

Exploring Willingness of Bicycle-sharing based on the Structural Equation

Model

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Abstract: In today's Internet era, due to the rapid advancement of information technology, the new business model of the "Sharing Economy" has attracted more and more attention. Bicycle-sharing has become an indispensable means of transportation for residents in the metropolis. Being an environmentally friendly means of transportation, although bicycle-sharing is valued by the traffic management departments, it lacks the research on the public willingness of using it. Therefore, this paper collects various data and explores the behavior characteristics of shared bicycle users by way of a questionnaire survey. After that, based on the planned behavior theory, the author constructs a structural equation model to study the influence of various factors such as attitude, social norms, usage behavior, usage intention, usage habits, and perceived behavior control, etc. to the willingness of bicycle-sharing, in which the results show that three of them are insignificant. Besides, this paper also puts forward policies and suggestions to promote the stable development of shared bicycles.

Keywords: Bicycle-sharing; Usage intention; Theory of planned behavior; Perceived behavior; Structural equation model; Policy suggestion.

1. INTRODUCTION

At present, there is a lack of domestic and foreign research on the willingness of bicycle-sharing. Therefore, this paper collects various data and explores the behavior characteristics of shared bicycle users by way of a questionnaire survey. Besides, this paper also studies the influence of various factors such as perceived behavior control, etc. to the willingness of bicycle-sharing, which, to some extent, can compensate for the lack of existing research and enrich the existing research and theoretical system. At the same time, the bicycle-sharing industry is facing a series of opportunities and challenges. To develop continuously and steadily, it is necessary to clarify the real needs of users. This study takes users' willingness as an entry point and studies the factors that could affect users' willingness, which can provide references and suggestions for the development and improvement of the enterprise.

Bicycle-sharing not only alleviates the disadvantages of urban transportation, such as traffic congestion but also reduces vehicle exhaust emissions, which is conducive to green travel and environmental protection. These benefits have attracted the attention of many scholars. However, the

current research on bicycle-sharing is mostly limited to superficial discussions. Taking the current situation of bicycle-sharing as a starting point, Si et al. [1] bicycle-sharing plays a key role in improving the sustainable mobility of Chinese cities. Unsustainable usage patterns and user behavior are increasingly serious problems faced by DBS in China and are severe enough to threaten their profits and supply.

Wu [2] found that the booming of the Bike Sharing System (BSS) has played an important role in offering a convenient means of public transport. The BSS is also viewed as a solution to the first/last mile connection issue in urban cities. The BSS can be classified into dock and dock-less. However, due to imbalance in bike usage over spatial and temporal domains, stations in the BSS may exhibit overflow (full stations) or underflow (empty stations).

Zhou et al. [3] divided the factors that affect the satisfaction of bicycle users into five categories: safe environmental protection factors, convenience and flexibility, deployment and departure factors, appearance and functional factors, performance and maintenance factors; to meet the needs of bicycle users, this study constructed a structural equation model (SEM). Finally, according to the practice questionnaire of Kunming City, the influence of various factors on the satisfaction of bicycle-sharing users was determined.

Binary logit models are developed to investigate the relationship between modal shift to bike-sharing with socio-demographic, commuting trip and motivation factors by Ma et al. [4]. The regression model results indicate that "No stolen/damage problem" and "Cheaper than other modes" are significant factors promoting dockless bike-sharing and bicycle-lease. "Good quality of bicycles" is a significant factor considered by docked bike-sharing and bicycle-lease users. "Public transport subsidy by employer" encourages commuters to shift to docked bike-sharing, whereas individuals with a government student discount are less likely to shift to Swapfiets. Male and multimodal commuters are more likely to use dockless bike-sharing.

Chen et al. [5] have found that the unprecedented development of Smart BSSs(Smart bike-sharing Schemes) results in considerable socioeconomic and environmental benefits but also creates new urban governance issues. Study results showed that the consumers' willingness to participate in co-governance of Smart BSSs is significant and the influence factors presented the diverse characteristics. Finally, this study provided the multi-path solutions for the further co-government. For consumers, positive participation in co-governance of Smart BSSs; For the government and urban managers, it is necessary to constantly optimize related institutional arrangements; For Smart BSSs enterprises, how to adopt rational market behaviors and improve service level will become the key.

Si et al. [6] have found that evolutionary trends in bike sharing research tend to move from the safety and benefits of bike usage to more complex external impacts, system optimization, design and integration with public transit.

Fishman et al. [7] used thematic analysis methods to study the operation of public bicycles in Brisbane, Italy and found that the three main factors affecting public participation in public bicycle programs are accessibility/spontaneity, safety, weather/terrain. Spontaneity is usually considered to attract people to participate in public bicycle programs, and the lengthy registration process is considered to inhibit spontaneity. Mandatory helmet legislation is believed to reduce the spontaneous use of bicycles by the general public. No matter what kind of people, safety needs to be considered,

including the lack of basic bicycle equipment and the general user's negative attitude towards some car drivers. Studies have shown that to improve the public's use of bicycle programs, it is necessary to simplify the registration process of law enforcement. At the same time, bicycles should be accessible 24 hours a day, seven days a week, and a greater incentive policy should be set to attract new members and ordinary members to register.

Campbell et al. [8] etc. have found that users have different types of local sources of public bicycle demand: travel distance, temperature, precipitation, and air quality difference. Although it is unclear whether bicycle-sharing is an attractive solution to the end distribution, it can be a good replacement for buses.

The theory of planned behavior is proposed by Ajzen [9]. Since Ajzen's study found that human behavior is not a spontaneous motive, but is under control, he enhanced TA and added "Self-control" behavior. Ajzen then added perceptual behavior control (perceived behavioral control, PBC) to the theory, improving its explanatory power and renaming it as planning behavior theory [10]. The new concept of "perceived behavioral control" has developed into a new model of behavior theory-theory of planned behavior (theory of planned behavior, TPB).

Five factors:

- (1) Attitude (behavior attitude) refers to a person's aggressive or negative mood to the behavior, i.e., the attitude of a person's conceptualization of the assessment of detailed behavior, so the formation of attitude is usually regarded as a function of symbol and virtual determination of individual behavior.
- (2) Subjective norms are the social pressure of individuals on whether they can take a certain behavior, i.e., the influence of individuals or groups (salient individuals or groups) on the prediction of individual behavior, or the prediction of individual behavior. Individuals take specific actions and exert influence.
- (3) Perceived behavioral control is a reflection of individual experience and expectations. The fewer obstacles to expectation, the better the behavioral perception. Two forms can affect it: the motive meaning of the behavior intention, and the non-indirect predictive behavior.
- (4) Behavior intention refers to a person's non-objective probability of specific behavior, which reflects the individual's intention to take a specific behavior.
- (5) Behavior (specific behavior) refers to the incident behavior taken by the individual.

Ajzen believes that all elements that can affect behavior are indirectly affected by the behavior intention, which is influenced by three related factors, one is the "attitude" from the individual, i.e., the "attitude" (attitude) held by a particular behavior, and the other is the "subjective norm" from the non-internal, which is the "subjective norm" (Subjective N). For example, hats can affect certain behaviors. Finally, it also comes from perceived behavioral control.

Generally speaking, the more active a person's attitude toward a certain behavior, the stronger the individual's behavior intention; the more active the subjective norms of a certain behavior, the stronger the individual's behavior, the more positive the attitude, and subjective norms; the stronger the perception of behavior, the stronger the personal behavior. Unlike the fundamental assumption of the theory of rational behavior, Ajzen maintains that the individual's perceived control of perceived behavior is regarded as a continuity, one is completely under the control of the perception, and the other is completely out of it. Most human behavior falls somewhere between these two extremes.

Therefore, to predict behavior that is not completely under the control of perception, it is necessary to increase the variable of perceived behavior control. However, when the personal control of behavior is closer to the strongest level, or the control problem is not a factor considered by the individual, the predicted effect of the theory of planned behavior is similar to the theory of rational behavior.

The theory of planned behavior mainly contains the following aspects:

- (1) Behavior that is not personal will not only be affected by the behavioral intention, but also be constrained by practical regulatory conditions such as individual talents, opportunities, and resources to perform the act. Under sufficient practical regulatory conditions, the behavioral intention is directly determined by the action;
- (2) The precise perception of behavioral regulation reflects the actual regulatory conditions. Therefore, it can be used as a substitute for the actual regulatory conditions to directly predict the possibility of the behavior, and the accuracy of the prediction depends on the authenticity of the perceived behavioral regulation;
- (3) Behavior attitude, subjective norms, and perceptual behavior control are the three main variables that determine behavior intention. The more active the attitude, the greater the support of important others, the stronger the perceived behavioral control, the greater the behavior intention, and vice versa;
- (4) Individuals have a lot of confidence in behavior, but only a small amount of behavioral confidence can be achieved within a certain period and environment, and these available beliefs are also called prominent beliefs. They are the cognitive and emotional foundations of behavior attitudes, subjective norms, and perceptual behavior control;
- (5) Individual and social civilization elements (such as personality, intelligence, experience, age, gender, culture, and art, etc.) indirectly affect behavior attitudes, subjective norms, and perceptual behavior control by affecting behavioral confidence, and ultimately affect behavioral intention and behavior itself;
- (6) Behavioral attitudes, subjective norms, and perceived behavioral control can be completely different from concepts, but sometimes they can have the same belief base. Therefore, it can be said that they are both independent and interrelated.

Ramayah et al. [11] used rational behavior theory, planned behavior theory, and technology acceptance model to study the willingness and behavior of Malaysian investors to use Internet stock trading technology for investment, and found that attitudes and subjective norms on investors' willingness to use the Internet to trade has a positive effect, and attitude is greatly influenced by perceived usefulness and ease of use. Besides, subjective norms will be affected by ban norms and descriptive norms.

Özer and Yilmaz [12] respectively used rational behavior theory and planned behavior theory to study consumers' purchase intentions in online grocery stores, and found that these two theories can explain consumers' online purchase intentions and behaviors. The theory of planned behavior at that time explained the phenomenon more strongly.

Based on the theory of planned behavior (TPB) and observed practices in China, Sun et al. [13] develops a theoretical framework to examine how attitudes (ATT), subjective norms (SN), perceived behavioral control (PBC), and personal norms (PN) motivate users' civilized cycling behavior through

civilized cycling intentions. The results indicate that the four influencing factors can encourage users' civilized cycling behavior, especially when civilized cycling intention exists. Policies like credit-based supervision mechanisms could promote users' civilized-cycling intentions, which could then be transformed into actual behavior.

Zhang et al. [14] proposed a model of consumers' online shopping willingness based on the theory of rational behavior and the theory of planned behavior. Studies have shown that, compared to rational behavior theory, planned behavior theory can better explain consumers' online shopping intentions. Behavior attitude and perceived behavioral control have a significant impact on online shopping intentions, but subjective norms have no significant impact on online shopping intentions. The study found that consumers' previous online shopping behaviors have an important impact on online shopping willingness, which is far greater than the influence of behavior attitudes and perceived behavioral control on online shopping intentions.

Liu and Zhang [15] introduced the three variables of seeking novelty, trust, and past behavior in the framework of planned behavior theory, studied the main factors that influence people's willingness to ride high-speed railways, and constructed a hidden tourist model of high-speed railways. Based on the collected sample data of 329 workers and students, the structural equation model was used for empirical testing, and occupation was used as the adjustment variable to take group analysis. The study found that attitude, subjective norms, and perceived behavioral control have a direct and positive effect on high-speed railway ride intentions, of which attitude is the most obvious, subjective norms are second, and the pursuit of novelty and trust has an indirect positive effect on it. Besides, the past behavior can directly affect the high-speed rail ride intention, there is a clear relationship between the variables. On this basis, this article puts forward some suggestions for high-speed railway operation and management.

Contini [16] based on a multicomponent model of the Theory of Planned Behaviour that has made it possible to verify how control factors such as cooking skills, product availability, budget, time pressure, and interest in healthy eating can affect the consumption of precooked plant-based foods. The results of Structural Equation Models applied to a sample representative of the Italian population (600 individuals) highlight the presence of a consistent group of consumers (almost 70%) that consider plant-based convenience foods as a useful means to improve their diet.

Pavlou and Fygenon [17] extended Ajzen's (1991) theory of planned behavior (TPB) to explain and predict the process of e-commerce adoption by consumers. Their findings stress the importance of trust and technology adoption variables (perceived usefulness and ease of use) as salient beliefs for predicting e-commerce adoption, justifying the integration of trust and technology adoption variables within the TPB framework. Arvola et al. [18] examined the usefulness of integrating measures of affective and moral attitudes into the Theory of Planned Behaviour (TPB)-model in predicting purchase intentions or organic foods. Cheon et al. [19] applied a conceptual model on basis of the theory of planned behavior. The findings showed that the TPB explained college students' acceptance of m-learning reasonably well. More specifically, attitude, subjective norm, and behavioral control positively influenced their intention to adopt mobile learning.

Zhao and Wang [20] found that a structural model for guiding users to regulate bicycle parking to guarantee the governance effect by adopting material incentive and spiritual motivation was

established via the utilization of the theory of planned behavior and motivation theories Zhang et al. [21] found that bike trajectories generated by the dockless bike-sharing service provides a great opportunity to explore users' travel behavior within the shared mobility transportation ecosystem.

2. SAMPLES AND STUDY DESIGN

To study the residents' intention to use bicycles, this study uses the planned behavior theory as the basis to study the factors that affect the residents' willingness to use. The variables and research models of this study will be introduced below.

2.1 Study variables and hypothesis

For each resident, bicycle-sharing means that in different situations, combined with their preferences or other factors, decide whether to use this tool to travel. The use of shared bicycles can help alleviate urban traffic congestion and reduce exhaust emissions, which is conducive to protecting the environment. However, residents' choice of whether to use shared bicycles as their means of travel is affected by many direct and indirect factors. Fishbein and Ajzen believe that before consumers adopt a certain behavior, they usually show a tendency. Through this behavioral tendency, we can predict the true behavior of consumers in the follow-up. They call this specific behavioral tendency as behavioral willingness. In the follow-up behavioral research, many scholars have confirmed that behavioral intention is a prerequisite for behavior, and he is highly related to behavior, so it can be used to predict the occurrence of individual behavior. And the acquisition of intentions will be affected by many factors. This article will focus on surveying users' attitudes, social norms, perceived behavioral control, behavioral intentions, use habits, and use behaviors of shared bicycles to study their impact on residents' intention to use. Hypotheses are brought up as follows:

H0: Social norms that affect residents' use of shared bicycles are positively related to behavioral intentions.

H1: Social norms that affect residents' use of shared bicycles are positively related to their attitude.

H2: Attitudes that affect residents' use of shared bicycles are positively related to behavioral intentions.

H3: Perceived behavior control that affects residents' use of shared bicycles is positively related to attitudes.

H4: Perceived behavior control that affects residents' use of shared bicycles is positively related to behavioral intentions.

H5: Perceived behavior control that affects residents' use of shared bicycles is positively related to usage behavior.

H6: The intention which influences residents' use of shared bicycles is positively related to their use.

H7: The habit that influencing residents to use shared bicycles is positively related to social norms.

H8: The habits that influence residents' habits in using shared bicycles is positively related to attitudes.

H9: The habit that influences residents' usage of shared bicycles is positively related to the perceived behavior control.

H10: The habits that influence residents' habits of using shared bicycles is positively related to their behavior.

H11: The habit that influences residents' usage of shared bicycles is positively related to their use behavior.

To study the factors that affect residents' intention to use bicycles and the internal relationship between these factors, the following research model in Fig. 1 is constructed.

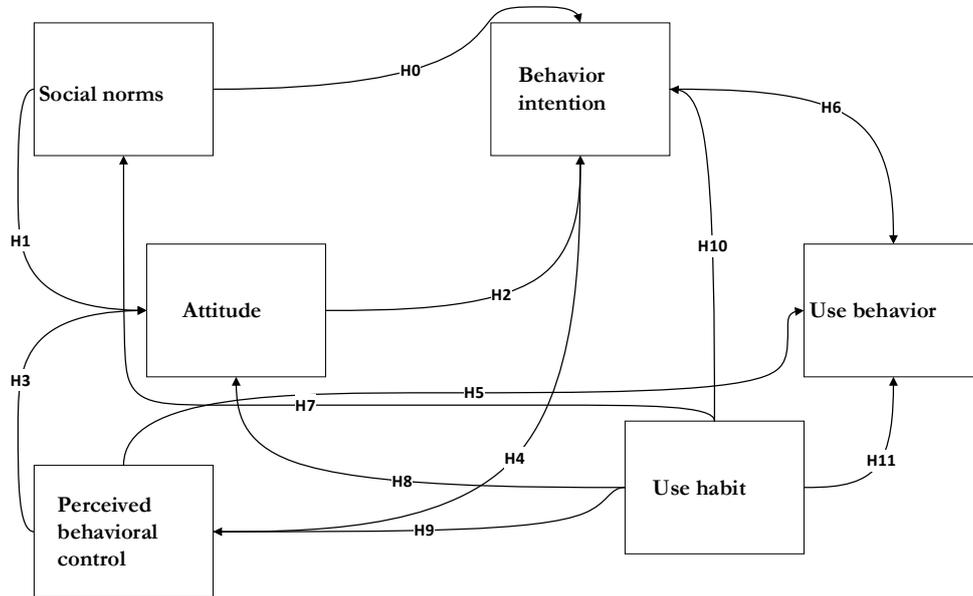


Figure 1 The architecture of the model

2.2 Variable measurement and questionnaire design

To study residents' intention to use shared bicycles, this paper is based on the theory of planned behavior and combined with other related research to extract several research variables such as usage attitude, social norms, perceived behavior control, behavior intention, usage habits, and usage behavior. Finally, this study determined the measurement items shown below and the questionnaire. There are a total of 30 questions in the questionnaire. The first 8 questions aim to understand the basic information of the residents. The next 22 questions are the research and measurement of various variables. Among them, the Likert scale V is used to measure the variables. For details of the questionnaire, please see the appendix of this paper.

(1) Attitude

Your preference for bicycle-sharing, Variable name: A1

Your preference for bicycle-sharing, Variable name: A2

(2) Social norms

Your family's attitude towards you traveling by bicycle-sharing, Variable name: SN1

b. Your friends' attitude towards you traveling by bicycle-sharing, Variable name: SN2

c. Your family's attitude towards travel by bicycle-sharing, Variable name: SN3

d. Your friends' attitude towards travel by bicycle-sharing, Variable name: SN4

(3) Perceived behavioral control

Do you know the distribution of shared bicycles in the school and near the school/company? Variable name: PBC1

b. How convenient is it when you travel or work on a shared bicycle? Variable name: PBC2

c. Is it convenient for you to find a shared bicycle when you want to use it? Variable name: PBC3

d. Is parking convenient when you use a shared bicycle? Variable name: PBC4

(4) Behavior intention

Whether to use the shared bicycle as the main driver in future travel? Variable name: BI1

Whether you are willing to use the shared bicycle method in future travel? Variable name: BI2

(5) Use habit

You will subconsciously, without thinking, choose to travel by bike-sharing. Variable name: H1

Choosing to travel by bicycle-sharing has become a part of your daily life. Variable name: H2

Bicycle-sharing has become the most familiar and comfortable way for you to travel. Variable name: H3

You have been using shared bicycles as a means of travel for a long time. Variable name: H4

It is very difficult to make you give up traveling by shared bicycles. Variable name: H5

(6) Use behavior

Have you used bicycle sharing as the main mode of travel in the past? Variable name: B1

How often do you use shared bicycles in the past? Variable name: B2

Based on existing theories and research, the research variables and hypothesis of this paper are proposed. On this basis, the research model of this paper is constructed, and the measurement indicators of the variables in this study are also designed.

3. EMPIRICAL TEST AND RESULT ANALYSIS

3.1 Descriptive statistical analysis

To study residents' intention to use bicycles. We distributed several questionnaires on the Internet, and finally recovered a total of 647 questionnaires.

According to statistics, 39.26% of the 647 effective samples are from Shanghai, and 60.74% are from other cities. Besides, the proportion of women is 14 percentage points higher than that of men. The percentages of freshmen, sophomores, juniors, seniors, first-year graduates, second-year graduates and high-grade graduates are: 8.54%, 13.82%, 24.62%, 46.98%, 4.02%, 1.76%, 0.25%. Among the 398 students, 47 have monthly living expenses below 1,000 yuan, 189 have 1,000 to 1,500 yuan, 104 have 1,500 to 2,000 yuan, and 58 have more than 2,000 yuan. It can be seen from this that the average monthly living expenses of the vast majority of students are at a moderate level. Besides, among the 249 non-students, 49 have an average monthly income of less than 3,000 yuan, 94 have 3,000-5,000 yuan, 72 have 5,000-10,000 yuan, and 34 have more than 10,000 yuan. Among these people, 79.13% do not have their bicycles, and 87.79% do not have their electric vehicles. Therefore, the owners of bicycles and electric vehicles account for a small part. The specific statistical results of the sample are shown in the table.

3.2 Reliability and validity test

3.2.1 Reliability test

The reliability test is to verify the stability and consistency of the measurement scale. Academically, the reliability of the scale is usually tested by calculating Cronbach's Alpha numbers. It is generally believed that Cronbach's Alpha number greater than 0.7 indicates that the reliability of the scale is better. During the reliability test, if the Cronbach's Alpha number is less than 0.7, the scale can be corrected by the corrected item-total correlation (CITC value). When the CITC value of a certain item

is less than 0.4, and after the item is deleted, the Cronbach's Alpha increases, you may consider deleting this question.

The reliability test of this research scale was conducted using SPSS21. The test results are shown in Table 1. From the table, we can see that the CITC values of all items in the six variables of use behavior, attitude, social norms, perceived behavioral control, behavior intention and use habits are greater than 0.4, Cronbach's Alpha is 0.83, 0.699, 0.891, 0.745, 0.729 and 0.916, which are close to or greater than 0.7. The overall Cronbach's Alpha of the measurement scale is 0.926, which is greater than the recommended value of 0.7, indicating that the variable scale of this study has good reliability.

Table 1. Research variable scale

variables	Item	CITC	Cronbach's Alpha after deleting the item	Cronbach's Alpha
Use behavior	B1	0.712	.a	0.83
	B2	0.712	.a	
Attitude	A1	0.537	.a	0.699
	A2	0.537	.a	
Social norms	SN1	0.76	0.86	0.891
	SN2	0.774	0.855	
	SN3	0.753	0.862	
	SN4	0.754	0.862	
Perceived behavioral control	PBC1	0.449	0.741	0.745
	PBC2	0.501	0.707	
	PBC3	0.592	0.655	
	PBC4	0.628	0.637	
Behavior intention	BI1	0.576	.a	0.729
	BI2	0.576	.a	
Use habit	H1	0.748	0.904	0.916
	H2	0.811	0.891	
	H3	0.824	0.889	
	H4	0.797	0.894	
	H5	0.742	0.906	

3.2.2 Validity test

KMO and Bartlett's tests were used to test the validity of this study scale. The test results in Table 2 show that the KMO value is 0.932, which is greater than the recommended value of 0.7, the chi-square value is 7338.214, the degree of freedom is 171, and it is significant at the level of 0.001. Therefore, this research scale has good construct validity.

Table 2. KMO and Bartlett's test

Kaiser-Meyer-Olkin metric with sufficient sampling		0.932
Bartlett's test	Approximate chi-square	7338.214
	df	171
	Sig.	0.000

3.3 Confirmatory factor analysis

Fig. 2 is the correlation analysis results between the core variables of this study. From the table, we can see that there is a simple positive correlation between the use behavior, attitude, social norms, behavior intention, use habits, and perceived behavioral control (P all less than 0.01), which laid the foundation for the path analysis of structural equations.

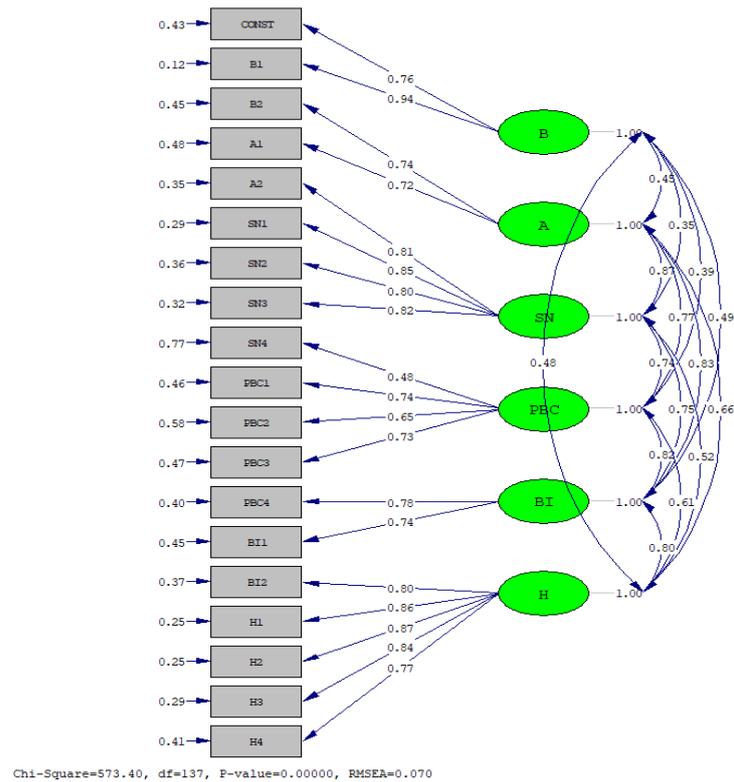


Figure 2 Correlation analysis results

3.4 Analysis of the structural equation model

3.4.1 Construct theoretical structural equation model

As shown in Fig. 3, we construct a structural equation model diagram of behavior, attitude, social norms, behavior intention, usage habits, and perceived behavioral control in Lisrel 8.7. In Figure 3-4, the ellipse represents six latent variables: behavior, attitude, social norms, behavior intention, usage habits, and perceived behavioral control. The rectangle represents the observed variable.

3.4.2 Pathways analysis

Table 3 and Fig. 4 show the path coefficients between model variables, which can be seen from the table that:

Use habits have a significant positive effect on use behavior ($B=0.25$, $P<0.05$), the hypothesis H11 is supported;

Use habits have a significant positive effect on behavior intention ($B=0.39$, $P<0.05$), the hypothesis H10 is supported;

Use habits have a significant positive effect on attitudes ($B=0.21$, $P<0.05$), the hypothesis H8 is supported;

Use habits have a significant positive impact on social norms ($B=0.54$, $P<0.05$), the hypothesis H7 is supported;

Use habits have a significant positive effect on perceived behavioral control ($B=0.62$, $P<0.05$), the hypothesis H9 is supported;

Perceived behavioral control has a significant positive effect on attitude ($B=0.19$, $P<0.05$), the hypothesis H3 is supported;

Perceived behavioral control has no significant effect on use behavior ($B=-0.03$, $P>0.05$), the

hypothesis H5 is supported;

Perceived behavioral control has a significant positive effect on behavior intention (B=0.28, P<0.05), the hypothesis H4 is supported;

Social norms have a significant positive effect on attitudes (B=0.67, P<0.05), the hypothesis H1 is supported;

Social norms have no significant effect on behavioral intentions (B=0.17, P>0.05), the hypothesis H0 is not supported;

Attitude has no significant effect on behavior intention (B=0.24, P>0.05), the hypothesis H2 is not supported;

The behavioral intention has a significant positive effect on use behavior (B=0.31, P<0.05), the hypothesis H6 is supported.

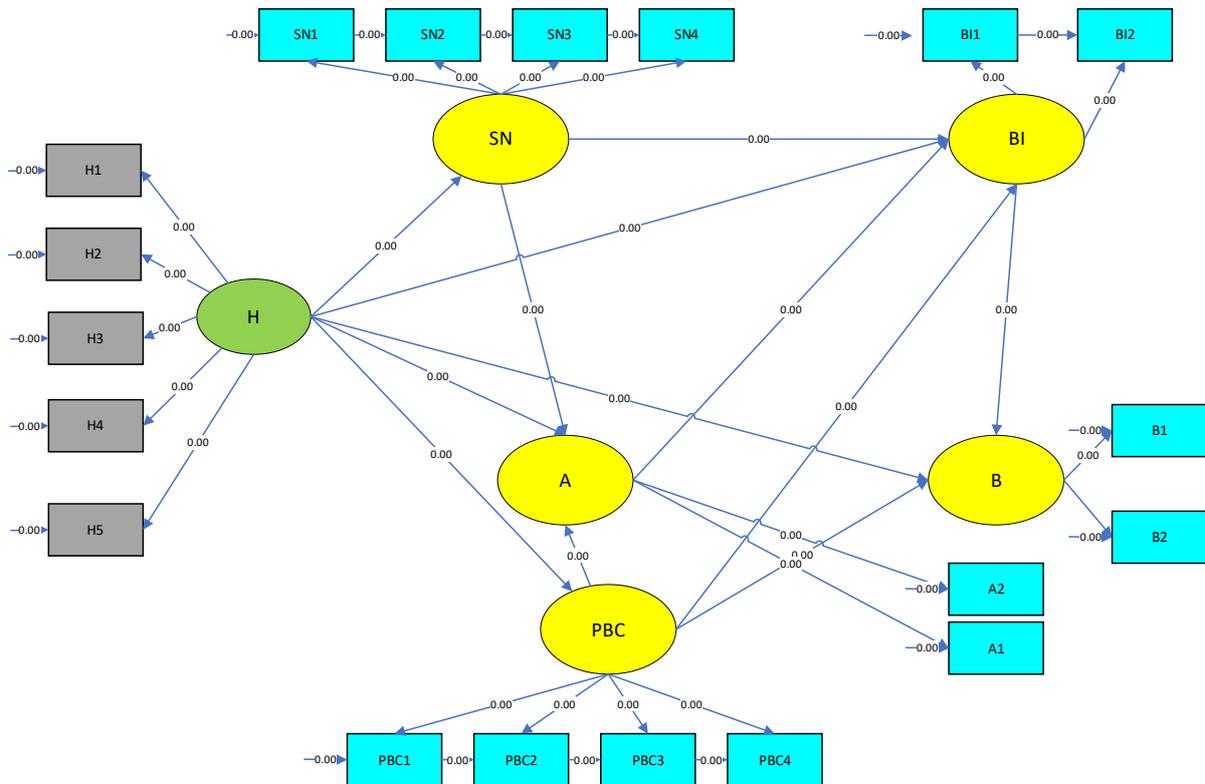


Figure 3 Structural Equation Model

Table 3 Path Coefficient

Pathways	Estimate	T	P	Support the hypothesis or not
Use behavior→Use habit	0.25	2.75	significant	Yes
Behavior intention→Use habit	0.39	5.3	significant	Yes
Attitude→Use habit	0.21	3.54	significant	Yes
Social norms→Use habit	0.54	12.03	significant	Yes
Perceived behavioral control→Use habit	0.62	11.93	significant	Yes
Attitude→Perceived behavioral control	0.19	3.27	significant	Yes
Use behavior→Perceived behavioral control	-0.03	-0.44	insignificant	No
Behavior intention→Perceived behavioral control	0.28	4.12	significant	Yes
Attitude→Social norms	0.67	6.56	significant	Yes
Behavior intention→Social norms	0.17	1.62	insignificant	No

Behavior intention→Attitude	0.24	1.64	insignificant	No
Use Behavior→Behavior intention	0.31	2.74	significant	Yes

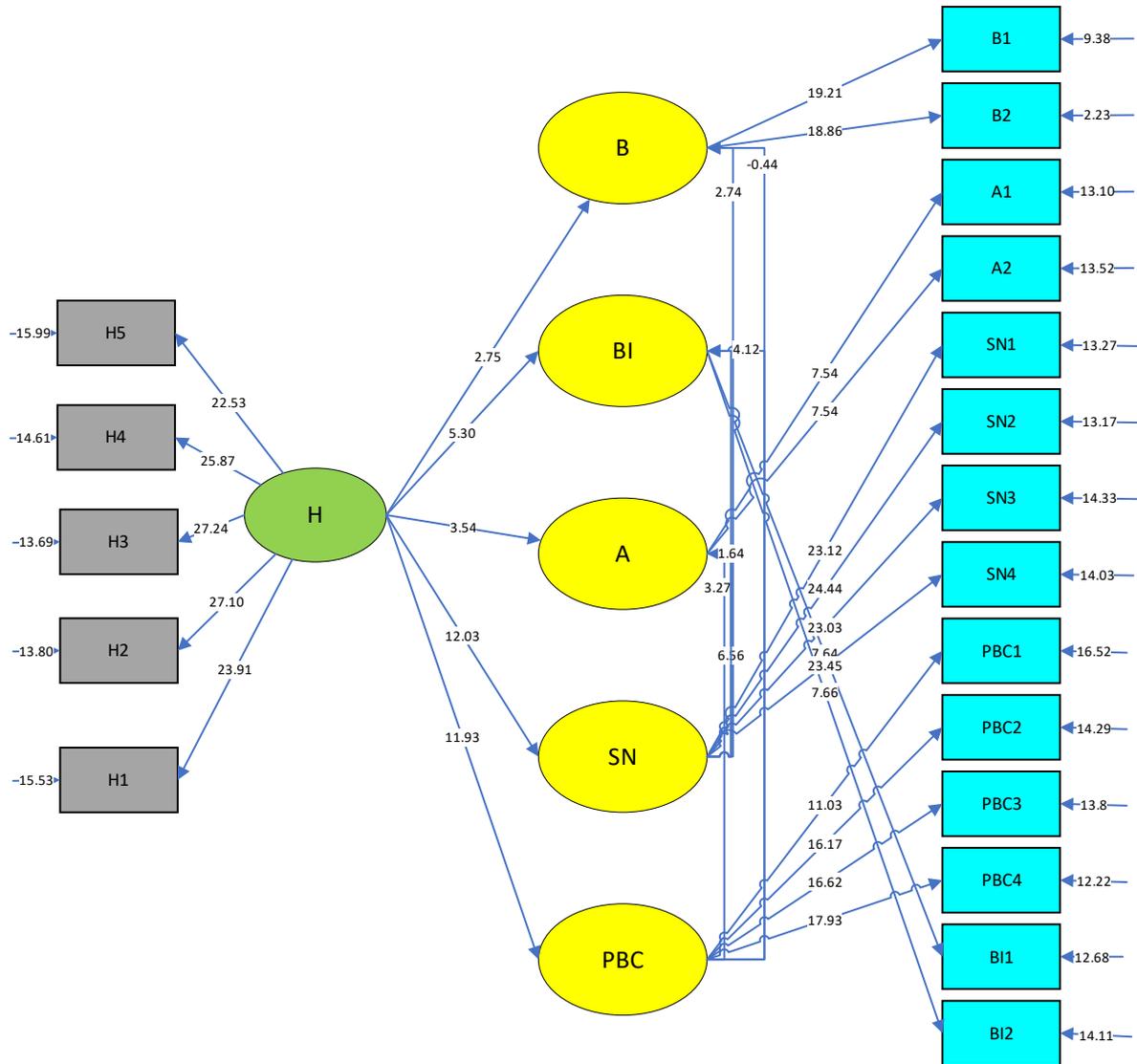


Figure 4 Path coefficient diagram of structural equation model

4. CONCLUSION

4.1 Research summary

This article uses a questionnaire survey to collect data and test the reliability and validity of the data. To study residents' intention to use shared bicycles, twelve hypotheses are proposed. Then, based on the planned behavior theory, the structural equation models are constructed to analyze the relationship between six latent variables such as attitude, intention to use, behavior, habits, perceived behavioral control, and behavior to verify the hypothesis. Based on the behavioral characteristics of bicycle users, a structural equation model was built based on the planned behavior theory to study the impact of attitudes, social norms, use behavior, use intention, use habits, and perceived behavioral control on use intentions. The results showed that three pathways of them are insignificant.

4.2 Policy suggestion

Based on the research result and the actual situation, the following suggestions are brought up:

Generally speaking, the government should insist on putting people first and facilitate residents' travel. Enterprises should operate bicycles per regulations. Secondly, residents should use the bicycles according to law and make reasonable use of shared bicycles to jointly build a convenient and comfortable urban transportation system.

At the same time, when operating a shared bicycle, an enterprise should abide by the responsibilities and obligations of the shared bicycle operation and management. Because the wear and tear of bicycles is a very important issue, companies that share bicycles should adapt to the development of technology and technology and innovate, to improve the level of shared bicycle service and achieve reasonable management, and ultimately establish a healthy travel mode. On this basis, relevant government departments should supervise per the law and control the loss of shared bicycles and other phenomena. Second, the location of shared bicycles should be reasonably planned according to the public facilities and local residents' preferences, so that residents can use it conveniently without affecting traffic order. Besides, it is strictly prohibited to place shared bicycles in areas such as green spaces and motor vehicle lanes. To be environmentally friendly, the technical performance of the shared bicycles should be per the relevant provisions of the current national standards and industry standards to ensure the quality of the bicycles; at the same time, the design of the body should be elegant and reasonable, so as not to affect the image of the city; besides, the bicycles should have a real-time GPS search function, which can accurately and timely carry out bicycle management. To manage bicycles reasonably, the operating enterprise should be reasonably equipped with a professional operation and maintenance team, carrying out regular repairs and place the un-parked bicycles back to the nearby stop. Therefore, the stable and sustainable development of shared bicycles requires our joint efforts.

4.3 Research outlook

Based on the theory of planned behavior, this paper studies the residents' intention to use bicycles. To a certain extent, the influence of six factors based on the theory of planned behavior to the intention to use can be obtained: attitude, use intention, use behavior, use habits, perceived behavior control, and social norms. However, there are still shortcomings.

Many factors affect personal intentions, such as weather, environment, family conditions, economic conditions, etc. This paper only examines the impact of six factors, which means it is impossible to accurately determine the conditions that affect residents' intention to use shared bicycles.

The questionnaires are distributed mainly in Chongqing and Shanghai. However, nowadays, there are many bicycle-sharing points all over the country and even around the world. From this point of view, the results of the survey largely cannot show the correctness of the results.

The times are constantly advancing and developing, the bicycle-sharing is also constantly being improved, and residents' perceptions of bicycle-sharing will also change. Therefore, the findings of this study are not time-sensitive.

In summary, in future research, these defects should be improved and the research should be further improved so that the research results can more reflect the real situation and have more credibility.

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