Short Communication

INFLUENCING FACTORS OF THE DEVELOPMENT OF PRODUCER SERVICES UNDER DEMAND–SUPPLY FRAMEWORK

MINGHUA. HAN
Faculty of Business, Ningbo University, Ningbo 315211, People's Republic of China

ABSTRACT
In this research, the author tries to make factor analysis on producer services in the perspective of demand and supply based on Zhejiang annual data from 1990 to 2011. The result shows that the level of scientific and technological development and industrialization are the most important variables in two common factors. At present, factors such as level of services, economic development, urbanization, technological development, and opening-up intensity and level have considerable impacts on Zhejiang producer services' development according to the results of model analysis. On the other hand, factors such as degree of industrialization and ownership structure have relatively less impacts on supply and demand. This paper makes reasonable suggestions from the perspective of supply and demand framework.
Keywords: demand–supply framework, factor analysis, influencing factors, producer services.

1 INTRODUCTION

There has been much research on producer services and its influences on economic growth along with its rapid growth in developed countries for the last 30 years. Influencing factors are probably one of the most popular ones.

Wang and Yuming [1] suggested that a lot of scholars such as Beyers, Gillespie, Green and Coffey believed that producer services had a trend of metropolis arrangement based on the study of producer services in United States, Britain and Canada. Based on the researches by Francois, Shugan and Diaz, Qun [2] pointed out that there were complementary and interactive relationship between producer services and manufacturing industry. Therefore, the growth of intermediate demands from the manufacturing sector lead to the development of producer services consequently. Harrington [3] believed that diverse labor costs and availability had significant impacts on producer services area. Yin and Jinyong [4] pointed out that gathered factor played a vital role in intrinsic mechanisms of producer services business location selection. Based on empirical analysis of China's producer services development, Jian [5] argued that the level of specialization, the degree of urbanization and externalization were the important factors. Zhuxin [6] suggested that the quality of labor, IT level, market competition and its environment were the major factors, which are influencing China's producer services development. Based on the analysis of China's producer services demands status, Huihui [7] pointed out that producer services outsourcing system, outsourcing transaction costs, industrial low-development and market mechanisms disorders were the main factors that restricted the effective demands of producer services.

Since there are many complex factors influencing development of producer services, and less study has been made on demand and supply factors, this paper discusses factors influencing producer services development under the framework of demand–supply based on Zhejiang annual data in China from 1990 to 2011, and relevant suggestions will be made in the conclusion.

ISSN: 1743-7601 (paper format), ISSN: 1743-761X (online), http://www.witpress.com/journals
DOI: 10.2495/SDP-V10-N1-120-127

2 ANALYSIS AND QUANTIZATION FACTORS THAT INFLUENCE PRODUCER SERVICES DEVELOPMENT BASED ON DEMAND–SUPPLY FRAMEWORK

2.1 Analysis and quantization of demand factors

i. *Industrialization levels*. When development of manufacturing industry reaches a certain degree, its core competitiveness and products' value-added will rely more than ever on producer services' support [8]. The deepening industrialization will create greater needs of producer services and promote its rapid development and therefore industrialization will facilitate the development of producer services. The proportion of industry is usually used to show the level of industrialization. Industrial share of GDP is regarded as a measurable indicator and is denoted as IL in this paper.
ii. *Services development levels*. Apart from its impacts on industrial development, service industry also influences the demand of producer services. Development level of services directly affects the demand level of producer services. Therefore, the higher the level services, the better the development of producer services. In general, services proportion of GDP reflects its importance in the national economy; thus, services added value share of GDP will be regarded as a measurable indicator and is denoted as SDL in this paper.
iii. *Economic development level*. Economic development level is the basis for the development of producer services. Demand for producer services will also grow along with the economic development. Thus, economic development will promote the development of producer services. Common indicators reflecting a country's or region's economic development level include national income, per capita income, GNP, GDP, per capita GDP, economic growth, etc. In this paper, per capita GDP is selected as a measurable indicator and is denoted as EDL.
iv. *Urbanization level*. Centralization is an important factor in producer services' development. The high-end producer services such as financial, business services and information services are highly concentrated in the metropolis. The higher the level of urbanization in the region, the more obvious the cluster effects will show and the greater the demand for producer services will be, which leads to the fact that urbanization level will also promote the development of producer services. Urbanization rate is the general indicator reflecting urbanization level. Therefore, the proportion of urban population to total population is regarded as a measurable indicator and is denoted as CDL in this paper.

2.2 Analysis and quantization of supply factors

i. *Marketization development level*. The specialization of external activities of manufacturing enterprises promote externalization of producer services sectors such as R&D, marketing and management consulting, which lead to professional and market-oriented development. The continuous improvement of market-orientation will further promote the scale and specialization of producer services' supply. Thus, the higher market-oriented development level will speed up the development of producer services. To measure market-oriented development level, different scholars use different criteria from different perspectives. For example, Gang and Xiaolu [9] proposed the development of non-state-owned economy, the relationship between government and the market analysis in five areas. A research group in Beijing Normal University [10] adopted five measuring factors as the liberalization of economic subjects, market-oriented production factors and so on. Above all, a non-state-owned economy share of industrial output is chosen as a measurable indicator and is denoted as MDL in this paper.

ii. *Scientific and technological development level*. Producer services have high knowledge content and knowledge-intensive features. The progress of science and technology, especially application and development of information technology, will further improve innovation of producer services enterprises and promote the improvement of producer services level and overall service levels, in general. Thus, scientific and technological development will promote the development of producer services. Ultimately, R&D is the basis of technology development and innovation, which is an important indicator to measure scientific and technological development level and speed of a country (or regional). Thus, R&D expenditure proportion of GDP is seen as a measurable indicator and is denoted as STDL in this paper.
iii. *Ownership structure*. It is generally acknowledged that private ownership has more positive impacts than state-owned property rights. Therefore, in a market economy, greater proportion of state-owned economy means less economic development and lower degree of market. This will thereby affect the supply effectiveness of producer services. Thus, the greater proportion of the non-state ownership in the economy will promote the development of producer services. The proportion of non-state-owned economy in total fixed asset investment is an important indicator to measure the proportion of non-state-owned economy in ownership; thus, non-state fixed asset investment share of total fixed asset investment is regarded as a measurable indicator and is denoted as PS in this paper.
iv. *Opening-up intensity and level*. Along with the transition of world economy to service economy, international service outsourcings gradually show offshore trend. With the increasing opening-up intensity and Level of producer services, it will initiatively undertake outsourcing production services dominated by multinational corporations. By absorbing international advanced services, the technical services will effectively promote producer services supply levels. Thus, the higher opening-up intensity and level will promote the development of producer services. To measure the opening-up degree, the general assessment indicator is external dependence including total exports or total imports, total imports and exports share of GDP or GNP ratio. Thus, the proportion of imports and exports of foreign trade in GDP is regarded as a measurable indicator and is denoted as FTD in this paper.

3 INFLUENCING FACTORS' EMPIRICAL ANALYSIS ON ZHEJIANG'S PRODUCER SERVICES DEVELOPMENT UNDER DEMAND–SUPPLY PERSPECTIVE

3.1 Sample data

According to the description of producer services in 'The Eleventh Five-Year Plan and The Twelfth Five-Year Plan for National Economic and Social Development of the People's Republic of China', producer services is defined as five industries: transportation, storage and postal industry; finance industry; information transmission, computer service and software industry; leasing and business services industry; and scientific research, technical services and geological prospecting industry. The sample data used in the study are Zhejiang 1990–2011 annual data. The sample capacity is 22. The indicators data of various influencing factors described in Section 2 are obtained by calculating and collating based on Zhejiang Statistical Yearbook from 1993 to 2012.

As China has adjusted statistical category for services industry since 2004, regarding the data availability and consistency, this paper selects industry added value including transportation and storage industry, finance and insurance industry, social services industry, and scientific research and comprehensive technical services industry to represent producer services added value for data before 2004 based on the study of Weihong [11].

3.2 Indicators data analysis

Based on the previous analysis of quantitative indicators and selected sample data, SPSS17.0 is used to make factor analysis on each influencing factor in order to further clarify their impact on the development of Zhejiang production services.

First, KMO and Bartlett's test are carried in order to determine whether the data are suitable for factor analysis. The results of KMO and Bartlett's test are shown in Table 1.

According to Kaiser's metrics [12], 0.7 is seen as the KMO critical value to judge whether variable data are suitable for factor analysis in the paper. KMO and Bartlett's test results show KMO = 0.816, which is more than 0.7. Bartlett's test shows the significant level of P value is 0.000, which is less than 0.01. The test results are significant, which prove that factor analysis can be performed.

To determine the number of factors, the initial variance and factor contribution rate are calculated as shown in Table 2.

As shown in Table 2, only the first two factor variances are greater than 1. The first factor explains 60.299% of the variables. The second one explains 24.279% of the variables, and the total factor contribution rate is 84.578% (greater than 80%), which can reflect the major information of original variable. Therefore, the first two factors are extracted as the main factors. Table 3 shows the rotated factors component matrix by factor analysis.

According to factor component matrix and eigenvalues, we further calculate factor eigenvectors using the formula:

$$Z_{ij} = a_{ij} / \sqrt{\lambda_j} \ (j = 1,2 \text{ and } i = 1,2,...,8) \tag{1}$$

Table 1: KMO and Bartlett's test.

Kaiser–Meyer–Olkin measure of sampling adequacy		0.816
Bartlett 's test of sphericity	Approximately chi-square	245.806
	df	28
	Significance	0.000

Table 2: Total variance explained.

	Initial eigenvalues			Rotation sums of squared loading		
Component	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	5.504	68.804	68.804	4.824	60.299	60.299
2	1.262	15.773	84.577	1.942	24.279	84.577
3	0.729	9.114	93.691			
4	0.353	4.407	98.098			
5	0.077	0.966	99.064			
6	0.048	0.595	99.660			
7	0.022	0.271	99.930			
8	0.006	0.070	100.000			

Table 3: Rotated component matrix.

	Component	
	1	2
(IL) Industrial share of GDP	0.060	0.862
(SDL) Services added value share of GDP	0.922	0.269
(EDL) Per capita GDP (unit: Yuan)	0.944	0.277
(CDL) Urban population to total population	0.900	0.394
(MDL) Non-state-owned economy share of industrial output	0.327	0.829
(STDL) R&D expenditure proportion of GDP	0.951	0.275
(PS) Non-state fixed asset investment share of total fixed asset investment	0.652	-0.229
(FTD) Proportion of imports and exports of foreign trade in GDP	0.912	0.283

In formula (1), Z_{ij} is the eigenvector of the ith element of the jth factor. a_{ij} is the element at the ith row and jth column in component matrix. λ_j is the eigenvalue of the jth factor. The results are shown in Table 4.

For further analysis, we reference the modeling method in [13]. According to the results shown in Table 4, the models of $F1$ and $F2$ are calculated as formulas (2) and (3)

$$F1 = 0.026\text{IL} + 0.393\text{SDL} + 0.402\text{EDL} + 0.384\text{CDL} + 0.139\text{MDL} + 0.405\text{STDL} + 0.278\text{PS} + 0.389\text{FTD} \quad (2)$$

$$F2 = 0.768\text{IL} + 0.240\text{SDL} + 0.247\text{EDL} + 0.351\text{CDL} + 0.738\text{MDL} + 0.245\text{STDL} - 0.204\text{PS} + 0.252\text{FTD} \quad (3)$$

According to the eigenvalues of each principal components (shown in Table 2) accounting for the sum of eigenvalues of extracted principal components, the principal components weight coefficients can be calculated as 0.813 ($W1$) and 0.187 ($W2$). Therefore, a comprehensive model is calculated as formula (4). The results are shown as formula (5):

$$F = W1 * F1 + W2 * F2 \quad (4)$$

$$F = 0.165\text{IL} + 0.364\text{SDL} + 0.373\text{EDL} + 0.378\text{CDL} + 0.251\text{MDL} + 0.375\text{STDL} + 0.188\text{PS} + 0.363\text{FTD} \quad (5)$$

4 CONCLUSIONS AND PROPOSALS

This paper carries out the theoretical analysis on the demand and supply factors that influence the development of producer services. Based on annual data of Zhejiang China from 1990 to 2011, the paper conducts empirical analysis on various influencing factors. The results indicate that:

i. Two common factors are obtained from factor analysis, as shown in Table 3 the factor loading coefficients of R&D expenditure proportion of GDP and industrial share of GDP are 0.951 and

0.862, respectively, which means that scientific and technological development level in supply factors and industrialization levels in demand factors are the most important variable factors in two common factors.

ii. As influencing factors comprehensive model (formula (5)) shows, the variable coefficients of each factor are positive. It shows that each factor has the positive impact on producer services development in Zhejiang, which verifies the theoretical analysis on the influence of various factors as referenced in Sections 2.1 and 2.2.

iii. Factor's influence degree differs from each other. Factors such as services development levels (SDL), economic development level (EDL), urbanization level (CDL), scientific and technological development level (STDL), opening-up intensity and level (FTD) have relatively larger influence, whereas the impact of industrialization levels (IL) and ownership structure (PS) have relatively small. On the other hand, the influence of marketization development level (MDL) is neither large nor small and stands at intermediate.

iv. Based on comparison between the results in (i) and (iii), the positive influences of existing scientific and technological development level, especially industrialization levels to producer services development in Zhejiang, should be further improved.

Based on the above analysis, some suggestions are proposed as follows:

i. From the demand perspective, in order to upgrade manufacturing industry and further promote transition toward service and high-end restructuring development, it is important to generate significant demands for knowledge and technology-intensive producer services as well as to provide more effective demand support for them. At the same time, it is necessary to accelerate the optimization of industrial structure adjustment, vigorously promote the development of tertiary industry, improve services development level, and thus stimulate effective demand for producer services. Furthermore, it is essential to improve the economic and social development and maintain steady economic progress. At present, consumers intend to pay more attention to service along with commodity itself, which will create more demands and further promote the increasing demand on producer services that supply intermediate services. Moreover, to accelerate urbanization, it is fundamentally important to promote high-end elements such as talents,

Table 4: Factor eigenvectors.

	Eigenvalues 1	Eigenvalues 2
(IL) Industrial share of GDP	0.026	0.768
(SDL) Services added value share of GDP	0.393	0.240
(EDL) Per capita GDP (Unit: Yuan)	0.402	0.247
(CDL) Urban population to total population	0.384	0.351
(MDL) Non-state-owned economy share of industrial output	0.139	0.738
(STDL) R&D expenditure proportion of GDP	0.405	0.245
(PS) Non-state fixed asset investment share of total fixed asset investment	0.278	–0.204
(FTD) Proportion of imports and exports of foreign trade in GDP	0.389	0.252

information, technology, knowledge, capital and so on to supply driving forces for producer services development.

ii. From the supply perspective, as main producer services industry such as finance, science and technology, research and development, information, etc. all require high levels of knowledge and technology, it is necessary to constantly increase innovation investment, gradually establish and improve science and technology innovation system in producer services, support the relevant enterprises to establish R&D institutions to carry out scientific and technological innovation activities. The above measures will promote the supply level of producer services which will further improve opening–up intensity & level of producer services, accelerate the introduction and study of international advanced technology, ideas and experiences in attempts to promote the level of domestic producer services. At the same time, gradually developing from ITO and BPO to KPO will also be important to enhance the overall scale and performance level of producer services. To vigorously promote market-oriented process of producer services, it would be useful to release market access conditions for producer services as well as encouraging non-public economy to participate for the development of producer services, especially deepening market-oriented reform of the monopoly industries, building up market-oriented environment of producer services so as to promote socialization and specialization of producer services supply.

ACKNOWLEDGEMENT

The research work was supported by Philosophy and Social Sciences Planning Project of Zhejiang Province under Grant No. 12JCJJ11YB.

REFERENCES

[1] Wang, Z & Yuming, S., The spatial characteristics of producer service agglomeration in Beijing–Tianjin–Hebei metropolitan region. *Progress in Geography*, **31(6)**, pp. 742–749, 2012.

[2] Qun, W., Research on manufacturing and logistics industry linkage symbiotic mode and related countermeasures. *Inquiry into Economic Issues*, **1**, pp. 72–75, 2011.

[3] Harrington, J.W., Empirical research on producer service growth and regional development: international comparisons. *The Professional Geographer*, **47(1)**, pp. 66–74, 1995. doi: http://dx.doi.org/10.1111/j.0033-0124.1995.00066.x

[4] Yin, C. & Jinyong, L., Study on the location mode of production service industry and relative institutions. *Shanghai Economic Review*, **7**, pp. 52–57, 2004.

[5] Jian, H., Influencing factors and countermeasure analysis on producer services of China. *Social Sciences in Guizhou*, **216(12)**, pp. 75–78, 2007.

[6] Zhuxin, On factors influencing development of productive service industry in China and strategy. *Productivity Research*, **2**, pp. 108–109, 205, 2011.

[7] Huihui, S., Influencing factors analysis on the development of producer services based on the perspective of effective demand. *Economic Vision*, **18**, pp. 29–30, 73, 2012.

[8] Renyuan, Y., The interactive development of producer services and modern manufacturing industry: a case study of Zhejiang. *East China Economic Management*, **24(8)**, pp. 11–14, 2010.

[9] Gang, F. & Xiaolu, W., 2000 Report on marketerization process all over China. *Journal of China National School of Administration*, **3**, pp. 17–27, 2001.

[10] Economic and Resources Management Institute of Beijing Normal University, *A Report on the Development of China's Market Economy*, China Foreign Economic Relations and Trade Publishing House: Beijing, pp. 1–364, 2003.

[11] Weihong, M., The influencing factors analysis on producer services industry. *Economy and Management*, **26(2)**, pp. 63–67, 71, 2012.
[12] Minglong, W. (ed.), *SPSS Statistical Application Practice: Questionnaire Analysis and Applied Statistics*, Science Press: Beijing, 2003.
[13] Xiu Qing, L. & Yuewen, T., Analysis and evaluation on influencing factors of producer services in Dalian. *Journal of Dalian Jiaotong University*, **32(3)**, pp. 109–112, 2011.
[14] Weidong, L. (ed.), *Applied Multivariate Statistical Analysis*, Peking University Press: Beijing, 2008.
[15] Chunying, W., The empirical study on the influence factors of Zhejiang producer service development. *Enterprise Economy*, **4**, pp. 123–126, 2013.