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Study on Sharing Characteristics and Sustainable Development Performance: Mediating Role of the Ecosystem Strategy

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Abstract: How the sharing economy can move toward sustainable development is an important research topic. This paper attempts to explore the mediating effect of ecosystem strategy on the relationship between sharing characteristics and sustainable development performance by applying the structural equation model and questionnaire survey of 90 sharing-economy enterprises. The research results show that the ecosystem strategy plays a complete mediating role in the relationship between sharing characteristics and environmental performance, a partial mediating role in the relationship between sharing characteristics and social performance, and an insignificant mediating role in the relationship between sharing characteristics and economic performance. The research results provide new knowledge for research on the sustainable development of the sharing economy, which are of certain reference value for the sustainable development of sharing-economy enterprises, and government's support to and supervision of the sharing economy.

Keywords: sharing economy; sharing characteristic; ecosystem strategy; sustainable development performance

1. Introduction

The fast growth of the sharing economy and its huge impact on all aspects of the current socioeconomic system have drawn the attention and interest of all sectors of society [1,2]. Some scholars, critics, and politicians in support of the sharing economy insist that it can save resources, reduce carbon emission, and encourage the sustainable development of a social economy [3]. The pattern of the sharing economy is likely to become a new pathway toward sustainable development [4–7], and it can contribute to the sustainable development of human society [8,9]. Those who hold a negative attitude toward the sharing economy argue that some entrepreneurs take advantage of the concept of the sharing economy for economic self-interest rather than for sharing, which is no more than a “predatory and exploitative” behavior [3]. Moreover, if the sharing economy continues its current pathway, “it appears unlikely to drive a transition to sustainability” [2]. In fact, what is hidden behind the vigorously growing wave of the sharing economy is the large discrepancy between the ideal desire of governments and all sectors of society to achieve sustainable development by strongly supporting the sharing economy and the actual business practices of enterprises engaged in the sharing economy. Therefore, research on how the sharing economy practices can follow a pathway toward sustainability and how the discrepancy between the idea of sustainability contributing to the sharing economy and the actual sharing economy practices, which are, in fact, unsustainable, is of great significance for both theoretical development and practical guidance. How the sharing economy can move toward sustainable development is truly an important research topic [2].

So far, research on the sharing economy has mainly focused on three aspects: (1) Business models of the sharing economy, (2) types of sharing economy, and (3) sharing economy and sustainable development. Among the literature on these aspects, studies on the third aspect are the least [1].

The understanding and views about the definition of the sharing economy differ widely, and a strict and consistent definition is lacking, as shown in the media and in the literature. In the definition of the sharing economy enterprise, neither a consensus nor a consistent opinion has been reached [10]. If all these enterprises are plotted out on a continuum, with pure sharing-oriented enterprises on one end and pure exchange-oriented on the other end, then some enterprises can be located in between and operate using a mixed business model. Enterprises that aim at pure sharing possess sharing characteristics, whereas those that aim at pure exchange exhibit exchange attributes [11].

The survey and analysis conducted by Habibi et al. [6,11] show that for the sharing economy enterprises, the higher the sharing characteristics their projects possess, the more attention will be given to the ecosystem construction favorable to social benefits and environmental benefits, thus making them more sustainable or favorable for sustainable development. The sustainable development of an enterprise, that is, corporate sustainability, is derived from the generalized concept of sustainable development for human society [12] and the business accounting framework triple bottom line (TBL) [13]. Compared with corporate social performance [14–16], which analyzes corporate social responsibility (CSR) through individual, organizational, and institutional aspects, the sustainable development performance (SDP) considers the economic, environmental, and social performance as the three aspects of a company's sustainability to interpret CSR.

Currently, some researches focus on detecting the relationship between the sharing economy and one aspect of sustainability. For example, Kang and Na [17] assess the relationship characteristics and social networks between sharing economy businesses and consumers. It interprets the sharing economy as collaborative consumption, which emphasizes the social aspect of long-range development. Sung et al. [18] study the excellent circulation of consumption and production for the sustainability of the sharing economy. It considers the environment and society's affection for the sustainability of the sharing firm. Curtis and Lehner [7] attempt to redefine the sharing economy by integrating the concept of sustainability. However, the positive correlation between sharing characteristics and sustainable development needs more empirical support. So far, not enough research has been conducted in the area of sharing characteristics of the sharing economy enterprises, ecosystem, and sustainable development.

Therefore, we attempt to answer the following questions:

- Does a positive correlation exist between sharing characteristics and ecosystem strategy?
- Does a positive correlation exist between sharing characteristics and sustainable development?
- Does a positive correlation exist between ecosystem strategy and sustainable development?
- Does a mediating effect of ecosystem strategy exist in the relationship between sharing characteristics and sustainable development performance?

In this study, we explore the relationship among sharing characteristics, ecosystem strategy, and sustainable development performance using Chinese sharing economy enterprises as samples. As the world's largest market of emerging economy, several studies pay much attention on the sustainable development of sharing economy of China, either in the specific field or in general [19,20]. From the 2019 China's Annual Report on Sharing Economy Development, the sharing economy market of China in 2018 has reached over 400 billion USD, which is an increase by 41.6%, compared to that of 2017. Specifically, the field of productivity sharing gets a double trading value in 2018, compared to the previous year [21,22]. With the support of Chinese government from 2016 [23], the population of the participants of the sharing economy attained 760 million in 2018 [21]. Particularly, around 10% of them are the service providers. In 2018, 34 Chinese unicorns with typical sharing characteristics exist among a total of 305 unicorns (both sharing and non-sharing economy based) worldwide [21]. Due to the importance of China's sharing economy market to the world, studying on data gathered from indigenous users of this country could largely incite the progress of the entire study of this field.

This research aims to validate the mediating effect of ecosystem strategy on the relationship between the sharing characteristics and sustainable development performance. If the mediating effect of ecosystem strategy can be validated through the empirical research, that is, the sharing economy enterprises achieving sustainability by employing the ecosystem strategy, answering the heatedly debated question of whether the sharing economy can contribute to sustainability will be theoretically possible. This research attempts to prove that the sharing economy enterprises are more likely to achieve sustainable development performance by implementing the ecosystem strategy and that it would be difficult for those so-called sharing economy enterprises to achieve sustainability if they do not implement the ecosystem strategy. The significance of this research includes not only its theoretical contribution but also its policy contribution for governments, which can more effectively supervise, manage, and support the sharing economy.

2. Literature Review and Hypothesis

The sharing economy (also called share economy, access, collaborative, and peer economy) refers to such an economic arrangement in which asset owners and users can share the products or services related to these assets [9,24]. Despite the use of different terms, “sharing economy” has become the default term, and it was even incorporated into the Oxford English Dictionary in 2015. Therefore, the term “sharing economy” is widely used in academic literature [2,25].

The term “sharing economy” was first mentioned in 2008, and it denotes the “collaborative consumption made by the activities of sharing, exchanging, and rental of resources without owning the goods” [26]. Although there has not yet been a completely unified definition of the sharing economy, the basic meaning of the term refers to asset owners and users sharing products and services related to these assets [9,24]. In 2015, the Oxford English Dictionary gave the following definition of the sharing economy: “an economic system in which assets or services are shared between private individuals, either for free or for a fee, typically by means of the Internet” (www.oxforddictionaries.com/words/about). “Sharing economy” is widely used in the academic literature [25], and thus the term is also adopted in this paper.

Cheng [1] summarized the literature on the sharing economy and put them under three categories: (1) The sharing economy’s business models and effect, (2) the nature of the sharing economy, and (3) the sharing economy’s sustainability development.

The practices of the sharing economy tentatively validate that the sharing economy is a “potential new approach” to sustainable development as a contribution to a sustainable economy [4,6] and that the sharing economy can help human society to move toward sustainable development [8,9]. Therefore, scholars believe that the research and exploration of the way the sharing economy achieves sustainable development is a significant topic [2].

2.1. Sharing Characteristics

Sharing has probably been the most basic form of economic distribution in hominid societies for several hundred thousand years [27]. Seen in all aspects of our society, including politics, economy, science and technology, culture, and daily living, among others, sharing is a basic behavioral attribute of humankind [28]. Both gift giving and commodity exchange involve transfers of ownership, whereas sharing involves joint ownership. Belk [28] put forward the pure sharing characteristics through a comparative analysis to distinguish it from pure transactions. He argued that pure resource sharing has the following characteristics [28]: (1) Non-reciprocal, (2) social links to others, (3) shared ownership or usufruct rights, (4) money irrelevant, (5) singular objects, (6) networked inclusion, (7) inalienable personal, (8) dependent, (9) sharing context, (10) social reproduction, (11) non-ceremonial, and (12) love and caring. With these sharing characteristics, enterprises can be distinguished from those with transactional characteristics. Habibi et al. [11,29] sketched the non-ownership collaborative consumption continuum between the pure transactional and the pure sharing enterprises through a

representative case analysis based on Belk's analysis. Enterprises between pure transaction and pure sharing exhibit certain sharing characteristics and are likely to call themselves sharing enterprises.

Habibi et al. [11] selected 10 indexes, measured the sharing characteristics of enterprises with scores of 1–5, and divided the enterprise operation model into three sections according to the scores (those in the range 3.5–5 are sharing-practice, those in the range 2.5–3.5 are dual-mode practice, and those in the range 1.0–2.5 are pseudo-sharing practice).

According to the analysis of the connotation of the sharing economy and Belk's definition of sharing characteristics, the higher the sharing characteristics of enterprises are, the more attention will be paid to the community construction, socialization, and sustainable development; the lower the sharing characteristics of enterprises are, the more attention will be paid to the economic benefit rather than to the community construction and sustainable development [11,29].

2.2. Business Ecosystem and Ecosystem Strategy

Moore [30,31], who introduced the term into the business literature, defined business ecosystem as an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. This economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organism also includes suppliers, lead producers, competitors, and other stakeholders. Over time, they co-evolve their capabilities and roles and tend to align themselves with the direction set by one or more central companies. The companies holding leadership roles may change over time, but the function of an ecosystem leader is valued by the community because it enables members to move toward shared visions to align their investments and to find mutually supportive roles.

Business ecosystems play increasingly important roles in competition [32], and the construction of a business ecosystem has already become a corporate strategy [33]. Adner [34] defined the ecosystem strategy as the way in which a focal firm approaches the alignment of partners and secures its role in a competitive ecosystem. The ecosystem strategy strives to retain the values of members, align direction with vision, and build common goals, so that all the members in the system have clearly defined roles to play, cooperate with each other in a friendly manner, rely on one another and compete healthily, keep innovating, and create and maintain the sustainable competitive advantages of the entire ecosystem. Followed by Adner [34], platforms (e.g., [35,36]) and multisided markets (e.g., [37]) approach a similar problem—that of intermediating an interface among different kinds of actors—with a focus on technology and transaction, respectively. The sharing platform is a core position in a network of interactions. In the platform, both consumers and suppliers are users. For example, in the Airbnb platform, both the tenants and house owners are users.

2.3. Sustainable Development Performance (SDP)

Sustainable development is a concept generated to meet the human long-term development. It is an organization principle that tends to maximize the development of human society and maintain the support of natural resources and ecosystem services. The concept was first officially raised by Brundtland [12] in the United Nations.

In the business domain, it is called corporation sustainability and defined as follows: Sustainability is a corporate strategy that monitors long-term corporate growth and effectiveness of corporate performance by incorporating the environmental, social, and economic aspects into the management and evaluation of the corporation [38]. The enterprises are a tissue cell of the society, and enterprise development should not only take economic indicators into account but also the social and environmental indicators. In general, the criteria for corporate sustainability constitute eco-efficiency [39], which shows a firm's efficient use of natural capital, and socio-efficiency [40], which describes the relation between a firm's value added and its social impact. The idea is also strongly influenced by Elkington's TBL [13], which proposes that business goals are inseparable from the societies and environments within which they operate. Although short-term economic gains can be pursued,

failure to account for the social and environmental effects of these pursuits is considered to make these business practices unsustainable. In the private sector, a commitment to CSR implies a commitment to transparent reporting about the firm's material impact for the good of the environment and the people. TBL is one framework for reporting this material impact. Derived from TBL, sustainable development requires balancing the environmental (or ecological), social, and economic (or financial) concerns [41]. These three aspects comprise the evaluation dimensions of SDP. Ecologically, a sustainable economic development is a priority axis for policies designed for the preservation of ecosystems. Taking the sustainable development path is an eternal theme of the human society. Enterprises are cells of the society, and their development should not be evaluated only in terms of economic measures but also in terms of social and environmental measures. Indicators measuring whether an enterprise takes a sustainable development path usually cover these three aspects [42,43], and some may also include corporation-related aspects such as corporation governance [44]. Nevertheless, we consider them as the economic (or financial) aspect of the SDP of the company, as these aspects affect the company's current profit in prior.

2.4. Research Hypothesis

To analyze the connection among sharing characteristics, ecosystem strategy, and sustainable development performance, we test their relationships between each other. As we are looking for the intermediate effect of the ecosystem strategy on sharing characteristics and sustainable development performance, the connection between ecosystem strategy and the other two should also be evaluated. Therefore, we formalize our hypothesis in three parts.

2.4.1. Relationship between Sharing Characteristics and Ecosystem Strategy

According to the analysis of the connotation of the sharing economy and Belk's definition of sharing characteristics [28], the higher the sharing characteristics the enterprise has, the more attention will be paid to the community construction, socialization, and sustainable development; the lower the sharing characteristics the enterprise has, the more attention will be paid to the economic benefits rather than to community construction or sustainable development [11,29]. The companies found to be in the range of high sharing characteristics (e.g., Couchsurfing; sharing score: 3.95), are beneficial and dedicated to community construction, and those in the range of medium sharing characteristics (e.g., Airbnb; sharing score: 3.14) also give considerable attention to community construction. Conversely, for exchange-oriented companies with low sharing characteristics (e.g., Zipcar; sharing score: 2.3), more attention will be given to demand satisfaction and service quality, as users mainly want to meet their travelling demands. Even if Zipcar pays attention to community construction, the result may not be remarkably effective. Habibi et al. [11,29] showed that the higher the sharing characteristics are, the more actively the enterprises will be involved in the construction of a sharing ecosystem, or that the sharing characteristics are positively correlated with the ecosystem construction.

For enterprises with high sharing characteristics adopting the ecosystem strategy, they play a positive role in constructing the sharing ecosystem and promoting the sustainable development of sharing enterprises.

Therefore, the higher the sharing characteristics of the sharing economy enterprises are, the higher the enthusiasm in implementing the ecosystem strategy of the enterprises will be. The following hypothesis is assumed:

Hypothesis 1: *Sharing characteristics have a positive effect on the implementation of the ecosystem strategy.*

2.4.2. Relationship between Sharing Characteristics and Sustainable Development Performance

Both auto-sharing platform operators and bike-sharing platform operators have enhanced the idle resource utilization or low-carbon travelling, whereas short rental and co-working platform operators attempt to improve the resource utilization rate [45,46]. Practices that have sharing-related

attributes are perceived to be part of a cluster of businesses that promote ethical standards and advocate politically correct consumption behaviors. Enterprises with high sharing characteristics emphasize on the sustainable development more emphatically. Sharing and sustainable consumption are inseparable objectives for such types of members, and therefore these aspects should go together when promoting the offers of a practice. Managers should emphasize the environmental benefits offered by the practice and the contribution each member is likely to make toward sustainable outcomes if it chooses to participate [29]. Therefore, we present the following hypotheses:

Hypothesis 2A: *Sharing characteristics have a positive effect on the economic performance of SDP.*

Hypothesis 2B: *Sharing characteristics have a positive effect on the environmental performance of SDP.*

Hypothesis 2C: *Sharing characteristics have a positive effect on the social performance of SDP.*

2.4.3. Relationship between Ecosystem Strategy and Sustainable Development Performance

Ecological strategy attempts to keep ecosystems intact by protecting natural abilities such as ecological stability or ecological resilience [47]. The business models that embrace the principles of sustainable development currently have different strategies that are geared toward innovation. They are grouped into eco-innovation business models, with their core structure promoting sustainable practices and services, and their number is increasing [48].

Sustainable businesses can also be called social businesses, and they use the TBL approach. That is, they attain success in three directions: Economic profit, people (social), and planet (ecological). They no longer only seek economic profitability; instead, their purpose is to respond to social needs and seek societal benefits [48]. Sustainable development can be a source of success, innovation, and profitability for companies [49]. Indicators that measure sustainability should include the three dimensions of economy, society, and environment [42,43].

Ecosystem strategy strives to retain the values of the members of the ecosystem, align direction with vision, and build common goals, so that the members of the system have explicit roles to play in the system, cooperate in a friendly manner, rely on and compete with one another healthily, maintain innovation, and create and maintain the sustainable competitive advantages of the entire ecosystem [34]. The implementation of an ecosystem strategy, ecosystem construction, and development can help companies to move toward sustainable development and achieve sustainable development performance [50–52]. Therefore, we assume the following hypotheses:

Hypothesis 3A: *Ecosystem strategy has a positive effect on the economic performance of SDP.*

Hypothesis 3B: *Ecosystem strategy has a positive effect on the environmental performance of SDP.*

Hypothesis 3C: *Ecosystem strategy has a positive effect on the social performance of SDP.*

2.4.4. Mediating Effect of Ecosystem Strategy on Sharing Characteristics and Sustainable Development Performance

All business ecosystem is an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world. This economic community produces goods and services of value to customers, who themselves are members of the ecosystem [31]. The players of the ecosystem “coevolve their capabilities and roles” [31] in a symbiotic business environment [53]. Research shows that enterprises with higher scores of sharing characteristics produce positive social outcomes than those with lower scores, and that the former pays more attention to the ecosystem construction to create value for customers more effectively. A powerful, well-structured, and attractive business ecosystem can continuously enhance the trust and loyalty of customers [11]. Enterprises with higher sharing characteristics become more active in implementing

the ecosystem strategy, which can help to improve the sustainable development performance of enterprises. Therefore, the following hypotheses are assumed:

Hypothesis 4A: *Ecosystem strategy plays a mediating role in the economic performance relationship between the sharing characteristics and SDP.*

Hypothesis 4B: *Ecosystem strategy plays a mediating role in the environmental performance relationship between the sharing characteristics and SDP.*

Hypothesis 4C: *Ecosystem strategy plays a mediating role in the social performance relationship between the sharing characteristics and SDP.*

3. Methodology

We investigated 90 sharing economic enterprises. In order to achieve objectivity, data was collected from two sources. One was from the companies' managers and directors, who provided the enterprises' descriptions on the ecosystem strategy and sustainable development performance of the sharing economy. The other was from MBA or EMBA students who were invited to evaluate the sharing scores.

3.1. Sample and Data Collection

Sample. The sharing economy emerged in China about seven years ago. Based on the Report of Development of Sharing Economy in China 2016 (<http://www.yixieshi.com/82406.html>), we investigated the 120 sharing economic enterprises in the report. We received 93 questionnaires, and three were invalid. A total of 90 valid questionnaires were obtained. The business distribution of the 90 enterprises is shown in Table 1.

Table 1. Business distribution of the sample.

Business	Number	Percentage (%)
Co-working	22	25.6
Shareable bikes	15	16.7
Short rental	13	14.4
Online car-hailing	9	10.0
Others	7	7.8
Sharable chargers	5	5.6
Sharable umbrellas	4	4.4
Logistics	4	4.4
Financial technology	4	4.4
Sharable parking lot	2	2.2
Online shopping platform	2	2.2
Catering	2	2.2
Total	90	100

Data collection. Two measures were taken to ensure the objectivity of the data collection: (1) The data on the ecosystem strategy and sustainable development performance of the sharing economy companies were mainly collected from the investigation on the general managers or operation directors, and (2) the evaluation of sharing scores was conducted using the method of [11]. According to Habibi et al. (2016) measurement [11], they randomly selected 81 respondents through the online platform and assigned them to read one of three companies' descriptions (Couchsurfing, Airbnb, and Zipcar). There are no company names available for the respondents, and instead described them as general market practices. Then, the respondents were asked to rate the characteristics of sharing and exchange. (1 = strongly disagree, 5 = strongly agree). In our process, we invited 90 professional outsiders currently studying in MBA or EMBA programs in Shanghai Jiao Tong University to evaluate these 90 companies to ensure an objective description of the business and operations of the 90 companies.

They are professional managers and have more than two years of working experiences. They are one of the largest groups using sharing platform in China. Since this group is mainly from the age of 30 to 40, they are willing to accept the innovative lifestyle, such as Mobike, DIDI, and Airbnb. All of the evaluators were randomly placed into nine groups, and each group evaluated 10 companies. We then obtained the mean values of the evaluation results of the 10 experts to show the score of sharing characteristics of each company.

The data of each company covering the two aspects were combined and recorded to develop the data for analysis.

3.2. Variables and Measurement

Sharing characteristics. Habibi et al. [11] measured the sharing characteristics with 10 indicators, among which four were used to measure the exchange characteristics of enterprises. As this study aimed to explore the relationship between the sharing characteristics and sustainable development performance, to reduce the complexity of the model, only six indicators were adopted: (1) Social bonds; (2) joint ownership; (3) dependence; (4) similarity to real sharing; (5) social reproduction and (6) singularity. Measurement was performed using a five-scale method (lowest score: 1; highest score: 5). The average of the total scores of the six indicators became the final score of the sharing characteristics of a company.

Ecosystem strategy. The measurement scale for measuring the ecosystem strategy was designed according to how ecosystem strategy and structural characteristics were defined in [34]: (1) Companies share the same value orientation as users; (2) companies share the same development goals as users; (3) companies and users rely on each other; (4) companies and users have explicitly different roles to play in business development; (5) users rely on each other; (6) companies try to improve the competitive advantages through innovation; (7) company employees and users trust each other; and (8) companies maintain a benign competition and friendly cooperation with users and between users.

Sustainable development performance of enterprises. Based on the literature [42,43], the indicators measuring the sustainable development performance of enterprises were selected and covered three aspects: (1) Economic aspects, including the main business profitability, return on equity, and business income growth rate; (2) social aspects, including user satisfaction, employee satisfaction, company integrity, and paying tax according to law; (3) environmental aspects, including resource utilization efficiency, excessive resource utilization rate, reliable quality of products or services, and corporate operation meeting the national policies of environmental protection.

The table of descriptive statistics for the indicators was showed in Appendix A.

3.3. Analysis Methods

Structural equation modeling (SEM) provides a more appropriate inference framework for mediation analyses and for other types of causal analyses [54]. We developed SEM to verify the assumption of the mediating effect of ecosystem strategy on the relationship between the sharing characteristics and the three aspects of SDP. The correlation analysis executed the variables to detect the colinear problem in the data. The data underwent reliability and validity analyses to ensure the consistency of the scale and the construct validity. Factor analysis was performed prior to the establishment of the structural equation model to guarantee the appropriation of the division of the dimension.

SPSS software was adopted for the statistical analysis, and AMOS software was used for the structural equation analysis. Model suitability and path analysis were carried out for the sharing characteristics, ecosystem strategy, and sustainable development performance, and the research hypotheses were tested.

4. Research Results

4.1. Correlation Analysis of the Variables

Correlation analysis was conducted for the economic, environmental, and social aspects of the sharing characteristics, ecosystem strategy, and sustainable development performance. The results are shown in Table 2 for the correlation coefficient. The variance inflation factor of the model was smaller than 10, thus indicating no co-linear problem in the sample data.

Table 2. Descriptive statistics and correlation coefficients.

Variables	M	SD	1	2	3	4	5
1. Sharing characteristic	2.86	0.79	1				
2. Ecosystem strategy	3.34	0.83	0.726 **	1			
3. Economic aspects	3.51	0.74	0.291 **	0.182	1		
4. Environmental aspects	3.59	0.58	0.609 **	0.628 **	0.496 **	1	
5. Social aspects	3.66	0.59	0.672 **	0.794 **	0.188	0.738 **	1

** $P < 0.05$.

4.2. Reliability and Validity Analysis

Reliability analysis usually takes the Cronbach's α coefficient to measure the internal consistency of the scale. In this study, Cronbach's α was above 0.8, proving the consistency of the scale. As for the construct validity test of the latent variables, AMOS software was employed to conduct the confirmatory factor analysis of all the latent variables. According to the results, all of the indicators reached an acceptable level and showed good construct validity. The results are shown in Table 3.

Table 3. Evaluation of the measurement models for the constructs used in the study.

Variables	Cronbach's Alpha	CMIN/DF	GFI	CFI	NFI	RMSEA
Sharing characteristic	0.93	1.89	0.96	0.99	0.97	0.04
Ecosystem strategy	0.95	1.84	0.93	0.98	0.96	0.05
Economic aspects	0.91	1.53	0.99	1.00	0.99	0.02
Environmental aspects	0.82	1.69	0.98	0.99	0.98	0.03
Social aspects	0.91	1.35	0.98	0.99	1.00	0.02
Reference value	>0.7	<2	>0.9	>0.9	>0.9	<0.08

4.3. Exploratory Factor Analysis

The results (Table 4) showed that the KMO of all the variables was above 0.6, and Bartlett's sphericity test p was significant, thus suggesting that the samples were suitable for factor analysis. Based on the standard of extracting factors with a characteristic root of above 1 and with only one factor that could be extracted for all variables, the factor loading was above 0.6, thus suggesting that the division of the dimension was appropriate.

Table 4. Results of exploratory factor analysis.

Variables and Items for Measurement	Factor Loading	Cumulative Explanation Variance	KMO-Bartlett Test
Sharing Characteristic		74.19%	0.853 ***
SC ₁ . Our company has a very close social relationship with users	0.78		
SC ₂ . Our company and users have a high degree of common ownership of resources	0.64		
SC ₃ . Our relationship with the user is highly interdependent	0.80		
SC ₄ . Our business (product or service) relationship with users is very close to pure sharing	0.75		
SC ₅ . Our business (product or service) platform creates social networking opportunities for our users	0.77		
SC ₆ . Our company and users have a high level of goal consistency in improving resource utilization efficiency and utilizing excess resources	0.72		
Ecosystem Strategy		74.37%	0.904 ***
ES ₁ . We strive to cultivate a shared value proposition with our users	0.86		
ES ₂ . We strive to adhere to the common development goals of the company with our users	0.90		
ES ₃ . We strive to maintain the relationship of interdependence between the company and users	0.89		
ES ₄ . Employees and users of our company have a clear role to play in business development	0.78		
ES ₅ . We strive to promote friendly relationship of interdependencies among the users	0.91		
ES ₆ . We strive to improve our competitive advantages through the ways of innovation	0.79		
ES ₇ . We ask for trust between employees and users	0.89		
ES ₈ . We maintain the healthy competition and friendly cooperation between the company and users, and among users	0.88		
Sustainable Development Performance			
Economic aspects		84.35%	0.744 ***
SDP ₁ . Our company's operating profit margin is higher than the average level of similar enterprises	0.85		
SDP ₂ . Our company's investment rate of return is higher than the average level of similar enterprises	0.87		
SDP ₃ . Our company's operating income growth rate is higher than the average level of similar enterprises	0.81		
Environmental aspects		65.47%	0.687 ***
SDP ₄ . Our company's utilization rate of resources is higher than the average level of similar enterprises	0.60		
SDP ₅ . Our company has a high utilization rate of excess resources	0.71		
SDP ₆ . Our company's products or services are of high quality and safety	0.63		
SDP ₇ . Our company conforms the requirements of government's environmental protection policy	0.65		
Social aspects		79.90%	0.788 ***
SDP ₈ . Our company's user satisfaction is very high	0.77		
SDP ₉ . Our company's employee satisfaction is very high	0.83		
SDP ₁₀ . Our company's social integrity is very high	0.81		
SDP ₁₁ . Our company has always been fair competition, and pay taxes according to the law	0.79		

*** $P < 0.001$.

4.4. Test of the Mediating Effect of Ecosystem Strategy on the Relationship between Sharing Characteristics and the Economic Performance of SDP

A structural equation model was developed for the sharing characteristics, ecosystem strategy, and economic performance of SDP, and the data were substituted into the model. The relationships among the three were analyzed, and model 1 was obtained (Figure 1a). As the fitting indicators GFI and NFI were close but failed to reach the reference value of 0.9, the model should be adjusted.

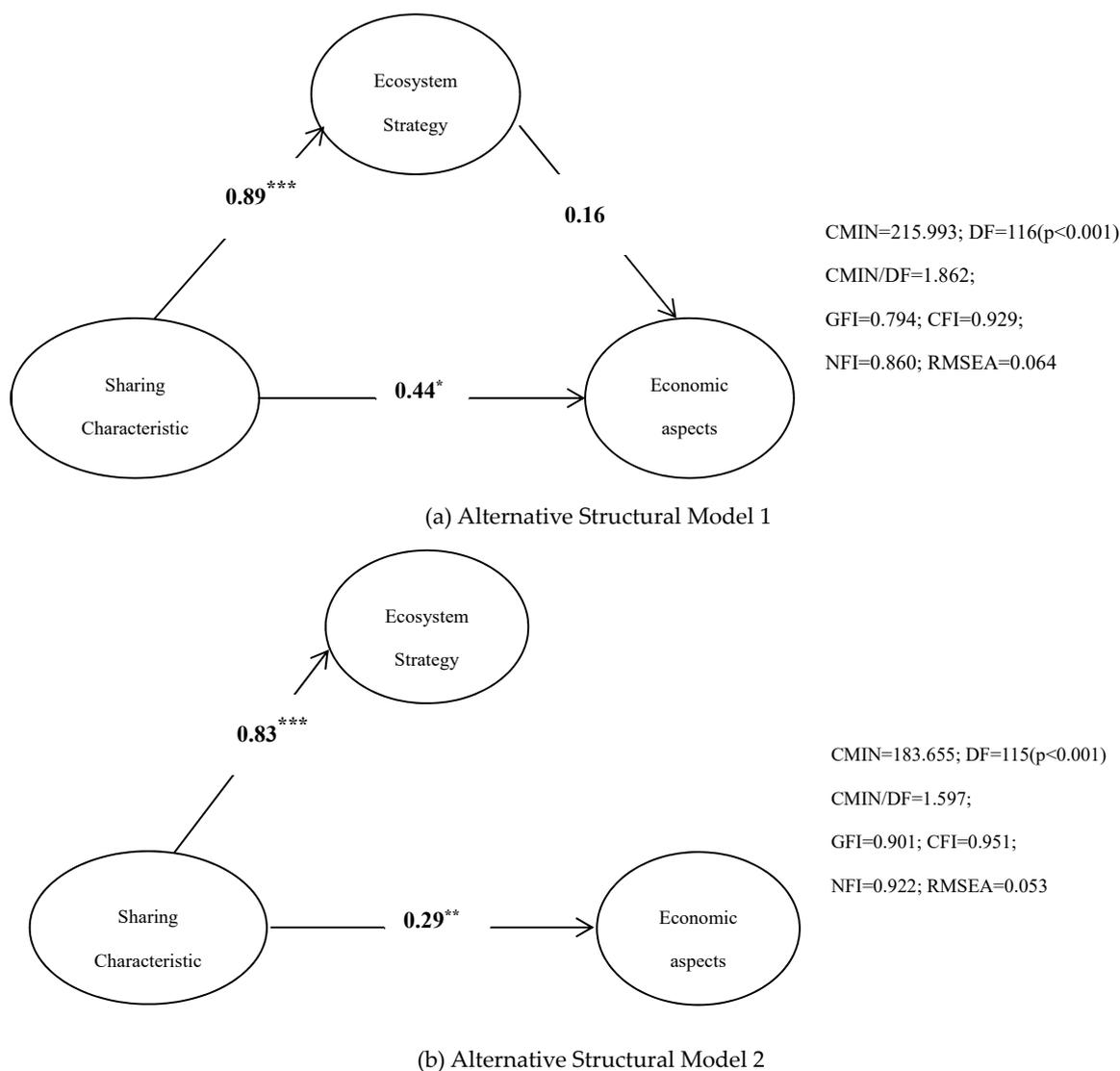


Figure 1. The structural equation model that is built for the sharing characteristics, ecosystem strategy and economic performance of SDP. (a) Alternative Structural Model 1; (b) Alternative Structural Model 2: Adjusted from Model 1.

Model adjustment process: (1) The path from the ecosystem strategy to the economic performance was deleted; (2) the correlation path of the SC1 error term and SC6 error term was added; (3) the correlation path between the ES1 error term and ES2 error term was added. Therefore, model 2 was obtained (Figure 1b). Compared with model 1, fitting indicators of model 2 were improved, and within a reasonable range. It can be seen from model 2 that sharing characteristics could enhance the ecosystem strategy ($\beta = 0.83^{***}$), as well as the economic performance ($\beta = 0.29^{**}$); but the ecosystem strategy could not boost the economic performance, and it did not play a mediating role in the relationship between the sharing characteristics and economic performance.

4.5. Test of the Mediating Effect of Ecosystem Strategy on the Relationship between Sharing Characteristics and Environmental Performance of SDP

The structural equation model was built for the sharing characteristics, ecosystem strategy, and environmental performance of SDP, and the data were substituted into the model. The relationship among the three was analyzed, and model 3 was obtained (Figure 2a). Since the fitting indicators GFI and NFI of model 3 were close to but failed to reach the reference value, namely 0.9, the model should be adjusted.

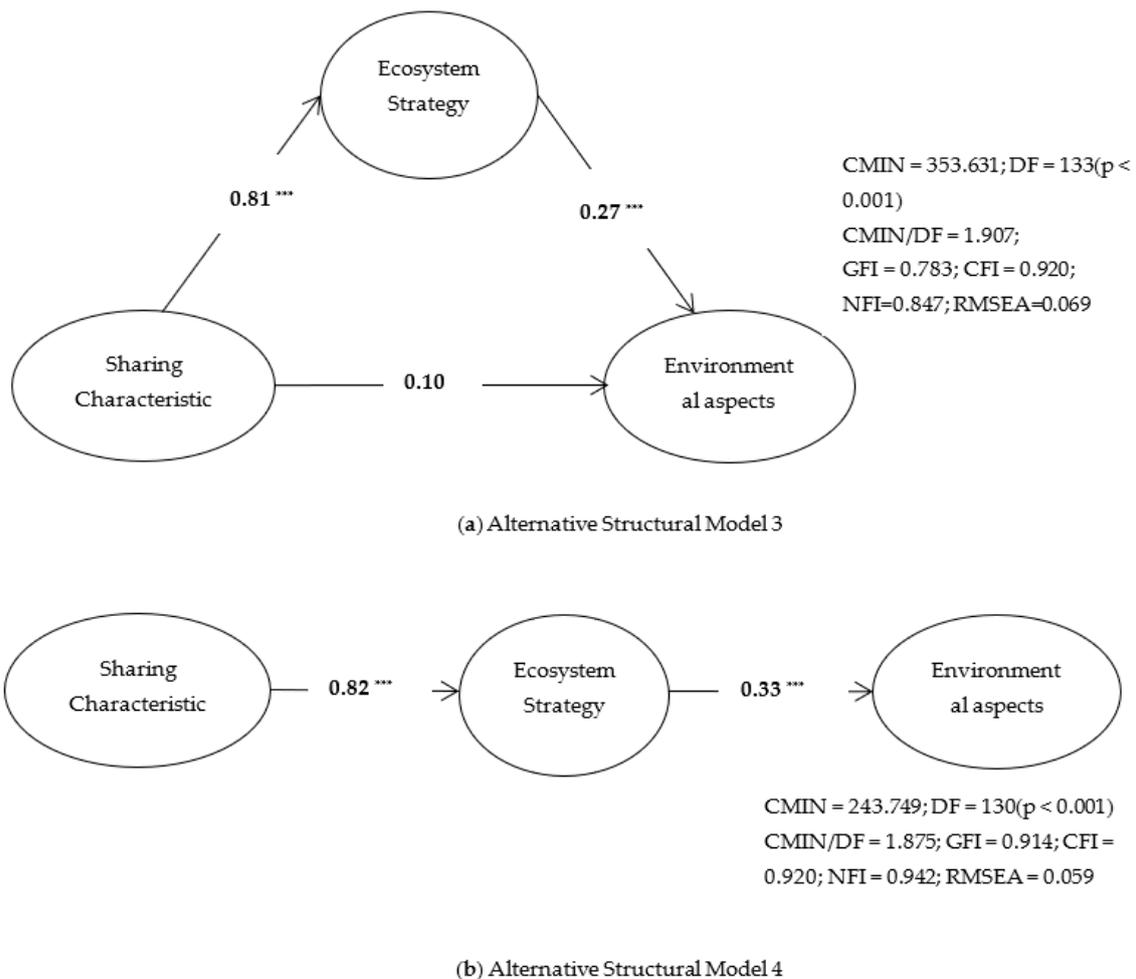


Figure 2. The structural equation model that is built for the sharing characteristics, ecosystem strategy, and environmental performance of SDP. (a) Alternative structural model 3; (b) alternative structural model 4: Adjusted from model 3.

Model adjustment process: (1) The path from the sharing characteristics to the sustainable development performance was deleted; (2) the correlation path of the SC1 error term and SC6 error term was added; (3) the correlation path between the ES₁ error term and ES₂ error term was added; (4) the correlation path between SDP₄ error term and SDP₇ error term was added, and model 4 was obtained (Figure 2b). Compared with model 3, fitting indicators of model 4 were improved, and within a reasonable range. It can be seen from model 4 that sharing characteristics could enhance the ecosystem strategy ($\beta = 0.82^{***}$), while the ecosystem strategy can enhance the environmental performance ($\beta = 0.33^{**}$); but the sharing characteristics could not boost the environmental performance, and ecosystem strategy played a complete mediating role in the relationship between the sharing characteristics and economic performance.

4.6. Test of the Mediating Effect of Ecosystem Strategy on the Relationship between Sharing Characteristics and Social Performance of SDP

The structural equation model was built for the sharing characteristics, ecosystem strategy, and social performance of SDP, and the data were substituted into the model. The relationship among the three was analyzed, and model 5 was obtained (Figure 3a). Since the fitting indicators GFI and NFI of model 5 failed to reach the reference value, namely 0.9, the model should be adjusted.

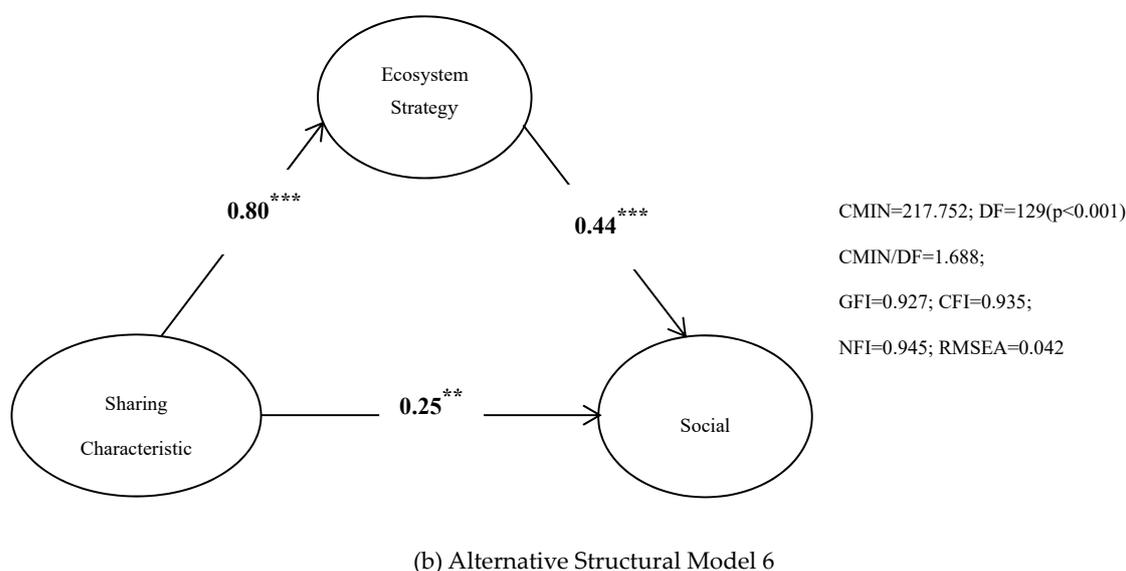
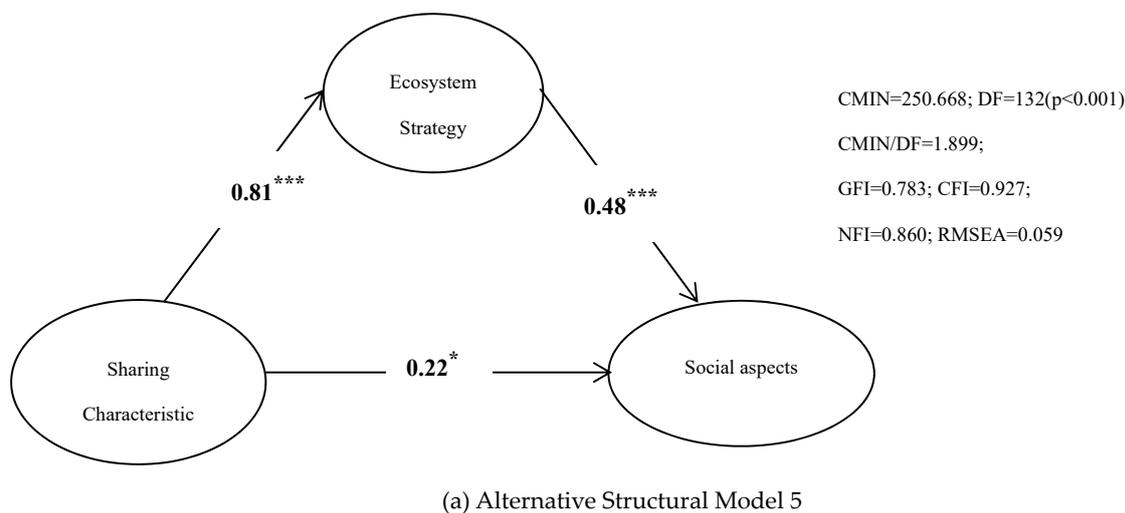


Figure 3. The structural equation model that is built for the sharing characteristics, ecosystem strategy, and social performance of SDP. (a) Alternative structural model 5; (b) alternative structural model 6: Adjusted from model 5.

Model adjustment process: (1) The correlation path of the SC1 error term and SC6 error term was added; (2) the correlation path between the ES₁ error term and ES₂ error term was added; (3) the correlation path between SDP₈ error term and SDP₁₀ error term was added, and model 6 was obtained (Figure 3b). Compared with model 5, fitting indicators of model 6 were improved, and within a reasonable range. It can be seen from model 6 that sharing characteristics could enhance the ecosystem strategy ($\beta = 0.80$ ***), while the ecosystem strategy can enhance the social performance ($\beta = 0.44$ **), and the ecosystem strategy can enhance the social performance directly ($\beta = 0.25$ **). The ecosystem

strategy played a partial mediating role in the relationship between the sharing characteristics and economic performance.

4.7. Hypothesis Testing Results

The research hypotheses were tested by constructing a structural equation model. According to the testing results, H.2B, H.3A, and H.4A failed to be supported, and the remaining seven hypotheses were supported (Table 5).

Table 5. Hypothesis testing results.

Hypothesis	Testing Results
H.1: Sharing characteristics have a positive effect on the implementation of the ecosystem strategy.	Supported
H.2A: Sharing characteristics have a positive effect on the economic performance of SDP.	Supported
H.2B: Sharing characteristics have a positive effect on the environmental performance of SDP.	Failed to be supported
H.2C: Sharing characteristics have a positive effect on the social performance of SDP.	Supported
H.3A: Ecosystem strategy has a positive effect on the economic performance of SDP.	Failed to be supported
H.3B: Ecosystem strategy has a positive effect on the environmental performance of SDP.	Supported
H.3C: Ecosystem strategy has a positive effect on the social performance of SDP.	Supported
H.4A: Ecosystem strategy plays a mediating role in the economic performance relationship between the sharing characteristics and SDP.	Failed to be supported
H.4B: Ecosystem strategy plays a mediating role in the environmental performance relationship between the sharing characteristics and SDP.	Supported
H.4C: Ecosystem strategy plays a mediating role in the social performance relationship between the sharing characteristics and SDP.	Supported

5. Discussion

The effect of sharing characteristics on environmental performance failed to pass the significance test, that is, sharing characteristics have an insignificant effect on environmental performance. Ecosystem strategy plays a complete mediating role in the relationship between the sharing characteristics and environmental performance, suggesting that sharing characteristics can enhance the environmental performance by implementing the ecosystem strategy.

Sharing characteristics are significantly positively correlated with the ecosystem strategy. Enterprises with higher sharing characteristics pay more attention to community construction [11,28,29] and show higher enthusiasm in implementing the ecosystem strategy. The ecosystem strategy focuses on cultivating consistent values and development goals for companies and users, as well as builds and maintains the mutual trust and reliance between companies and users and between users to enhance the cohesion of the system. Moreover, it maintains a competitive and cooperative relation between companies and users to improve the competitive advantages of the system through innovation [33,34], increases the resource utilization rate and excessive resource utilization, enhances the environmental performance, and promotes the sustainable development of enterprises.

The sharing characteristics of the sharing economy enterprises have a significant positive effect on social performance in the sustainable development performance and the ecosystem strategy. Moreover, the ecosystem strategy has a significant positive effect on the social performance of sustainable

development performance and plays a partial mediating role in the relationship between the sharing characteristics and social performance.

By improving the sharing characteristics, the sharing economy enterprises can actively improve the satisfaction of employees and users and enhance the compliance, fair competition, and observation of social morality. Many sharing-based platforms either enhance the idle resource utilization or improve the resource allocation efficiency [45,46], which provides the social benefice to the service users or providers. Such benefice could also motivate people to consume and provide sharing economy accommodation, so that the sustainability of those platforms could be achieved [18]. Therefore, higher sharing characteristics can promote social performance.

By implementing the ecosystem strategy, firms can focus on the cohesion construction of members, maintain the competitive and cooperative state of members, improve the competitive advantages through innovation, enhance the satisfaction of employees and users, and actively boost the observation of social morality, fair competition, and social performance. High score of sharing characteristics leads to a positive social outcome from the enterprise [11]. These firms pay more attention on establishing a robust ecosystem strategy to enhance the trust and loyalty of customers. Building trust for the company and creating subjective form from peers has been shown as the important facts to affect the customers' behavioral intention [19].

If the sharing economy enterprises want to improve their social performance, they should implement the ecosystem strategy while improving their sharing characteristics to promote their social performance positively.

The sharing characteristics of the sharing economy enterprises have a significant positive effect on the economic performance of enterprises. According to the analysis of the measurement indicators of sharing characteristics, enterprises with higher sharing characteristics pay more attention to improving the resource sharing degree, which enhances users' care of resources shared, decreases the damage of resources, and lowers the resource utilization and usage cost [3,55], to increase the economic benefit. Moreover, enterprises with higher sharing characteristics attach more importance to maintaining the mutual reliance between companies and users, thus enhancing users' loyalty to firms, improving the sustainable consumption, and increasing the economic benefit [29].

Despite these findings, this study found that the ecosystem strategy has an insignificant effect on the economic performance and that the ecosystem strategy fails to play a significant mediating role in the relationship between the sharing characteristics and economic performance. The conclusion is that the increase in economic benefit of the sharing economy enterprises does not rely on the implementation of the ecosystem strategy. As long as the sharing characteristics are improved and maintained, they can promote the economic performance. However, the path coefficient of the sharing characteristics and economic performance is small ($\beta = 0.29^{**}$). Therefore, simply improving the sharing characteristics has little effect on the increase in economic benefit.

Although sustainable development performance covers the economic, environmental, and social aspects, sustainable development may not be realized when there is no environmental performance and social performance or when social performance or environmental performance is low. The implementation of the ecosystem strategy by the sharing economy enterprises is favorable for the environmental performance, social performance, and sustainable development of enterprises. Enterprises can take sustainable development as a long-term strategic goal, focus on social and environmental problems, and attempt to coordinate in the long-term development of the economic, social, and environmental performance. With the social and environmental performance as the long-term strategic goal of companies, it may be favorable for promoting the long-term economic performance but may affect the short-term economic performance of companies [56]. The practice of shared bikes in China proves that if the sharing economy enterprises blindly pursue the economic benefits, pay no attention to the social and environmental benefits or the ecosystem construction, and just try to achieve the ambition of expansion through short-term financing behaviors, these enterprises will certainly face bankruptcy if they fail to raise enough funds [57–60].

6. Conclusions

The results of this empirical research show that the sustainable development performance of the sharing economy enterprises can be realized by implementing the ecosystem strategy. Simply improving the sharing characteristics of enterprises may not enhance their sustainable development performance. Only by improving the sharing characteristics of enterprises, implementing the ecosystem strategy, and constructing the sharing ecosystem actively can the sustainable development performance significantly improve and move toward the path of sustainable development.

For enterprises with higher sharing characteristics, the sustainable development performance will improve if the ecosystem strategy can be actively implemented. Conversely, the pseudo-sharing economy enterprises, which have lower sharing characteristics and only focus on the economic benefit rather than the environmental and social benefits, may find it difficult to promote their sustainable development performance or move toward the path of sustainable development.

6.1. Implications and Contributions

The ecosystem strategy playing a mediating role in the relationship between the sharing characteristics and sustainable development performance contributes to our understanding of the research on the sharing economy and sustainable development. It has a positive effect on the theoretical research on how the sharing economy enterprises can move toward sustainable development.

The research results can also help to shed light on the ambiguous understanding of whether the sharing economy can theoretically realize sustainable development. Moreover, this study can provide explicit theoretical support to resolve the contradictory issues between the ideal sustainable development path of the sharing economy enterprises and their actual unsustainable development practice.

Neither the enterprises claiming themselves to be sharing economy enterprises nor those that just improved their sharing characteristics can move toward sustainable development. Only enterprises with high sharing characteristics and those that implement the ecosystem strategy can actively achieve sustainable development.

The research results have an important reference value for social organizations and for the government's support and supervision of the sharing economy. They also provide theoretical support to the sustainable development of the sharing economy enterprises.

6.2. Limitations and Further Studies

This study is mainly focused on the sharing economy enterprises in China and the empirical analysis relies on a small sample of Chinese companies. Future research needs to cover other countries' sharing economy enterprises to make the sample larger. In addition, this study has validated the mediating effect of the ecosystem strategy on the relationship between the sharing characteristics and sustainable development performance, and it concludes that sharing enterprises are likely to move toward sustainable development by implementing the ecosystem strategy. As many sharing economy enterprises operate in the environment of the Internet, which is dynamic and complicated, what capabilities should the sharing economy enterprises be equipped with to implement the ecosystem strategy to achieve sustainable development? What role should the government play in supervision that can benefit the sustainable development of the sharing economy enterprises? These issues require further research.

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Appendix A Evaluation of Firms' Characteristics on Sharing, Ecosystem Strategy, and Sustainability

Table A1. Assessments of the firm's attributes in sharing characteristics, ecosystem strategy, and sustainable development performance.

Sharing Characteristic		Strongly disagree — strongly agree				
		1	2	3	4	5
Our company has a very close social relationship with users.						
Our company and users have a high degree of common ownership of resources.						
Our relationship with the user is highly interdependent.						
Our business (product or service) relationship with users is very close to pure sharing.						
Our business (product or service) platform creates social networking opportunities for our users.						
Our company and users have a high level of goal consistency in improving resource utilization efficiency and utilizing excess resources.						
Ecosystem Strategy		Strongly disagree — strongly agree				
		1	2	3	4	5
We strive to cultivate a shared value proposition with our users.						
We strive to adhere to the common development goals of the company with our users.						
We strive to maintain the relationship of interdependence between the company and users.						
Employees and users of our company have a clear role to play in business development.						
We strive to promote friendly relationship of interdependencies among the users.						
We strive to improve our competitive advantages through the ways of innovation.						
We ask for trust between employees and users.						
We maintain the healthy competition and friendly cooperation between the company and users, and among users.						
Sustainable Development Performance		Strongly disagree — strongly agree				
		1	2	3	4	5
Economic aspects						
Our company's operating profit margin is higher than the average level of similar enterprises.						
Our company's investment rate of return is higher than the average level of similar enterprises.						
Our company's operating income growth rate is higher than the average level of similar enterprises.						
Environmental aspects						
Our company's utilization rate of resources is higher than the average level of similar enterprises.						
Our company has a high utilization rate of excess resources.						
Our company's products or services are of high quality and safety.						
Our company conforms the requirements of government's environmental protection policy.						
Social aspects						
Our company's user satisfaction is very high.						
Our company's employee satisfaction is very high.						
Our company's social integrity is very high.						
Our company has always been fair competition and pay taxes according to the law.						

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