The Evaluation on the Innovation in Service of China's Listed Commercial Banks

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Keywords: Innovation in service, Evaluation index system, Evaluation results.

Abstract. An evaluation index system of China's listed commercial banks' service innovation has been set up in this paper. The Analytic Hierarchy Process is introduced to evaluate them in three areas, i.e. the innovation input, innovation output and innovation environment. In this study, the related indicator data is acquired from 2012 annual reports of China's listed commercial banks. Through the analyses on the evaluation results, it is concluded that innovation input and innovation environment are positively correlated to innovation output. The purpose of setting up the evaluation index system is to measure the overall service innovation level in China's commercial banks, to make sure their development status and try to find out the ways to improve their service innovation.

Introduction

Foreign research on evaluation of service innovation began in the 1990s, and started in China in the early twenty-first century. The construction of evaluation index system and survey data collection is the most important aspects in evaluation on service innovation. In regards to construction of evaluation index system, the international and national research achievements are EIS (European Innovation Scoreboard, EIS) (2001-2010)[1], Hollanders and Arundel (2006) [2], Kanerva et al. (2006) [3]. There is no international research in China at present. Chen Jin (2004) made an exploratory study at the national level [4], while more scholars concentrated on the studies of regional level, such as Li Yanhua et al. (2009) evaluated information technology in financial, real estate, culture, education and other modern service industries in Beijing from four dimensions of innovation input, innovation output, innovation economic performance, and innovation environment[5]. Zhao Yan et al. (2009) evaluated totally six KIBS clusters in Regensburg area of Germany from six aspects of the innovation, i.e. the hard environment, soft environment, innovation network mechanism, supply factors, demand factors and the influence of clusters to enterprises [6]. They found that soft environment construction and the influence of clusters to enterprises have a strong effect on the innovation ability of the clusters' enterprises. Sun Youxia et al (2010) evaluated innovation of 23 areas of Chinese modern service industry from five dimensions of knowledge creation ability, technology innovation ability, innovation undertaking, innovation basis ability and service innovation performance [7].

The research on the industry level is more concerned both at home and abroad. The main research results include Arundel et al (2007) [8], Cruysen and Hollanders (2008) [9], Kusiak (2009) [10], Shen Jing et al. (2008-2011) [11], Huang Shuwen (2010) [12], Zhang Dehai and Liu Dewen (2010) [13]. Researches on the industry level made by domestic scholars are mainly concentrated in KIBS. As Chen Jin (2008) argues that, the KIBS innovation evaluation index system should include investment index, resource index and innovation effect index [14]. His evaluation system emphasizes more on innovation results and adds customers' satisfaction, patents, software copyrights and other indexes. Some scholars also made evaluation researches on the innovation in specific KIBS activities. Shen Jing et al (2008, 2009, 2010, 2011) constructed a series of innovation evaluation index system, which integrates technological innovation and service innovation indicators from the viewpoint of utility of innovation, to evaluate China's high technology services, telecommunications, securities, banking, e-commerce and other typical KIBS. Shen Jing et al(2009) evaluated the service innovation of China's listed state-owned commercial banks in 2007 from three dimensions of innovation input, innovation output and innovation environment. Several years passed, it is necessary to make further research on the innovation in service of China's commercial banks to make sure the status quo and its development.

The Construction of Evaluation Index System of China's Commercial Banks' Service Innovation

With reference to Shen Jing et al(2009)'s evaluation index system, depth interview was made to senior industry experts and group discussions about the evaluation indicators and their weights, then the evaluation index system of service innovation was contructed. See Table 1.

Tab.1 Service Innovation Evaluation Index System, Index Weight and the Data Source of Chinese Commercial Banks

Objective	The criterion layer	The 1st layer	The 2nd layer	Weight (%)	Data available
Service innovation evaluation index system of Chinese commercial banks	Innovation input A1 (0.25)	Information input B1(0.20)	Investment on banking information construction C1(1.00)	5	Not available
		R&D input B2(0.36)	Index weight of investment on independent research institutes to income C2(0.25)	2.25	Not available
			Index weight of investment on bank's dependent research departments to income C3(0.75)	6.75	Not available
		Investment on employees B3(0.44)	Education background of employees C4(0.25)	2.75	4 levels, weight, 1 for below junior college degree, 2 for junior college degree, 3 for undergraduate degree, 4 for graduate degree and up
			Index weight of education and training to income C5(0.75)	8.25	Not available
	Innovation output A2(0.6)	Dissemination of information and knowledge achievement B4(0.20)	Yearly applications on patent C6(0.20)	2.4	http://www.cnpatent.com/zljs.asp
			Growth rate of application on patent C7(0.20)	2.4	Not adopted
			The quantity of published report and papers C8(0.60)	7.2	Not available
		Income of non-interest B5(0.49)	Income of non-interest C9(0.18)	5.29	Bank's annual reports
			Growth rate of non-interest income C10(0.32)	9.41	Bank's annual reports Non-interest income=income-interest income
			Value creation per capita C11(0.22)	6.47	Value creation per capita=annual imcome/total employees * 100%
			Growth rate of Value creation per capita C12(0.28)	8.23	To be compared with that in last year
		Innovation spillover benefits B6(0.31)	Value created for other industries/enterprises C13(0.40)	7.44	Data of banks' load amount to companies
			Growth rate of Value created for other industries/enterprises C14(0.60)	11.16	To be compared with that in last year
	Innovation environment A3(0.15)	Cooperation of research and production B7(0.14)	Index weight of investment on cooperation with colleges and research institutes to total investment on science and technology C15(1.00)	2.1	Not available
		Abroad investment B8(0.86)	Foreign direct investment C16(0.22)	2.84	(Abroad corporation stocks +abroad natural person stocks + foreign stocks on abroad listed companies + foreign stocks on domestic listed companies)×stock price on last dealing date of the year
			Domestic investment C17(0.28)	3.61	(Domestic stocks of non-state owned +Domestic natural person stocks+ normal stocks in RMB)×stock price on last dealing date of the year;
			State investment C18(0.50)	6.45	State investment=(state-owned stocks+ state corporation stocks)×stock price on last dealing date of the year

The AHP (Analytical Hierarchy Process) method is adopted to make a combination of qualitative and quantitative analysis for multiple attribute decision making to evaluate the innovation service level of China's commercial banks.

Terming the item i for index i; X_i for the score of index i; Y_i for the utility value of indexes i; X_{imax} for the maximum value of index i; X_{imin} for the minimum value of index i; using formula (1) to standardize on the score of each bank in each index.

$$Y_i = \frac{X_i - X_{i\min}}{X_{i\max} - X_{i\min}} \times 100 \quad (1)$$

Finally, by multiplying the index weight to the corresponding index score of every indicator and then aggregating each score, the final score of each bank's service innovation is obtained. Since some data are not available, total score is 66.05 points with eleven available indexes. See table 2.

The Process of Evaluation on China's Commercial Banks' Service Innovation

Specimen of banks

This paper attempts to compare and evaluate objectly the service innovation of total 16 listed commercial banks. However, after reading their annual reports, only ten indicators can be obtained from them, the remaining indicator, i. e. educational background of employees cannot be abtained completely among 16 banks. As this indicator is the only one in second layer of "innovation input", in order to make the research valuable, only 9 banks are chosen based on the identical information of employees' educational background. Among the specimen banks, five banks, i.e. the Agricultural Bank of China (ABC), the Industrial and Commercial Bank of China (ICBC), China Construction Bank (CCB), Bank of China (BOC) and Bank of Communications (BOCOM) are the state-owned commercial banks; and the remaining four, i.e. Bank of Beijing (BOB), China Merchants Bank (CMB), Industrial Bank (CIB) and The CITIC Bank (CITIC) are joint-stock commercial banks.

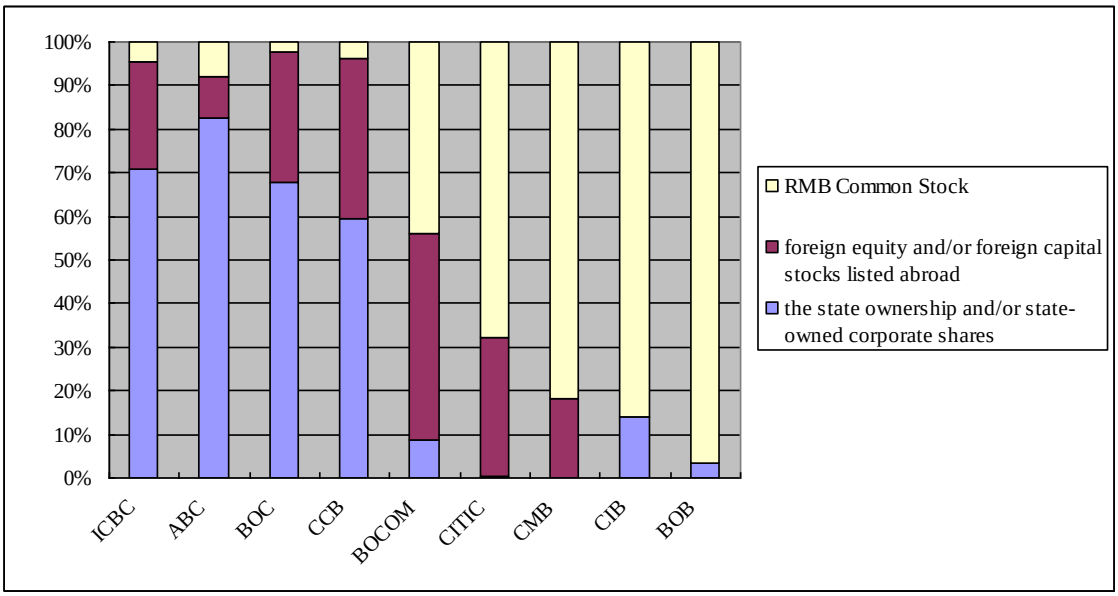

Fig.1 The Structure of Capital Share of Specimen Banks

Result of Evaluation on specimen banks' service innovation

As to the results of evaluation on specimen banks' service innovation in 2012, please see Table 2.

Table2 shows that in 2012, CIB has the strongest ability of service innovation, and after CIB, the state-owned commercial banks as ICBC,CCB,ABC,BOC and BOCOM rank No.2 to No.6,while the other joint-stock commercial banks ,i.e. CMB, BOB and CITIC, rank No.7 to No.9.

By comparison with Shen Jing's results(2009), the state-owned commercial banks still have advantages than the joint-stock commercial banks in overall service innovation after five years development, however, the attention should be paid to CIB, one of the joint-stock commercial banks in 2012, who becomes the strongest one by means of comprehensive innovation ability. Its innovation input

(employees' educational background), innovation output (growth rate of non interest income, value creation per capita, growth rate of Value creation per capita, growth rate of value created for other industries/enterprises) and innovation environment (domestic risk investment) are in better condition than the indicatios of most other banks, which is worthy of in-depth analysis.

The Comparison of results of evaluation on service innovation of some listed China's commercial Banks between 2007 and 2012, please see Table 3.

Tab. 2 Result of Evaluation on Specimen Banks' Service Innovation in 2012

Objective	The criterion layer	The 2nd layer	ICBC	ABC	BOC	CCB	BOCOM	CITIC	CMB	CIB	BOB
Service innovation evaluation index system of Chinese commercial banks	Innovation input	Education background of employees	0.7	0	1.75	1.09	1.99	2.71	*2.75	2.64	2.22
	Innovation output	Yearly applications on patent	*2.40	0.36	0.18	1.09	0.14	0.04	0.22	0.01	0
		Non-interest income	*5.29	3.55	4.85	4.77	1.2	0.61	1.1	0.67	0
		Growth rate of non-interest income	0	1.14	0.46	1.54	1.5	1.77	2.99	*9.41	8.98
		Value creation per capita	3.26	2.05	3.1	3.49	4.23	*6.47	5.58	6.1	0
		Growth rate of Value creation per capita	5.08	5.17	4.8	5.49	5.25	4.07	0	8.16	*8.23
		Value created for other industries/enterprises	*7.44	5.19	3.82	5.82	2.73	1.36	1.32	1.03	0
		Growth rate of Value created for other industries/enterprises	1.66	1.26	0	2.21	3.02	1.96	3.91	*11.16	1.16
	Innovation enviroment	Foreign direct investment	2.42	0.58	1.64	*2.84	1.16	0.43	0.36	0	0
		Domestic risk investment	0.73	0.85	0	0.41	2.3	1.89	*3.61	2.63	0.97
		State investment	*6.45	4.72	3.47	4.29	0.2	0.01	0	0.19	0.02
	Total score	66.05	35.43	24.87	24.07	33.04	23.72	21.32	21.84	42	21.58
	Rank		2	4	5	3	6	9	7	1	8

Tab.3 The Comparison of Results of Evaluation on Service Innovation of Some listed Chinese Commercial Banks in 2012 and 2007

Year	Scores/ Rank	CIB	ICBC	CCB	ABC	BOC	BOCOM	CMB	BOB	CITIC	CMBC	HXB
2012	Scores 66.35	42	35.43	33.04	24.87	24.07	23.72	21.84	21.58	21.32		
	Rank	1	2	3	4	5	6	7	8	9		
2007	Scores 66.77		34.88	40.19		26.91	25.18	33.35	23.34	32.14	22.44	20.43
	Rank		2	1		5	6	3	7	4	8	9

Conclusion and Suggestion

It is concluded that innovation inputs-"Educational background of employees (C4)" and innovation environment-"Foreign direct inverstment(C16), State investment(C18)" have positive correlations to the

innovation output- “Growth rate of non-interest income(C10), Value creation per capita (C11), Growth rate of value creation per capita (C14)”.

With the comparison of listed joint-stock commercial banks, the listed state-owned commercial banks have some advantages in service innovation mainly in the capital structure, scale, etc. which depends on the allocation of national resources and policy preferetials and have disadvantages personnel quality. In addition, all China's commercial banks need to strengthen the innovation of intermediate products, improve human resource system, emphasize personnel training and make full use of foreign and domestic venture capital to enhance their core competitiveness.

Suggestions:

(1) It is suggested that the listed state-owned commercial banks to increase the input of innovation. That is, the banks should optimize the employees’ education background by increasing the proportion of graduate and up staffs, to provide powerful source for service innovation.

(2) For the non state-owned joint-stock commercial banks, restricted by its equity structure, their innovation environment is relatively weak. They can only make full use of its domestic venture capital and improve vigorously their efficiency to make great achievement in service innovation.

(3) For the state-owned joint-stock commercial banks, it is recommended that they should use sufficiently the absolute advantage of state ownership, state corporate shares and foreign investments to produce more innovation output.

(4) All China’s commercial banks should make more innovations of new financial products and financial services to optimize the structure of business income.

Since some evaluation indexes cannot be obtained from the annual report of China’s listed commercial banks and other sources, the evaluation system and the evaluation results of this study have certain limitation. The universal application of the evaluation index system proposed in this study is to be verified and also adjustment, revision and supplement are necessary when it is applied to other fields of enterprises.

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