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Rui Miao, Jintao Cao, Kai Zhang, Boxiao Chen, Zhibin Jiang & Liya Wang

Department of Industrial Engineering & Logistics Management, Shanghai Jiao Tong University, Shanghai, China

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Value-added path of service-oriented manufacturing based on structural equation model: the case of electric car rental for instance

Rui Miao*, Jintao Cao, Kai Zhang, Boxiao Chen, Zhibin Jiang and Liya Wang

Department of Industrial Engineering & Logistics Management, Shanghai Jiao Tong University, Shanghai, China

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Electric cars foreshadow the future direction of the automotive industry owing to its great potential for environment protection. Electric car rental may be an effective mode to popularise the electric car, before the cost of the electric car can be reduced substantially. To provide the electric car rental service well, the company must understand how consumers value renting an electric car and what they consider to be value-added, which is the main objective of the research. First, the concepts of customer participation (CP), service quality (SERVQUAL) and customer value (CV) are identified. Then, the value-added path structural equation is constructed by exploratory factor analysis and confirmatory factor analysis. Use path coefficient and standard factor loading to identify the value-added paths and key factors in the electric car rental. The results show that CP will improve customer satisfaction and the post-purchase intentions, through the improvements of SERVQUAL and CV and thus realising the added value of the path.

Keywords: service-oriented manufacturing; value-added path; customer participation; electric car rental; structural equation model

1. Introduction

Electric cars foreshadow the future direction of the automotive industry due to its great potential for environment protection (Eberle and von Helmolt 2010). So many car manufacturers rank it as the business strategy (Hodson and Newman 2009). However, because of high production cost, the lack of the infrastructure and other technical problems like short cruising range, its pace of development has been limited. It is an urgency to explore a suitable way to introduce people to experience the advantage of electric car. Hence, it is important to figure out how consumers value renting an electric car and what they consider to be value-added.

Train and Winston (2004) pointed that nearly all of the loss in market share for U.S. manufacturers can be explained by changes in the basic attributes of a car: price, size, power, operating cost, and body type. Eggers and Eggers (2011) showed that purchase price, range, timing of the market entry, or environmental evolution are different critical factors of the adoption of all electric car. After a direct experience of driving a battery electric car, some consumers indicated that they might start to consider electric cars as second cars if they had a range of 100 miles, and as main cars if they had a range of 150 miles; they may be willing to pay modest premiums over conventional cars, equivalent to around three years’ running cost savings, and most would recharge at home overnight (Skippon and Garwood 2011). So, due to the price, usage cost and other problems (like difficulty for charging), the risk for consumers to buy electric cars is larger than the traditional cars. Therefore, before the cost of the electric car is reduced substantially, rental service can not only make consumers have the opportunity to drive electric cars at a relatively low cost and experience the advantage of electric cars directly, but also can attract consumers through reducing their risk. So this may be an effective mode to popularise the electric car. Furthermore, electric car manufacturers will obtain direct customers’ feedback to assist decision-making. To provide the electric car rental service well, the company must know what factor (price, charging network, etc.) consumers concern in the rental process, which is the main objective of this research.

In addition to seeking the new technology to improve the electric car performance, it is also very important to understand how consumers use and evaluate the electric car in order to explore a suitable way to the development of electric car. Unfortunately, it has drawn so little attention. Graham-Rowe et al. (2012) Investigates the customer’s feedback on driving electric vehicles compared with hybrid energy vehicle. Axsen et al. (2011) research how customer behaviour impacts on the new energy automotive industry. As far as we know there is limited prior research on customer perceived

*Corresponding author. Email: miaorui@sjtu.edu.cn

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value of electric cars. The present work is an attempt to bridge this gap. The value of electric car rental is integrated by service value (rental service) and physical value (car value). And the perceived value usually is formed in a specific context, which need the customer participation (CP) in (Zhang et al. 2011). This can be considered as a typical form of service-oriented manufacturing. Service-oriented manufacturing is a new model of manufacturing, which means integrating the manufacturing and service through manufacturing expansion to service and service penetration to manufacturing. Enterprises obtain the profit at the same time to create the greatest value for customers. For example, IBM integrated internal and external resources to provide customers with trinity of hardware, software and service (Erkoyuncu et al. 2011). The traditional manufacturing sells products, whose value is based on real objects. So it’s easy to describe and grasp. While the value of service-oriented manufacturing which is integrated by service and manufacturing is combined with physical value and service value. The CP impacts on customer value (CV) (Nambisan and Baron 2009). Customer’s cognition of using products which produces costs and gains determines its impact on evaluation of comprehensive value of service-oriented manufacturing system. Therefore, it’s an urgency to discuss the value-added path and theory, and to explore a new method to grasp the CP, service quality (SERVQUAL) and CV in the service-oriented manufacturing of electric cars.

Because of high premium of selling price and perceived disadvantages of recharging availability and performance, the quantity of electric car sale is very low although the governments provide preferential policies. Rental service or car sharing make customers use the electric cars only to pay the cost of using stage instead of buying an electric car, Green et al. provides some case studies for car sharing: ‘car sharing organisations (CSO) eliminate the purchase price burden of Plug-in electric vehicles (PEVs) for members, reduce auto mobile operating costs, and address range anxiety by allowing members to choose a car “fit for the trip” (e.g. a PEV for shorter trips and a conventional or hybrid vehicle for longer trips)’ (Green et al. 2014). This operation process of car sharing is similar to rental service, so consumers may also adopt electric cars through rental service easier than buying them. Therefore, the SAIC MOTOR introduces the electric car rental service to Chinese market and cooperates with eHi car services beginning in Shanghai. For implementing electric car rental service better, the companies need know how customers perceive the value of rental service they involve. To ensure the independence of the survey, they entrust us complete this work. After the introduction, the remainder of the paper is structured as follows: on the basis of previous literature, we construct a hypothetical model in Section 2. In Sections 3 and 4, we collect the samples and use software SPSS 17.0 and AMOS 17.0 to analyse the sample data; then discuss the results. Finally, we summarise the paper in Section 5.

2. Literature review and hypothesis of constructing

The key factor for enterprises to establish competitive advantage and win the market share is to improve customers’ post-purchase intentions through ensuring the SERVQUAL in order to improve CV and customer satisfaction. So it is very important to study how consumers assess the value of products (Jayaraman, Singh, and Anandnarayan 2012). Customer participating in the service process is one of significant characteristics, which will have an uncertain impact on CV as well as the company performance. CP refers to customers’ behaviour reacting to the design, production and delivery for specific goals, including customers’ unilateral efforts as well as the interactive behaviour between customer and enterprise (Bendapudi and Leone 2003). Claycomb and Lawrence (2001) designed a nine-amount-table to measure CP including three dimensions of the information sharing (IS), cooperative production (CB) and personal communication (PC); meanwhile validated the reliability and validity empirically. This essay will divide CP into three dimensions which are IS, CB and PC.

Studies have shown that CP has a positive impact on the SERVQUAL (Franke, Schreier, and Kaiser 2010). SERVQUAL is the discrepancy between customer expectations and service performance that customer perceived. Gronroos (2000) recognises that the SERVQUAL contains three dimensions which are technical quality, functional quality and company image. CV is the comparison result of customers’ perception between the outcome for some goals, including customers’ unilateral efforts as well as the interactive behaviour between customer and enterprise (Bendapudi and Leone 2003). Sweeney and Soutar (2001) develop a measurement model PERVAL to measure CV in retail sales node, which is practically operational. Because the dimension of PERVAL is closest to the properties of electric car value, such as driving, environmental protection and aesthetic, this paper will divide the CV of renting an electric car into four basic dimensions on the basis of PERVAL, which contains Emotional Value (EV, the emotional feelings of product), Social Value (SV, utility produced by enhancing the consumer’s social self-concept), Price Effect (PE, utility due to the short-term and long-term cost reduction) and Product Function (PF, the characteristics of products to achieve a certain function). It has also been found that the SERVQUAL can positively affect CV in the research of mobile services business in China and Canada, and most other empirical studies have also pointed out that the SERVQUAL has a positive impact on CV (Wang, Lo, and Yang 2004; Yang and Peterson 2008; Yee et al. 2010).
Customer satisfaction is composed of the cognition of consuming experience and customers’ emotional response, which is affected by the emotions of customer in the process of consumption and can’t be ignored. Post-purchase intention is that customers tend to repurchase services or products in the same store or company and advocate the consuming experience to their friends and relatives. In the study of traditional retailing, sites and online shopping, scholars found that CV has a positive influence on customer satisfaction (Bauer et al. 2006). Tung (2004) found that customer satisfaction has a positive influence on the post-purchase intentions in the study of multimedia telecommunications services in Germany and Singapore. Gupta and Kim (2008) also support this view.

Based on the analyses above, the existing research only defined the generic connotation and investigated the relationships among CP, SERVQUAL, CV, customer satisfaction and post-purchase intentions empirically in either the service industry or the manufacturing industry. Little attention has been paid to the relationships among the factors above in a context of the integration of manufacturing and service, for instance, the electric car rental, whose value includes tangible product index (electric car) and intangible service index (rental process). The relationships among them have been validated in many conditions, but to our knowledge, there is no literature to validate the relationships in the electric car rental service environment. In such a rental system, which can be seen as a service-oriented manufacturing system, are the empirical conclusions indicating the relationships among the factors above suitable for use directly? And does CP have an influence on value-added path of service-oriented manufacturing? In this study, based on existing studies, we establish assumptions of relationship between CP and the value of the service-oriented manufacturing as follows.

H1: in electric car rental service environment, CP has a positive impact on the SERVQUAL;
H2: in electric car rental service environment, the SERVQUAL has a positive impact on CV;
H3: in electric car rental service environment, CV has a positive influence on customer satisfaction and
H4: in electric car rental service environment, customer satisfaction has a positive influence on post-purchase intentions.

If these hypotheses are also established in electric car rental service environment, the existing experience can be used for daily operations of the electric car rental service to avoid unnecessary losses and ensure service efficiency.

One concept can be characterised by a number of factors, like CP containing three factors (IS, CB, PC). The magnitude of coefficient between two factors implies that how different factors reflect the influence on value-added paths. The interactions between the two factors are shown in Figure 1. λ denotes the external variables’ coefficient of influence path

![Figure 1. Theoretical model.](image-url)

Notes: CP means customer participation; IS means information sharing; CB means cooperative production; PC means personal communication; SQ means service quality; TQ means technical quality; CI means company image; FQ means functional quality; CV means customer value; EV means emotional value; SV means social value; PE means price effect; PF means product function; CS means customer satisfaction; PI means post-purchase intentions.
on internal variable, $\beta$ represents the internal variables’ path coefficients on other internal variables. Each single arrow means that arrowhead has a positive impact on the end, such that $\lambda_{11}$ means assuming IS has a positive influence on technical quality in electric car leasing.

3. Research methods and sample collection

Service-oriented manufacturing is a new manufacturing mode that aims to eliminate the boundaries of manufacturing and services and provide a whole solution for consumer’s individual expectation. The purpose of service-oriented manufacturing is to provide ‘product service system (PSS)’ (Gao et al. 2011; Wang et al. 2013). There are three types: product-oriented PSS, use-oriented PSS, result oriented PSS; rental service is a representative of use-oriented PSS (Mont 2002; Williams 2007). With the corresponding of PSS, service-oriented manufacturing also can be divided to three types. So we consider the electric car rental service can be used to represent service-oriented manufacturing mode. This article selected the electric car rental industry, which only includes passenger car leasing that serve the individual consumers, as the representative to test and verify the theoretical assumptions and analyse the value-added path of service-oriented manufacturing. First we design the questionnaire based on the literature review and expert interviews. Then use the statistical analysis to test the hypotheses model. After a sufficient analysis of the literature, we list the items of each dimension; then we choose some experts including two professors of marketing, two leasing dealers, and one electric car manufacturer, for semi-structured interviews to revise the items. The whole process lasted for several rounds until we obtain a unified version of the items through the standard Delphi Method (Okoli and Pawlowski 2004). Secondly, after affirming all items, we finish the standardised questionnaire using the classification scale for respondents to fill out basic personal information section. In addition, 7 points LIKERT scale (Olhager and Selldin 2004) is used in the main part of the questionnaire, where 1–7 points represent strongly disagree to strongly agree.

Some market researches in different countries (US, Germany, China) show that early adopters have similar characteristics like highly educated and environmentally sensitive (Zhang, Yu, and Zou 2011; Carley et al. 2013; Hackbarth and Madlener 2013). So we consider that this group of respondents with these characteristics will provide more accurate feedbacks for our questionnaire, and choose the samples to comply with the above characteristics. Furthermore, considering the effectiveness of samples, they must have rented electric cars before (at least once per week).

We choose the students, who are PhD students or postgraduates in universities in Shanghai. These samples can satisfy above conditions. Then the students are not in full-time ones, but on-job ones, who will finish the study using their rest time. And these students are major in vehicle engineering; this makes them distinguish the difference between electric cars and fuel cars. Furthermore, Shanghai is one of the major electric car rental markets in China. Big cities are the main market of electric cars, because the air pollution and traffic condition have an impact on big cities more seriously (Rienstra and Nijkamp 1998). Secondly, the respondents received a good higher education in university, and have environmental awareness. This kind of group is the main potential consumer of electric cars (Hidrue et al. 2011). Thirdly, they have an experience of renting an electric car for different aims, and can be regarded as the representative of main consumers in China (the people who have a driving licence, but with very low income); and they often rent electric cars (at least once per week). Finally, this research is in cooperation with SAIC MOTOR, the company hope us complete this survey in Shanghai. Previous research affirms that there is no significant difference across main cities in China, like Peking, Shanghai, and Hangzhou (Yan 2013). In a small-scale test, we collect 48 questionnaires in order to check the availability of our questionnaire. We use the SPSS 17.0 statistical analysis software to test the reliability and validity as well as the exploratory factor analysis (EFA). Then based on the test results, further modifications have been done to the questionnaire. Using principal component analysis and orthogonal rotation, according to the standard that the cumulative item-total correlation is greater than 0.5 and factor loading greater than 0.4, combined with internal consistency test that the Cronbach’s $\alpha > 0.7$, finally appropriate items for large scale sample test were selected (we list all items in Appendix 1).

In large-scale tests, 243 questionnaires have been collected from the four key universities in Shanghai, but 36 questionnaires did not meet the screening requirements leading to 207 valid samples, and the pass rate is 85.2%. The statistical analysis software SPSS 17.0 and AMOS 17.0 were used to analyse the sample data. Firstly, we conduct the confirmatory factor analysis (CFA) to verify the reliability, validity, and the goodness of fit of the corresponding measurement model based on above assumptions. Then use structural equation model (SEM), a widely used approach in social science (Roberts et al. 2010; Vinodh and Joy 2012), to establish the value-added path among constructs. Structural equation modelling can handle the relationship between multiple reasons and multiple results at the same time and the variables unobserved directly (latent variables). So it has been considered as a very good method in the study of social science since 1980s (Gupta and Kim 2008). This method is very suitable for our research. After testing the reliability, the validity, and the goodness of fit, we finally figure out the value-added path.
4. Data analysis and discussion

4.1 Confirmatory Factor Analysis

4.1.1 Pre-test
The Bartlett sphericity test can be used to determine whether the data is suitable for factor analysis. By testing the data with Bartlett spherical test, Kaiser–Meyer–Olkin (KMO) value is calculated to be 0.927, and significance level is 0.01, indicating a strong correlation between the variables, so factor analysis is feasible.

4.1.2 Reliability analysis
In this study, through analysing the indicators of the measurement entries under each construct: Cronbach’s α, the squared multiple correlation coefficient ($R^2$) and composite reliability (CR), the reliability of the measurement scale can be tested. From Table 1, we know that Cronbach’s α of the various constructs ranges from 0.745 to 0.881, and Cronbach’s α of the total measurement model is 0.956, which are greater than the minimum threshold value 0.70; $R^2$ of each measurement entry is within a range of 0.603–0.806, which are higher than the generally accepted minimum value 0.50; the CR of the latent variables is 0.838, which is higher than the recommended minimum critical level 0.70, indicating that all measures have good reliability. So it can be concluded that the measurement scale used in this study has a good consistency, stability and high reliability.

4.1.3 Discrimination validity analysis
The validity of the distinction between the various constructs was tested by EFA. The results of analysis showed that after the orthogonal rotation, 12 factors whose characteristic values are greater than 1 were extracted, corresponding to the theoretical model constructs exactly. Each measurement entry loads to one corresponding factor and no measurement entry is in two constructs at the same time. And the value of factor loading of each measurement entry on a single construct is from 0.714 to 0.916, which is far higher than the minimum standard 0.50. At the same time, factor loading of each entry on the irrelevant factor is rather low.

On the basis of EFA, this study uses CFA to test the discrimination validity of the measurement scale. As shown in Table 1, the square root of the average variance extracted (AVE) of each construct varies from 0.6081 to 0.7686, while the absolute value of the correlation coefficient between any two constructs varies from 0.015 to 0.640, and each latent variable’s AVE is larger than the squared correlation between each pair of latent variables. Hence the discrimination validity is adequate.

4.1.4 Convergent validity analysis
The values of standardised factor loading of the 42 measurement entries on the corresponding construct vary from 0.714 to 0.916, which are higher than the minimum requirement 0.50 and show strong statistical significance at $p < 0.001$; the AVE value of each construct varies from 0.6081 to 0.7686, which is higher than the recommended threshold value 0.50. In addition, the absolute value of the correlation coefficient between any two constructs is lower than 0.80, indicating the level of correlation between two variables is acceptable. The results show that the measurement scales of the 12 constructs have high convergent validity in the theoretical model in this study.

4.1.5 Explanatory power analysis
In this study, the squared multiple correlation coefficient ($R^2$) is used to validate the explanatory power of the model building. As shown in Table 1, the value of $R^2$ of each construct is higher than the recommended value (0.30), indicating that the constructed model has better explanatory power.

4.2 Analysis of the value-added path

4.2.1 Results of parameter estimation
Based on the statistical results, we can get many variables to explain the relationships between main factors (like CP). Because of the complexity of service process, it is very difficult to control all variables. Through assigning these variables a high priority to ensure their quality, we can provide the service level to satisfy customers to the maximum extent. To get the priority, we establish the SEM based on these variables. In order to clearly indicate the different levels
of the degree of influence that each variable effect on the final customer perceived value, we use the coefficients between variables in the SEM to show these differences. If the coefficient of one variable is larger, it shows the higher the degree of influence.

Assuming that the causality between two latent variables is unidirectional and the observed variables coexist with the latent variables, the model has the nature of the measurement model and the structural model, so the model of path analysis is the path analysis of latent variables recursive model. In Figure 1, the three dimensions of CP known as IS,
CB and PC are exogenous constructs, while the remaining ones are internal constructs. In this model, there are 42 assumptions to be inspected and 110 free parameters to be estimated. Using AMOS 17.0 to calculate the estimated value, the model can converge to identify causal model diagram of standard estimated value in Figure 2.

If the path coefficient is positive, then the starting point of a path has a positive influence on the end point; if the path coefficient is negative, then such influence is negative. The SEM has 793° of freedom and 110 free parameters to be estimated. The \( \chi^2 \) value of overall fit is 0.36, and probability value of significance \( p = 0.54 \), lower than the significance level of 0.05, so we accept the null hypothesis that the causal model of CP affecting the CV of service-oriented manufacturing mentioned in this article can fit the actual survey data well, and assumed model of the path analysis is verified. Absolute value of path coefficient being less than 0.5 indicates no significant effect; the absolute value of path coefficient being larger than 0.5 means it has a significant effect; if the absolute value of path coefficient is larger than 0.7, it would be said that the effect is very significant. The bold arrows in Figure 2 show very significant value-added paths. The standardised factor loadings show how important the measurement entries are to the corresponding construct and the entries in the bold rectangular box are relatively more important compared to others.

4.2.2 Model fit assessment

Quality of SEM can be judged by goodness of fit between data and model with the ratio of chi-square to degrees of freedom (\( \chi^2 / df \)), Goodness of fit index (GFI), Adjusted goodness of fit index (AGFI), Normed fit index (NFI), Comparative fit index (CFI), Incremental fit index (IFI), Relative fit index (RFI), Root mean square error of approximation (RMSEA).

As can be seen from Table 2, all the model-fit indices exceed the respective common acceptance levels, indicating that the measurement model exhibit a good fit with the data collected.

4.3 Discussion

According to the analysis of value-added path above, the following conclusions can be done.

Firstly, CP helps to improve the SERVQUAL. Customers have more communication with vendors on electric car rental service provider and manufacturers through the IS. Manufacturers can better understand customers’ needs on

![Figure 2. Structural equation model of CP’s impact on value-added path of service-oriented manufacturing.](image_url)
technical qualities such as mileage range of electric cars, battery charging time; then they can obtain a sort of technology development that the consumers are more concerned about. They can take this list as a reference of decision-making, because CP may has a negative impact on the innovation of new product (Gruner and Homburg 2000). The rental service provider can obtain the customers’ feedback about charging network, the guarantee deposit used, the lease contract and so on, thus they may have a chance to create a better SERVQUAL through eliminating the gap between the current status of company and the customers’ exception got from the feedback. Due to customers’ lack of expertise, CB mainly contributes to the improvement of SERVQUAL and it influencing the service provider is more significant than the manufacturer.

SERVQUAL has a positive impact on CV and CP improves CV by affecting the quality of service. The assumption that the technical quality has a positive influence on the emotional value (β11 = 0.65), indicates that the cruising range, battery charging time and energy consumption per 100 km can necessarily to make customers feel more comfortable and stylish; The assumption that technical quality has a positive effect on the customer social values (β13 = 0.57), indicates that better technical performance of electric cars will help the customer feel more contributions on the community (like the electric car more environmentally friendly), thus enjoying a higher status. The influence of technical quality on product function is also very significant (β14 = 0.57). The assumption that functional quality has a positive influence on the price effect (β33 = 0.82), indicates that initial freezing funds and single-day rental fee are very sensitive to the customer in electric car rental, so companies need to focus on this problem; besides, functional quality has a positive influence on the product function (β34 = 0.68), shows that a clear lease contract and mature service delivery programme can help the customer have a better experience. Functional quality has a positive influence on the emotional value of the customer (β31 = 0.76), indicating that enthusiastic and proactive attitude of the rental service staff help customers feel comfortable and convenient. Company image has a strong positive impact on the social value (β22 = 0.72), indicating that the higher the status of the company’s reputation is, the more customers feel they have done to protect the environment and improve the traffic.

CV has a positive impact on customer satisfaction. CP improves customer satisfaction by affecting SERVQUAL and CV. The assumption that the four dimensions of CV (emotional value, social value, price effect and product function) have a positive impact on customer satisfaction, indicates that CP indirectly improves customer satisfaction. Among the four dimensions, the influence of price effect on customer satisfaction is the most significant.

The higher the customer satisfaction is, the stronger the customers’ post-purchase intention is. The assumption that customer satisfaction has a positive impact on the post-purchase intention, indicates that customers enhance their satisfaction of the electric car rental service by their own participation, thus they are more willing to continue to lease and recommend to their friends.

Secondly, we can get some information from the factor loadings of all measurement entries: IS2-disclose plans, CB2-recommended outlets and models set and PC2-process interconnection, they are the most important links to improve CP. Enterprises should pay special attention to them. In the SERVQUAL, factor loadings of TQ3-charging time, FQ1-guarantee deposit used, FQ3-warm service and CI2-status of the company’s reputation are larger, indicating that these entries have a greater impact on the SERVQUAL. In CV, factor loadings of EV1-convenience, SV3-social status, SV4-image building, PE1-reduce the maintenance fees and PF2-adjustable using time are larger, indicating that they are the critical points that customers concern about.

Thirdly, from the analysis above we can conclude several significant value-added paths:

1. CB→TQ→PF→CS→PI: cooperative production improves technology quality, thereby affecting product function, thereby improving customer satisfaction, finally improving customer’ post-purchase intention;
2. CB→FQ→EV→CS→PI: cooperative production improves functional quality, thereby affecting emotional value, thereby improving customer satisfaction, finally improving customer’ post-purchase intention;
3. PC→Cl→SV→CS→PI: personal communication improves company image, thereby affecting social value, thereby improving customer satisfaction, finally improving customer’ post-purchase intention;
4. PC→FQ→PF→CS→PI: personal communication improves functional quality, thereby affecting product function, thereby improving customer satisfaction, finally improving customer’ post-purchase intention.

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<tr>
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<th>χ²/df</th>
<th>RMSEA</th>
<th>CFI</th>
<th>NFI</th>
<th>NNFI</th>
<th>IFI</th>
<th>GFI</th>
<th>AGFI</th>
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<tbody>
<tr>
<td>Model</td>
<td>2.68</td>
<td>0.063</td>
<td>0.98</td>
<td>0.95</td>
<td>0.97</td>
<td>0.97</td>
<td>0.92</td>
<td>0.9</td>
<td>0.062</td>
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<td>Recommended standard</td>
<td>&lt;3.0</td>
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So, at present the electric car manufacturers and rental operators should focus on strengthening CB and PC. For example, let customers participate in the discussion to develop new service programmes and encourage them to recommend outlets and models, and electric car manufacturers and rental operators should keep in touch with customers during the lease term to timely response to customer’s emergent demands. Then according to the customers’ advice, the rental service provider should seek a reasonable way to reduce the charging time, compress the guarantee deposit, and improve the company’s image, making customers feel comfortable and convenient to lease and save the money.

Finally, we have noticed that the path coefficient of social value to the customer satisfaction is 0.58, indicating the influence is not significant; but the path coefficient of price effect to the customer satisfaction is 0.79, indicating that the influence is very significant. This result shows that the consumers are price-sensitive for electric car rental in China, and the main group of consumers temporally can afford to buy a car and lease a car instead of buying one. And due to short lease term, the customers cannot feel they make great contribution to the environmental protection. So in the course of the promotion of electric cars, the government and enterprises should actively give publicity to benefits of using electric cars to the environment and society, set up the fashion and glorious image of driving the electric car and build a good social atmosphere for the promotion of electric cars.

5. Summary
Choosing the electric car rental industry as the background, from the views of the consumers, this article explores the influence of CP on SERVQUAL, CV, customer satisfaction, and post-purchase intentions in a service-oriented manufacturing mode. The results show that CP will improve customer satisfaction and the post-purchase intentions through the SERVQUAL and CV, thus realising the added value. And CB and PC are the main constructs of CP. This research shows that CP is essential for service-oriented manufacturing enterprises, because it will not only affect the SERVQUAL, but also affect the perceived value of the product. SERVQUAL and CV will ultimately affect consumer satisfaction and post-purchase intentions.

On the one hand, this research expands the scope of application of the theory between the CP and SERVQUAL, CV, customer satisfaction and post-purchase intentions, and its research method has a good reference outside of the electric car rental industry. On the other hand, it proves that service-oriented companies must focus on CP and SERVQUAL, and this is the only way to get a higher customer satisfaction. The electric car rental is a typical form of service-oriented manufacturing, which is oriented to use, we will continue to study the value-added path of the product-oriented and result-oriented mode of service-oriented manufacturing, and the specific style of CP between the different types of enterprises and customers and the difference of the value in the delivery process in the future. In addition, we will continue this survey in the future, in order to observe the influence of sample size to the model.

Our research shows that it is feasible to improve customer satisfaction through improving electric car rental service, furthermore encourage consumers to adopt electric cars through the rental way. So they can achieve the purpose of promoting electric cars, and the electric car manufacturer can obtain consumers’ feedback about their electric cars to continue to improve the technical quality of the electric cars, starting from the one which the consumers most concerned about. For example, charging time (TQ3) is the factor that consumers most care about, so the manufacturing should resolve it firstly, namely developing new technique to reduce the charging time.

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References


Appendix 1

All measures used a LIKERT scale ranging from 1 = complete unconformity to 7 = complete conformity.

1. Information sharing
   (a) I actively express my demand information in the process of buying.
   (b) I actively express my purchase plan in the process of buying.
   (c) I actively learn it when the company shares their features.

2. Cooperative production
   (a) I involved in the inspection of rental car condition before and after my usage.
   (b) I participate in selecting the new network node and the new types of the cars.
   (c) I will put my opinions to the company after the lease.

3. Personal communication
   (a) I discuss with the staff when we check the car.
   (b) I will contact the company in time if some problems happen during the usage.
   (c) The staff still keeps in touch with me after the lease.

4. Technical quality
   (a) The cruising range is enough?
   (b) The max speed can meet my expectation?
   (c) The charging time is acceptable?
   (d) The charging network can satisfy my needs?
   (e) The energy consumption per one hundred kilometers is acceptable?

5. Functional quality
   (a) The guarantee deposit is acceptable?
   (b) Unit maintenance cost during lease term is acceptable?
   (c) The service is enthusiastic and initiative?
   (d) The lease contract is clear enough?
   (e) The company has a mature assessment system of the car condition.

6. Company image
   (a) The store image is very good?
   (b) The company’s reputation is very good?
   (c) The societal values approve the electric car rental.

7. Emotional value
   (a) It is convenient for me to use the rental service.
   (b) It is fashionable for me to use the rental service.
   (c) It is comfortable for me to use the rental service.

8. Social value
   (a) I make my contribution to environmental protection.
   (b) I make my contribution to improve the traffic condition.
   (c) Others admire my behavior of renting an electric car.
(d) Renting an electric car to help me make a good impression to others

(9) Price effect
(a) Renting an electric car can save the maintenance cost.
(b) Renting an electric car can save the money to buy a car.
(c) Renting an electric car can avoid the cost of disposal.

(10) Production function
(a) I can select different types of cars according to different situations.
(b) I can select different lease term flexibly.
(c) The company can provide sufficient customer service (maintenance, driving service, etc.).
(d) It is very convenient to give back the car or make a contract extension.

(11) Customer satisfaction
(a) I’m satisfied with the company’s product and service.
(b) There is nothing to complain.
(c) The company's service and product can meet my expectation.

(12) Post-purchase intention
(a) I will continue to renting electric cars when I need.
(b) I will purchase the service again at the same company.
(c) I will recommend it to my friends.