplace Stress, Procrastination, and Job Satisfaction amongst Employees at Academic Institution

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Abstract

The study leverages a robust empirical framework, analyzing data from a meticulously curated cohort of 217 Chinese nationality teachers employed at a private university specializing in science and technology. The research sample, characterized by a balanced gender distribution and diverse educational attainment, provides a comprehensive foundation for examining the multifaceted impacts of stress on occupational outcomes. Employing validated instruments such as the Job Stress Scale, Procrastination at Work Scale (PAWS), and the Overall Job Satisfaction measure, this study elucidates the nuanced gender-specific and educational level-based patterns in stress, procrastination, and job satisfaction. The findings reveal significant gender disparities, with males reporting lower job stress but higher procrastination and lower job satisfaction compared to their female counterparts, who exhibit elevated stress yet maintain higher job satisfaction and lower procrastination. Furthermore, the study delineates the correlation between educational attainment and the observed variables, highlighting that higher educational levels correlate with increased job stress but improved procrastination management and sustained high job satisfaction. Through rigorous statistical analyses, including Pearson correlation and regression models, the research substantiates the inverse relationship between workplace stress and both procrastination behavior and job satisfaction, reinforcing the imperative for tailored organizational interventions. This investigation not only contributes to the existing body of knowledge but also underscores the critical need for gender-sensitive and educational level-specific strategies to mitigate workplace stress and enhance job satisfaction, thereby fostering a healthier and more productive academic workforce.

Keywords: Workplace Stress, Procrastination Behavior, Job Satisfaction, Chinese Employees

1. Introduction

1.1 Background of the Study

Workplace stress constitutes a pervasive issue that significantly impinges upon employees' performance. From a psychological standpoint, stress influences employees' mental states, impacting their productivity and efficiency at work. Research delineates divergent perspectives on the correlation between work stress and employee performance. One school of thought posits a positive relationship, where stress acts as a motivational force driving enhanced

performance (Antara, 2020). Conversely, an opposing view underscores the detrimental effects of stress, indicating that excessive stress burdens employees, thereby diminishing their work efficiency (Bashir, 2017; Cheng et al., 2019). An intermediate perspective suggests a non-linear, inverted U-shaped relationship, where moderate stress levels optimize performance, while both low and high stress levels impair it (Demand-control-Social support model of work stress, 2014). Notwithstanding these theoretical paradigms, empirical data remain inconclusive, necessitating further scholarly inquiry (Jones & Boye, 1992).

Moreover, workplace stress adversely affects employees' mental health and occupational satisfaction (Pawar, 2019). Chronic exposure to stressors, such as high job demands, low control, and inadequate social support, precipitates a spectrum of mental health issues, including anxiety, depression, and burnout (Liu et al., 2024; Garcia et al., 2016). The demand–control–support (DCS) model explicates how high-stress environments exacerbate these psychological conditions, impairing cognitive and emotional functioning (Demand-control-Social support model of work stress, 2023). Furthermore, stress induces procrastination, a maladaptive behavior characterized by the postponement of tasks, which compounds stress and undermines performance (Metin, 2022). Procrastination's adverse effects are manifold, encompassing increased stress, diminished job satisfaction, and impaired occupational performance (Nyberg, 2021). Therefore, understanding the intricate interplay between stress, procrastination, and mental health is imperative for devising efficacious stress management strategies (Sun, 2014). Altogether, the deleterious impact of workplace stress on employees is multifaceted, affecting performance, mental health, and occupational satisfaction. Addressing these issues requires a holistic approach that incorporates workload management, organizational support, and mental health resources (Stufano et al., 2022). Employers must foster a conducive work environment that mitigates stressors and promotes employee well-being, thereby enhancing overall productivity and job satisfaction (Suparman, 2024). Through continued research and practical interventions, it is possible to mitigate the adverse effects of workplace stress and cultivate a healthier, more productive workforce (Pisanti et al., 2018).

1.2 Problem Statement, Research Gap and Values

The pervasive issue of workplace stress presents a multifaceted challenge, significantly impinging upon employees' productivity and psychological well-being (McKee et al., 1992). Despite divergent theoretical perspectives—ranging from stress as a motivational catalyst to its role as a detrimental burden—the empirical evidence remains inconclusive, revealing a critical research gap (Klehe & Hooft, 2018). The demand–control–support (DCS) model highlights how high-stress environments exacerbate mental health issues, including anxiety, depression, and burnout, which in turn impair cognitive and emotional functioning (Liu et al., 2024; Wei & Song, 2024; Demand-control-Social support model of work stress, 2014;). Procrastination, a maladaptive response to stress, further compounds these adverse effects by perpetuating a cycle of stress and diminished performance (Metin, 2022; Nyberg, 2021). This complex interplay underscores the necessity for a holistic approach to stress management, incorporating workload management, organizational support, and robust mental health resources (Pawar, 2019). Addressing these issues is paramount to enhancing overall productivity and job satisfaction (Riyanto et al., 2021). Through rigorous scholarly inquiry and

practical interventions, it is imperative to develop strategies that mitigate the deleterious impact of workplace stress, thereby fostering a healthier, more resilient workforce (Sinambela, 2020; Zhang, 2023).

1.3 Research Objectives

In light of the prevailing issue of workplace stress and its multifaceted impact on employees' performance and well-being, this study endeavors to elucidate the intricate relationships between stress, procrastination behavior, and job satisfaction among organizational employees. Specifically, the objectives of this research are threefold:

1) To ascertain the general level and state of workplace stress, procrastination behavior, and job satisfaction among Chinese academic institutional employees according to the demographic variables (gender and educational levels)

2) To explore the correlations among workplace stress, procrastination behavior, and job satisfaction within this demographic

Correspondingly, the research questions formulated to guide this investigation are as follows:

1) What are the general levels and states of workplace stress, procrastination behavior, and job satisfaction among Chinese organizational employees based on the demographic variables (gender and educational levels)?

2) What are the correlations among workplace stress, procrastination behavior, and job satisfaction among Chinese academic institutional employees?

By addressing these questions, this research aims to contribute to the body of knowledge on workplace stress and its consequences, offering insights for developing effective stress management strategies and fostering a conducive work environment that enhances employee well-being and organizational productivity.

2. Literature Review

2.1 Notions of Workplace Stress, Procrastination Behavior, and Job Satisfaction

Workplace stress, a multifaceted phenomenon, arises when occupational demands exceed an individual's coping capacity, resulting in adverse physical and psychological responses. This stress can manifest as acute or chronic, with chronic stress being more prevalent in contemporary work settings. The transactional model of stress, which emphasizes the dynamic interaction between the individual and their work environment, provides a comprehensive framework for understanding workplace stress (Macdonald, 2018; Peterson, 2018). Additionally, stressors are categorized into work content and work context factors. Work content stressors include excessive workload, time pressure, role ambiguity, and lack of control over job-related decisions (Peterson, 2018). Work context stressors encompass poor interpersonal relationships, lack of managerial or colleague support, limited career development opportunities, and unsupportive organizational culture (Chandler, Berg, & Barry, 2018). Additional exacerbating factors include work-life imbalance, discrimination, and exposure to unpleasant or hazardous conditions (Mayhew, 2018; Cobb, 2022).

The impact of workplace stress on individuals and organizations is profound. Prolonged exposure to stress can lead to serious health problems such as cardiovascular diseases, musculoskeletal disorders, anxiety, depression, and burnout (Sharma, Cooper, & Pestonjee, 2021). Stress impairs cognitive function, leading to reduced productivity, increased absenteeism, and higher risks of accidents and errors (Weinberg, Sutherland, & Cooper, 2015). Organizational consequences include lower morale, increased turnover, and potential legal liabilities (Cooper, 2013). Managing and preventing workplace stress necessitates a proactive and holistic approach that addresses both individual and organizational factors. Employers must create supportive work environments that promote well-being and resilience through stress management training, employee assistance programs, and policies fostering work-life balance and open communication (Cobb, 2022). Individuals should develop effective coping strategies, such as time management, relaxation techniques, and seeking social support (Weinberg, Sutherland, & Cooper, 2015).

Procrastination, fundamentally defined as the voluntary postponement of tasks or the failure to meet deadlines despite awareness of potential adverse outcomes, epitomizes a significant lapse in self-regulation and time management. This behavior, often construed as self-defeating, manifests across various life domains, encompassing educational, professional, and personal contexts (Ferrari, Johnson, & McCown, 2013). The intricate nature of procrastination is further delineated through its classification into decisional, arousal, and avoidant types. Decisional procrastination pertains to delayed decision-making, arousal procrastination is linked to the emotional overwhelm that hampers task initiation, while avoidant procrastination involves evading tasks perceived as daunting (Schouwenburg, 1995). The determinants of procrastination are rooted in personal attributes, such as low conscientiousness and high neuroticism, coupled with situational influences like environmental distractions and unclear task instructions (Hen & Goroshit, 2018; Çakmak, 2023). Consequently, procrastination begets a plethora of negative repercussions, including diminished academic and professional performance, heightened stress, and impaired well-being (Sirois, 2022). Interventions targeting procrastination encompass time management strategies, acceptance-based behavior therapies, and cognitive restructuring, yet no singular approach has emerged as universally efficacious, underscoring the complexity of this behavior (Ferrari, Johnson, & McCown, 2014). Continued scholarly exploration is imperative to refine our understanding of procrastination and to devise nuanced, effective interventions tailored to mitigate its pervasive impacts on both individual and societal levels (Simpson, 2008; Bakhtiar & Kasim, 2017).

Job satisfaction is a multifaceted construct that encapsulates an employee's affective and cognitive appraisal of their work environment, responsibilities, and experiences (Spector, 2022). This construct is pivotal for both employee well-being and organizational success. Job satisfaction is deeply influenced by factors such as company culture, work-life balance, career development opportunities, job security, and recognition (Huang, 2020; Sinha, 2020). Employees who feel appreciated, supported by colleagues and management, and have a sense of purpose exhibit higher levels of job satisfaction. This satisfaction is divided into cognitive (evaluative) and affective (emotional) components. Cognitive satisfaction involves an objective evaluation of job facets like pay and promotion opportunities, while affective satisfaction reflects the emotional pleasure derived from the job (Locke, 2011). Edwin A. Locke's definition underscores the emotional state resulting from job appraisal (Locke, 2011). Moreover, job satisfaction can be assessed at both global and facet levels, with common facets including appreciation, communication, coworker relationships, and promotion opportunities

(Oshagbemi, 2013). Improving job satisfaction, through strategies such as recognition programs, flexible working hours, and career advancement opportunities, leads to increased productivity, reduced turnover, and a positive work environment (Geydar, 2020; Fahed-Sreih, 2020). In conclusion, job satisfaction is a complex, dynamic concept encompassing cognitive evaluations and affective emotions towards one's job, significantly affecting employee performance and organizational health (Witte, 2004; Carroll, 1973).

2.2 Research Framework among Current Research Variables

In this study, the theoretical framework integrates three pivotal constructs: workplace stress, procrastination, and occupational satisfaction. The transactional model of stress serves as the foundation for understanding workplace stress, positing that stress arises from the interaction between individual perceptions and environmental demands (Haque, 2022; McGregor & Caputi, 2022). This model is instrumental in elucidating how employees appraise stressors and their capacity to cope, influencing their psychological and physiological responses (Schonfeld & Chang, 2017). The demand–control–support (DCS) model further refines this understanding by highlighting the interplay between job demands, control over work, and social support in shaping stress outcomes (Theorell, 2020; Elgmark-Andersson, Larsen, & Ramstrand, 2017). Procrastination, characterized as the voluntary delay of intended tasks, is examined through the lens of self-regulation theory, which explains procrastination as a failure in self-control mechanisms (Pietrzak & Tokarz, 2016). This behavior is linked to immediate stress relief but ultimately exacerbates stress and hampers performance (Eleni Spyridaki & Galanakis, 2022). The intricate dynamics between procrastination and stress necessitate a comprehensive exploration of their bidirectional relationship (Sutton, 2020). Occupational satisfaction is grounded in the job characteristics model which posits that job satisfaction derives from meaningful work, autonomy, and feedback (Schonfeld & Chang, 2017). This model underscores the importance of job design in fostering satisfaction and mitigating stress (Haque, 2022; McGregor & Caputi, 2022). Integrating these theoretical perspectives, this research aims to elucidate the complex interrelationships among workplace stress, procrastination, and job satisfaction, thereby providing a nuanced understanding of how these variables interact to influence employee well-being and performance (Pietrzak & Tokarz, 2016; Sutton, 2020). The synthesis of these theories offers a robust framework for developing targeted interventions to enhance workplace environments and employee outcomes (Theorell, 2020; Elgmark-Andersson, Larsen, & Ramstrand, 2017). This approach allows for a thorough investigation into the intricate mechanisms that underlie occupational stress, procrastination, and job satisfaction, facilitating the development of comprehensive strategies to improve both individual and organizational outcomes (Eleni Spyridaki & Galanakis, 2022). By adopting a multidimensional perspective, this study seeks to contribute to the existing literature on occupational health psychology and inform practical interventions aimed at optimizing workplace dynamics and employee well-being (Schonfeld & Chang, 2017).

2.3 Correlational Studies and Hypotheses

The extant literature on the empirical correlations between workplace stress and personal procrastination elucidates a complex interplay of personal and environmental factors influencing employee behavior. Procrastination, defined as the intentional deferment of tasks, often manifests through engagement in unrelated activities, thereby detrimentally impacting individual well-being, team dynamics, and organizational productivity (Bäulke, Daumiller, & Dresel, 2019; Moslemi, Ghomi, & Mohammadi, 2020). Scholarly investigations reveal two predominant theoretical frameworks: trait-based and situation-based procrastination. Trait-

based procrastination attributes the propensity to delay tasks to inherent personality traits such as neuroticism and deficient self-regulation (Bäulke et al., 2019; Moslemi et al., 2020), whereas situation-based procrastination posits that external stressors, including excessive workload and suboptimal job design, precipitate procrastination (Westman, Hobfoll, Chen, Davidson, & Laski, 2004; Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014). Central to this discourse is the Conservation of Resources (COR) theory, which conceptualizes procrastination as a resource-conservation strategy under perceived resource threat or loss (Hobfoll, 2005; Yıldırım, 2022). Empirical evidence differentiates hindrance stressors, perceived as insurmountable, which exacerbate procrastination, from challenge stressors, viewed as opportunities for growth, which mitigate procrastination (Kang & Jang, 2019; Abbas & Raja, 2018). Furthermore, neuroticism is consistently identified as a predictor of procrastination (Moslemi et al., 2020; Chenery & Monaghan, 2023), whereas conscientiousness serves as a mitigating factor, particularly in response to challenge stressors (Bäulke et al., 2019; Moslemi et al., 2020). The review underscores the necessity for further empirical studies employing experimental methodologies to establish causal links and broaden the scope across diverse industries (Halbesleben et al., 2014; Moake, 2017). Understanding the multifaceted nature of procrastination within the workplace is imperative for devising effective management strategies to enhance employee performance and organizational efficiency (Westman et al., 2004; Halbesleben et al., 2014). Based on the review of the extant literature on the empirical correlations between workplace stress and personal procrastination, the researcher proposes the following research hypothesis:

Research Hypothesis 1: Workplace stress is positively correlated with employees' procrastination behavior

On the other hand, research unequivocally elucidates the intricate dynamics between workplace stress and job satisfaction. Workplace stress, characterized by an imbalance between job demands and an individual's coping capacity, encompasses excessive workloads, time pressures, interpersonal conflicts, and organizational changes (Hole, 2018; Kavuran & Camcib, 2023). These stressors not only impair employees' psychological and physiological well-being but also diminish job satisfaction, which is the affective orientation an employee has towards their work (Kim & Ahn, 2019; Baker & Alshehri, 2020). Empirical evidence consistently demonstrates a negative correlation between job stress and job satisfaction. High levels of stress correlate with decreased job satisfaction, as stressed employees often exhibit lower utilization of their skills and experience, thereby undermining organizational performance (Khalatbari, Ghorbanshiroudi, & Firouzbakhsh, 2013; Kim & Ahn, 2019). This negative relationship is supported by studies revealing that stress-induced burnout significantly reduces job satisfaction and overall productivity (Hassani, Sedaqat, & Kazemzadehbeytali, 2017; Kim & Ahn, 2019). Conversely, job satisfaction functions as a critical buffer against stress, fostering a supportive work environment that enhances employee morale, motivation, and engagement (Kavuran & Camcib, 2023; Hussain, Iqbal, & Rehman, 2023). This duality underscores the necessity for organizations to mitigate stressors through strategic interventions, such as fostering a supportive culture and providing adequate resources, to bolster job satisfaction and, consequently, enhance organizational performance (Hussain et al., 2023; Kavuran & Camcib, 2023). Hence, The researcher presents the second research hypothesis derived from an extensive and meticulous review of the existing literature:

Research Hypothesis 2: A significant negative correlation exists between workplace stress and employees' job satisfaction

Last but not least, procrastination, often characterized as a behavioral tendency to delay task performance or decision-making, is linked to heightened workplace anxiety and stress. Empirical evidence substantiates that employees who procrastinate experience elevated tension and report diminished job satisfaction (Pollack & Herres, 2020; Sudhir, Petwal, & Mehrotra, 2021). For instance, studies indicate that procrastinating individuals seek immediate gratification, leading to task accumulation and increased anxiety, which adversely affects job satisfaction (Pollack & Herres, 2020; Sudhir et al., 2021). The concept of delay of gratification, the voluntary postponement of immediate rewards for long-term benefits, inversely correlates with procrastination (Mohsin & Ayub, 2014; Liu & Wang, 2021). Research indicates that individuals capable of delaying gratification exhibit lower levels of stress and greater job satisfaction (Liu & Wang, 2021; Zang & Feng, 2023). Despite the plethora of studies linking academic procrastination with stress, there is a dearth of research focusing on procrastination within workplace settings (Wei et al., 2023; Chung, 2018; Mohsin & Ayub, 2014). Notably, workplace stress is identified as excessive demands placed on employees, exceeding their coping resources, which inversely affects job satisfaction (Kumcagiz, Ersanli, & Alakus, 2014; Baker & Alshehri, 2020). Cross-cultural studies highlight an inverse relationship between job-related stress and satisfaction, emphasizing the necessity for further research in diverse cultural contexts, such as Pakistani high school teachers (Mohsin & Ayub, 2014; Wilson, 2021). This study aims to bridge this research gap, providing valuable insights into the dynamics of procrastination, delay of gratification, and their impact on job satisfaction, ultimately informing strategies to enhance teacher time management and occupational well-being (Mohsin & Ayub, 2014; Rajbhandari, 2023). Given the robust evidence within the extant literature that elucidates a significant inverse relationship between procrastination and job satisfaction, the researcher proposes the third research hypothesis as follows:

Research Hypothesis 3: Procrastination behavior exhibits a negative correlation with employees' job satisfaction

3. Methodology

3.1 Research Sample

In this empirical investigation, a precisely curated cohort of 217 Chinese nationality teachers (N=217), employed at a private university specializing in science and technology within China, was examined. The sample encompassed a balanced gender distribution, comprising 102 males (N=102, 47%) and 115 females (N=115, 53%). Educationally, the cohort included 55 participants (N=55, 25.3%) holding a B.A degree, 95 participants (N=95, 43.8%) with an M.A degree, and 67 participants (N=67, 30.9%) with a Ph.D. degree. The demographic data of the study participants has been systematically delineated and is comprehensively encapsulated within Table 1 presented below. This tabulation offers a detailed enumeration of the pertinent demographic characteristics of the participant cohort, thereby providing a foundational context for the ensuing analytical discourse.

Table 1

Demographic Characteristics of Current Research Samples

Variable	Categories	Frequency (N)	Percentage (%)
Gender	Male	102	47.0
	Female	115	53.0
Educational Levels	B.A. degree	55	25.3
	M.A. degree	95	43.8
	Ph.D. degree	67	30.9

3.2 Research Instrument, Validity, and Reliability

The research employed three validated instruments to measure workplace stress, procrastination, and job satisfaction among employees at an academic institution. The first instrument, the Job Stress Scale (Parker & DeCotiis, 1983), comprises 13 items distributed across two dimensions: time stress (8 items) and job anxiety (5 items). The instrument demonstrated high reliability, with Cronbach's alpha values of 0.86 for time stress and 0.74 for job anxiety. The exploratory factor analysis revealed two factors accounting for 77.5% of the variance, signifying the robust factorial validity of the instrument. The corrected item-total score correlations ranged from 0.61 to 0.79 for time stress and from 0.61 to 0.75 for job anxiety, further substantiating the internal consistency of the scale.

The second instrument, the Procrastination at Work Scale (PAWS), developed and validated by Metin (2022), measures procrastination through 12 items rated on a five-point Likert scale ranging from 1 (never) to 5 (always). The PAWS exhibits excellent reliability, with an overall Cronbach's alpha of 0.91. The scale assesses two dimensions: soldiering (6 items) and cyberslacking (6 items), with Cronbach's alpha values of 0.90 and 0.86, respectively. This high internal consistency confirms the reliability of the scale in measuring procrastination behaviors at work. The third instrument, the Overall Job Satisfaction measure, originally developed by Brayfield and Rothe (1951) and later adapted, consists of 18 items on a five-point Likert scale. Reliability assessments of the measure have yielded coefficient alpha values ranging from 0.88 to 0.91, while the six-item version's reliability ranged from 0.83 to 0.90. The instrument's validity is supported by positive correlations with job facets, autonomy, distributive justice, and other organizational variables, and negative correlations with family-work conflict and role ambiguity. Confirmatory factor analysis further distinguishes this measure from related constructs, affirming its empirical validity. The delineation of the research instruments employed in the present study has been comprehensively depicted in Table 2.

Table 2

Breakthrough of the Research Instruments for the Current Study

Instrument	Researcher	Dimensions	Items	Reliability	Validity
Job Stress Scale (JSS)	Parker & DeCotiis, (1983)	Time Stress, Job Anxiety	13	0.86 (Time Stress), 0.74 (Job Anxiety)	EFA: Two factors, 77.5% variance; substantial relationships with organizational stressors
Procrastination at Work Scale (PAWS)	Metin (2022)	Soldiering, Cyberslacking	12	0.91 (Overall), 0.90 (Soldiering), 0.86 (Cyberslacking)	High internal consistency; validated through sample B
Overall Job Satisfaction (OJS)	Brayfield & Rothe (1951)	One-dimensional	18	0.88-0.91 (18-item), 0.83-0.90 (6-item)	Correlates with job facets, autonomy, and other variables; distinct from related constructs

3.3 Research Procedure

The research procedure commenced in January 2024 with the adoption and adaptation of three validated scales, subsequently reorganized into a comprehensive electronic questionnaire. By February 2024, this instrument was meticulously compiled, the questionnaire link generated, and all preparations completed. In March 2024, the questionnaire link was strategically disseminated to the Research and Development (R&D) department of a private university specializing in science and technology within China. The data collection phase yielded 234 questionnaire responses, of which 17 were deemed invalid due to incomplete items, resulting in 217 (N=217, 92.7% collected rate) valid questionnaires available for subsequent data analysis. This methodical approach ensured a robust data collection framework, underpinning the rigor and reliability essential for the subsequent analytical phases of this empirical investigation. Through this structured process, we aim to derive nuanced insights into the interrelations of workplace stress, procrastination, and job satisfaction, contributing to the broader discourse on occupational well-being within academic institutions.

4. Results

4.1 Job Stress, Procrastination Behavior, Job Satisfaction: Gender Disparity Perspective

This section elucidates the empirical findings pertaining to workplace stress, procrastination behaviors, and job satisfaction among male and female employees within an academic institution, analyzed by gender as indicated in Table 3, Figure 1 & 2. The study engaged 217 participants, divided into 102 males and 115 females. The overall mean values for job stress, procrastination, and job satisfaction revealed significant gender disparities. Males reported an average job stress level of X=4.23 (SD=.81), procrastination at X=4.52 (SD=.70), and job satisfaction at X=3.02 (SD=.59). In contrast, females demonstrated higher job stress (X=4.52, SD=.78) but lower procrastination (X=3.04, SD=.76) and higher job satisfaction (X=3.98, SD=.60). The male cohort exhibited a propensity towards elevated procrastination behaviors, juxtaposed with moderate job satisfaction levels. Females, however, experienced higher job stress levels concomitant with substantial job satisfaction and comparatively minimal procrastination. These findings indicate a potential inverse relationship between procrastination and job satisfaction among the female demographic, suggesting that increased job stress does not necessarily correlate with diminished job satisfaction. The aggregated data provides a nuanced understanding of the psychological and behavioral dynamics within academic institutions, delineating gender-specific patterns that necessitate tailored organizational interventions to mitigate stress and enhance job satisfaction.

Table 3

Male vs. Female toward Job Stress, Procrastination Behavior, and Job Satisfaction

Gender	Ave. Job Stress (X)	Ave. Procrastination (X)	Ave. Job Satisfaction (X)
Male	4.23 (High)	4.52 (Extremely High)	3.02 (Medium Low)
Female	4.52 (Extremely High)	3.04 (Medium Low)	3.98 (High)

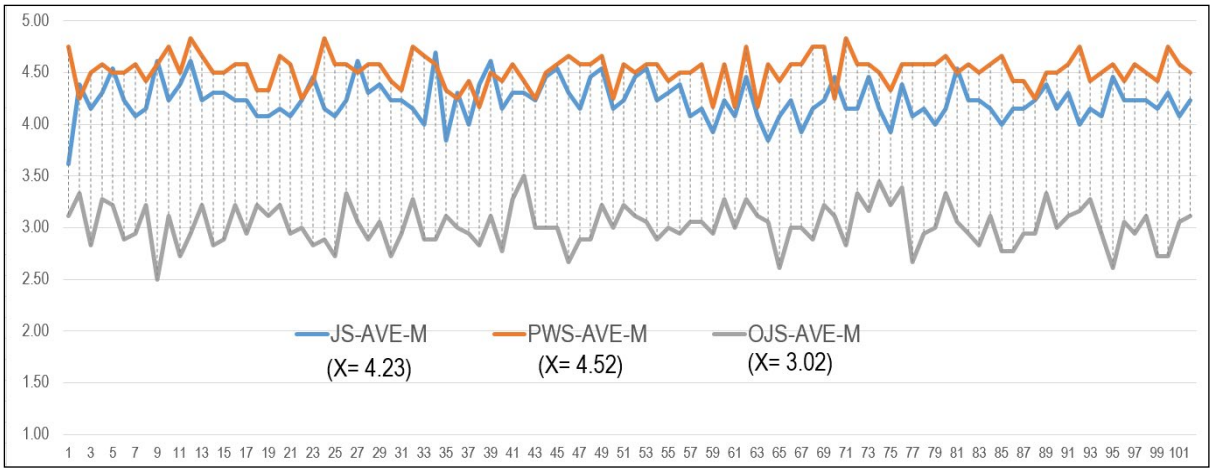

Figure 1

Means of Male Participants' Job Stress, Procrastination and Job Satisfaction (N=104)

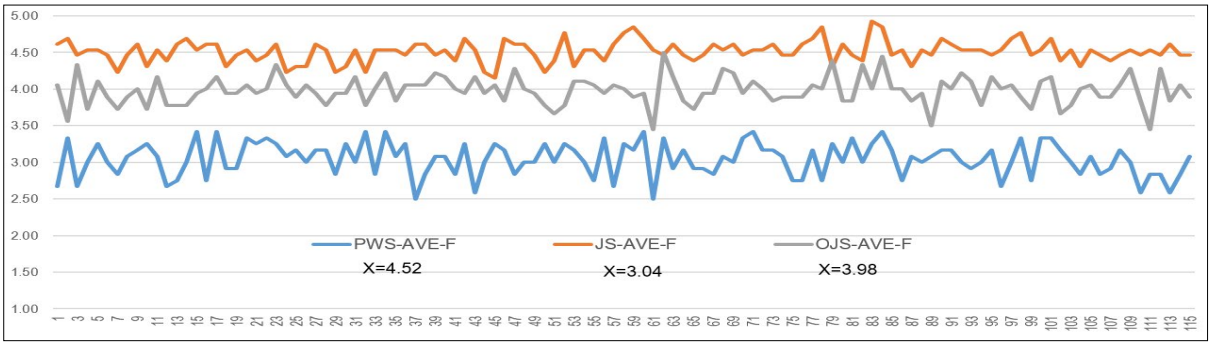

Figure 2

Means of Female Participants' Job Stress, Procrastination and Job Satisfaction (N=115)

4.2 Job Stress, Procrastination Behavior, Job Satisfaction: Educational Level Perspective

On the other hand, the findings reveal distinct trends in workplace stress, procrastination behavior, and job satisfaction across employees with varying educational levels within a Chinese academic institution as presented in Table 4, Figure 3, 4 & 5. Among those holding a Bachelor's degree (BA) (N=55), the average job stress level is moderately high (X=3.58, SD=.87), while procrastination behavior is notably pronounced (X=4.00, SD=.76). Conversely, job satisfaction is relatively elevated (X=4.53, SD=.91). For employees with a Master's degree (MA) (N=95), job stress exhibits a substantial increase (X=4.27. SD=.72), coupled with a considerable decrease in procrastination (X=2.99, SD=.65), and consistently high job satisfaction (X=4.50, SD=.64). In contrast, Ph.D. holders (N=67) experience the highest job stress levels (X=4.48, SD=.85), coupled with moderate procrastination (X=3.00, SD=.58) and

sustained high job satisfaction (X=4.48, SD=.69). The data delineates a pattern wherein higher educational attainment correlates with increased job stress and a nuanced impact on procrastination and job satisfaction. Specifically, job stress intensifies with higher education levels, reflecting perhaps the augmented responsibilities and expectations associated with advanced academic roles. Procrastination is inversely related to educational attainment, suggesting improved time management skills among more educated employees. Job satisfaction, however, remains consistently high across all educational levels, indicating a pervasive sense of fulfillment despite varying stress and procrastination levels.

Table 4

Educational Levels toward Job Stress, Procrastination Behavior, and Job Satisfaction

Education	Ave. Job Stress (X)	Ave. Procrastination (X)	Ave. Job Satisfaction (X)
BA	3.58 (Medium High)	4.00 (High)	4.53 (Extremely High)
MA	4.27 (Extremely High)	2.99 (Medium Low)	4.50 (Extremely High)
Ph.D.	4.48 (Extremely High)	3.00 (Medium)	4.48 (Extremely High)

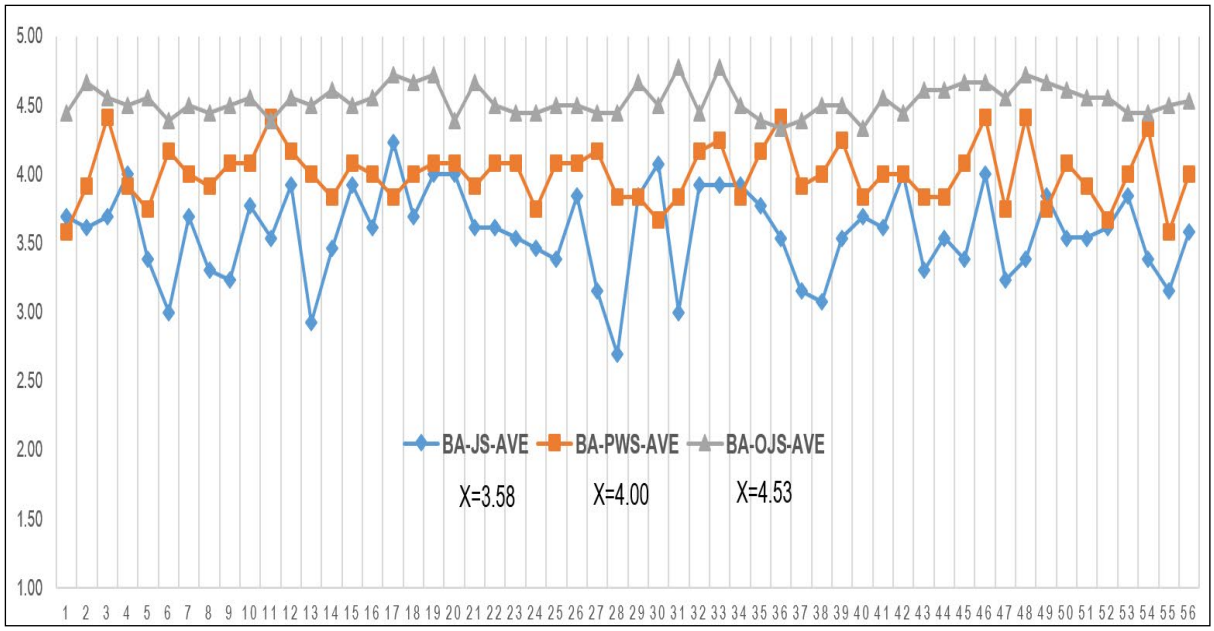

Figure 3

BA-Holder Participants' Job Stress, Procrastination and Job Satisfaction (N=55)

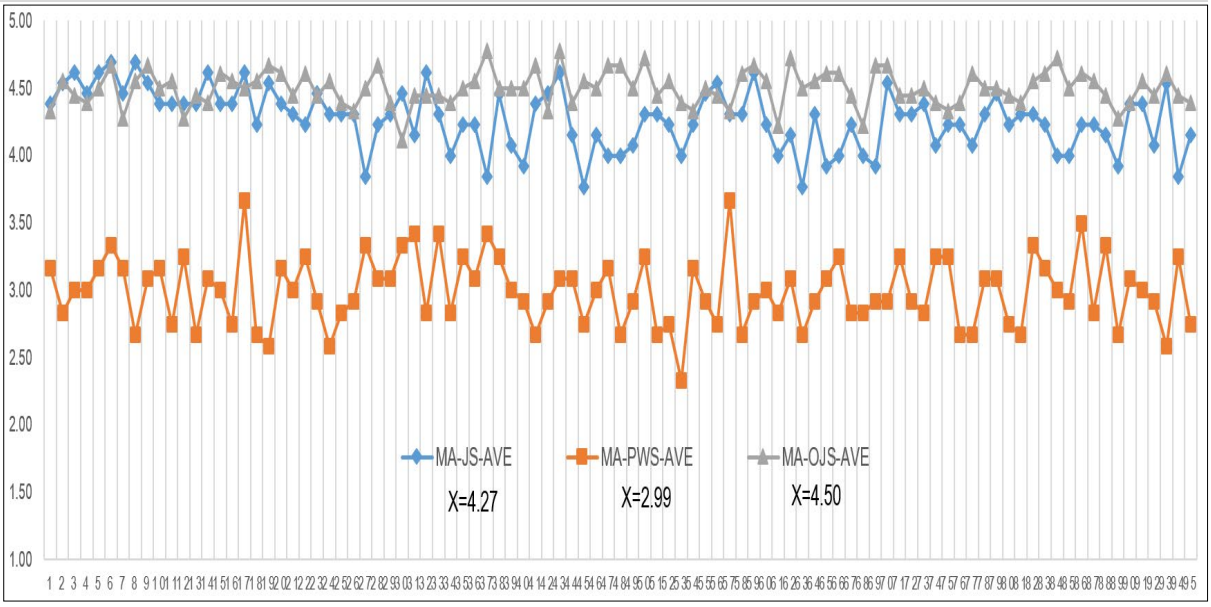

Figure 4

MA-Holder Participants' Job Stress, Procrastination and Job Satisfaction (N=95)

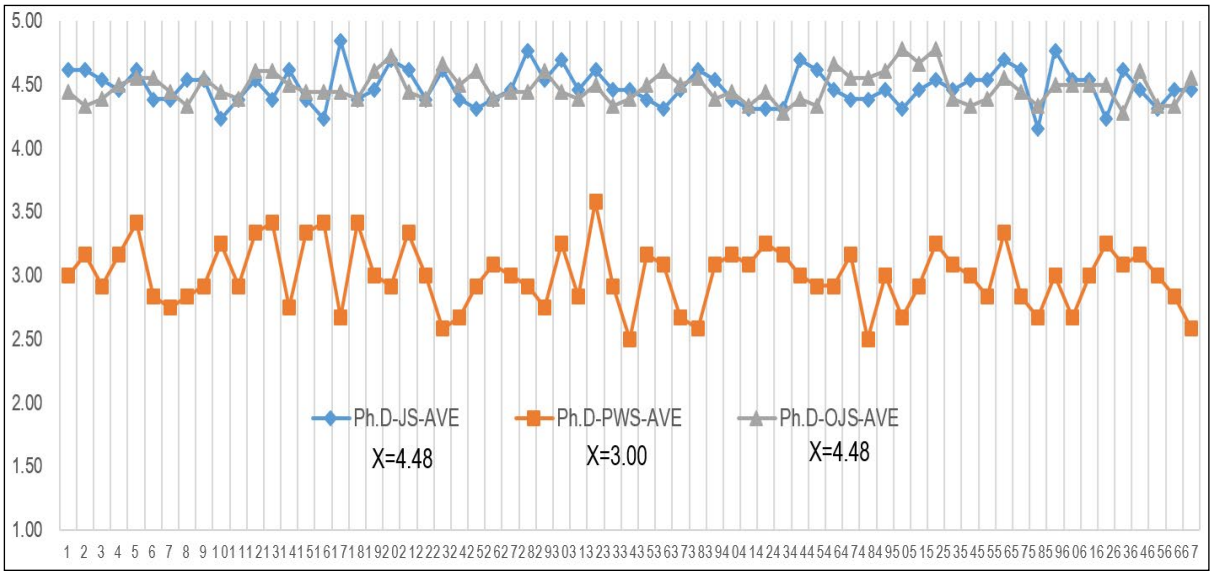

Figure 5

Ph.D.-Holder Participants' Job Stress, Procrastination and Job Satisfaction (N=67)

4.3 Interplay of Correlations among Job Stress, Procrastination Behavior, Job Satisfaction

The present study examined the correlations among workplace stress, procrastination behavior, and job satisfaction within the context of Chinese academic institutional employees. The results, derived from Pearson correlation coefficients, underscore significant interrelationships among the variables of interest as shown in Table 5. Notably, a positive correlation of moderate strength ($r = .660$, $p < .01$) was observed between procrastination behavior and job satisfaction, indicating that increased procrastination behavior is associated with heightened job satisfaction. Conversely, workplace stress exhibited a robust negative correlation with both procrastination behavior ($r = -.906$, $p < .01$) and job satisfaction ($r = -.629$,

<.01). These findings suggest that as workplace stress intensifies, both procrastination behavior and job satisfaction diminish. The inverse relationship between workplace stress and job satisfaction underscores the detrimental impact of stress on employees' overall job contentment, reinforcing the necessity for institutional interventions aimed at mitigating stressors. The data elucidates the complex dynamics underpinning employee behaviors and perceptions within academic environments, providing a nuanced understanding that can inform organizational strategies to foster a more supportive and productive work atmosphere.

Table 5

Interplay of the Correlations among Three Variables (N=217)

	Mean	Std. Deviation	N
Job Stress	4.3663	.20681	217
Procrastination	3.7103	.75950	217
Overall Job Satisfaction	3.5257	.54813	217

		Job Stress	Procrastination	Overall Job Satisfaction
Job Stress	Pearson Correlation	-	.660**	-.629**
	Sig. (2-tailed)			
Procrastination	Pearson Correlation	.660**	-	
	Sig. (2-tailed)	.000		
Overall Job Satisfaction	Pearson Correlation	-.629**	-.906**	-
	Sig. (2-tailed)	.000	.000	

*** Correlation is significant at the 0.01 level (2-tailed)*

4.4 Examination of the Research Hypotheses

The correlation analysis, detailed in the descriptive statistics, reveals significant findings. The Pearson correlation between job satisfaction (JS) and workplace stress (WPS) is 0.660, significant at the 0.01 level, affirming Hypothesis 1 that workplace stress positively correlates with employees' procrastination behavior. Moreover, the Pearson correlation between job satisfaction (JS) and overall job satisfaction (OJS) is -0.629, significant at the 0.01 level, confirming Hypothesis 2, which posits a significant negative correlation between workplace stress and employees' job satisfaction. Furthermore, Hypothesis 3, which suggests a negative correlation between procrastination behavior and job satisfaction, is substantiated by the Pearson correlation between PWS and OJS, recorded at -0.906 and significant at the 0.01 level.

The linear regression analysis further elucidates these relationships, offering predictive insights. The model summary for predicting overall job satisfaction, with job stress and procrastination as predictors, shows an R Square of .824, indicating that approximately 82.4% of the variance in overall job satisfaction is accounted for by these predictors. The ANOVA results confirm the model's significance ($F=496.452$, $p < 0.001$). The coefficients table reveals that both job stress ($\beta=.285$, $p < 0.001$) and procrastination ($\beta=-.381$, $p<0.001$) are significant predictors of overall job satisfaction, reinforcing Hypotheses 1 and 3. A separate regression analysis predicts job stress with procrastination as the sole predictor, yielding an R Square of .549, signifying that 54.9% of the variance in job stress is explained by procrastination behavior. The ANOVA results again indicate a significant model ($F=262.129$, $p<0.001$), and the coefficients table highlights that procrastination is a significant predictor of job stress ($\beta=-.680$, $p<0.001$), thereby validating Hypothesis 2. Table 6, 7 and 8 comprehensively

enumerates the results of the empirical test conducted on the research hypotheses. This summary table systematically delineates the findings, providing a clear and concise overview of the hypothesis testing outcomes. The table serves as an integral component of our research, encapsulating critical data that substantiates the theoretical framework and empirical inquiries posited in this study.

Table 6

Summary of Linear Regression Analysis (OJS-P-WPS)

R	R Square	Adjusted R Square	Std. Error of the Estimate
907[a]	.824	.821	.23188

a. Predictors: (Constant), Procrastination, Job Stress

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	53.389	2	26.694	496.452	.000[b]
Residual	11.507	214	.054		
Total	64.896	216			

a. Dependent Variable: Overall Job Satisfaction

b. Predictors: (Constant), Procrastination, Job Stress

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3.580	.670		5.347	.000
Procrastination	-.381	.092	-.381	-4.134	.000
Job Stress	.285	.101	.285	2.835	.000

a. Dependent Variable: Overall Job Satisfaction

Table 7

Summary of Linear Regression Analysis (OJS-P-WPS)

R	R Square	Adjusted R Square	Std. Error of the Estimate
.741[a]	.549	.547	.31133

a. Predictors: (Constant), Procrastination

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.407	1	25.407	262.129	.000[b]
Residual	20.839	215	.097		
Total	46.246	216			

a. Dependent Variable: Job Stress

b. Predictors: (Constant), Procrastination

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	6.349	.138		46.099	.000
Procrastination	-.647	.042	-.680	-16.190	.000

a. Dependent Variable: Job Stress

Table 8
Summary of the Research Hypotheses Test

Hypothesis	Relationship	Correlation Coefficient (r)	Sig. (p)	Regression Coefficients (β)	Sig. (p)
H1	Positive correlation between workplace stress and procrastination behavior	.660**	p< .01	-.680	p<.001
H2	Negative correlation between workplace stress and job satisfaction	-.629**	p< .01	.285	p<.001
H3	Negative correlation between procrastination behavior and job satisfaction	-.906**	p< .01	-.381	p<.001

5. Conclusion & Discussion

The present study offers a comprehensive analysis of the intricate interplay among workplace stress, procrastination behavior, and job satisfaction within an academic institution in China, delineating significant insights based on demographic variables of gender and educational levels. The empirical findings underscore the gender disparities in stress levels, procrastination tendencies, and job satisfaction. Males reported lower job stress but higher procrastination and lower job satisfaction compared to females, who experienced elevated stress yet reported higher job satisfaction and lower procrastination. These gender-specific patterns reveal a complex dynamic, suggesting that while male employees may engage more in procrastination, it does not translate to enhanced job satisfaction, contrary to their female counterparts who, despite experiencing higher stress, maintain higher job satisfaction. This finding highlights a potential inverse relationship between procrastination and job satisfaction, particularly among females, necessitating targeted interventions to address the unique stressors and motivational factors influencing each gender (Baker & Alshehri, 2020; Badiru & Racz, 2018; Bashir, 2017).

More than that, the study elucidates the impact of educational levels on the observed variables, revealing that higher educational attainment correlates with increased job stress, albeit with improved procrastination management and sustained job satisfaction. Bachelor's degree holders exhibited moderate job stress and high procrastination but maintained relatively high job satisfaction. In contrast, employees with Master's and Ph.D. degrees reported higher stress levels with a notable reduction in procrastination, yet they sustained high job satisfaction (Chenery & Monaghan, 2023; Chaudhuri, 2022). This pattern suggests that advanced

educational qualifications may equip employees with better time management skills, reducing procrastination despite increased stress. Nevertheless, the consistent high job satisfaction across educational levels indicates that job fulfillment in academic roles may be influenced by intrinsic factors such as intellectual engagement and professional development opportunities (Eleni Spyridaki & Galanakis, 2022; Elgmark-Andersson et al., 2017). The study's conclusions reinforce the necessity for tailored organizational strategies that address the specific needs of employees based on their gender and educational background, aiming to mitigate stress and enhance job satisfaction.

6. Implications and Future Directions

The implications of this study are manifold, offering valuable insights for organizational management within academic institutions. Firstly, the observed gender disparities in job stress, procrastination, and job satisfaction necessitate the development of gender-sensitive interventions. For male employees, strategies aimed at reducing procrastination and enhancing job satisfaction are imperative, potentially through the implementation of structured time management training and motivational support programs (Chung, 2018; Cobb, 2022). Conversely, for female employees, stress reduction initiatives such as mindfulness training, stress management workshops, and fostering a supportive work environment are critical to sustaining their high levels of job satisfaction (Haque, 2022; Halbesleben et al., 2014). Addressing these gender-specific needs can contribute to a more balanced and productive workplace, enhancing overall employee well-being and organizational performance (Hen & Goroshit, 2018; Hobfoll, 2005). In terms of educational levels, the findings suggest that higher educational attainment is associated with increased job stress, necessitating the implementation of stress management and mental health support tailored to the needs of highly educated employees (Jones & Boye, 1992; Hole, 2018). Additionally, the consistent high job satisfaction across all educational levels underscores the importance of maintaining intellectually stimulating work environments and opportunities for professional growth. Institutions should consider developing mentorship programs, continuous learning opportunities, and platforms for academic collaboration to foster job satisfaction and reduce stress among employees with advanced degrees (Kang & Jang, 2019; Kavuran & Camcib, 2023).

Future research should expand on this study by exploring the underlying psychological and contextual factors contributing to the observed relationships. Longitudinal studies could provide deeper insights into how workplace stress, procrastination behavior, and job satisfaction evolve over time and the long-term effectiveness of implemented interventions (Klehe & Hooft, 2018; Kumcagiz et al., 2014). Furthermore, cross-cultural comparisons could illuminate the generalizability of these findings beyond Chinese academic institutions, offering a broader understanding of these dynamics in diverse organizational settings. Investigating additional demographic variables such as age, job tenure, and specific academic roles could also enrich the understanding of how these factors influence workplace stress, procrastination, and job satisfaction (Hussain et al., 2023; Liu & Wang, 2021). Ultimately, this study lays the groundwork for ongoing research and practical applications aimed at fostering healthier and more satisfying work environments within academic institutions (Weinberg et al., 2015; Westman et al., 2004).

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China's Presumptive Reciprocity on Recognition and Enforcement of Foreign Judgments

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Abstract

China adopts presumptive reciprocity as a new principle for its recognition and enforcement of foreign judgments. It presumes that China is in reciprocal relationship with foreign state unless being proved, especially by refusal precedent, such foreign state denying that. This principle takes important role in the process of China's shift from de facto reciprocity to de jure reciprocity. It's of great value to the judicial efficiency of Chinese courts and overseas protection of China's creditor. However the specific rule of presumptive reciprocity is still vague and unstipulated in law. This article seeks to suggest rules for the application of this principle, by analysing the relevant theory, China's judicial practice and issues comprehensively. This article finds the following applicable rules. A prima facie ascertainment shall be applied before use of presumpitve reciprocity in order to exclude those foreign states which are impossible to meet de jure reciprocity. Ascertainment on refusal precedent should be on the basis of that precedent constitutes denial of reciprocal relationship, inequality of reciprocity or review of merits, instead of the mere result of that precedent.

Keywords: Recognition and Enforcement; Presumptive Reciprocity; Prima Facie Ascertainment; Review of Merits

1. Introduction

In bilateral international relationship regarding recognition and enforcement of foreign judgments [abbreviated as REFJ], the principle of reciprocity may be used by states on the condition that no corresponding treaty between them. Reciprocity, in this context and background, refers to such a treatment that requested state will recognize and enforce the judgment made by original state on the same method that original state recognizes and enforces the judgment made by requested state.

With rapid increase of China's investment towards foreign states under the Belt and Road Initiative, it's important for China to get its judgments concerning foreign affairs granted by foreign states. The 2019 Convention on the Recognition and Enforcement of Foreign Judgments in Civil or Commercial Matters [the Convention] was entered into force on September 1st, 2023, while China is not contracting party of this convention (Hague Conference on Private International Law [HCCH], 2023). Thus bilateral treaty and reciprocity are two main ways to get Chinese judgment granted by foreign states. In this situation, reciprocal relationship is easier to be reached than treaty.

For the purpose to establish reciprocal relationship broadly, China adopted in recent years a new principle called presumptive reciprocity. On the issue of REFJ, China presumes the existence of reciprocal relationship with foreign state unless being proved such foreign state denying the existence of reciprocal relationship with China. In a sense it constitutes a unilateral proposal to establish reciprocal relationship from China.

China takes REFJ important. China Civil Procedure Law [CCPL] got modified in 2024. Provisions regarding foreign affairs especially REFJ is the crucial part being modified. Nonetheless this amendment doesn't create rules for presumptive reciprocity. This principle only appears in official policy and judicial case in a form of principle. Thus the validity and applying method of presumptive reciprocity remain vague. Maybe this vagueness indicates the cautious attitude of China toward this principle.

In the absence of relevant rule entered into force, China's judicial practice is a very important way to formulate and fulfill the theory of presumptive reciprocity. To research the potential problems lies in judicial practice will help understanding and developing this principle.

Considering that Hong Kong, Macao and Taiwan have their own rule on REFJ, China mainly refers to China Mainland in this article.

2. The Adaptability of China's Rules to Reciprocity

Considering the equivalent feature of reciprocity, the domestic rules on REFJ of both requested state and original state need to be considered jointly. Only equivalent rules can allow these two states maintain a reciprocal relationship. Thus it's necessary to discuss whether China's rules on REFJ are acceptable to international community.

The CCPL stipulates the general rules on REFJ. Article 299 is about the method to decide whether to recognize and enforce foreign judgment. In this judicial procedure, firstly the court reviews whether the original state, which made the judgment to be reviewed, has relevant treaty with China, or be in reciprocal relationship with China. If the original state meets either relationship of treaty or reciprocity, secondly the court reviews whether the foreign judgment contradicts the basic principles of Chinese law or violates sovereignty, security and public interest of China. If neither of them is met, the court shall recognize the foreign judgment. And if the recognized foreign judgment needs to be enforced, the court shall then enforce it.

2.1 Definition of Foreign Judgement

The definition of foreign judgment in several domestic rules of these states determines whether their rules are equivalent on scope of application of REFJ.

Article 299 is applied for "legally effective judgment and order made by a foreign court". The definition of "judgment and order" determines the scope of application. Chinese court once enacted rules for court's trial on REFJ in a Minutes ("Minutes of the National Symposium on the Foreign-related Commercial and Maritime Trial Work of Courts," 2022). This Minutes stipulates specifically the "judgment and order" refers to legal documents that made decision on substantial dispute. It shall be verified by substantial content of legal document. Meanwhile, the definition of foreign judgment in the Convention is "any decision on the merits given by a court, whatever that decision may be called." Merits means the substantial rights and obligations of parties, and "substantial dispute" aforesaid should be interpreted as dispute that

determine the rights and obligations of parties. Therefore Chinese law and the Convention share a same definition on foreign judgment.

However, some common law states require the foreign judgment not only legally effective but also final. For example, Canada holds requirement of finality. If the foreign court retains the power to vary or otherwise modify or recall its own judgment, the judgment is not final and is thus not enforceable (Erin Hoult & Daniel Styler, 2018, p.48). Hong Kong also holds requirement of finality. In case Chiyu Banking Corp. Ltd. v. Chan Tin Kwun, [1996] 2 H.K.L.R.395 (H.C.), Hong Kong once refused recognizing a judgment of China Mainland on the grounds that the judgment is not final, which is because court in China Mainland is able to retrial the case which was made judgment by the court itself. But later Hong Kong made The Mainland Judgments in Civil and Commercial Matters (Reciprocal Enforcement) Ordinance (Cap.645) to recognize and enforce judgment of China Mainland in 2024. Finality of judgment is no longer an issue for China Mainland judgment to be recognized in Hong Kong. Singapore also holds requirement of finality, but China and Singapore is in reciprocal relationship. Requirement of finality is not an absolute reason to refuse recognition of China's judgment in common law states. But it remains a potential risk for China.

2.2 Review Procedure and Refusal Consideration

In the judicial procedure, applicant shall submit written application to the court with jurisdiction, and respondent shall be served by court, both applicant and respondent appear in front of court and make their allegations. Finally the recognition is made by a written order with effectiveness to enforcement. The main text of the order is in the form of "recognize [the code and name of foreign judgment] made by [the name of foreign court] on [the date of foreign judgment]". It means the order won't record the specific content of the main text of the foreign judgment.

The review of treaty is prior than of reciprocity, because treaty may have stipulated the specific rule and scope of review in the case. By directly searching and counting relevant treaties in Treaty Database of China, there are 38 foreign states which enacted civil and commercial judicial assistance treaty with China till 2023. The 38 states include Iran, Ethiopia, Brazil, Algeria, Kuwait, Bosnia and Herzegovina, Greece, Poland, Mongolia, Romania, Turkey, Ukraine, Cyprus, Peru, UAE, Argentina, Tunisia, Morocco, Hungary, Kyrgyzstan, Tajikistan, Russia, Cuba, Kazakhstan, Belarus, Egypt, France, Spain, Italy, Bulgaria, Laos, Lithuania, North Korea, Uzbekistan, Vietnam, Thailand, South Korea, and Singapore. Except treaties with Thailand, South Korea and Singapore, all the treaties aforesaid are with content of recognition and enforcement of judgment. Only if there's no treaty with content of recognition and enforcement will the court start reviewing reciprocal relationship.

Article 300 of the CCPL is the general rule to refuse REFJ, both under treaty and reciprocity. It includes the following conditions: (a) The court of origin has no jurisdiction; (b) The respondent's procedural rights in litigation get harmed; (c) The judgment is obtained by fraud; (d) The judgment is inconsistent with a prior judgment made by Chinese court; (e) The judgment contradicts the basic principles of Chinese law or violates sovereignty, security and public interest of China.

If any of these conditions is met, the foreign judgment will be refused. Comparing with the rules in the Convention and China's relevant treaties, they are in a high similarity. The Convention stipulates that recognition and enforcement may be refused if the defendant was not notified duly; the judgment was obtained by fraud; the judgment is incompatible with the public policy of requested state; the court of origin lacked jurisdiction; or, the judgment is inconsistent with a prior judgment. Considering the persuasive power of the Convention,

China's refusal rule on REFJ can be widely accepted by international community.

All these refusal conditions don't relate to the merits of foreign judgment. However there is one exception in Chinese law, if the main text of foreign judgment includes punitive damages and it's obviously beyond reasonable amount to cover actual loss, court may not recognize or enforce the excessive part of punitive damages.

In a conclusion, it's convincing that China's rules on REFJ are acceptable to international community.

3. China's Policy and Practice Regarding Presumptive Reciprocity

On the basis of the present domestic rules on REFJ, China is confident on advancing the principle of presumptive reciprocity. By analysing relevant policy and practice of China, the progress and obstacle on presumptive reciprocity may be found.

3.1 Verification of Reciprocal Relationship

Presumptive reciprocity was put forward firstly in The Nanning Declaration at the second China-ASEAN Justice Forum in 2017. According to the Nanning Declaration, if there is no precedent of refusing to recognize and enforce civil and commercial judgments on the grounds of reciprocity between two states, it's presumed to have reciprocal relationship between them within the scope permitted by their several domestic laws. Then Supreme People's Court reasserted that courts shall adopt the judicial criterion of presumptive reciprocity ("Opinions of the Supreme People's Court on Further Providing Judicial Services and Guarantees by the People's Court for the Belt and Road Initiative," 2019). After these policies, the Minutes was made.

According to Article 44 of the Minutes, reciprocal relationship can be verified in any of the following conditions: (a) China's judgment can be recognized and enforced pursuant to the law of the original state. (b) The original state reached consensus with China on reciprocal relationship. (c) Unilateral commitment for reciprocal relationship has been made through diplomatic way by China or the original state, and no evidence showing that original state ever denied China's judgment by the reason of nonexistence of reciprocal relationship.

The conditions of Article 44b and 44c should be with diplomatic documents thus they are easy to be verified. Such like the case Power Solar System Co., Ltd. v. Suntech Power Investment Pte. Ltd.[（2019）沪 01 协外认 22 号] made by Shanghai First Intermediate People's Court in 2021. In Power case Chinese court recognized Singaporean judgment on the grounds of reciprocity. It's because a Memorandum regarding REFJ was signed between China and Singapore.

On contrast, the condition of Article 44a is depending on the domestic law of foreign state. For those foreign states which have no granting precedent to China's judgment, there are two obstacles to ascertain their laws.

Firstly, it's kind of difficult to accurately ascertain the law of foreign state. Secondly, on the circumstance that original state also holds principle of reciprocity, the court's review on whether this state recognizes China's judgment will become a review on whether China recognizes the judgment of this state. Considering the purpose of this review is to judge whether China to recognize, it's a paradox that means become purpose itself.

Presumptive reciprocity shows its value towards these obstacles. For the paradox, court presumes the existence of reciprocal relationship thus it should grant recognition. For the ascertainment, court needs only to review whether the foreign law refuses to recognize,

especially if there's any refusal precedent. The practice of presumptive reciprocity can be legitimated by Article 44a as a way of ascertainment.

3.2 Precedent of Presumptive Reciprocity

Spar Shipping AS v. Grand China Logistics Holding (Group) Co., Ltd. [（2018）沪 72 协外认 1 号] is a precedent adopting presumptive reciprocity to recognize UK judgment. It was made in 2022 by Shanghai Maritime Court [SMC]. On the basis of neither treaty nor reciprocal precedent exists between China and UK, SMC deemed in its order that: (a) According to UK law, UK doesn't take the relevant treaty as necessary precondition to recognize and enforce foreign judgment in civil or commercial matters, therefore China's civil and commercial judgment can be recognized and enforced by UK court; (b) Respondent failed to prove any legal or de facto obstacle existing on the recognition and enforcement of China judgment in UK court; (c) No precedent that UK court refused to recognize and enforce China judgment on the grounds of nonexistence of reciprocal relationship, and; (d) No other conditions to refuse recognition. Finally, SMC granted the recognition of two UK judgments made by EWHC and EWCA.

The Conclusion of this case implies presumptive reciprocity. The court find that UK and China are under reciprocal relationship while it didn't discuss explicitly the sufficient preconditions in UK law to get recognition.

According to England and Wales law, if neither treaty nor statute grants a foreign state reciprocal treatment on recognition and enforcement, a money judgment can be enforced under common law. The leading case which summarizes the key requirements is Adams v. Cape Industries plc (1990) Ch433 (Charles Falconer et al., 2014, p.125). For enforcement, a new case must be commenced in court of England and Wales and this foreign judgment is submitted as evidence. Then the court sees the foreign judgment as a contract debt and makes a summary judgment basically identical to this foreign judgment. The summary judgment is without trial unless being impeached by defendant. A foreign judgment which is final and conclusive on the merits cannot generally be impeached for any error either as to fact or law (Standing International Forum of Commercial Courts, 2020, p.123). Such a summary judgment is without requirement of treaty or reciprocity. China's judgment is able to get enforced under UK common law.

SMC also mentioned this common law practice in this case. In a sense the court implicitly agreed the validity of this common law practice without discussing whether such summary judgment constitutes recognition, especially on the circumstance that UK has its registration procedure for recognition of foreign judgments under UK statutory law.

3.3 Obstacles to Presumptive Reciprocity

As aforesaid, presumptive reciprocity has no rules entered into force. It makes presumptive reciprocity lacks legitimacy and applicability. A theoretical foundation can help to build this principle legitimacy. Further by the theoretical guide, a practical way to apply this principle within the structure of current law can be found.

4. Theoretical Analysis on Presumptive Reciprocity

4.1 International Comity

In absence of treaty obligation, one state giving treatment of recognition and enforcement to another is the right not obligation. One state can give such treatment without requirement of

reciprocity. China recognizes foreign judgment on the dispute of divorce without requirement of reciprocity or treaty. Such a unilateral treatment constitutes international comity. Firstly, it benefits the original state for its jurisdiction is guaranteed. Secondly, there's no obligation for requested state to ensure the treatment. Thirdly, the requested state can seek no consideration or commitment from the original state. This treatment is still a comity if requested state requires equivalent reciprocal treatment.

Domestic law and its practice of requested state should be seen as in a blackbox. To recognize a judgment is internal affairs of requested state, which is under jurisdiction and by sovereignty of that requested state. It's not convenient for original state to predict what conclusion would be made. The original state should only anticipate the conclusion because domestic law of requested state is not commitment or obligation to original state.

Presumptive reciprocity proposed by Nanning Declaration only requires no precedent of refusing recognition on the grounds of reciprocity. This standard is results-orientated and it doesn't consider the domestic law of the original state.

The fundamental purpose of a state holds principle of reciprocity is not to protect its sovereignty. Wenliang Zhang (2014, p.85) said the reciprocity requirement has a large connection with a generalized distrust of other countries' courts, especially in the circumstance that the prevailing party of judgment is a citizen of the original country while the losing party is a citizen of the requested party. The fundamental purpose is to guarantee the oversea interests by the creditor of original state under judgment can get protected by requested state. John F. Coyle (2014) served an example. USA approved the Semiconductor Chip Protection Act in 1984 to protect the intellectual property of mask works, and a reciprocity clause was included which stipulates that only the foreign state to recognize this new type of intellectual property of USA will USA recognizes that intellectual property of the foreign state. As a response, former European Community adopted legislation to protect intellectual property of mask works in 1989.

4.2 Res Judicata

A judgment which falls into refusal conditions thus being refused shall not be a refusal precedent. Only an outcome of refusal doesn't entitle it to become refusal precedent. This judgment is still entitled procedural right to be recognized despite it is refused in the end. As discussed before, these refusal conditions are all relate nothing with the merits of judgment. The Convention stipulates "no review of the merits of the judgment in the requested State" as general provision. China also follow the principle of no review of merits, despite China doesn't explicitly stipulate so.

The principle of no review of merits can be explained by the doctrine of res judicata, which means once a dispute has been made final judgment, the parties shall not sue for the same dispute again. Res judicata is widely accepted by civil law system and common law system. If a final judgment has been made in one state, the parities shall not been incurred a litigation on same dispute in another state. Hans Smit (1962) thought the principle underlying the doctrine of res judicata provides the only logical and satisfactory explanation for recognition of foreign judgments.

Recognition as a practice of international res judicata protects the rights of both parties in private law. And the refusal conditions can be explained as a review of whether the foreign judgment is a valid final judgment.

The Nanning Declaration sees a refusal precedent only be on the grounds of reciprocity. If a judgment is refused because of a refusal condition relating res judicata, then it's not a refusal precedent on the grounds of reciprocity. It implies that China and ASEAN states seek

a treatment of res judicata for their judgments, instead of a treatment of being recognized absolutely.

Therefore, a refusal precedent may refer to a case that original state refuse to grant a treatment of res judicata to a judgment of requested state, on the grounds of no relationship for recognition and enforcement exists.

5. Issues and Advices on Judicial Practice

Whether to grant recognition according to presumptive reciprocity is an issue to be decided case by case. However, a granting precedent still has a strong persuasive power to influence the attitude of relevant foreign state. A unified, persistent and reasonable standard to apply presumptive reciprocity is important for it can prevent potential diplomatic risk which arises from judicial practice.

5.1 Presumption and Prima Facie Ascertainment

Reciprocity can be sorted by its requirement as de facto reciprocity and de jure reciprocity (Ma Mingfei & Cai Siyang, 2019). De facto reciprocity requires a precedent which grants recognition and enforcement has been made before by original state. De jure reciprocity requires the original state will give reciprocal treatment, regardless whether a granting precedent existed. China adopted standard of de facto reciprocity for a long time. After promulgating the Minutes, China shifts to standard of de jure reciprocity. Hence, presumptive reciprocity should be construed under standard of de jure reciprocity.

Presumptive reciprocity emphasizes the standard of proof. As for Spar Shipping AS case, SMC ascertained the domestic law of UK according to the standard of de jure reciprocity on the condition that no UK granting precedent for de facto reciprocity. However, the ascertainment of UK law in this case didn't reach the specific rule of the sufficient condition for recognition and enforcement. On the contrary, presumptive reciprocity is applied to reduce the requirement of proof.

Presumptive reciprocity can be only a supplementary and secondary standard to de jure reciprocity. It would be dangerous to consider presumptive reciprocity as the sole and decisive standard. Because those states which won't recognize China's judgment but still no refusal precedent has ever happened will pass the test of presumptive reciprocity easily. If a prima facie ascertainment on original state law is enough to make sure that original state won't recognize China's judgment, there is no more need to apply presumptive reciprocity to find a refusal precedent. Also, under de jure reciprocity, an active ascertainment on original state law is necessary and supposed.

A balance between prima facie ascertainment and presumption should be stroked. Prima facie ascertainment serves grounds for presumption. The precondition of presumption is the presumed fact should not be impossible. Thus, prima facie ascertainment should make sure the REFJ is possible. For the possibility it's obvious that original state should have a judicial procedure for REFJ, and such a procedure doesn't excludes China explicitly. And it should allow the potential risk that China's judgment may be refused finally. Like aforesaid the risk that Chinese judgment may be refused by the requirement of finality.

5.2 Ascertainment of Refusal Precedent

Whether a case constitutes a refusal precedent should be based on the nature of this case, instead of what original state alleges. There may be three types of refusal precedent. First type is that which refused on the grounds of nonexistence of reciprocal relationship. Second type is that which refused on the grounds of refusal conditions but breaks the equality of reciprocity.

Third type is that which reviewed on the merits of recognized judgment. Nanning Declaration didn't mention the second and third types, but it's the due meaning for "recognition" that allowing some refusal conditions and preventing review of merits.

5.2.1 Nonexistence of Reciprocal Relationship

For the first type, there are some exceptional situations which remain the reciprocal relationship need to discuss.

From a view of space, many states have multiple judicial zones within their territory. As a result, the reciprocal relationship may exist between parts of territories of two states. It's more reasonable to judge whether a reciprocal relationship exists between two judicial zones, instead of sovereign states. A judicial zone of state A denying reciprocal relationship with state B should not influence the reciprocal relationship between rest part of state A and state B.

From a view of time, the original state may have both refusal precedent and granting precedent, and the new one should be considered. For example, China once refused to recognize the judgments of Germany and South Korea, but later China granted to recognize the judgments of Germany and South Korea on the grounds of de facto reciprocity, because precedents of recognizing China's judgment were made by Germany and South Korea in the intermediate period (Fan Bingyi, 2021). From the view of Germany and South Korea, the true will of China should been seen from the new granting precedent instead of old refusal precedent.

For the situation that original state denies reciprocal relationship on the grounds that China at first made refusal precedent, it's hard to break the dilemma only based on current legal rules. If China wishes to actively establish reciprocal relationship with such a state, China must grant recognition at first notwithstanding the requirement of Article 44 of the Minutes. It's more a diplomatic issue rather than judicial issue.

5.2.2 Inequality of Reciprocity

On the precondition of having reciprocal relationship between two states, it's still possible that the several scopes of reciprocity of these two states are different. One state may recognize all types of civil and commercial judgments while another state may only recognize monetary judgment. Consequently, the reciprocal relationship may be reached only within a limited scope of judgments.

A refusal precedent which is beyond the limited scope of reciprocity of original state should not become a reason by requested state to deny a judgment within this limited scope of reciprocity. As for whether such a refusal precedent precludes reciprocal relationship which is beyond the scope of reciprocity of original state but within the scope of reciprocity of requested state, it depends on whether the requested state requires an absolute equality on the scope of reciprocity.

Generally, every state has different exclusive jurisdictions over certain types of cases, and a foreign judgment which is in contradiction with exclusive jurisdiction won't be recognized. Also, they have different limitation periods for the procedure of recognition and enforcement. This inequality is obvious and predictable because the boundary of reciprocity of every state is stipulated by their laws. But the boundary indicates only the maximum possibility of scope of reciprocity. Reciprocal relationship may be independently reached in a part of that scope of reciprocity.

5.2.3 Review of Merits

Review of Merits should be seen as substantial refusal to recognition. It's evident that merits are reviewed if court trials the merits again. No matter whether an amendment is made

to the conclusion of foreign judgment, the parties lost the right of res judicata and spend unnecessary time and costs any way.

Considering the purpose of reciprocity of requested state is to ensure the party who won a case in requested state can be protected the same way by original state, if the party who lost a case in requested state initiates a new litigation in original state, and the party who won submits the previous judgment of requested state as evidence for his pleading in new litigation, does that relate to recognition? If the answer pleading failed and a new judgment was made, the purpose of reciprocity failed. Such situation may constitute a refusal precedent.

In Spar Shipping AS case SMC also discussed case Spliethoff's bevrachtingskantor BV v. Bank of China Limited [2015] EWHC 999 (Comm) with considerable paragraphs. Spliethoff case was submitted by applicant as evidence in Spar Shipping AS case to prove that UK had precedent to recognize China's judgment. In Spliethoff case, the defendant submitted two Chinese judgments as evidence for its pleading, EWHC recognized these two judgments but plaintiff won the litigation in the end. SMC found Spliethoff case not a precedent because of the following reasons. Firstly, both the parties and the object of litigation are different between Spliethoff case and the case which made aforesaid two China's judgments. Secondly, there's no evidence to show that recognition in answer pleading, instead of a formal procedure for recognition, also constitutes recognition in the definition of recognition and enforcement of foreign judgment.

5.3 Burden of Proof

According to presumptive reciprocity, respondent is anticipated to prove the existence of refusal precedent or the nonexistence of reciprocal relationship. It minimizes the applicant's burden to prove the existence of reciprocal relationship and the court's duty on ascertainment. On this point, presumptive reciprocity shows great value on evidence and ascertainment. American Law Institute also proposes in its model law that the debtor of foreign judgment shall be responsible to prove the original state won't recognize and enforce USA judgment (LIU Ya-jun & CHEN Wan-shu, 2020).

If so, what's the balance of responsibility among applicant, respondent and court on evidence and ascertainment? Court takes responsibility to ascertain applicable foreign law according to Chinese law. Ascertainment of reciprocal relationship pursuant to Minutes also belongs to ascertainment of foreign law. Parties may provide foreign law but that's just supplementary and unnecessary to court's duty on ascertainment.

Both prima facie ascertainment and presumption shall be the duty of court. To find a refusal precedent is not a passive obligation incurred by court but an active right for respondent. Prima facie ascertainment needs a unified standard on the minimum possibility that Chinese judgment may be recognized. For a foreign state which has no granting precedent, it's extremely hard to demand court to make sure whether Chinese judgment can be recognized absolutely or not. It's hard to prove something will happen, especially something relating judicial sovereignty of foreign state. So an ascertainment based on possibility and presumption is practical and necessary to de jure reciprocity.

6. Potential Influence on Foreign Relations

Major western states and most former Comecon states are under treaty or reciprocity with China. However, no evidence to show some important states, such like Japan and India, are under treaty or reciprocity with China. Let alone most third world states. Considering the Belt and Road Initiative, the judicial assistance on recognition and China's oversea interests are disproportional.

Seen from a broad perspective, the reciprocity requirement as a precondition for the recognition and enforcement has already faded and lost its popularity around the world (Wenliang Zhang, 2014, p.86). This trend benefits Chinese judgment to get recognized unilaterally by those states which have no reciprocal requirement. Despite that, it's still necessary for China to hold principle of reciprocity. Presumptive reciprocity seems best option to enlarge reciprocal relationship.

A great portion of those states not under treaty or reciprocity with China are Commonwealth states. China has granted reciprocal treatment to some common law states including UK and Singapore. And they two recognize the foreign judgment by a new summary judgment under the common law theory that the foreign judgment as a debt independent of the debt on which the foreign judgment is based. Such summary judgment is in high possibility being adopted by those rest commonwealth states. For those states which also adopt summary judgment, they may have more confidence that they can pass the test of China's presumptive reciprocity.

6.1 Situation of Canada and Australia

In Australia, there are two way to enforce foreign judgments in common law practice. The judgment creditor can sue for the judgment amount as debt in Australian court. He can also bring a new action in Australian court on the original cause of action of the foreign judgment, and the foreign judgment becomes an estopple which prevents the judgment debtor to raise any defense (Beverley Newbold & Tamlyn Mills, 2018, p.23). The first way is a summary judgment while the second way is somehow a fresh new case.

In Canada, except province of Quebec which is under civil law regime, a foreign judgment would be recognized and enforced under common law. An action on a foreign judgment is often commenced by a statement of claim for the amount of the judgment, and can be pursued by way of a motion for judgment (Erin Hoult & Daniel Styler, 2018).

They all adopt summary judgment as the way to enforce foreign judgment, which is similar like the common law practice of UK.

6.2 Situation of India

As for India, according to Article 44A of the Indian Civil Procedure Code 1908, India will execute decrees passed by Courts in reciprocating territory as if it had been passed by the District Court. "Reciprocating territory" means foreign state and region which is declared by notification in the Official Gazette by Indian government. Hong Kong is a reciprocating territory to India. But China Mainland is not a reciprocating territory.It's similar like the recognition under statutory law of UK.

For the judgments made by those states not reciprocating territory to India, a new case should be initiated in India, and the foreign judgment will be submitted as evidence. But, such an action is treated as though it were any other suit filed before an Indian court, with parties having the right to lead evidence and advance arguments on the merits of the claim (Amar Gupta & Ananya Kumar, 2023). It's not similar like the summary judgment of UK which has no review on merits. India may not be able to pass the prima facie ascertainment, thus presumptive reciprocity may not be applied.

6.3 Situation of Japan

According to Japanese law, to recognize a foreign judgment requires "mutual guarantee exists", which means the requirement of reciprocity (Masahiro Nakatsukasa, 2018, p.111).

Japan was once refused by China firstly on recognition of a Japanese judgment, and then

Japan refused recognition of a Chinese judgment (张先恚, 2021). Consequently, China and Japan aren't in reciprocal relationship which they could be. As discussed before, it's hard to solve the dilemma within current law or by the principle of presumptive reciprocity. Both Germany and Japan require reciprocal relationship as their precondition to recognize foreign judgment. Germany was once denied by China firstly on recognition too, but Germany still recognized China's judgment in the case Vgl. Urteil des Kammergerichts Berlin vom 18.05.2006, Aktenzeichen 20 Sch 13/04. In this German recognition, German court indicated that it should consider that if one party grants recognition at first, whether the other party will follow to grant recognition. China should also consider whether Japan will follow. If there's no substantial obstacle between China and Japan to establish reciprocal relationship, China may grant recognition at first, as an exception to presumptive reciprocity.

7. **Conclusion**

Presumptive reciprocity makes it easier to establish reciprocal relationship with those states which have no precedent of recognizing China's judgment. As consequence, the right of Chinese creditor is more possible to get protected worldwide.

In the judicial procedure of recognition in China, parties' burden of litigation is reduced. Parties' civil rights on the aspect of res judicata get respected better. Also court's duty on ascertainment is reduced too. It enhances the judicial efficiency on REFJ in China.

Presumptive reciprocity is subject to de jure reciprocity. Presumption must be considered with prima facie ascertainment collaterally and constrained by it. A minimum standard of prima facie ascertainment needs to be found.

Refusal precedent should be interpreted and considered broadly rather than only a case refusing recognition on the grounds of nonexistence of reciprocal relationship. Review of merits and inequality of reciprocity are also possible to become reason to constitute a refusal precedent. Also, a refusal precedent should not have power to deny all the reciprocal relationship. Refusing recognition by requested state should be equivalent in a way to the refusal precedent of original state.

Although the rule of presumptive reciprocity is still vague, presumptive reciprocity has been implemented into review of recognition. The issue of recognition and enforcement is indeed both judicial issue and diplomatic issue. And this practice ensures the room for diplomatic consideration. China should not consider presumptive reciprocity as a mere legal standard, but also consider it as a flexible diplomatic tool to actively alter the situation of reciprocal relationship with foreign states.

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