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Understanding Community Resilience through the Lens of Stakeholder Participation: Empirical Evidence from the Moat System Restoration Project

Shihua Yan and Roziya Binti Ibrahim *

Department of Landscape Architecture, Faculty of Design & Architecture, Universiti Putra Malaysia, Serdang 43400, Selangor, Malaysia; gs56915@student.upm.edu.my
* Correspondence: roziya@upm.edu.my

Abstract: In the milieu of escalating flood occurrences, the concept of community resilience has garnered considerable attention. A series of studies recommend a river restoration approach to encourage the participation of all relevant stakeholders to manage floods to improve community resilience. However, existing studies have not sufficiently unraveled the intricate interplay of drivers shaping such participation. Therefore, using the Moat System Restoration Project in Tianchang City as the empirical conduit, this study elucidates the relationship between the drivers that drive stakeholder participation in river restoration in the context of improving community resilience. The Theory of Planned Behavior was employed to extend additional independent variables such as stakeholder attitudes, priorities, risk perception, trust in government decisions, knowledge, motivation, and intentions. A sample of 473 local residents involved in the Moat System Restoration Project was evaluated by Structural Equation Modelling. The empirical results revealed the salient influence of stakeholder attitudes, knowledge, and priorities on their behavior and risk perception where harnessing perceptions of priority has the potential to significantly improve community resilience. Notably, the study dispelled the presumed influence of trust on risk perception, a revelation that deviates from some existing literature. The findings further demonstrate a strong association between stakeholder motivation and both risk perception and intentions, a relationship underappreciated in previous studies. Theoretically, this study unearths the intricate dynamics of stakeholder participation in river restoration projects, thereby extending the Theory of Planned Behavior to the sphere of stakeholder participation, which adds a critical dimension to the understanding of flood management and community resilience. Practically, this study provides a valuable lens for practitioners as it illuminates pathways to foster stakeholder participation in river restoration initiatives, guiding the development of strategies to foster stakeholder participation in similar projects.

Keywords: community resilience; river restoration; stakeholder participation; driving factors

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1. Introduction

Nowadays, the frequency of floods inevitably challenges adaptation projects, despite the great efforts that have been made to manage floods. Birkholz et al. [1] delineate that no country is immune to the effects of flooding, and floods are one of the most common natural disasters, with approximately 50–300 inland floods occurring annually worldwide [2]. Floods account for an alarming 11.7% of all natural disaster deaths [3]. In response to concerns about the consequences of the increased frequency of flooding problems, the concept of "community resilience" has received increasing attention in the scientific and policy spheres [4,5]. It refers to the ability of a community to anticipate, withstand, and bounce back from adversities, such as natural disasters, which primarily involves the participation of all community members, as well as collaboration between different sectors and levels of government. As elucidated by Ashmawy [5], resilient communities have access to the needed information and resources to prepare, respond, and recover from

disasters. In 2005, the UN World Conference extolled the virtues of a bottom-up approach to community resilience and encouraged the participation of all relevant stakeholders to cater to local exigencies [6]. Indeed, involving stakeholders in the resilience-building process not only helps to increase social acceptance of flood response initiatives but also creates strong bonds between decision-makers and stakeholders working towards co-creating highly resilient communities for Sustainable Development Goals [7]. Consequently, a myriad of countries are proactively fostering the integration of stakeholder and community resilience into risk policies and interventions [8]. In terms of the specific implementation, a series of studies recommend a 'river restoration' approach to encourage the participation of all relevant stakeholders managing floods to improve community resilience [9,10]. The Society for Ecological Restoration [11] defines restoration as "a process that assists the recovery of degraded, damaged, or destroyed ecosystems", and many international organizations have made declarative commitments to engage in restoration as a means of addressing global environmental change [12]. JMR Benayas et al. [13] utilized meta-analysis to confirm that ecological restoration can provide ecological services, restore river socio-ecological functions, improve flood management capabilities, and emphasize the indispensable role of stakeholder participation [14,15].

However, Conniff [10,15] reported that due to insufficient stakeholder participation, 75% of the implemented river restoration projects did not reach their minimum targets. Whereas less resilient community residents tend to be older, marginalized groups who may lack the necessary resources and lag behind other communities in the restoration process [16]. Therefore, investigating the drivers that drive stakeholder participation in river restoration projects has both theoretical and practical implications for building resilience in local communities.

According to Turcanu et al. [17], setting restoration goals is a value-laden event as it involves people's attitudes, risk perceptions, knowledge, trust in the government, and ultimately their behavior or willingness to participate. Several scholars have examined the relationship between stakeholders and river restoration projects from different perspectives. For example, Alam [18] analyzed the relationship between attitudes and river restoration from the perspective of local attachment, and Schaich [19] measured people's perceptions of the floodplain and their attitudes towards the restoration measures taken. Phalen [20] explained people's reactions to restoration projects through human behavior, motivation, and cognitive theory. Aggestam [21] investigated how people's values influence the restoration process, and Hong et al. [22] showed the relative importance and priority of the values of each stakeholder in a river restoration project. Nevertheless, this study found that few studies have attempted to examine stakeholder knowledge, priorities, and behaviors towards participating in river restoration projects. Follett et al. [23] observed that only 3% of papers addressed participants' priorities in the context of improving community resilience. To fill this distance, using the medium of the Moat System Restoration Project (MSRP), this study explores the relationship between the drivers that drive stakeholder participation in river restoration in the context of improving community resilience. The findings of this study contribute to shaping local community resilience and help decision-makers know how to motivate stakeholders to participate in environmental decision-making, especially in flood management.

2. Literature Review

2.1. Stakeholders and Theory of Planned Behavior

According to Cascetta et al. [24], stakeholders are defined as individuals and organizations that have a stake in a particular issue, even if they have no formal role in the decision-making process. Yosie and Herbst [25] distinguished between different categories of stakeholders. These include (1) those who are directly affected by the decision and take action; (2) people who have an interest in the project and want to participate and offer input; (3) those who are interested in participating in seeking information; and (4) those affected by the consequences of the decision but unaware of participatory processes. This

study follows Freeman's [26] definition of stakeholders as those who live or work close to the moat system, including local authorities, academics, and relevant institutions. Because their lives will be affected by the MSRP, they have the ability to participate in environmental decision-making.

In fact, stakeholder participation in environmental decision-making has been widely discussed in previous studies. Both the Water Framework Directive [27] and the EU Flood Assessment and Management Directive [28] require stakeholder participation in environmental decision-making and emphasize the need for coordination of efforts between different stakeholders, as simply following the people-centered principle itself may lead to mismatches of needs and delays in responsibilities [29,30]. According to the Asian Development Bank [31], engaging people outside of academia and politics in decision-making supports good governance, citizenship, and accountability and helps local authorities use available evidence to make decisions that address stakeholder priorities. Moreover, bringing together multiple stakeholders facilitates mutual learning to integrate priorities not often considered by decision-makers [32]. However, Blicharska and Rönnbäck [33] highlighted that relevant stakeholder willingness to act is required if a specific project or policy is to be implemented. Previous studies have shown that a theoretical model frequently used to identify stakeholders' attitudinal factors related to behavior is the Theory of Planned Behavior (TPB) [34]. Thus, this study extended TPB theory to consider the situation of MSRP by adding additional independent variables to understand the relationships between the factors driving stakeholder participation in such river restoration projects in the context of improving community resilience.

TPB has been applied in the field of participation and has proved to be effective in explaining relevant behavioral intentions [35]. The TPB assumes that an individual's participation behavior is the result of his or her intentions, and behavioral intentions are affected by three distinct factors: attitude toward behavior, subjective norms, and perceived behavior control [36]. Specifically, attitudes refer to people's evaluation of particular objects in a like or dislike manner, and subjective norms refer to the perceived social pressure to perform or not perform behavior. Perceived behavioral control is people's perception of the ease or difficulty of performing the behavior. If a person has a positive assessment of a particular behavior, believes that people who are important to them want them to perform the behavior, and perceives it to be easy, they will have a strong intention to perform the behavior. For example, stakeholders may feel that their participation can influence the outcome of a restoration project, which falls within the realm of perceived behavioral control.

Considering the situation of MSRP, the term 'subjective norms' is replaced by stakeholder behaviors. The concept of 'perceived behavioral control' is replaced by stakeholder knowledge. More specifically, 'attitude' in this study can be interpreted as stakeholders' response to MSRP, while 'behavior' refers to stakeholder's participation behavior. The concept of 'motivation' refers to the driving factors that make stakeholders voluntarily participate in decision-making, while 'intention' represents the goals that stakeholders expect to achieve through their participation behavior. The term 'risk perception' refers to stakeholders' perceived level of risk to the moat system, while 'knowledge' reflects stakeholders' familiarity with participating in MSRP decision-making. The concept of 'trust' indicates the degree of trust stakeholder confidence in local government or government decisions.

2.2. Research Hypotheses and Conceptual Framework

2.2.1. Stakeholder Attitudes and Priorities

It has been acknowledged that the effectiveness of river restoration projects depends mainly on stakeholders' attitudes [37]. Kelly [38] established that attitude is the most important predictor of people's participation. Stakeholders are more likely to participate if they have a positive attitude toward a river restoration project. Deffner and Haase [39] indicated that most people have a positive attitude toward river restoration and benefit from restored river sections. Tunstall et al. [40] emphasized the importance of understanding

stakeholder perceptions of restoration goals and incorporating them into river restoration decisions. Risk decision priorities have been shown to correlate with risk perception [41]. In the literature, prioritization means ranking objectives in order of importance [42], which can reflect the ideal river restoration goals of stakeholders and enhance the fairness of decision-making [43]. For example, Weitzner and Deutsch [44] explored the relationship between stakeholder priorities and motivation and demonstrated that individuals' priorities are linked to their attitudes and risk perceptions [45]. Gallego-Ayala and Juízo [46] successfully identified stakeholders' priorities by applying the analytic hierarchy process method. Based on the above discussion, this study proposes the following hypotheses:

H1. *Stakeholder attitudes have a positive impact on stakeholder behavior towards participation in river restoration decision-making.*

H2. *Stakeholder attitudes have a positive impact on stakeholder priorities.*

H3. *Stakeholder priorities have a positive impact on stakeholder behavior.*

2.2.2. Risk Perception and Trust in Government Decisions

Risk perception plays an important role in decision-making [47], as it can lead decision-makers to make decisions and take action to reduce risk [48]. Paul Slovic [49] defines the concept of "risk perception" as people's subjective assessment or judgment of potential risks. Moreover, risk perception has been previously incorporated into the TPB framework [50], and sufficient evidence shows that risk perception can affect people's participation behavior [51] and behavioral intention [52]. There is a correlation between risk perception and attitudes [53,54]. Likewise, Moen [55] observed that risk perception has a positive effect on priorities. When the perceived risk is high, the intention to choose safer alternatives is seen as prioritizing safety. However, Swapan's [56] empirical study found that a lack of trust in the government was the cause of stakeholder indifference to participation. A correlation exists between trust and participation [57]. Low trust in government reduces participation, while low participation reduces trust [58]. The higher perceived risk reduces people's confidence in the governing institutions [59].

Rousseau et al. [60] defined 'trust' as a state of mind comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another that allows individuals to determine whether they are willing to let others influence their decisions and behavior [61]. According to previous studies, risk perception, participation, and trust in local government are closely related [62]. Carnevale and Wechsler [63] found that trust and attitudes are related to some extent. Trust in local government can affect citizens' motivation to participate in decision-making [64]. When laypeople do not have specific knowledge, they will place more trust in authorities when judging risks [65]. Thus, this study proposes the following hypotheses:

H4. *Stakeholder priorities have a positive impact on stakeholder risk perception.*

H5. *Stakeholder risk perception has a positive impact on stakeholder behavior.*

H6. *Stakeholders' trust in government decisions has a positive impact on stakeholder behavior.*

H7. *Stakeholders' trust in government decisions has a positive impact on stakeholder risk perception.*

2.2.3. Stakeholder Knowledge

According to Ajzen [36], the concept of knowledge refers to situational factors that influence attitudes toward certain behaviors. In the existing literature, knowledge is often considered a prerequisite for one's behavior [66]. Some scholars have studied how knowledge can predict behavior by applying TPB [67]. Dreyer [68] argued that people's willingness to participate is influenced by trust and knowledge factors. Stakeholders who have the required knowledge are more likely to participate in decision-making [69]. Rather,

some of these stakeholders are unwilling to participate because they do not know the behavior to be performed [70]. In addition, Venkataramanan [71] found that knowledge helps shape people's attitudes and predict their intentions and motivations for behavioral change. Knowledge also helps determine people's priorities [72]. The following hypotheses were proposed:

H8. *Stakeholder knowledge has a positive impact on stakeholder behavior.*

H9. *Stakeholder knowledge has a positive impact on stakeholder priorities.*

2.2.4. Participation, Motivation, Intention, and Behavior

Participation is one of the outcomes of motivation [73]. Gul [74] define the term 'motivation' as 'directing a person to behave in a certain way'. Understanding stakeholder motivation could stimulate their desire to participate in and improve the quality of decision-making. The concept of motivation includes both extrinsic and intrinsic motivation [75]. Following Deci [76], one is said to be intrinsically motivated to perform a behavior when one receives no apparent reward except the behavior itself. Shirk et al.'s [77] and Ryan et al.'s [78] surveys found that people's motivation for participating in environmental stewardship is to help the environment and to learn. Instead, extrinsic motivation is just a tool to achieve a certain desired outcome [79]. TPB states that the most proximate determinant of an individual's behavior is his or her intention to engage in the behavior [36]. Expected value theory suggests that human behavioral intentions are based on the expectation that a particular behavior will produce a particular outcome [80,81]. However, Gollwitzer [82] argues that a key factor leading to intention formation and behavior is personal motivation to achieve the ultimate goal. Behavior is guided by intentions [83]. People's beliefs and desires causally combine to determine their intentions, which in turn control their behavior [84]. Accordingly, the following hypotheses were proposed:

H10. *Stakeholder motivation has a positive impact on stakeholder risk perception.*

H11. *Stakeholder motivation has a positive impact on stakeholder intentions.*

H12. *Stakeholder intentions have a positive impact on stakeholder behavior.*

According to the description and analysis above, the conceptual framework has been developed, which summarizes the hypothesized relationships, as shown in Figure 1.

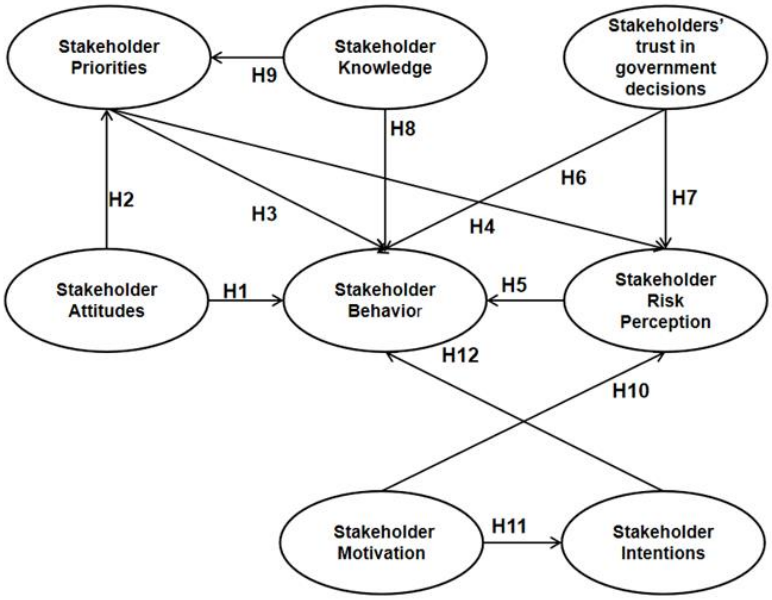

Figure 1. Conceptual framework.

3. Methods

3.1. Study Area

The study was undertaken in Tianchang City, Anhui Province, China, which is the nearest city to the mouth of the Yangtze River in this province, as it is seriously affected by floods almost every year, causing huge economic losses and negative impacts. In detail, Tianchang is a sub-prefecture-level city with a total area of 1770 square kilometers. The local population is about 628,900. Its average temperature is between 14 and 17 °C, and its annual precipitation is between 750 and 1700 mm. During the summer, Tianchang has frequent and intense rainfall, leading to more vulnerability to flooding.

The moat system is a famous landmark of Tianchang City, with the unique functions of cultural heritage and ecological optimization. In 2017, some scholars discovered a section of city wall ruins in the moat system. The city wall is about 17.65 m in length. Some of the bricks still retain old symbols. The moat system originated in the Ming and Qing dynasties in ancient China and was mainly used for flood control and protection of the city. However, Zheng [85] argues that the function of the moat is more for drainage purposes than its original defensive function. When the city suffers from floods, the moat can play the role of flood discharge, thereby reducing the risk of flooding. Figure 2 shows the location of the moat system in Tianchang City.

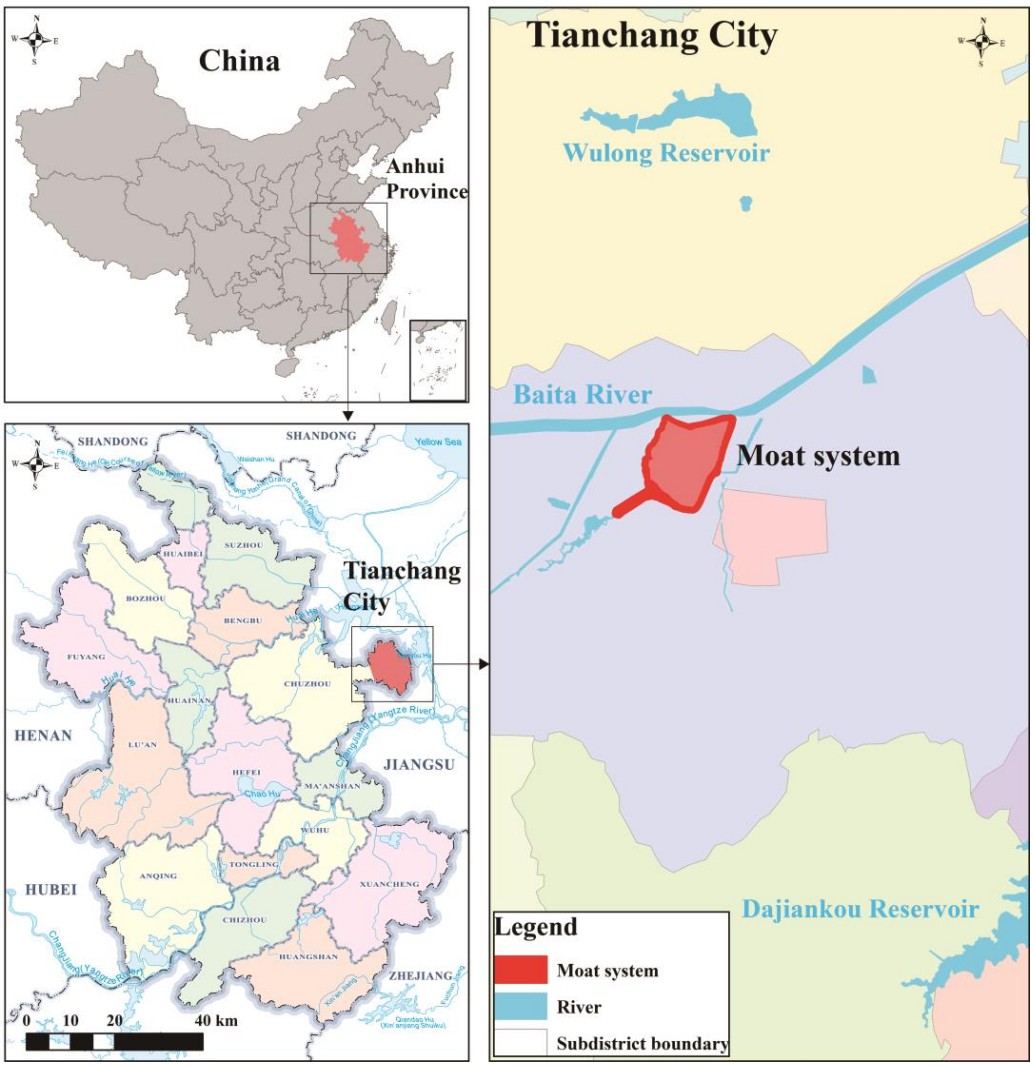

Figure 2. Location of the moat system in Tianchang City.

The moat system has experienced frequent flooding problems due to frequent and concentrated rainfall. One of the worst floods in Anhui during the last three years affected 1.608 million people, resulting in four deaths and direct economic losses of 6.55 billion yuan, as reported by China's Ministry of Emergency Management. Communities that settled near the moat system suffered a series of negative impacts due to flooding in the moat system. To address this serious issue, the Tianchang government and the Moat System Management Team initiated the MSRP to increase the resilience of the local communities and inspire stakeholders to participate in it.

The success of river restoration depends largely on the stakeholders who may support or oppose restoration decisions [86]. Conversely, even though the Tianchang government has recognized the urgency of taking measures to mitigate frequent flooding, previous response decisions have not always been accepted by the population, which indicates that the frequent flooding problem is apparent to local authorities, but the stakeholders may not be as conscious, thus restricting the progress of river restoration and the development of community resilience. Stakeholder participation is an important step in ensuring that the MSRP considers stakeholder needs, priorities, and interests. Thus, employing the MSRP in Tianchang City as the study area offers a compelling case for an investigation of the relationship between the drivers that drive stakeholder participation in river restoration projects in the context of improving community resilience.

3.2. Measures

This study utilized the questionnaire as the survey instrument. The questionnaire contained two sections. The first section is designed to collect the demographic characteristics of the respondents, including questions on respondents' knowledge of participation in MSRP and whether they favored flood management as a priority. The second section consists of a series of measurement items for identified variables and the measurement items were adapted from the scales in the existing literature. Specifically, the stakeholder knowledge (SE) measurement item was adapted from [87,88]. Stakeholder trust in government decisions (STD) was used in Mah's [89] scale with a minor modification. Stakeholder Risk Perception (SRP) referenced the scale developed by Su [53] and Whitmarsh [90]. We adopted the scale from Beechie [91] and Berander [92] to measure stakeholder priorities (SP). To measure the participation motivation (SM) of stakeholders, we adopted the 5-item scale of van Riper [93] and Corbett [94]. Stakeholders' participation intention (SI) was measured using the scale from Woosnam [95] and Venkataramanan [71]. Stakeholder attitudes (SA) towards MSRP were captured by adapting the items from Schaich [19] and Tunstall [96]. Stakeholder Participation Behavior (SB) uses the scale from Wang [97] and Sarvilinna [98], with slight modifications. All items in the questionnaire were measured on a 5-point scale, from "strongly disagree" to "strongly agree".

3.3. Data Collection

Data were collected from 1 February to mid-March 2023. Respondents were drawn from residents living or working in communities near the Tianchang Moat System. All participation was voluntary and anonymous. Most questionnaires were completed by scanning WeChat QR codes. Those unfamiliar with online surveys were collected on-site. The study received a total of 510 questionnaires, 368 online and 142 offline. In the process of data screening, 37 invalid questionnaires were eliminated. Therefore, 473 valid questionnaires were obtained for analysis.

3.4. Data Analysis

SPSS 25.0 was employed for descriptive statistical analysis of the collected data. Structural Equation Modeling (SEM) was used to test the hypotheses proposed in this study with the assistance of AMOS 26.0 software [99]. SEM is an advanced multivariate statistical technique employed to incorporate multiple dependent and independent variables

into a single model and identify the relationships between various latent constructions or variables [100]. Thus, SEM was considered an appropriate analytical tool in this study.

SEM consists of a measurement model and a structural model [101]. The measurement model focuses on analyzing the causal relationships between measurement items and latent variables, while the structural model tends to explore the associations between latent variables. In specific analysis, first, Confirmatory Factor Analysis (CFA) assessed the validity and model fit of the measurement model. Second, path analysis was carried out to explore the structural model, i.e., testing H1–H12.

4. Results

4.1. Sample Description

The demographic profiles of the respondents are shown in Table 1. Males and females accounted for 50.7% and 49.3%, respectively. It was found that 36.6% of the respondents were aged between 26 and 35 years old, and about 22.2% were aged between 18 and 25. The respondents who were aged between 46 and 55 made up 18.2%, while 17.1% were aged between 36 and 45. The results show that most of the respondents had high educational qualifications. It was found that 37.6% of respondents had a bachelor's degree as their highest degree; 18% had a master's degree and 4.2% had a doctorate. Primary and secondary education levels collectively accounted for 40.2%. In terms of employment status, civil servants were 39.7%, students 18.4%, retirees 1.7%, and self-employed 18.0%. Farmers or workers make up 22.2%. Moreover, 22.0% of the respondents have lived around the moat system for more than 20 years. Participants who had lived in this area for 8–13 and 14–19 years accounted for 18.6% and 18.4%, respectively, and 21.1% of the people had lived in the area for 2–7 years. Only 19.9% of respondents had lived near the moat system for less than a year. On the other hand, 20.5% and 20.3% of the participants were extremely familiar and very familiar with the knowledge of participation in MSRP, respectively. The proportion of moderately familiar participants was 19.5. The proportion of slightly familiar participants was 22.2. Only 17.5% of the respondents were not at all familiar with the knowledge of participation in MSRP. Regarding the priority target, 23.9% of respondents strongly approved of "flood protection" as a priority, while 22.2% of respondents strongly disapproved. The proportion of respondents disapproving was 19.2%, while 18.2% approved. It was found that 16.5% of the participants were neutral.

4.2. Measurement Model and CFA

A measurement model encompassing all scale items was tested through CFA. Specifically, the reliability of constructs was first examined by Cronbach's α value and Composite Reliability (CR). As shown in Table 2, Cronbach's α value of each construct is between 0.811 and 0.905, exceeding the recommended value of 0.70 [102], while CR coefficients of the variables are between 0.841 and 0.902, above the standard of 0.70 [103]. These indicate that the constructs have good internal consistency and reliability. The convergent validity was secondly checked through factor loadings and Average Variance Extracted (AVE). The results show that the factor loadings are all above 0.7, exceeding the suggested threshold of 0.50, while the AVE values were above 0.6, exceeding the recommended threshold value of 0.50 [102], indicating good convergent validity. Finally, discriminant validity was verified by assessing the correlations between the constructs and the square root of AVE for each construct. The square root of AVE for each construct was more significant than the correlation coefficient between other constructs, indicating adequate convergent validity. As shown in Table 3, the square roots of AVE values were higher than the correlation coefficients. Therefore, the discriminant validity of the constructs was supported.

Table 1. A sociodemographic overview of the sample (n = 473).

Attributes	Description	Frequency	Percentage (%)
Gender	Male	240	50.7
	Female	233	49.3
Age	18–25	105	22.2
	26–35	173	36.6
	36–45	81	17.1
	46–55	86	18.2
	55+	28	5.9
Education Level	Primary School	95	20.1
	Secondary School	95	20.1
	Undergraduate	178	37.6
	Master's degree	85	18.0
	PhD+	20	4.2
Employment Status	Civil servant	188	39.7
	Self-employed	85	18.0
	Retired	8	1.7
	Student	87	18.4
	Farmer or worker	105	22.2
Years	Less than 1 year	94	19.9
	2–7 years	100	21.1
	8–13 years	88	18.6
	14–19 years	87	18.4
	More than 20 years	104	22.0
Familiarity with Participation in MSRP	Not at all familiar	83	17.5
	Slightly familiar	105	22.2
	Moderately familiar	92	19.5
	Very familiar	96	20.3
	Extremely familiar	97	20.5
Flood Management as a Restoration Priority	Approve	86	18.2
	Strongly Approve	113	23.9
	Neutral	78	16.5
	Disapprove	91	19.2
	Strongly Disapprove	105	22.2

Table 2. Reliability and convergent validity.

Construct	Item	Loading	CR	AVE	Cronbach's α
SA	SA1. I am interested in Moat System Restoration Projects.	0.780	0.892	0.623	0.811
	SA2. I am concerned with Moat System Restoration Projects.	0.798			
	SA3. I have only a little information on the Moat System Restoration Project.	0.767			
	SA4. I think the restoration project is necessary for the moat system.	0.802			
	SA5. I believe the Moat System Restoration Project can help solve real problems.	0.797			
SB	SB1. I am willing to participate in decision-making.	0.781	0.889	0.615	0.870
	SB2. I am open to sharing knowledge.	0.781			
	SB3. I am willing to be trained to participate in decision-making.	0.764			
	SB4. I am glad to communicate with people in different roles.	0.803			
	SB5. I am able to encourage others to participate in decision-making.	0.791			
	STD6. I think local government decisions can address people's concerns.	0.759			

Table 2. *Cont.*

Construct	Item	Loading	CR	AVE	Cronbach's α
SP	SP1. Flooding Management.	0.823	0.901	0.647	0.902
	SP2. Social welfare	0.819			
	SP3. Strengthen legislation.	0.803			
	SP4. Ensure health and safety.	0.777			
	SP5. Economic development	0.798			
	SP3. Strengthen legislation.	0.803			
	SP4. Ensure health and safety.	0.777			
	SP5. Economic development	0.798			
SRP	SRP1. I think solving the flooding problem of the moat system is very urgent.	0.826	0.841	0.638	0.823
	SRP2. I think the flooding issue of the moat system is threatening my life.	0.816			
	SRP3. I agree with flood management as a priority for Moat System Restoration Projects.	0.753			
STD	STD1. I think the decision of the government is trustworthy.	0.807	0.902	0.605	0.901
	STD2. I have confidence in the competence of decision-makers.	0.775			
	STD3. I am satisfied with the current decision-making process.	0.764			
	STD4. I believe the decision-making process is fair in Tianchang City.	0.801			
	STD5. I think the local government's decision is accepted.	0.758			
	STD6. I think local government decisions can address people's concerns.	0.759			
SK	SK1. I have received all the information necessary to participate in decision-making.	0.787	0.901	0.647	0.905
	SK2. I have the requisite knowledge to participate in decision-making.	0.793			
	SK3. I understand how to participate in decision-making.	0.806			
	SK4. I am aware of my role in the decision-making process.	0.802			
	SK5. I know the benefits of participating in decision-making.	0.832			
SM	SM1. I have the right to participate in decision-making.	0.812	0.898	0.637	0.884
	SM2. I have the ability to participate in decision-making.	0.802			
	SM3. I feel confident when participating in decision-making.	0.780			
	SM4. I think my participation can influence decisions.	0.801			
	SM5. I have a sense of responsibility to participate in decision-making.	0.797			
SI	SI1. Gives me the opportunity to learn new skills.	0.768	0.888	0.612	0.883
	SI2. Network with academics related to my major.	0.792			
	SI3. Let decision-makers know and consider my thoughts.	0.777			
	SI4. Make more like-minded friends.	0.774			
	SI5. To preserve the ecology of the place where I live.	0.800			

Table 3. Discriminant validity for the measurement model.

Construct	SK	STD	SRP	SP	SM	SI	SA	SB
SK	0.804							
STD	0.056	0.778						
SRP	0.340	0.059	0.799					
SP	0.310	0.124	0.215	0.804				
SM	0.107	0.119	0.123	0.047	0.798			
SI	0.128	0.120	0.080	0.064	0.402	0.782		
SA	0.278	0.414	0.254	0.263	0.140	0.362	0.789	
SB	0.466	0.506	0.407	0.394	0.512	0.505	0.614	0.784

Note: The square root of AVE is on a diagonal.

The fit of the model was tested by chi-square statistics, the comparative fit index (CFI), the Tucker–Lewis index (TLI), the approximate root mean square error (RMSEA), and the standardized root mean square residual (SRMR). Table 4 shows that the proposed models are acceptable overall fit, that is measurement model (Chi-square = 762.402; df = 674; Chi-square/df = 1.131; SRMR = 0.031; RMSEA = 0.017; TLI = 0.991; CFI = 0.992) and structural model (Chi-square = 989.358; df = 684; Chi-square/df = 1.446; SRMR = 0.065; RMSEA = 0.031; TLI = 0.970; CFI = 0.972).

Table 4. Goodness-of-fit of the model.

	Chi-Square	df	Chi-Square/df	SRMR	RMSEA	TLI	CFI
Recommended value	/	/	<3	<0.10	<0.05	>0.9	>0.9
Measurement model	762.402	674	1.131	0.031	0.017	0.991	0.992
Structural model	989.358	684	1.446	0.065	0.031	0.970	0.972

4.3. Structural Model and Hypothesis Testing

The measurement model was turned into a structural model by adding hypothesized paths between the constructs. Table 5 shows the results of the hypothesis testing.

Table 5. Results of the hypothesis testing.

Path	Path Direction	Non-Standard Coefficient	SE	Z (CR Value)	*p*	Standardized Coefficient	Result
H1	SA→SB	0.185	0.034	5.393	0.000	0.201	Accepted
H2	SA→SP	0.229	0.056	4.116	0.000	0.212	Accepted
H3	SP→SB	0.149	0.029	5.230	0.000	0.175	Accepted
H4	SP→SRP	0.239	0.051	4.654	0.000	0.244	Accepted
H5	SRP→SB	0.206	0.029	7.211	0.000	0.237	Accepted
H6	STD→SB	0.361	0.035	10.329	0.000	0.395	Accepted
H7	STD→SRP	0.014	0.055	0.255	0.799	0.013	Rejected
H8	SK→SB	0.239	0.031	7.716	0.000	0.266	Accepted
H9	SK→SP	0.299	0.055	5.443	0.000	0.284	Accepted
H10	SM→SRP	0.165	0.053	3.109	0.002	0.162	Accepted
H11	SM→SI	0.455	0.048	9.476	0.000	0.498	Accepted
H12	SI→SB	0.404	0.035	11.475	0.000	0.418	Accepted

The results indicate that the standardized path coefficient from SA to SB was 0.201 ($p < 0.001$), suggesting that stakeholder attitudes significantly affected stakeholder behavior, thereby supporting H1. The standardized path coefficient from SA to SP was 0.212 ($p < 0.001$), and the path was significant, suggesting that stakeholder attitudes positively affected stakeholder priorities, thereby supporting H2. Moreover, SP could positively influence both SB ($\beta = 0.175$, $p < 0.001$) and SRP ($\beta = 0.244$, $p < 0.001$), which indicates that stakeholder priorities could positively influence both stakeholder behavior and stakeholder risk perception. Therefore, H3 and H4 were accepted. The standardized path

coefficient from SRP to SB was 0.237 ($p < 0.001$), and the path was significant, suggesting that stakeholder risk perception positively impacted stakeholder behavior. Therefore, H5 is accepted. STD could positively influence SB (β = 0.395, $p < 0.001$), but STD did not affect SRP (β = 0.013, $p > 0.05$), which indicates that stakeholder trust in government decisions is significantly correlated with stakeholder behavior. By contrast, stakeholder trust in government decisions did not affect stakeholder risk perception as it failed to reach statistical significance. As a result, H6 was accepted while H7 was rejected. Furthermore, SK could positively influence both SB (β = 0.266, $p < 0.001$) and SP (β = 0.284, $p < 0.001$), which indicates that stakeholder knowledge has significant positive effects on stakeholder behavior and priority, respectively. Accordingly, H8 and H9 are supported. Similarly, SM could positively influence both SRP (β = 0.162, $p < 0.001$) and SI (β = 0.498, $p < 0.001$), which indicates that stakeholder motivation could positively influence stakeholder risk perception and stakeholder intentions, supporting H10 and H11. Finally, the standardized path coefficient from SI to SB was 0.418 ($p < 0.001$), suggesting that stakeholder behavior was positively impacted by stakeholder intentions, thereby supporting H12. Figure 3 presents the standardized regression weights of the hypothesis paths.

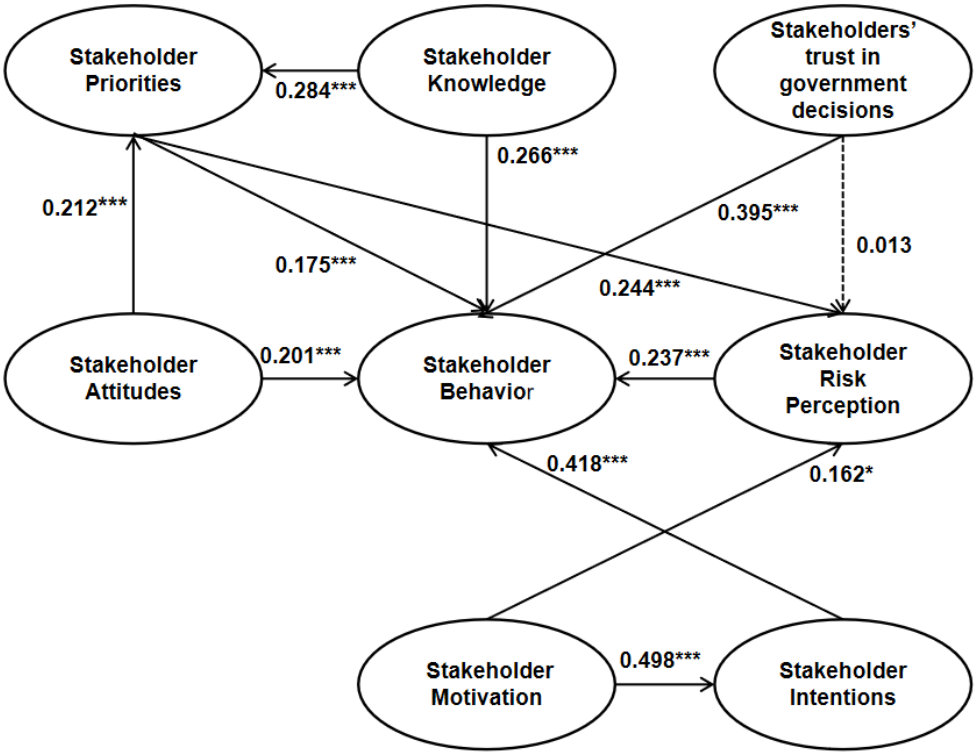

Figure 3. The results of the hypothesis paths. Note: Only solid lines represent significant paths; * $p < 0.05$; *** $p < 0.001$.

5. Discussion

Using the MSRP in Tianchang City as the medium, this study explores the relationship between the drivers that drive stakeholder participation in river restoration in the context of improving community resilience. The results indicate that out of 12, only one hypothesis was rejected while the remaining were accepted.

The results reveal the positive influence of stakeholder attitudes on both stakeholder behavior and stakeholder priorities that attitudes serve as a significant determinant of behavior. This is in line with the assertions of Ajzen [104] and buttresses the connection drawn in previous studies between attitudes and participation in environmental management [105,106]. These findings suggest that individuals who harbor favorable perceptions of MSRP are more likely to participate actively, while the perception of river restoration

projects is an underpinning driver for stakeholder prioritization. Concurrently, this study broadens the existing discourse, that is attitudes held toward flood protection measures bear a significant sway over stakeholder's proactivity. Consequently, the potential utility of harnessing favorable stakeholder attitudes and targeted knowledge dissemination as catalysts for proactive stakeholder participation, thereby contributing to the effective execution of river restoration projects and the fortification of community resilience against flooding.

Moreover, stakeholder priorities also demonstrated a substantial effect on stakeholder behavior and risk perception, indicating that these priorities shape behavioral tendencies and perceptions of risk. This, in essence, elucidates the theory that more significant emphasis placed on a particular area, such as flood protection in this study, tends to influence stakeholders' subsequent behavior and risk perception, complementing prior studies in the realm of environmental risk perception [107]. This revelation has subtle implications for stakeholders' risk communication and management strategies, suggesting that perceptions of priority can be harnessed to bolster community resilience. More specifically, the nuanced understanding of the relationship between stakeholder priorities and risk perception could inform risk communication strategies, enhancing the efficiency and effectiveness of resilience-building efforts.

The hypothesis that stakeholder risk perception positively impacts stakeholder behavior was affirmed, reaffirming the notion that apprehended risks, in this instance, towards flooding, stimulate the adaptation of congruent behavioral measures, aligning with the findings of scholars such as Leppin and Aro [108]. It is noteworthy, however, that the inability to substantiate Hypothesis 7 implies that trust does not, in fact, influence risk perception, juxtaposing with some literature that argues the vital role of trust in shaping risk perceptions [65], where trust is suggested as a buffer for perceived risks. While intuitively counterintuitive, this finding may suggest that stakeholders independently assess risks, notwithstanding their trust levels in government decisions. This discrepancy may be attributable to context-specific factors or differing conceptualizations of trust, which reveals an intriguing facet of stakeholder psychology, warranting further exploration.

Stakeholder knowledge, we found, had significant positive effects on stakeholder behavior and priorities, demonstrating its centrality in shaping environmental behavior, an insight that resonates with Kollmuss and Agyeman's [109] affirmation of the vital role knowledge plays in ecological behavior. Stakeholder motivation similarly revealed positive influence on stakeholder risk perception and stakeholder intentions, which underscores its importance as an intrinsic driver of pro-environmental behavior, in line with scholars such as De Groot and Steg [110]. The relationship between stakeholder knowledge, priorities, and behavior elucidates the importance of knowledge in shaping both priorities and behaviors, a significant contribution to our understanding of stakeholder involvement in river restoration projects. Previous studies have emphasized the role of knowledge in stakeholder behavior [111]; our findings further extend this narrative by showcasing its influence on stakeholder priorities. This correlation posits that enhancing stakeholder knowledge could be instrumental in prioritizing river restoration projects more effectively towards improving community resilience.

Of note, a point of divergence with earlier research lies in the influence of stakeholder motivation on stakeholder risk perception and stakeholder intentions, i.e., H10 ($\beta = 0.162$, $p < 0.001$) and H11 ($\beta = 0.498$, $p < 0.001$). While earlier research may suggest a muted relationship between these variables [112], our study provided robust empirical evidence for a strong association, an indication of the evolving nature of stakeholder dynamics in river restoration and improving community resilience contexts.

6. Conclusions

This study utilized the MSRP in Tianchang City as an empirical conduit and endeavored to delineate the complex interplay of factors shaping stakeholder participation in river restoration efforts, contributing to the ongoing discourse on community resilience and flood management.

Theoretically, this study substantiates the applicability of TPB in the realm of flood management and community resilience. It confirms the centrality of attitudes, knowledge, risk perception, and motivations as determinants of stakeholder behavior and priorities. Our findings enrich the existing theoretical landscape by explicating the complex and interdependent nature of these drivers, particularly emphasizing the roles of stakeholder knowledge and priorities—areas hitherto not explored extensively. Noteworthy is our findings' divergence from earlier scholarship concerning the negligible influence of stakeholder trust on risk perception [65] and the amplified influence of stakeholder motivation on risk perception and intentions [112], reflecting the dynamic nature of stakeholder attitudes and behavior in different contexts.

From the practical perspective, the insights generated here equip practitioners (e.g., policymakers, project managers, and community leaders) with an informed understanding of stakeholder behavior, as these insights illuminate the pathways to foster stakeholder participation in river restoration initiatives, thus enabling the development of efficacious strategies to stimulate active participation in river restoration projects, with the potential to enhance community resilience significantly. The nuanced relationships uncovered between stakeholder priorities, risk perception, and behavior suggest the need for well-crafted communication strategies that take these factors into account to optimize stakeholder participation and, thus, the project outcomes.

However, these findings are not without their constraints. This study concentrated solely on Tianchang City's MSRP, while the unique cultural, social, and environmental contexts could influence stakeholder behavior and participation, which may differ in other settings. Consequently, future investigations employing a longitudinal design across diverse geographical contexts would augment the external validity and inferential power of our findings. Additionally, the counterintuitive finding concerning stakeholder trust's negligible influence on risk perception reveals an intriguing facet of stakeholder psychology, inciting further exploration. How stakeholders perceive, assess, and react to risks in the absence of trust merits a comprehensive investigation, potentially uncovering novel dynamics between trust, risk perception, and behavior.

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