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The relationship among customer demand, competitive strategy and manufacturing system functional objectives

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Abstract:

Purpose: To ascertain the relationship between the operation system function goal decision making and customer demand and competition strategy, can better discover and integrate all available resources (including important capital resources) to achieve business opportunities, the establishment of sustainable competitive ability. Because, to achieve business development lead policymakers take great uncertainty, which led to the investment behavior required for the operational activities of resources also bear the enormous risks.

Design/methodology/approach: Through principal component analysis on the data collected by questionnaires, the manuscript obtains dominant factors for customer demand, competitive strategy and manufacturing system functional objectives respectively. By these factors, it tests its three hypotheses with the data from northeast of China and draws some conclusions.

Findings: The results show that customer demand have a significant positive effect on competitive strategy; competitive strategy have positive influence on manufacturing system functional objectives; customer demand affect the functional objectives, by competitive strategy.

Research limitations/implications: In this research, competitive strategy and manufacturing system functional objectives are influenced by customer demand. The conclusion of the research can

provide theoretical guidance for Chinese enterprises which carry out manufacturing system functional objectives.

Originality/value: In this research, a new measure questionnaire of competition strategy, customer satisfaction and operating system function goal was used, analyzed the influence factors of time, quality, cost, efficiency, service and environment, on the operation of the system. The study shows that the effect of competition strategy and customer demand has a direct impact on the operating system functions, customer demand through competitive strategy of indirect effects operating system functions.

Keywords: customer demand, competitive strategy, performance, functional objectives, decision

1. Introduction

With the development of information technology, there are many changes on business environment: the trend of economic globalization, the competitions of enterprise, the shorter lifecycle of product, the demand of time and quality etc. Manufacturing system functional objective decision is jointly influenced by customer demand and competition strategy. The traditional manufacturing system functional objectives only pursue the harmony of low cost and high efficiency, which can not adapt to the current trend, such as agile manufacture, Mass Customization, networked manufacture, intelligent manufacture etc. Manufacturing system is the core subsystem of enterprise, which provides satisfactory products to the users for winning market competition. So, functional objective decision is the significant on the design of manufacturing system.

Manufacturing system is an input/output system where manufacturing resources are converted into products or semi-finished products. The system is consisted of manufacturing process and the related hardware, software and personnel. The system involves the whole or part process of product lifecycle, such as market analysis, product design, process plan, manufacturing process, assembly, transport, product sales, after sales service, and recycling process etc. Different from production technology, the research objectives of manufacturing system are not only traditional technological behaviors, but are consisted of economy, society, humanity and other integrated factors as well. Therefore, manufacturing system should be considered as economic, social, humane environment, namely complex social large system. The basic functional objectives of manufacturing system should be research on TQCESE (time, quality, cost, efficiency, service and environment). Manufacturing system functional objectives are mutual restrictions; even, with contradictory, for example, high quality and low cost, high efficiency and satisfactory service. Analyses of relationship among customer demand, competitive strategy and manufacturing system functional objectives, is the key problem of

manufacturing system to respond to market demand, to carry out strategic intent of enterprises, to obtain sustainable competitive ability and to resist highly uncertain manufacturing environment. Compared with the previous studies, we establish the relationship on analysis schemes of TQCESE, which can be of more significance to grasping the direction of development. By means of empirical research, this paper validates the relevance of customer demand and competitive environment to functional objectives, which is to provide theoretical basis for manufacturing system of Chinese enterprises to make scientific decisions.

2. Research plan

2.1. Conceptual framework of the research

This paper based on previous research results, related theories and panel discussion establishes conceptual framework of the research, as Figure 1 says. In this figure, customer demand not only directly affects manufacturing system functional objectives, which are also indirectly affected by competitive strategy.

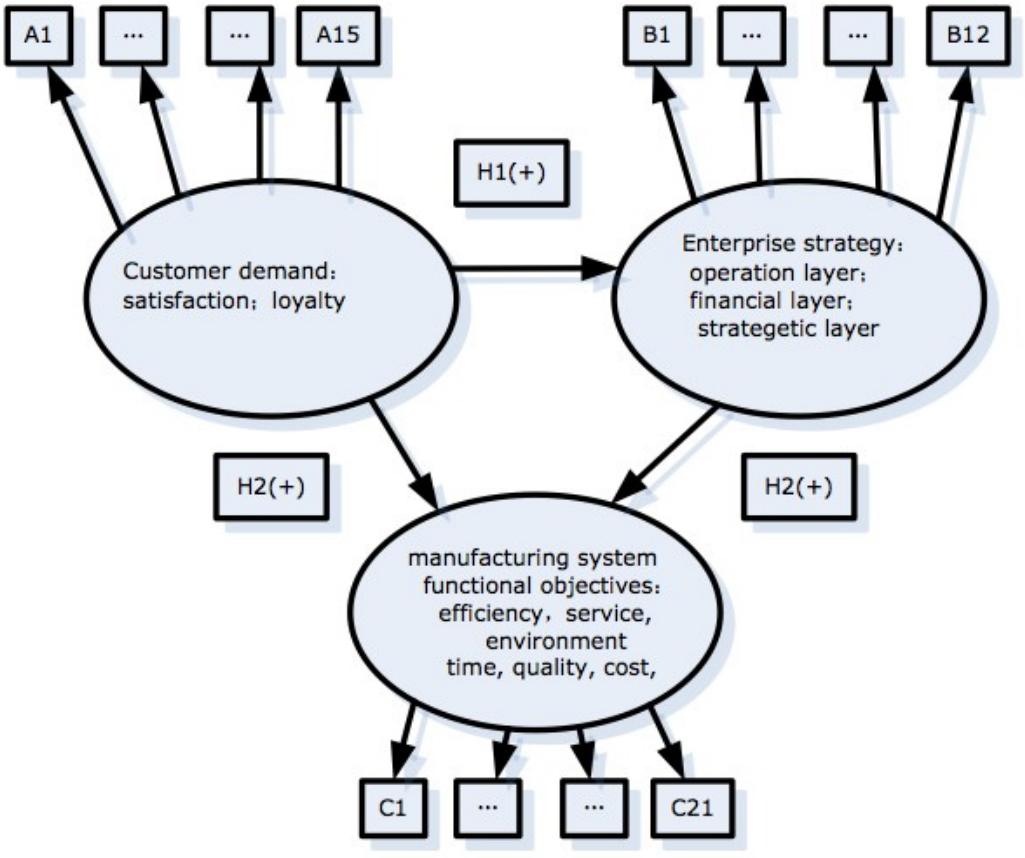


Figure 1. The hypothesis path

2.2. Definition and measure of the variables

To ensure validity and reliability of measuring tool, this paper uses the scales which have been used by the existing literature at home and abroad and are amended on the basis of research objectives as far as possible.

The scales of customer demand mainly come from the research of [1-12], among which there are 13 items including 2 factors which are customer satisfaction and customer loyalty in all. The scales of competitive strategy of supply chain mainly come from the research of [13-32], among which there are 12 items including 3 factors which are operation layer, financial layer and strategic layer. The scales of manufacturing system functional objectives mainly come from the research of [33-43], among which there are 21 items including 6 factors which are cost, quality, service, efficiency, flexibility and environment.

3. Hypothesis testing

3.1. Theoretical basis and research hypothesis

3.1.1. Customer demand

Many scholars define customers from different angles. For example, Levis and Papageorgiou (2005) considers customer demand is the agreement of competitive strategy, benefit sharing and risk sharing between buyers and sellers. Tsai and Chen (2010) believes customer demand is that for the same objective different customers invest related resources which are mainly time and money, to make efforts to reach product objective quality and quantity stetted by themselves. Zäpfel (1998) claims customer demand is a relationship between customer and enterprise which is based on the trust towards each other, the total risk, benefit-sharing awareness, achieving competitive advantage and creating greater performance. Tiemessen, Fleischmann, van Houtum, van Nunen and Pratsini (2013) maintains that it is an agreement between sellers and buyers, by which enterprises could achieve objectives of mutual benefit, the total risk, sharing profit.

In summary, this paper defines customer demand as the one which is formed between consumers and enterprises, benefit-sharing, risk-sharing, long-term, stable and cooperative. Establishing forecasts and management of customer demand can attain the objectives of reducing cost, diversification of risk, gaining critical resources and improving competitive position.

While, what aspects shall we proceed from to measure customer demand? On the basis of the opinions of Babakus, Yavas and Ashill (2009), customer satisfaction and customer loyalty are two factors of measuring customer demand. Customer satisfaction is a product of the performance to meet customer expectations, which is the basis for customers to buy again. Customer loyalty refers to the customer for a product with attachment or affection, the

behavior of repeat purchasing the enterprise products as a habit. It is more practical to measure the consumer demand for the product through these two factors.

3.1.2. Competitive strategy

Competitive strategy is considered as the base of realizing enterprise market share (Claver-Cortés, Pertusa-Ortega & Molina-Azorín, 2012; Acquaah & Yasai-Ardekani, 2008). Most scholars argue that the upstream and downstream of supply chain can alleviate effect by competitive strategy (Information Sharing), to improve supply chain performance (Heijltjes & van Witteloostuijn, 2003). What aspects of information should supply chain partnership share? Salunke, Weerawardena and McColl-Kennedy (2011) point that in supply chain organizational complete competitive strategy should contain: partners are willing to share sales forecasting information and technical information; both sides understand product sales' degree etc. Deeming competitive strategy of supply chain can be divided into four aspects: order processing information, operation information, strategic information and competitive information.

According to the existing literature, this paper divides competitive strategy content of supply chain into three aspects: operation information, financial information and strategic information. Operation information is mainly about order processing information, stock amount, production scheduling, production capacity planning and Order forecasting etc. Financial information is mainly about sales data sharing, production cost and profit etc. Strategic information mainly provides the information of increasing the rate of reaction and reducing the uncertainty of demand for enterprises.

3.1.3. Manufacturing system functional objectives

Cost, customer service, flexibility, due date and innovations are always applied by manufacturers to evaluate performance or operational objectives. Ahn, Lee, Song and Kim (1998) apply six indexes which are stock, time, order fulfillment, quality, customer focus and customer service to evaluate performance of supply chain. Tegarden, Sheetz and Monarchi (1995) apply four kind of competitive advantages which are cost, quality, due date and flexibility to analyze manufacturer performance. Kalogeraki, Melliar-Smith, Moser and Drougas (2008); Gregoriades and Karakostas (2004) apply cost, quality, flexibility and innovations to discuss automobile manufacturer performance. Based on the above researches, this paper applies four variables which are cost, service level, time and innovations to measure manufacturing system functional objectives. Cost performance applies two items to evaluate: low production cost and the decrease of overall cost; customer service applies three items to evaluate: order satisfaction rate, distribution punctuality and out of stock rate; time applies two items to evaluate: the production lead time shortened and time to market of new products shortened; innovations apply two items to evaluate: new product quality and existing products' function increasing.

3.2. The relationship among customer demand, competitive strategy and manufacturing system functional objectives

3.2.1 Customer demand and competitive strategy

The closer the relationship between customer and enterprise is, the easier they share information with each other, even more willing to change its internal information system reinvestment to reduce the problem of the drop of informatization level, to improve the capacity of manufacturing system. Agus and Hassan (2011) points, in terms of the action of competitive strategy, when there isn't customer demand, manufacturing system functional objectives are the key factors for the success of manufacturing system which balance planning skills and executive ability of competitive strategy. When enterprise strategy and manufacturing system are integrated in the interactive process, there will be close contact between each other, which can promote prospective and customer demand satisfied actions. Lockamy III and Smith (1997) says, reliant relationship in organizations will influence the ability of information flow, and the accuracy of determining customer demand will help enterprises to make competitive strategy and resist market risk. Ray and Jewkes (2004) argues, future leaders regard customer value, commercial appeal, individuation and variety as competitive centre whose key influencing factors are individuation and variety of customer demand. Bolloju, Schneider and Sugumaran (2004) considers, customer demand is the basis of competitive strategy, and cultivating responsible relations is propitious for enterprises to timely adjust strategy. Thus, this paper puts forward the first hypothesis.

H1: customer demand has a significant positive impact on the performance of competitive strategy.

3.2.2. The relationship between competitive strategy and manufacturing system functional objectives

Draman, Altinel, Bajgoric, Unal and Birgoren (2001) considers, adding the preference of competitive strategy can reduce Bull Whip Effect of manufacturing system caused by insufficient competitive strategy. Zhang, Zhang, Xu and Li (2011) holds, competitive strategy obviously affects manufacturing system functional objectives, that is, the higher degree of competitive strategy can give an index to higher performance of manufacturing system. Manufacturing system is an important medium for the implementation of competitive strategy, which needs timely adjustment in accordance with competitive strategy. So, this paper puts forward the second hypothesis.

H2: competition strategy has a significant positive effect on manufacturing system functional objectives.

3.2.3. The relationship between customer demand and manufacturing system functional objectives

The customer demand strongly affects the performance of the manufacturing system (Hadden, Tiwari, Roy & Ruta, 2007). When the intensity of customer demand is more and more dependent on manufacturing system functional objectives, manufacturing system will show significant changes by transforming its functions. Because, when relations that customer demand depends on manufacturing system functional objectives change, different functional objectives of the system will be adjusted anew, which in order to response to market opportunities makes the system has the ability to respond to customer demand and makes both sides more efficiently match resource to achieve the same objectives. So building relationship between customer demand and manufacturing system functional objectives will improve the dependent degree between customers and enterprises, and then improve operating performance of manufacturing system. Therefore, this paper puts forward the third hypothesis.

H3: customer demand has a significant positive impact on manufacturing system functional objectives.

3.3. Research sample

This research mainly studies the relationship among customer demand, competitive strategy and manufacturing system functional objectives. Manufacturing industry is the one which has the characteristics of obvious manufacturing system. So manufacturing industry is the research model, and the research objects are basically the enterprises of automobile industry, chemical industry, computer and related equipment industry, appliances industry, mechanical industry, telecommunication industry and textile industry in the manufacturing industry. The field of investigation is the northeast of China.

On the basis of enterprise yellow pages of the northeast of China, this paper randomly chooses the sample enterprises intended to investigate, then gets in touch with the executives by phone. After ensuring they accept investigation, the action begins. Meanwhile EMBA students, senior manager training class and MBA students of Harbin Institute of Technology, Jilin University and Northeastern University are chosen, which gathers a lot of business executives, and ask them to fill out this questionnaire when they are free. All the students come from the northeast of China, which have comparative cultural backgrounds to understand this questionnaire.

1000 copies of questionnaires are sent. 756 copies of questionnaires are taken back, among which there are 14 copies of invalid questionnaires whose answers are not complete and 742 copies of valid questionnaires. Manufacturing industry is the research object, so 54 copies of

non-manufacturing enterprises questionnaire are deducted. 688 copies of questionnaires are actually used. The investigation time is from March 1, 2012 to October 30, 2012.

3.4. Factor analysis

Aiming at customer demand and manufacturing system functional objectives, this paper uses factor analysis to extract main factors. In the customer dimension, consists of 15 items (A1~A15, such as Table 1), to measure the customer demand. After retrieving data, factors are analyzed by SPSS16.0. This paper starts with principal components analysis, takes 4 factors whose value is 1 plus, and rotates their shafts by maximum variation. After the first factors analysis, the paper finding interpretation degree of 6 items which are A4, A7, A10, A12, A14, A15 is worse, so they are deleted. Then analyzing the remaining 8 items whose qualities are higher, the results are shown in Table 2. The value of KMO is 0.770, which is greater than Kaiser (1974) that the least value of KMO is 0.5, which shows that there are a lot of common factors in the variables, it is adapted to adopt factor analysis; Bartlett's test of sphericity（P-value）:0, which reaches significant level, meaning correlation matrix of the population has common factors, it is adapted to adopt factor analysis, and 2 factors extracted can explain the whole variant 71.086%.

Item	Problem description
A1	On the product or service to meet the demand level of expectation
A2	Customer expectations of product or service quality reliability
A3	Customer perceived customer on the quality of the overall evaluation of the quality of the product or service
A4	Customer satisfaction degree evaluation requirements on the quality of the product or service
A5	Customer evaluation on the quality of the product or service reliability
A6	Evaluation on the quality level of the perception of value given price condition of customer to customer
A7	The customer total value to the customer's satisfaction
A8	The comparison of perception and expectation of customer complaints consumer complaints
A9	Customer complaints
A10	The possibility of customer loyalty and repeat purchase
A11	Can bear the price range
A12	To boycott competitors prices
A13	Cost performance
A14	Pre-sale and after sale service
A15	Safety performance of the product customer satisfaction

Table 1. Problem description of customer demand

Performing principal component analysis to analyze 12 items (such as Table 3) of competitive strategy, Kaiser Meyer Olkim (KMO) Measure of Sampling Adequacy： 0.821, which is greater than Kaiser (1974) that the least value of KMO is 0.5, which shows that there are a lot of common factors in the variables, it is adapted to adopt factor analysis. And Bartlett's test of sphericity (p-value): 0, which reaches significant level, meaning correlation matrix of the

population has common factors, it is adapted to adopt factor analysis, and 3 factors extracted can explain the whole variant 70.151%.The results are shown in Table 4.

Item	Customer satisfaction	Customer loyalty
A6	0.875	
A1	0.802	
A2	0.777	
A5	0.700	
A3	0.687	
A13		0.813
A9		0.736
A11		0.701
A8		0.684
Explained variation %	43.787%	27.306%
Total variation%	43.787%	71.086%
Kaiser Meyer Olkim（KMO）Measure of Sampling Adequacy：0.709		
Bartlett's test of sphericity（P-value）:0:0		

Table 2. Factor analysis of customer demand

Item	Problem description
B1	Effects of past strategy
B2	Their dependence on the outside
B3	Attitudes towards risk.
B4	Strategy of time
B5	Strategy on time
B6	Decision making style
B7	Prevent the transformation from the strategy
B8	To overcome the obstacles of strategic change
B9	The dominant values
B10	Cultural conflict
B11	Potential competitors
B12	Competition and political environment

Table 3. Problem description of competitive strategy

Item	Operation information	Strategic information	Financial information
B5	0.852		
B6	0.791		
B2	0.760		
B8	0.691		
B1	0.589		
B11		0.815	
B12		0.750	
B9		0.689	
B3		0.675	
B10			0.872
B4			0.800
B7			0.649
Explained variation %	29.186%	22.104%	18.861%
Total variation%	29.186%	51.290%	70.151%
Kaiser Meyer Olkim (KMO) Measure of Sampling Adequacy：			0.821
Bartlett's test of sphericity（P-value: 0			

Table 4. Factor analysis of competitive strategy

Performing principal component analysis to analyze 21 items (Such as Table 5) of manufacturing system functional objectives, Kaiser Meyer Olkim (KMO) Measure of Sampling Adequacy： 0.790, which is greater than Kaiser (1974) that the least value of KMO is 0.5, Bartlett's test of sphericity (p-value): 0, which reaches significant level, 4 factors extracted can explain the whole variant 87.777%.The results are shown in Table 6.

Item	Problem description
C1	Technology;
C2	Technological innovation
C3	Product quality assurance function
C4	The quality guarantee of the work function
C5	Coordination mechanism of changes in production systems on the environment
C6	Strain capacity
C7	Continuity of production
C8	Production system scalability
C9	Production system compatibility
C10	In order to meet the needs of product development and customer service
C11	Production system has strong vitality
C12	The production system with the development ability strong
C13	Flexible function
C14	Intelligent and multifunctional application
C15	High performance production system
C16	The production system must have the ability to control cost of manufacture
C17	The degree of the requirement for production system
C18	Guarantee in the development process has always been able to maintain the coordination of production system
C19	Future production system should have the functions of planning and expectations
C20	Hardware and their combination in the production system
C21	Software elements to support and control the operation of the system in production system

Table 5. Problem description of manufacturing system functional objectives

Item	Cost	Quality	Efficiency	Service	Flexibility	Environment
C16	0.846					
C5	0.799					
C6	0.778					
C9		0.885				
C13		0.834				
C1 C2 C3			0.763 0.750 0.621			
C16 C8				0.806 0.612		
C21					0.816	
C10					0.780	
C14					0.700	
C4					0.644	
C7						0.831
C18						0.793
Explained variation %	20.127%	17.714%	14.508%	13.814%	11.773%	9.841%
Total variation %	20.127%	37.841%	52.349%	66.163%	77.936%	87.777%
Kaiser Meyer Olkim (KMO): 0.790						
Bartlett's test of sphericity (p-value):0						

Table 6. Factor analysis of manufacturing system functional objectives

3.5. Reliability checkout

Reliability analysis of the questionnaires is to further confirm the reliability. This paper adopts Cronbach's reliability analysis which is widely used in the literature. Generally, the one less than 0.3 is incredible, from 0.3 to 0.4 is barely credible, from 0.4 to 0.5 is a little credible, from 0.5 to 0.7 is credible, from 0.7 to 0.9 is highly credible, greater than 0.9 is fully credible. As shown in Table 7, Cronbach's values of various factors and variables are credible, which shows the scale has good reliability.

Value	Factor	Cronbach's		Variable	Factor	Cronbach's	
Manufacturing system functional objectives	cost	0.8177	0.8460	information sharing	operation information	0.8541	0.8239
	quality	0.8005					
	efficiency	0.7058			financial information	0.7863	
	service	0.7146					
	flexibility	0.6912			strategic information	0.8801	
	environment	0.7031					
Customer demand	satisfaction degree	0.8414	0.8219				
	loyalty degree	0.7834					

Table 7. Reliability checkout

4.1 The influencing relationship of the major factors of variables

4.1.1. The relationship between customer demand and competitive strategy

Regarding 2 factors of customer demand as the independent variable, regarding 3 factors of competitive strategy as the dependent variable, this paper separately adopts regression analysis. The results are shown in Table 8. The satisfaction of sharing performance like operation information, financial information and strategic information has significant positive impacts, which means enhancing customer satisfaction can improve the core competence. In addition, loyalty degree has significant positive impacts on competitive strategic performance and financial information.

Independent variable	Dependent variable		Financial information
	Operation information	Strategic information	
Satisfaction degree	0.289** (2.403)	0.272** (2.163)	0.363** (2.690)
Loyalty degree	0.078 (0.593)	0.244* (2.022)	0.232* (1.996)
the value of F	4.237**	6.859***	8.667***
R^2	0.112	0.1710.834	0.210

Annotation: the data in the table is the standardized coefficient, the values in parentheses is t coefficient; * means p < 0.1; ** means p < 0.05; *** means p < 0.01.

Table 8. The influence of customer demand of supply chain on manufacturing system functional objectives

4.1.2. The influence of customer demand on manufacturing system functional objectives

Regarding 2 factors of customer demand as the independent variable, regarding 6 factors of manufacturing system functional objectives as the dependent variable, this paper separately adopts regression analysis. The results are shown in Table 9. The satisfaction has significant positive impacts on cost, quality, efficiency, service, flexibility and environment, which means ameliorating customer satisfaction, is beneficial to improve the performance of manufacturing system functional objectives. Besides, loyalty degree has significant positive impacts on service and flexibility.

Independent variable	Dependent variable					
	Cost	Quality	Efficiency	Service	Flexibility	Environment
Satisfaction degree	0.413*** (3.508)	0.517*** (4.739)	0.362*** (2.780)	0.439*** (3.806)	0.342*** (2.711)	0.398*** (3.796)
Loyalty degree	0.073 (0.565)	0.127 (1.044)	0.276 (2.671)	0.219 (2.417)	0.291 (2.903)	0.246 (2.590)
the value of F	8.245***	16.475***	10.994***	16.901***	12.301***	14.167***
R^2	0.258	0.366	0.265	0.362	0.249	0.322

Annotation: the data in the table is the standardized coefficient, the values in parentheses is t coefficient; * means p < 0.1; ** means p < 0.05; *** means p < 0.01.

Table 9. The influence of customer demand on manufacturing system functional objectives

4.1.3. The influence of competitive strategy on manufacturing system functional objectives

Regarding 3 factors of competitive strategy as the independent variable, regarding 6 factors of manufacturing system functional objectives as the dependent variable, this paper separately adopts regression analysis. The results are shown in Table 10. The higher level of competitive strategy is more beneficial to improve the performance of manufacturing system functional objectives. Operation information is conducive to reducing operating cost and improving quality, efficiency, flexible manufacturing capability. Financial information is conducive to improving enterprise performance and the level of customer service. Strategic information is conducive to reducing cost, improving the level of customer service and paying attention to the environmental protection.

Independent variable	Dependent variable					
	Cost	Quality	Efficiency	Service	Flexibility	Environment
Operation information	0.408*** (4.105)	0.391*** (3.763)	0.386*** (3.504)	-0.178 (-1.265)	0.329*** (2.814)	0.246 (2.596)
Financial information	0.010 (0.158)	0.348 (2.501)	0.309*** (3.555)	0.374*** (2.273)	0.289 (2.718)	0.278(2.037)
Strategic information	0.278** (2.003)	-0.034 (-0.210)	0.089 (0.564)	0.543*** (2.994)	0.282 (2.730)	0.416*** (3.772)
the value of F	15.652	4.891	5.632	9.437	6.784	5.202
R^2	0.432	0.205	0.199	0.305	0.168	0.196

Annotation: the data in the table is the standardized coefficient, the values in parentheses is t coefficient; * means $p < 0.1$; ** means $p < 0.05$; *** means $p < 0.01$.

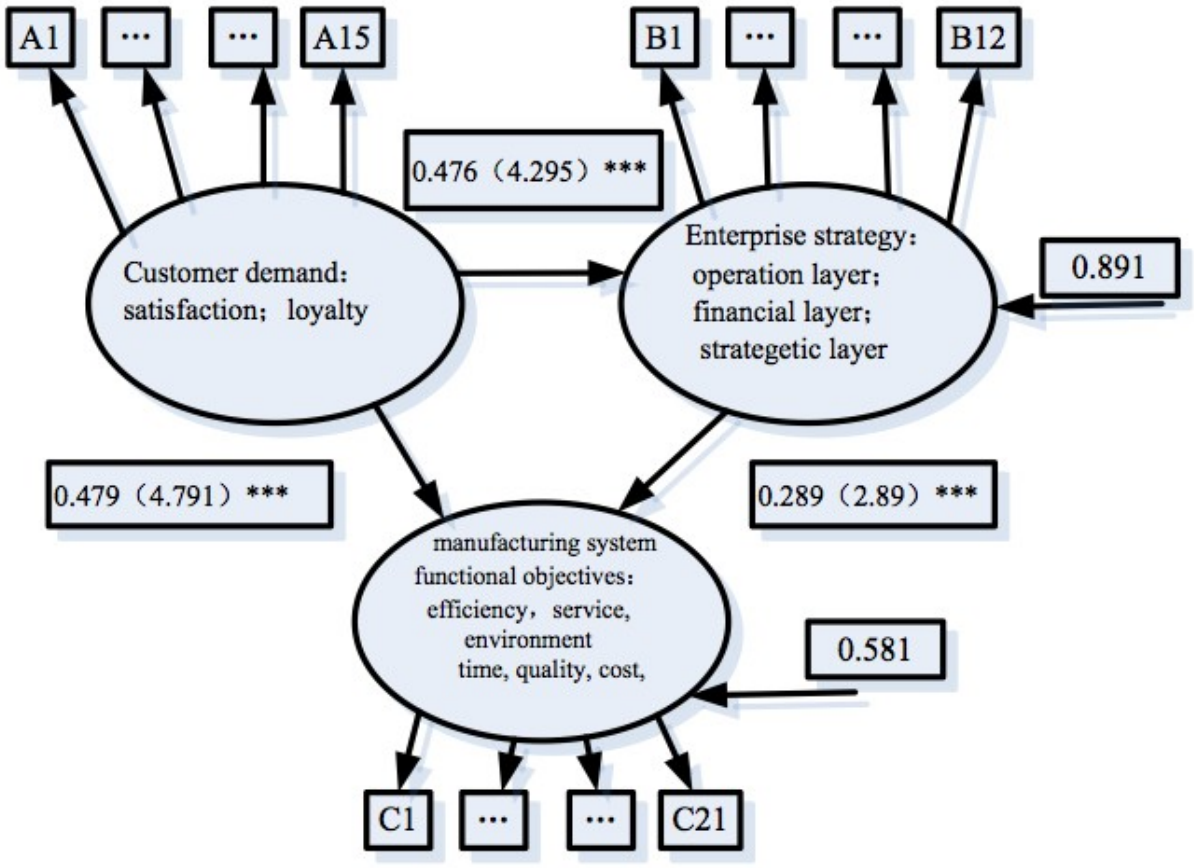
Table 10. The influence of competitive strategy on manufacturing system functional objectives

4.2. Path analysis of customer demand, competitive strategy on manufacturing system functional objectives

This paper analyzes the relationship of various factors of three variables among customer demand, competitive strategy on manufacturing system functional objectives above, but doesn't analyze the interactions between variables. Due to Figure 1, customer demand may not only have a direct impact on the manufacturing system functional objectives, but also indirectly affect the manufacturing system though influencing competitive strategy. So path analysis is needed. In the path analysis, two multiple regression are conducted. Firstly, manufacturing system functional objectives are regarded as the dependent variables; customer demand and competitive strategy are regarded as the independent variables. Secondly, competitive strategy is regarded as the dependent variable; customer demand is regarded as the dependent variable.

The results are shown in Figure 2. There are 3 outstanding paths of manufacturing system functional objectives. The first one is customer demand directly affect manufacturing system functional objectives, the path coefficient is 0.492; the second one is competitive strategy directly affect manufacturing system functional objectives, the path coefficient is 0.294; the third one is

customer demand indirectly affect manufacturing system functional objectives though competitive strategy, the indirect effect is 0.136. The overall influence of customer demand on manufacturing system functional objectives is 0.631; competitive strategy's is 0.294, such as Table 11.



(Annotation: the data in the table is the standardized coefficient, the values in parentheses is t coefficient; * means $p < 0.1$; ** means $p < 0.05$; *** means $p < 0.01$.

Figure 2. the path analysis of customer demand, competitive strategy on manufacturing system functional objectives

Dependent variable	Independent variable	Direct results	Indirect results	Total results
Competitive strategy $R^2 = 0.214$	Customer demand	0.477	—	0.477
Manufacturing system functional objectives $R^2 = 0.467$	Customer demand and competitive strategy	0.478 0.287	0.142 —	0.621 0.288

Table 11. The results of path analysis

5. Conclusions

The results further confirm the argument scholars discussing which is customer demand and competitive strategy have significant positive effects on manufacturing system functional objectives. So, satisfying customer demand and lifting the core competence will be beneficial to improve manufacturing system functional objectives.

Moreover, satisfaction degree and loyalty degree of customer demand have important positive effects on operation information, strategic information and financial information of the performance of competitive strategy. And satisfaction degree and loyalty degree of customer demand have momentous positive effects on cost, quality, service, efficiency, flexibility and environment of manufacturing system functional objectives. It says that when conducting competitive strategy, manufacturing enterprises of the northeast of China should pay attention to the bearing capacity of manufacturing system functional objectives. More importantly, the overall influence of customer demand on manufacturing system functional objectives is higher than that of competitive strategy. That is to say, when conducting competitive strategy, manufacturing enterprises of the northeast of China, should pay more attention to satisfy customer demand. Because the influences of customer demand on enterprise operation is comprehensive and far-reaching.

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References

Acquaah, M., & Yasai-Ardekani, M. (2008). Does the implementation of a combination competitive strategy yield incremental performance benefits? A new perspective from a transition economy in Sub-Saharan Africa. *Journal of Business Research*, 61(4), 346-354. http://dx.doi.org/10.1016/j.jbusres.2007.06.021

Agus, A., & Hassan, Z.F. (2011). Enhancing Production Performance and Customer Performance Through Total Quality Management (TQM): Strategies For Competitive Advantage. *Procedia-Social and Behavioral Sciences*, 24(11), 1650-1662. http://dx.doi.org/10.1016/j.sbspro.2011.09.019

Ahn, J.H., Lee, S.W., Song, H.J., & Kim, H.J. (1998). A survey of architectural features of contemporary object storage systems. *Journal of Systems Architecture*, 45(5), 363-386. http://dx.doi.org/10.1016/S1383-7621(98)00004-6

Babakus, E., Yavas, U., & Ashill, N.J. (2009). The Role of Customer Orientation as a Moderator of the Job Demand–Burnout–Performance Relationship: A Surface-Level Trait Perspective. *Journal of Retailing*, 85(4), 480-492. http://dx.doi.org/10.1016/j.jretai.2009.07.001

Bolloju, N., Schneider, C., & Sugumaran, V. (2012). A knowledge-based system for improving the consistency between object models and use case narratives. *Expert Systems with Applications*, 39(10), 9398-9410. http://dx.doi.org/10.1016/j.eswa.2012.02.126

Claver-Cortés, E., Pertusa-Ortega, E.M., & Molina-Azorín, J.F. (2012). Characteristics of organizational structure relating to hybrid competitive strategy: Implications for performance. *Journal of Business Research*, 65(7), 993-1002. http://dx.doi.org/10.1016/j.jbusres.2011.04.012

Draman, M, Altinel, I.K., Bajgoric, N., Unal, A.T., & Birgoren, B. (2001). An Object-Oriented Optimization-based Software for Agile Manufacturing in Process Industries. *Agile Manufacturing: The 21st Century Competitive Strategy*, 265-278.

Gregoriades, A., & Karakostas, B. (2004). Unifying business objects and system dynamics as a paradigm for developing decision support systems. *Decision Support Systems*, 37(2), 307-311. http://dx.doi.org/10.1016/S0167-9236(03)00004-6

Hadden, J., Tiwari, A., Roy, R., & Ruta, D. (2007). Computer assisted customer churn management: State-of-the-art and future trends. *Computers & Operations Research*, 34(10), 2902-2917. http://dx.doi.org/10.1016/j.cor.2005.11.007

Heijltjes, M., & van Witteloostuijn, A. (2003). Configurations of market environments, competitive strategies, manufacturing technologies and human resource management policies: A two-industry and two-country analysis of fit. *Scandinavian Journal of Management*, 19(1), 31-62. http://dx.doi.org/10.1016/S0956-5221(01)00039-2

Kaiser, H.F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31-36. http://dx.doi.org/10.1007/BF02291575

Kalogeraki, V., Melliar-Smith, P.M., Moser, L.E., & Drougas, Y. (2008). Resource management using multiple feedback loops in soft real-time distributed object systems. *Journal of Systems and Software*, 81(7), 1144-1162. http://dx.doi.org/10.1016/j.jss.2007.08.035

Levis, A.A., & Papageorgiou, L.G. (2005). Customer Demand Forecasting via Support Vector Regression Analysis. *Chemical Engineering Research and Design*, 83(8), 1009-1018. http://dx.doi.org/10.1205/cherd.04246

Lockamy III, A., & Smith, W.I. (1997). A strategic alignment approach for effective business process reengineering: linking strategy, processes and customers for competitive advantage. *International Journal of Production Economics*, 50(2-3), 141-153. http://dx.doi.org/10.1016/S0925-5273(97)00038-8

Ray, S., & Jewkes, E.M. (2004). Customer lead time management when both demand and price are lead time sensitive. *European Journal of Operational Research*, 153(3), 769-781. http://dx.doi.org/10.1016/S0377-2217(02)00655-0

Salunke, S., Weerawardena, J., & McColl-Kennedy, J.R. (2011). Towards a model of dynamic capabilities in innovation-based competitive strategy: Insights from project-oriented service firms. *Industrial Marketing Management*, 40(8), 1251-1263. http://dx.doi.org/10.1016/j.indmarman.2011.10.009

Tegarden, D.P., Sheetz, S.D., & Monarchi, D.E. (1995). A software complexity model of object-oriented systems. *Decision Support Systems*, 13(4-5), 241-262. http://dx.doi.org/10.1016/0167-9236(93)E0045-F

Tiemessen, H.G.H., Fleischmann, M., van Houtum, G.J., van Nunen, J.A.E.E., Pratsini, E. (2013). Dynamic demand fulfillment in spare parts networks with multiple customer classes. *European Journal of Operational Research,* 228(2), 367-380. http://dx.doi.org/10.1016/j.ejor.2013.01.042

Tsai, C.F., & Chen, M.Y. (2010). Variable selection by association rules for customer churn prediction of multimedia on demand. *Expert Systems with Applications*, 37(3), 2006-2015. http://dx.doi.org/10.1016/j.eswa.2009.06.076

Zäpfel, G. (1998). Customer-order-driven production: An economical concept for responding to demand uncertainty? *International Journal of Production Economics*, 56(20), 699-709. http://dx.doi.org/10.1016/S0925-5273(97)00080-7

Zhang, Y., Zhang, W., Xu, W., & Li, H. (2011). Competitive strategy for on-line leasing of depreciable equipment. *Mathematical and Computer Modelling*, 54(1-2), 466-476. http://dx.doi.org/10.1016/j.mcm.2011.02.036