RESEARCH ON THEORETICAL ANALYSIS AND STATISTICAL EXAMINATION OF MANUFACTURING ENTERPRISE’S SERVICE ENHANCEMENT BASED ON STRUCTURAL EQUATION MODELING

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ABSTRACT

According to recent statistical data and empirical research, the importance of service in manufacturing industry has been significantly strengthened and the melting tendency between relative service and manufacturing process is obvious. More and more manufacturing enterprises have adopted differentiation service strategy to acquire competitive advantage for high profit. Commercial products which reflect service enhancing effect can be chosen as empirical analysis objectives. Dynamic capability theory, customer equity management theory and enterprise growth theory are comprehensively applied in analyzing inner mechanism of service enhancing effect. Through literature research and enterprise interview, the theoretical model of enhancing service effect can be constructed and divided into three layers such as dynamic capability, customer equity management and enterprise growth performance. Based on collected one hundred and seventy four questionnaires, structural equation modeling method can be applied in measuring the validity of theoretical model through empirical research. The measuring coefficients such as $\chi^2/df$ (equals to 1.845), $RMSEA$ (equals to 0.072), $TLI$ (equals to 0.913) and $CFI$ (equals to 0.964) have all matched the statistical measuring level and standard path coefficients can be calculated so as to verify hypotheses for find out valuable academic rules. The measuring results discover that customer equity has positive effect on enterprise growth performance, and dynamic capability has positive effect on enterprise growth performance through the intermediate effect of customer equity.

KEYWORDS

Service enhancement; theoretical analysis; statistical examination; structural equation modeling.

1. INTRODUCTION

With the development of economy, the proportion of tertiary industry in industrial structure is raising, the significant importance of service industry has been attached to by academic scholars. Nevertheless, there is imitate relation between different industries, the combination of service elements and manufacturing process can improve product competitiveness (Kim and Mauborgne 1997). Academic scholars describe the
phenomenon distributed in many different manufacturing industries as “service enhancement” (Burger and Lester, 1997)[2]. Considering of the new phenomenon, many academic scholars have carried out theoretical analysis on above mentioned focus (Oliva and Kallenberg 2003, Stoughton and Votta, 2003)[3-4], while only a few scholars concentrate on empirical research based on industry data from developed countries and developing countries to find out the effect of service enhancement on manufacturing enterprises (Wang et al. 2009)[5]. Service can provide more additional value for products, bring out differentiation competitive strategy to strengthen competitiveness of products and the effect mechanism of service enhancement can be found out which reflects combination of service and product (Chen et al. 2006, Lin and Wu 2007)[6,7]. At present, the researches on service enhancement are still limited and concentrate on recognition of influence factors. The effect mode of service enhancement on the combination relation between service and product has not been constructed. Most researches attach importance to the distinction degree of service enhancement while the researcher on the construction, function process and effect mechanism have not been carried out. Considering of the lack of theoretical analysis and empirical research, commercial products which reflect service enhancement effect can be selected as empirical objectives based on questionnaire data from manufacturing enterprises in China. According to the characteristics of the combination between service and product, theoretical model which describes service enhancement can be constructed to find out influence factors and the effect mechanism of service enhancement on enterprises growth performance. The research focuses on creating a new outlook and valuable academic contribution of service enhancement and providing administrative method for manufacturing enterprises.

2. LITERATURE REVIEW AND HYPOTHESES

2.1 Fundamental Academic Concepts

Hierarchy of Service Enhancement

According to the combination level of service and product and the importance of service in the manufacturing enterprises, service enhancement of manufacturing enterprises generally can be divided into two domains such as fundamental service enhancement and improvement service enhancement (Lin and Wu 2007)[8]. (1) Fundamental service enhancement can be defined as consumer enhancement. Considering of product competitive strategy, manufacturing enterprises can improve product competitiveness through providing sufficient differentiation services which are relative with products for customers. Fundamental service enhancement focuses on product which contains long-term cumulative knowledge and skill. Product is carrier of fundamental service enhancement. Fundamental service enhancement can be observed in general and individual consumer market which acquires enterprise growth performance through consumer performance on the basis of differentiation service that are relative with product. In this process, service is still supplementary of product and this phenomenon can be defined as fundamental service enhancement. Many scholars have carried out plenty of theoretical analysis and empirical research on the influence factors, effect mechanism and paths of fundamental service enhancement. (2) Improvement service enhancement can be defined as enterprise enhancement which is based on acquiring mode and developmental strategy of commercial value. Improvement
service enhancement refines service elements such as knowledge and skill built in the product to provide service solution with high additional value for enterprise consumers. Improvement service enhancement is high relative with fundamental service enhancement, and the former is the evolution status of the latter (Evans et al. 2013)\textsuperscript{[9]}. Improvement service enhancement stimulates enterprises to adjust competitive strategy and operational administrative mode according to the dynamic commercial environment. The operational focus is located at the service chain with high additional value and more and more commercial value can be created through the specialization of the service. Essential characteristic of both fundamental and improvement service enhancement is service differentiation, the former enhancement concentrates on product differentiation while the latter enhancement emphasizes service differentiation (Chen et al. 2012)\textsuperscript{[10]}. Improvement service enhancement especially focuses on the guidance of consumer demand to acquire consumer performance for improving manufacturing enterprise growth performance. In the period of product competitiveness, product generally is standard and the customization level is relatively low. Correspondingly, in the period of service competitiveness, manufacturing enterprises bring out differentiation service solution schemes according to special demand of different enterprises. In a word, service enhancement is a kind of consumer’s guidance strategy. Considering of complicated differentiation service of different enterprise’s consumers, manufacturing enterprises should meet extremely high level to carry out service enhancement strategy. Manufacturing enterprises should integrate and optimize inner and outer resources and capabilities to be suitable for dynamic complicated commercial environment for carrying out improvement service enhancement strategy. According to empirical questionnaire which generates measuring items on a seven-point scale by carefully examining and utilizing present literatures, the distinction between fundamental service enhancement and improvement service enhancement can be acquired such as table 1.

<table>
<thead>
<tr>
<th>Measuring Items of Questionnaire</th>
<th>Average Points of Enterprise Customers</th>
<th>Average Points of Individual Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers are aware of their own demand and concentrate on quality and cost performance more than service level. (B1)</td>
<td>3.56</td>
<td>4.73</td>
</tr>
<tr>
<td>Most enterprises in industry improve product competitiveness through high quality service. (B2)</td>
<td>5.45</td>
<td>4.53</td>
</tr>
<tr>
<td>Most enterprises in industry acquire high profit through providing high quality service. (B3)</td>
<td>5.77</td>
<td>3.91</td>
</tr>
<tr>
<td>Terminal client service can be provided by the cooperation of different departments in the organization. (B4)</td>
<td>5.23</td>
<td>4.12</td>
</tr>
<tr>
<td>Customers and enterprises can communicate frequently with each other through technical terms. (B5)</td>
<td>3.79</td>
<td>5.04</td>
</tr>
<tr>
<td>Measuring Items of Questionnaire</td>
<td>Average Points of Enterprise Customers</td>
<td>Average Points of Individual Customers</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Customers and enterprises generally cooperate to design physical products and solution scheme. (B6)</td>
<td>5.64</td>
<td>3.85</td>
</tr>
<tr>
<td>The proportion of providing service cost in the total cost of product is high. (B7)</td>
<td>5.26</td>
<td>4.11</td>
</tr>
<tr>
<td>Service attitudes and after-sales service can significantly improve customer’s satisfaction and loyalty. (B8)</td>
<td>4.88</td>
<td>5.93</td>
</tr>
<tr>
<td>Most customers aren’t aware of what kind of service system is needed and enterprise should design solution scheme. (B9)</td>
<td>5.91</td>
<td>3.74</td>
</tr>
<tr>
<td>Enterprise should acquire customer’s dynamic changes in the demand and improve products and solution schemes. (B10)</td>
<td>5.83</td>
<td>4.66</td>
</tr>
</tbody>
</table>

**Research Framework of Customer Equity**

Many scholars have advanced the definitions of customer equity, the definition of the scholar Rust (Rust et al. 2004)\[11\] has been accepted by most scholars. From dynamic research view, customer equity attaches importance to not only the present revenue but also the potential revenue which can be brought for the enterprises. Considering of discounting concept, customer equity can be defined as the total sum of lifetime customer’s discounting value. As an new strategic asset, customer equity is different from traditional tangible assets and intangible assets such as brand, trademark, patent and intellectual property (Silveira et al. 2012)\[12\]. According to the research of the scholar Rust, customer equity can be divided into three dimensions such as value equity, brand equity and relationship equity (Anna Torres 2011)\[13\]. (1) Objective evaluation of customer on enterprise brand forms value equity, and opportunity cost of customer is essential for the measurement of value equity which consists of important driving elements such as quality, service, commercial environment and product price. (2) Brand equity which reflect the subjective evaluation of customer on enterprise brand is an important component of enterprise assets. Brand equity exceed objective value feeling and are influenced by enterprise’s market strategy. The driving elements of brand equity include recognition of brand, attitude of brand and moral power of brand. (3) Relationship equity concentrate on the relation between enterprises and customers. The driving elements of relationship equity consist of satisfactory degree of customer, recognition degree of customer, reliance degree of customer, commitment of customer and special service.

**Construction of Dynamic Capability**

According the research of the scholar Teece (Teece 1997, 2007)\[14,15\], dynamic capability can be defined as capability of constructing, integrating and restructuring inner and outer resources of enterprises in order to be suitable for complicated and dynamic commercial environment. Through restructuring enterprise’s resources and capabilities to be suitable for external environment, sustainable competitive advantage
can be acquired. Dynamic capability can be divided into three dimensions such as sensing capability, grasping capability and restructuring capability. (1) Sensing capability can be defined as sensing and collecting inner and outer environmental changes and customer demand’s information. Sensing capability is a kind of responding capability to inner and outer environmental changes. Enterprise should sensing inner and outer environmental threats and opportunities corresponding with environmental changes in order to take measures rapidly. Sensing capability is the primary elements of dynamic capability (Heusinkveld et al. 2009)[16]. (2) Grasping capability can be defined as the capability of evaluation, integration and utilization of resources according to inner and outer environmental changes. Grasping capability reflects transition function in the three dimensions of dynamic capability (Salunke et al. 2011)[17]. (3) Restructuring capability can be defined as enterprise’s capability of integrating and utilizing finance and human resources to be suitable for customer demand and environmental changes. From the view of constructing dimensions, restructuring capability is the critical and essential element of dynamic capability. Rapid responding capability of enterprise to inner and outer environment primarily can be reflected by restructuring capability (Cepeda and Vera 2007)[18].

**Enterprise Growth Mode**

The process during which enterprises experiment from small scale to large scale can be defined as enterprise growth (Chan et al. 2007, Holz 2011)[19,20]. Enterprise growth needs the driving factors which can be divided into two categories. The first category which enterprise growth is driven by outer factors can be defined as exogenous mode of growth, and the second category which enterprise growth is driven by inner factors can be defined as endogenous mode of growth. (1) Enterprise exogenous growth are mainly concerned with classical economics, neoclassical economics and neo-institutional economics. Enterprise growth mainly relies on market scale which simulates enterprise growth. In the meanwhile, enterprise growth may be limited by market scale to slow down growth speed. Enterprise growth is also influenced by technical level. With the development of outer factors, enterprises should adjust individual scale to be suitable for environmental changes. When the market is flat, enterprise growth is obviously limited. Internal consistency of different enterprises is impossible, and market transaction cost is driving factor which simulates enterprise growth (Huh and Kim 2013)[21]. (2) Enterprise endogenous growth can be explained by resource based view and capability based view theories. Resource based view concentrates on the importance of enterprise resource which drives enterprise rapid growth. Enterprise capability which affects growth speed and scale is built on the basis of resource. Capability based view focuses on the importance of the enterprise capability and insists that capability is critical and essential driving factor. Nevertheless, core capability rigidity limits the rapid responding capability to the environmental changes. In this case, dynamic capability theory is advanced to provide solution for core capability rigidity of enterprise growth. Dynamic capability is an important and essential driving factor which integrates and utilizes internal and external enterprise resource to be suitable for the flexible and complicated changes of customer demand and commercial environment (Huh and Kim 2013)[21].
2.2 Theory Analysis and Hypotheses

Dynamic Capability and Customer Equity

According to literature research and enterprises investigation result, the mechanisms that sensing capability grasping capability and restructuring capability drive customer equity reflect as following aspects. (1) Enterprises can orient accurate objective market and collect relative information of product function and service demand to respond to external environmental changes. Product and service innovation can be carried out to acquire competitive advantages. Information and knowledge are critical and essential elements of sensing capability, the mentioned two elements are microcosmic basis that sensing capability affects customer performance (Teece 1997, 2007)[14,15]. The function of sensing capability is to indicate enterprise what to do, outstanding sensing capability provides the basis for utilizing validly information to grasp opportunity, making suitable decision, integrating and restructuring resources and capabilities to form grasping capability and restructuring capability. In this case, sensing capability is essential for customer equity, because manufacturing enterprises can concentrate on sustainable search in the information of internal and external environments and objective customers to bring out outstanding customer performance. (2) Enterprises can accurately grasp product innovation opportunities and adjust product category and service mode according to market environmental changes. Top managers can lead product and service innovation group efficiently. Enterprises can acquire technique service from external environment and carry out special cooperation with external institutions. Grasping capability reflects that manufacturing enterprises carry out efficient analysis on acquiring environmental information to respond to market environmental changes and grasp opportunities in time. Grasping capability indicates enterprises how to do. From the view of resource based theory, enterprise’s competitive advantages origins from rare resources in control. Grasping capability can integrate enterprise internal and external resources to optimize resource allocation. In this case, grasping capability is essential for customer equity that can affect customer performance through service enhancement strategy (Johnson et al. 2012)[22]. (3) Enterprise culture advocates innovation and sustainable improvement, enterprise can adjust product and service strategies to be suitable for environmental changes. Special rule and mechanism guarantee that relative information of market department can be transmitted to R&D and production departments to form self-suitable group to deal with difficulties. Restructuring capability is the capability of reconfiguring resources based on the utilization of acquiring and mastering information. It concentrates on high efficient execution to bring out creative outcomes. Only if the information acquired from sensing capability and the decision made by grasping capability have been carried out, customer equity may improve enterprise growth performance. According to above mentioned theoretical analysis, the following hypotheses can be advanced (Abbas Keramati 2010)[23].

Hypothesis 1.

The higher an enterprise’s sensing capability, (a) the higher an enterprise’s value equity, (b) the higher an enterprise’s brand equity, (c) the higher an enterprise’s relationship equity.
Hypothesis 2.

The higher an enterprise’s grasping capability, (a) the higher an enterprise’s value equity, (b) the higher an enterprise’s brand equity, (c) the higher an enterprise’s relationship equity.

Hypothesis 3.

The higher an enterprise’s restructuring capability, (a) the higher an enterprise’s value equity, (b) the higher an enterprise’s brand equity, (c) the higher an enterprise’s relationship equity.

Customer Equity and Enterprise Growth Performance

Customer equity as primary objective of the improvement service enhancement concentrates on plenty of customers’ special demand more than product to improve enterprise growth performance (Rust et al. 2004)[11]. (1) Value equity and enterprise growth performance. On the basis of customer’ opportunity, value equity focuses on scientific and objective evaluation of solution scheme. The core characteristic of value asset reflects on quality, price and convenience of demand solution scheme. If customers can receive individual service solution scheme with reasonable cost at any situation and period, customer satisfaction and loyalty can be improved so as to simulate customer to decrease sensitivity towards price and service. In this process, not only enterprise financial performance but also staff quality, market satisfaction and internal management of enterprise can be improved. In this case, value equity are essential for the improvement of enterprise growth performance (Dwivedi et al. 2012)[24]. (2) Brand equity and enterprise growth performance. Brand equity which reflects appraisal of brand originates from objective value feeling. Market strategy, customer’s consumption experience and the relation between customer and brand have made important effect on brand equity. High efficient information communication may simulate customer center to establish emotional relation and association of enterprise brand. Comparing with the value equity which focuses on objective experience of individual customer, brand equity mostly reflects subjective feelings of customer group. The primary function of brand equity is to improve brand awareness and establish positive brand image in main customer’s group. The above mentioned function also can shorten the time of purchasing decision and exploit potential customers (Nyadzayo et al. 2011)[25]. (3) Relationship equity and enterprise growth performance. Relationship equity which excels the value equity and brand equity is the tendency of customer loyalty towards brand. It concentrates on the relation between customer and enterprise to achieve the goal of establishing and sustaining the relationship. The driving elements include customer satisfaction, customer acceptance, customer reliance, customer promise and special treatment. Relationship equity focuses on sense, guidance and exploiting of customer demand. Comparing with brand equity which attaches importance to exploiting potential customers, relationship equity with the assistance of the function of value equity and brand equity concentrates on sustaining critical customer’s group to improve enterprise growth performance (Zhang et al. 2013)[26]. According to the above mentioned theoretical analysis, the following hypotheses can be advanced.
Hypothesis 4.
(a) the higher an enterprise’s value equity, (b) the higher an enterprise’s brand equity, (c) the higher an enterprise’s relationship equity, the higher an enterprise’s growth performance.

The Moderating Role of Customer Equity on the Effectiveness of Dynamic Capability and Enterprise Growth Performance

Improvement service enhancement as a kind of customer’s guidance strategy is primary to achieve outstanding customer performance for improving enterprise growth performance. Considering of high limitation of enterprise capability to carry out improvement service enhancement, the initial capability which reflects operational capability and advanced capability which reflects core capability can’t sustain the application of improvement service enhancement strategy, the dynamic capability should be exploited correspondingly according to commercial environmental changes (Teece 2007)[15]. Dynamic capabilities is divided into sensing capability, grasping capability and restructuring capability (Teece 1997, 2007, Eisenhardt and Martin 2003)[14,15,27]. The sensing capability helps the enterprises keep market sensitivity to recognize opportunities; the grasping capability urges quick decision and supporting resources. The enterprise resources adjustment, organization and integration is impelled by restructuring capability (Torres and Tribó 2011)[28]. Dynamic capability is the capability of establishing, integrating and restructuring internal and external resources of manufacturing enterprises to maintain sustainable core competitiveness to be suitable for customer demand. Suitability and mutability are two principle characteristics of dynamic capability which mean that enterprise can take measures in the dynamic commercial environment. Comparing with initial capability and advanced capability mentioned above, dynamic capability is capability which can improve enterprise growth performance significantly. Customer equity makes moderating effectiveness between dynamic capability and enterprise growth performance (Peltier et al. 2013)[29]. Sensing capability, grasping capability and restructuring capability have synergistically made effect on customer satisfaction to establish customer equity, and improve enterprise growth performance gradually through outstanding customer equity (Johnson et al. 2012)[22]. Obviously, the moderating effectiveness of customer equity is essential for the enterprises to improve growth performance of manufacturing enterprises considering of the application of improvement service enhancement strategy (Kim and Ku 2012)[30]. According to above mentioned theoretical analysis, the following hypotheses can be advanced.

Hypothesis 5.
(a) the higher an enterprise’s sensing capability, (b) the higher an enterprise’s grasping capability, (c) the higher an enterprise’s restructuring capability, the higher an enterprise’s growth performance.

Hypothesis 6.
Value equity (a) positively moderates the relationship between sensing capability and enterprise growth performance, (b) positively moderates the relationship between grasping capability and enterprise growth performance, (c) positively moderates the relationship between restructuring capability and enterprise growth performance.
Hypothesis 7.

Brand equity (a) positively moderates the relationship between sensing capability and enterprise growth performance, (b) positively moderates the relationship between grasping capability and enterprise growth performance, (c) positively moderates the relationship between restructuring capability and enterprise growth performance.

Hypothesis 8.

Relationship equity (a) positively moderates the relationship between sensing capability and enterprise growth performance, (b) positively moderates the relationship between grasping capability and enterprise growth performance, (c) positively moderates the relationship between restructuring capability and enterprise growth performance.

3. METHOD

3.1 Setting and Data Collection

Questionnaire is primary method to collect empirical data. Investigation units are manufacturing enterprises which are constituted and operated by law from sixteen typical industries in China. In this field, the enterprises which legal persons are more than three years old, aware of the developmental plan and the scale of enterprise assets meet the level are selected as empirical units. Stratified random sampling method has been applied in the investigation. In the details, sampling enterprises are marked according to the classification of present scale and product category, and samples are selected randomly in every category. Each empirical unit concentrates on enterprise customer beyond some percentage of all the operations. Through E-mail, telephone, relational network, Tax, network responses and appointed special investigation institutions, questionnaires are distributed to the relative persons of selected sampling enterprises to collect empirical data.

To deal with potential problems associated with single-informant bias and common-method bias, we temporarily separated the measurement of independent and dependent variables and collected data at two different points in time. In the beginning of the year 2012, a survey assessing sensing capability, grasping capability and restructuring capability was administered to the general managers and relative employers of 572 organizational units from 16 typical manufacturing industries in China. To ensure confidentiality, we agreed not to reveal the name of the person and asked each person to return the questionnaire directly to the research team. Unit managers and relative employers from 269 organizational units returned their valid questionnaires, representing a response rate of 47.03%. In the end of the year 2012, approximately 9 months after the first survey, a second survey was distributed to the same 269 organizational unit managers and relative employers to assess their unit’s value equity, brand equity, relationship equity and enterprise growth performance. We received 174 valid surveys from organizational units, representing a final response rate of 64.68%. The respondents of these 174 organizational units had a mean company tenure of 8.37 years. The average size of the organizational units was more than 1700 full-time employees. The average assets scale of the organizational units was more than 0.97 billion RMB.
To test for nonresponse bias, we examined differences between respondents and non-respondents for our final sample. T-tests showed no significant differences based on the enterprise’s assets scale, administrative division, organizational mode, manufacturing industry and operational years. We also compared early and late respondents in terms of demographic characteristics and model variables. These comparisons did not reveal any significant differences (p < 0.05), indicating that nonresponse bias was not a problem (Armstrong and Overton 1977).[31]

3.2 Measurement and Validation of Constructs

This study used existing scales from the literature, we reviewed relevant literature and generated a pool of items to tap the domain of each construct. Next, to enhance the construct validity of the survey measures, we conducted a pretest involving in-depth pilot interviews with some managers with various tenures at different enterprises. The managers were asked to complete questionnaires and to indicate any phrasing of the items that they thought was ambiguous. During follow-up interviews, managers were invited to provide suggestions for improvement of the questionnaire. After this pretest, the phrasing of items was further enhanced by the authors and peers, resulting in the final version. The formal questionnaire provides all items of study variables.

**Dependent Variables**

According to relative literatures (Delmar et al. 2003, Zhang and Gao 2010)[32,33] and operation characteristics of large and medium manufacturing enterprises, enterprise growth performance can be measured from four aspects such as financial performance, learning and staff growth, market satisfaction of customer demand, internal procedure and firm’s administration (the above-mentioned four aspects can be categorized into financial performance and non-financial performance). Empirical research is difficult to acquire precise and objective statistical data, we generated items on a seven-point scale by carefully examining existing literature (Benner and Tushman 2003, Lewin and Long 1999, Uzzi and Lancaster 2003)[34-36]. Subjective measuring items have relatively high internal consistency and reliability (Chandler and Hanks, 1993) [37], subjective performance would not affect the reliability and validity of empirical research (Dess and Lumpkin 2003)[38]. In addition, manufacturing enterprise growth is a process which should considers of time factor (Dunne and Hughes, 1996)[39], the empirical measuring period can be defined as three-year cycle (from 2009 to 2011).

**Independent Variables**

Based on the explanation on the structure and connotation of dynamic from famous scholar Teece (Teece 2007)[15], dynamic capability can be divided into three dimensions such as sensing capability, grasping capability and restructuring capability. From the analytical view of organization process (Teece et al. 1997, Eisenhardt and Martin 2003)[14,27], dynamic capability makes indirect effect on enterprise growth performance through the modification of operational capability and resource foundation (Adner and Helfat et al. 2010, Easterby-Smith et al. 2008, Ambrosini and Bowman 2009)[40-42]. Enterprise growth performance cannot be measured by the guidance of financial results, and should be observed on the basis of special organization process to justify if special actions occur or not and the frequency of the occurrence (Lichtenthaler, 2008)[43]. The scholar Jansen (Justin et al. 2006)[44] applied this method to measure organizational absorbing capability
and the measuring results are scientific and reasonable. In our research, the measuring items of dynamic capability concentrate on the combination of product and service to improve product competitiveness to be suitable for the complicated and dynamic customer demand.

**Intermediate Variables**

According to the concept of the scholar Rust (Rust, 2004)[11], customer equity can be divided into three core dimensions such as value equity, brand equity and relationship equity. In our research, the questionnaire which consists of relative items to reflect three dimensions will be set up to measure customer equity. Value equity which are based on the opportunity cost of the customer are objective estimate of enterprise brand. The driving factors of value equity include quality, price and convenience (Nyadzayo et al. 2011)[25]. Brand equity simulates customers to significantly strengthen individual subjective consciousness to select enterprise. The choice is primarily affected by the enterprise’s market strategy. The driving factors of brand equity include recognition of brand, attitude of brand and moral power of brand (Olhager and Johansson 2012)[45]. Relationship equity set up a bridge which is oriented and centered by loyalty between customers and enterprises to strengthen intimate relation. Driving factors of relationship equity consist of satisfactory degree of customer, recognition degree of customer, reliance degree of customer, commitment of customer and special service (Peltier 2013)[29].

**4. EMPIRICAL RESEARCH AND RESULTS ANALYSIS**

**4.1 Relation Test of Different Variables Based on Multiple Statistical Analysis Model**

According to the hypotheses above mentioned in the chapter 2.2 and relative academic literatures, the fundamental testing model can be established with the application of the multiple statistical analysis models in the table 2 which reflects the fundamental relation of core academic variables such as dynamic capability which can be divided into three dimensions, customer equity which can be divided into three dimensions and enterprise growth performance which can be divided into four dimensions. Through multiple liner regression analysis on one hundred and seventy four valid questionnaires, analytical results such as The Correlation of Independent and Dependent Variables, Multiple Correlation Coefficient $R$, Determination Coefficient $R^2$, Durbin-Watson Coefficient, Variation Amount Significance Test $F$ and Check Coefficient Sig. $F$ Value can be calculated as table 3. According to statistical standard values, the testing coefficients of three fundamental models have met significant level.
Table 2
Brief Description of Three Fundamental Models

<table>
<thead>
<tr>
<th>Name</th>
<th>Dependent Variables</th>
<th>Independent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>Customer Equity</td>
<td>Sensing Capability, Grasping Capability, Restructuring Capability</td>
</tr>
<tr>
<td>Model 2</td>
<td>Enterprise Growth Performance</td>
<td>Value equity, Brand equity, Relationship equity</td>
</tr>
<tr>
<td>Model 3</td>
<td>Enterprise Growth Performance</td>
<td>Sensing Capability, Grasping Capability, Restructuring Capability</td>
</tr>
</tbody>
</table>

Table 3
Multiple Regression Analysis Results of Three Fundamental Models

<table>
<thead>
<tr>
<th>Examination Information</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation of Independent and Dependent Variables</td>
<td>Sig.&lt;.05</td>
<td>Sig.&lt;.05</td>
<td>Sig.&lt;.05</td>
</tr>
<tr>
<td>Multiple Correlation Coefficient R</td>
<td>.919</td>
<td>.936</td>
<td>.901</td>
</tr>
<tr>
<td>Determination Coefficient R²</td>
<td>.844</td>
<td>.877</td>
<td>.817</td>
</tr>
<tr>
<td>Durbin-Watson Coefficient</td>
<td>1.773</td>
<td>1.979</td>
<td>2.196</td>
</tr>
<tr>
<td>Variation Amount Significance Test F</td>
<td>307.638*</td>
<td>403.397*</td>
<td>241.977*</td>
</tr>
<tr>
<td>Check Coefficient Sig. F Value</td>
<td>*p.&lt;.05</td>
<td>*p.&lt;.05</td>
<td>*p.&lt;.05</td>
</tr>
<tr>
<td>Whole Regressive Model Explained Variation</td>
<td>Significant level</td>
<td>Significant level</td>
<td>Significant level</td>
</tr>
</tbody>
</table>

The intermediate role of customer equity between dynamic capability and enterprise growth performance can be justified by the regression effect distinction between model 4 (which does not includes customer equity) and model 5 (which includes customer equity). Through further analysis on one hundred and seventy four questionnaires, analytical results can be calculated as table 4. The F value of Model 4 and Model 5 achieve significant level towards Sig. < 0.05 (F1 = 307.206, F2 = 379.040), in Model 5 with intermediate variable, the customer equity regressive coefficient rises to 0.597 which is markedly different from the standard value of 0 (Sig. < 0.001), the regressive coefficients of sensing capability, grasping capability and restructuring capability are positive and remarkable, but they are lower than the value of Model 4. R² of model 5 rises to 0.901 (Sig. < 0.05) with increasing explaining power, from which distinctive Intermediate role of customer equity can be verified.
<table>
<thead>
<tr>
<th>Variable</th>
<th>4.353</th>
<th>-1.113</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Constant Term</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Independent Variable</strong></td>
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<tr>
<td>Sensing Capability</td>
<td>.321</td>
<td>.246</td>
</tr>
<tr>
<td>Grasping Capability</td>
<td>.175</td>
<td>.132</td>
</tr>
<tr>
<td>Restructuring Capability</td>
<td>.496</td>
<td>.352</td>
</tr>
<tr>
<td><strong>Intermediary Variable</strong></td>
<td></td>
<td></td>
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<tr>
<td>Customer Equity</td>
<td></td>
<td>.597</td>
</tr>
<tr>
<td><strong>Statistics in Regression Model</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( R^2 )</td>
<td>.844</td>
<td>.901</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
<td>.842</td>
<td>.897</td>
</tr>
<tr>
<td>( F )</td>
<td>*307.206</td>
<td>*379.040</td>
</tr>
</tbody>
</table>

Note:
1) Model 4: The multiple regressive model testing sensing capability, grasping capability and restructuring capability effect on enterprise growth performance.
2) Model 5: Model 4 plus intermediate variable.
3) *p<.05 ***p<.001

4.2 Statistical Test Based on Structural Equation Modeling

Based on the structural equation modeling (SEM), the theoretical model of improvement service enhancement and relative hypotheses can be tested. The hypotheses relation of three core academic concepts of improvement service enhancement such as dynamic capability, customer equity and enterprise growth performance should be verified and analyzed. At the aim of further analysis on the relation of three academic concepts, the dynamic capability which can be divided into three dimensions such as sensing capability, grasping capability and restructuring capability and the customer equity which can be divided into three dimensions such as value equity, brand equity and relationship equity make contributions to establish precise analytical model such as figure 1 which consists of eleven exogenous explicit variables, three exogenous latent variables, fourteen endogenous explicit variables and four endogenous latent variables.
Based on theoretical analysis and structural equation modeling, statistical model of improvement service enhancement can be described as mathematical formula (1) which represents measuring model of index variables $(X, Y)$ and formula (2) which represents structural equation (S.E.). The analytical results of initial model can be calculated as table 5. According to estimate results of the initial model, $\chi^2$ equals to 1525.920, the degree of freedom (DF) equals to 170, the value of $\chi^2/DF$ equals to 8.976 which has not met the standard value 2.000, RMSEA equals to 0.365 which has not met the standard value 0.08, TLI equals to 0.548 and CLI equals to 0.532 which have not met the standard values. From the optimal view, most analytical indexes’ results can’t be accepted, C.R. values don’t meet the significant level and the initial model should be modified.

$$
(X, Y) = (a_1 = \gamma_{11} \times A_1 + e_1, a_2 = \gamma_{12} \times A_2 + e_2, a_3 = \gamma_{13} \times A_3 + e_3, a_4 = \gamma_{21} \times A_2 + e_4,
\quad a_5 = \gamma_{22} \times A_2 + e_5, a_6 = \gamma_{23} \times A_2 + e_6, a_7 = \gamma_{31} \times A_3 + e_7, a_8 = \gamma_{32} \times A_3 + e_8,
\quad a_9 = \gamma_{33} \times A_3 + e_9, a_{10} = \gamma_{34} \times A_3 + e_{10}, a_{11} = \gamma_{35} \times A_3 + e_{11},
\quad b_1 = \eta_{12} \times B_1 + e_{12}, b_2 = \eta_{12} \times B_1 + e_{13}, b_3 = \eta_{13} \times B_1 + e_{14}, b_4 = \eta_{14} \times B_1 + e_{15},
\quad b_5 = \eta_{21} \times B_2 + e_{16}, b_6 = \eta_{22} \times B_2 + e_{17}, b_7 = \eta_{23} \times B_2 + e_{18},
\quad b_8 = \eta_{31} \times B_3 + e_{19}, b_9 = \eta_{32} \times B_3 + e_{20}, b_{10} = \eta_{33} \times B_3 + e_{21},
\quad c_1 = \theta_{11} \times C + e_{22}, c_2 = \theta_{12} \times C + e_{23}, c_3 = \theta_{13} \times C + e_{24}, c_4 = \theta_{14} \times C + e_{25})
$$
\[
\begin{align*}
B_1 &= \beta_{11} \times A_1 + \beta_{21} \times A_2 + \beta_{31} \times A_3 + e_{26} \\
B_2 &= \beta_{12} \times A_1 + \beta_{22} \times A_2 + \beta_{32} \times A_3 + e_{27} \\
B_3 &= \beta_{13} \times A_1 + \beta_{23} \times A_2 + \beta_{33} \times A_3 + e_{28} \\
C &= n_1 \times A_1 + n_2 \times A_2 + n_3 \times A_3 + \lambda_1 \times B_1 + \lambda_2 \times B_2 + \lambda_3 \times B_3 + e_{29}
\end{align*}
\]

(2)

Table 5
Initial Fitting Data of Improvement Service Enhancement

<table>
<thead>
<tr>
<th>Path</th>
<th>Standard Coefficient</th>
<th>Path Coefficient</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value equity ← Sensing Capability</td>
<td>0.182</td>
<td>0.179</td>
<td>0.176</td>
<td>1.013</td>
<td>0.311</td>
</tr>
<tr>
<td>Value equity ← Grasping Capability</td>
<td>0.351</td>
<td>0.384</td>
<td>0.612</td>
<td>0.626</td>
<td>0.531</td>
</tr>
<tr>
<td>Value equity ← Restructuring Capability</td>
<td>0.259</td>
<td>0.245</td>
<td>0.430</td>
<td>0.570</td>
<td>0.568</td>
</tr>
<tr>
<td>Brand equity ← Sensing Capability</td>
<td>0.136</td>
<td>0.130</td>
<td>0.180</td>
<td>0.722</td>
<td>0.470</td>
</tr>
<tr>
<td>Brand equity ← Grasping Capability</td>
<td>0.278</td>
<td>0.295</td>
<td>0.603</td>
<td>0.490</td>
<td>0.624</td>
</tr>
<tr>
<td>Brand equity ← Restructuring Capability</td>
<td>0.517</td>
<td>0.477</td>
<td>0.433</td>
<td>1.102</td>
<td>0.271</td>
</tr>
<tr>
<td>Relationship equity ← Sensing Capability</td>
<td>0.518</td>
<td>0.515</td>
<td>0.138</td>
<td>3.742</td>
<td>***</td>
</tr>
<tr>
<td>Relationship equity ← Grasping Capability</td>
<td>0.091</td>
<td>0.101</td>
<td>0.298</td>
<td>0.337</td>
<td>0.736</td>
</tr>
<tr>
<td>Relationship equity ← Restructuring Capability</td>
<td>0.453</td>
<td>0.436</td>
<td>0.337</td>
<td>1.950</td>
<td>0.051</td>
</tr>
<tr>
<td>Growth Performance ← Sensing Capability</td>
<td>0.277</td>
<td>0.790</td>
<td>0.487</td>
<td>1.662</td>
<td>0.105</td>
</tr>
<tr>
<td>Growth Performance ← Grasping Capability</td>
<td>-0.241</td>
<td>-0.768</td>
<td>0.935</td>
<td>-0.821</td>
<td>0.412</td>
</tr>
<tr>
<td>Growth Performance ← Restructuring Capability</td>
<td>0.278</td>
<td>0.769</td>
<td>0.678</td>
<td>1.134</td>
<td>0.257</td>
</tr>
<tr>
<td>Growth Performance ← Value equity</td>
<td>0.105</td>
<td>0.305</td>
<td>0.135</td>
<td>2.259</td>
<td>0.024</td>
</tr>
<tr>
<td>Growth Performance ← Brand equity</td>
<td>0.674</td>
<td>2.017</td>
<td>0.496</td>
<td>4.071</td>
<td>***</td>
</tr>
<tr>
<td>Growth Performance ← Relationship equity</td>
<td>0.006</td>
<td>0.017</td>
<td>0.827</td>
<td>0.021</td>
<td>0.983</td>
</tr>
</tbody>
</table>

\[\chi^2 = 1525.920\text{ }RMSEA = 0.365\text{ }DF = 170\text{ }TLI = 0.548\text{ }\chi^2/DF = 8.976\text{ }CFI = 0.532\]

According to the hypotheses relation of academic concepts in the model of improvement service enhancement and the fitting results of initial model, parts of paths in the initial model can be removed, and then re-estimate results can be calculated as formula (3), formula (4), table 6 and figure 2 which reflect modified structural equation modeling. After parts of paths such as Growth Performance ← Sensing capability, Growth Performance ← Grasping Capability, Growth Performance ← Restructuring Capability, Sensing Capability ← Grasping Capability, Grasping Capability ← Restructuring Capability and Sensing Capability ← Restructuring Capability have been removed, re-estimate results have been improved significantly, the coefficients such as \(\chi^2\) which equals to 280.440, \(RMSEA\) which equals to 0.072, \(TLI\) which equals to 0.913, \(\chi^2/DF\) which equals to 1.845 and \(CFI\) which equals to 0.964 have met standard level, fitting status is excellent and all the reserved paths are statistical significantly.
\[ a_1 = 0.83 \times A_1 + e_1, a_2 = 0.86 \times A_2 + e_2, a_3 = 0.80 \times A_3 + e_3, a_4 = 0.77 \times A_2 + e_4 \]
\[ a_5 = 0.76 \times A_2 + e_5, a_6 = 0.73 \times A_2 + e_6, a_7 = 0.82 \times A_3 + e_7, a_8 = 0.80 \times A_3 + e_8 \]
\[ a_9 = 0.81 \times A_3 + e_9, a_{10} = 0.85 \times A_3 + e_{10}, a_{11} = 0.81 \times A_3 + e_{11} \]
\[ (X,Y) \]
\[ b_1 = 0.68 \times B_1 + e_{12}, b_2 = 0.82 \times B_1 + e_{13}, b_3 = 0.73 \times B_1 + e_{14}, b_4 = 0.77 \times B_1 + e_{15} \]
\[ b_5 = 0.73 \times B_2 + e_{16}, b_6 = 0.72 \times B_2 + e_{17}, b_7 = 0.78 \times B_2 + e_{18} \]
\[ b_8 = 0.61 \times B_3 + e_{19}, b_9 = 0.66 \times B_3 + e_{20}, b_{10} = 0.62 \times B_3 + e_{21} \]
\[ c_1 = 0.78 \times C + e_{22}, c_2 = 0.75 \times C + e_{23}, c_3 = 0.72 \times C + e_{24}, c_4 = 0.85 \times C + e_{25} \]

\[ (S.E.) \]
\[ B_1 = 0.33 \times A_1 + 0.28 \times A_2 + 0.73 \times A_3 + e_{26} \]
\[ B_2 = 0.37 \times A_1 + 0.19 \times A_2 + 0.73 \times A_3 + e_{27} \]
\[ B_3 = 0.44 \times A_1 + 0.24 \times A_2 + 0.69 \times A_3 + e_{28} \]
\[ C = 0.40 \times B_1 + 0.70 \times B_2 + 0.32 \times B_3 + e_{29} \]

Table 6

<table>
<thead>
<tr>
<th>Path</th>
<th>Modified Fitting Data of Improvement Service Enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Coefficient</td>
</tr>
<tr>
<td>Value equity ← Sensing Capability</td>
<td>0.331</td>
</tr>
<tr>
<td>Value equity ← Grasping Capability</td>
<td>0.281</td>
</tr>
<tr>
<td>Value equity ← Restructuring Capability</td>
<td>0.444</td>
</tr>
<tr>
<td>Brand equity ← Sensing Capability</td>
<td>0.375</td>
</tr>
<tr>
<td>Brand equity ← Grasping Capability</td>
<td>0.191</td>
</tr>
<tr>
<td>Brand equity ← Restructuring Capability</td>
<td>0.729</td>
</tr>
<tr>
<td>Relationship equity ← Sensing Capability</td>
<td>0.728</td>
</tr>
<tr>
<td>Relationship equity ← Grasping Capability</td>
<td>0.243</td>
</tr>
<tr>
<td>Relationship equity ← Restructuring Capability</td>
<td>0.687</td>
</tr>
<tr>
<td>Growth Performance ← Value equity</td>
<td>0.403</td>
</tr>
<tr>
<td>Growth Performance ← Brand equity</td>
<td>0.702</td>
</tr>
<tr>
<td>Growth Performance ← Relationship equity</td>
<td>0.325</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 280.440 \quad RMSEA = 0.072 \quad DF = 152 \quad TLI = 0.913 \quad \chi^2/DF = 1.845 \quad CFI = 0.964 \]
Fig. 2: Modified Model of Improvement Service Enhancement

5. DISCUSSION AND CONCLUSION

5.1 Discussion of Statistical Results

Through the analysis of multiple statistical regression modeling and structural equation modeling, the hypothesis 1 including (a), (b) and (c), hypothesis 2 including (a), (b) and (c) and hypothesis 3 including (a), (b) and (c) which represent the relation between dynamic capability and customer equity have been tested and verified. The testing results imply that sensing capability, grasping capability and restructuring capability respectively make positive effect on value equity, brand equity and relationship equity. Approximate 84.4% variance of customer equity can be explained by sensing capability, grasping capability and restructuring capability which represents significant level $p < 0.05$. Dynamic capability is the capability of integrating and restructuring enterprise’s information, internal and external resources. Dynamic capability is critical and essential factor which affects the operational efficiency of commercial reforms and strategies to measure rapid responding speed of manufacturing enterprises towards external environmental changes. Suitable and outstanding dynamic capability significantly simulates establishment of customer equity.

Through the analysis of multiple statistical regression modeling and structural equation modeling, the hypothesis 4 including (a), (b) and (c) which represents the relation between customer equity and enterprise growth performance has been tested and
verified. The testing results imply that value equity, brand equity and relationship equity respectively make positive effect on enterprise growth performance. Approximate 87.7% variance of enterprise growth performance can be explained by value equity, brand equity and relationship equity which represent significant level p < 0.05. Customer equity is the primary objective of improvement service enhancement, and brand equity comparing with the other two core dimensions of customer equity have most significant effect on enterprise growth performance. In the theoretical model of improvement service enhancement based on structural equation modeling, it can be found out that there are not direct and indirect effect paths of three core dimensions of customer equity.

Through the analysis of multiple statistical regression modeling and structural equation modeling, the hypothesis 5 [including (a), (b) and (c)] which represents the relation between dynamic capability and enterprise growth performance, hypothesis 6 [including (a), (b) and (c)], hypothesis 7 [including (a), (b) and (c)] and hypothesis 8 [including (a), (b) and (c)] which represent the intermediate function of customer equity have been tested and verified. The testing results imply that value equity, brand equity and relationship equity respectively positively moderate the relation between sensing capability, grasping capability, restructuring capability and enterprise growth performance. After customer equity is added into the theoretical model, approximate 90.1% variance of enterprise growth performance which improves from 84.4% can be explained by dynamic capability and customer equity which represent significant level p < 0.05. In addition, the standard regression coefficient of customer equity equals to 0.597 that are larger than explanations of sensing capability, grasping capability and restructuring capability. Therefore, the intermediate function of customer equity between dynamic capability and enterprise growth performance is necessary and essential. The effect of dynamic capability on enterprise growth performance can be acquired only through the intermediate role of customer equity.

5.2 Research Conclusion and Administrative Revelations

Improvement service enhancement strategy is based on the guidance of customers. Through improving customer performance, the improvement service enhancement strategy concentrates on achieving comprehensive performance which includes four aspects such as financial performance, learning and staff growth, market satisfaction of customer demand, internal procedure and firm’s administration. The formation of outstanding customer performance relies on the manufacturing enterprise’s capability of integrating and restructuring internal and external resources flexibly. It means that excellent customer equity is based on dynamic capability of enterprises while suitable organization structure and resource basis make contribution to the formation of dynamic capability. Therefore, the improvement service enhancement can be described and explained by the three hierarchies of the theoretical model constructed in our research which includes dynamic capability, customer equity and enterprise growth performance. Administrative principles can be concluded through empirical research based on SEM method.

The intermediate function of customer equity between dynamic capability and enterprise growth performance is critical and essential. Through customer equity, dynamic capability makes effects on enterprise growth performance. Dynamic capability is capability basis of the application of service enhancement strategy. Dynamic capability
stimulates that manufacturing enterprises precisely sense internal and external environmental changes, estimate opportunities and threats, make decisions in time, integrate and restructure resources to acquire competitive advantages. Nevertheless, dynamic capability does not make direct effects on enterprise growth performance. As for service enhancement phenomenon, enterprises should make use of dynamic capability to provide solution schemes for satisfying complicated customer’s demand, improving brand awareness and utilizing potential customers on the basis of maintaining key accounts. Outstanding customer equity can improve four aspects of comprehensive performance, dynamic capability’s effect on enterprises growth performance can be activated through the intermediate function of customer equity of manufacturing enterprises.

Manufacturing enterprises should set up growth route map from strategic view of improvement service enhancement. It is essential component of enterprise’s competitive strategy to establish flexible organization structure, form subjective initiative intellectual capital and create particular knowledge resource that cannot be easily copied and learned especially in large and medium manufacturing enterprises. Furthermore, on account of dynamic external environment and hysteretic effect of competitive strategy, manufacturing enterprises should keep high sensitivity for sensing environmental changes and rapid integrating and restructuring of internal and external resources to grasp business opportunity in complicated and dynamic commercial environment. Following by cycle-time reduction of industrial technological updating and personalized developmental trend of market demand which is mutable and diversified, adaptability to environment will prove to be essential key link of competition advantage, large and medium manufacturing enterprises should get ready for the establishment and implement of improvement service enhancement strategy.

5.3 Shortage of Research

Firstly, cross-section data have been collected to carry out empirical research, it limits the statistical examination of variable relation in our research. Furthermore, one hundred and seventy four questionnaires only meet basic standard of statistical examination. Longitudinal data and more samples should be collected to discover causality relations between different variables for strengthening reliance and universality of research conclusions.

Secondly, dynamic relation between improvement service enhancement strategy and enterprise growth performance reflects distinct commercial phenomenon under different environments. Empirical research is carried out based on large and medium manufacturing enterprises in the article. Comparing with small businesses which have different market responding capability, initial resources and technical level, large and medium enterprises have significant distinction. Further research should focus on empirical samples of small businesses.

Thirdly, considering of research proposal and limitation, only simple liner relations of dynamic capability, customer equity and enterprise growth performance have been examined. Further research should concentrate on analyzing non-liner relations of different academic variables to explain effect mechanism of improvement service enhancement strategy on the process of operational administration and enterprise growth performance.
6. ACKNOWLEDGMENTS

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