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The Dynamic Mechanism and Empirical Study on Distribution and Manufacturing Sector Co-evolution: Evidence from China

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Abstract

This article analyzed the principle of theory and dynamic mechanism on distribution and manufacturing sector co-evolution. Empirical study was based on collaborative degree model and co-evolution mode, applying the data of year 1986-2010 distribution and manufacturing sector of China. The empirical study demonstrated that, there existed interaction relations between distribution and manufacturing sector. The combined system of distribution and manufacturing sector was cooperative system. An equilibrium stable solution was existed in system evolution. Study also found out, the synergy degree of combined system for distribution and manufacturing sector was relatively low, but in collaborative development status overall. Order degree of manufacturing sector was higher than distribution sector, but both parties showed significant consistency.

Keywords: *Distribution sector, Manufacturing sector, Dynamic mechanism, Co-evolution mode*

1. Introduction

After 30 years of rapid development, China has become the huge manufacturing and distribution sector country, manufacturing and distribution sector have become the main driving force to China. However there were still some problems such as irrational economic structure, substantial excess manufacturing capacity, pilot status advantage and distribution promoting production of distribution sector not been fully exploited, industry structure adjustment function of distribution far not been fully exploited etc. One of the main reasons to the above problems was, coordinated development effect between distribution sector and manufacturing has not been comprehensive released because of the restriction from history and culture factor, especially the deep rooted tradition of "emphasis on production, despise on distribution". So the problems to be solved were existed, what's the mechanism of distribution sector and manufacturing? What's the dynamic mechanism of coordinated development? How much was the synergy degree? How to achieve the positive coordinated development and co-evolution? In the background of Chinese manufacturing's tight factor supply, factor price going up rapidly, irrational industry structure and industrial upgrading difficult, answers to these problems were particularly urgent. In order to find the breakthrough of problems, comprehensive review for the relative research literatures must be done.

Productive service industry was the process industry for promoting other industries and the adhesives for economic development and industry for serving economic transaction (Riddle, 1986) Based on the study of Ethier (1982), The inside mechanism of production service industry promoting manufacturing and economy were solved(Markusen,1989). Because of the market expansion and manufacturing fast

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development, the productive service industry was becoming increasing important. There was a interactive relationship of mutual promotion between productive service industry and manufacturing (Francois, 1990; Diaz, 1998). Manufacturing was the premise and foundation of productive service industry. Scale of manufacturing industry was decided by the development level of service industry. Productive service industry was the premise and foundation of manufacturing efficiency improvement. If there was not a high efficient productive service industry, a competitive manufacturing sector could not be formed. Service industry could improve the degree of social division, extend the industry chain and reduce the social transaction cost (Pappas, 1998; Karaomerlioglu & Carlsson, 1999; Rowthorn & Ramaswamy, 1999). Relationship between distribution sector and manufacturing was, distribution sector had the strong channel control power in buyer market, but in seller market manufacturing enterprises had the strong control power on retailers (Shafter, 1991). The concentration of retailers would break the monopoly of manufacturing, and then change the market power balance (Dobson & Waterson, 2002). There were interaction and integration relationship between logistic industry and manufacturing. The system was overall stable when they were in collaborative integration. The symbiosis and synergy development of logistic and manufacturing would promote the healthy development and improve the industrial competitiveness (Chen & Huang, 2004; Zheng & Xia, 2004; Peng, 2009; Gao & Li, 2011). Distribution sector had the natural function of adjusting the industrial structure. The lag development of distribution had become the main constraints to improve the industrial competitiveness. To solve the problem of irrational industrial structure, the main route was to fully exerting industrial influence of distribution sector. Data from China demonstrated that, the expansion of distribution sector scale could promote the level of manufacturing technology. The level of manufacturing production efficiency was depended on the development level of distribution sector (Song, *et al.*, 2010; Xu & Shi, 2000; Humphrey, 2002; Wang, 2011).

Overview the existing literature, this article tried to make some breakthrough on the following aspects: (1) Established the dynamic mechanism model of cooperative co-evolution on distribution and manufacturing sector, solved the stable solution for evolution results of model (2). Applied the data of China, degree of order and the synergy degree were estimated between distribution and manufacturing sector and then analyzed the degree of co-evolution (3). By applying co-evolution model, the co-evolution status of distribution and manufacturing sector were analyzed about China.

2. Theoretical Principle and Dynamic Mechanism

Manufacturing sector provided the material basis and conditions for distribution sector. The development of distribution sector was inseparable from manufacturing sector. Manufacturing sector was the premise and basis of distribution sector. Manufacturing sector was the main demand sector for distribution sector. There was almost no demand for distribution sector without manufacturing sector (Rowthorn & Ramaswamy, 1999). Distribution sector was the means and protection of improving manufacturing sector efficiency. Although manufacturing sector was the basis of distribution sector, distribution also had the strong counter-action on manufacturing. Distribution sector could improve the production efficiency of manufacturing. A relative strong competitive manufacturing sector could not formed without a well developed distribution sector (Karaomerlioglu & Carlsson, 1999).There were two ways for the benefiting to manufacturing from distribution, one was the specialization and division of labor, another was reducing the middle service cost of input to

manufacturing sector (Eswaran, 2001). For the single industry system, under the certain environment, the evolution was affected by its own fitness, economic social environment, competition or cooperative relation of other industrial system. If other industrial systems were not considered, the dynamic model of industrial system and economic social environment was:

$$\begin{cases} \frac{dN}{dt} = rN(1- \frac{N}{K}) \\ N(0) = N_0 \end{cases}$$

Among them, K represented the amount of environment, *i.e.*, $K = \lim_{t \to \infty} N(t)$, r represented the individual growth rate of industrial system, N represented the scale of industrial system. The growth rate of single industrial system was followed by above model, *i.e.*, Logistic model. Industrial scale number N:

$$N = \frac{KN_0e^n}{K + N_0(e^n - 1)}$$

The growth of N was shown in Figure 1.

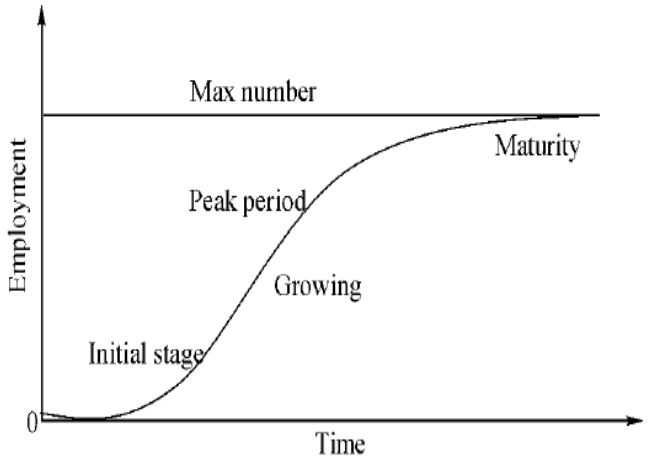

Figure 1. The Evolution Path of Single Industrial System

There were three kinds of collaborative relationships between two industries: competition relationship, cooperative relationship and competition cooperative relationship, so same were evolution dynamic models. Cooperative relation was the most common relationship. Relation between distribution and manufacturing sector was cooperative relationship and the evolution dynamic model was the cooperative co-evolution dynamic model. In this model, relations of industry were inter-effect, mutual benefit, co-evolution and joint development. Supposed two industries N_1 and N_2, (N_1 is manufacturing sector, N_2 is distribution sector), relation between N_1 and N_2 were symbiotic cooperative relationship and cooperative evolution. Industries of N_1 and N_2 promoted each other because of resource sharing. N_2 provided sharing resources for N_1 and had the positive impact on N_1 .So the cooperative co-evolution model for N_1 was:

$$\frac{dN_1}{dt} = r_1 N_1 (1 - \frac{N_1}{K_1} + m_{12} \frac{N_2}{K_1})$$

Among them, m_{12} was model parameter, indicating the coefficient of elasticity for N_2 to N_1, m_{12} Î [0,1]. , $0 < m_{12} < 1$. The results of model were depended on m_{12} and K_1.The cooperative co-evolution model for N_2 was:

$$\frac{dN_2}{dt} = r_2 N_2 (1 - \frac{N_2}{K_2} + m_{21} \frac{N_1}{K_2})$$

The equations for N_1 and N_2 were:

$$\begin{cases} \frac{dN_1}{dt} = r_1 N_1 (1 - \frac{N_1}{K_1} + m_{12} \frac{N_2}{K_1}) \\ \frac{dN_2}{dt} = r_2 N_2 (1 - \frac{N_2}{K_2} + m_{21} \frac{N_1}{K_2}) \end{cases}$$

Let,

$$\frac{dN_1}{dt} = 0 \ ; \ \frac{dN_2}{dt} = 0$$

when, $0 < m_{12} m_{21} < 1$, Four steady solutions of equation system were:

$$E_0(0,0); E_1(K_1,0); E_2(0,K_2); E_3(\frac{K_1 + m_{12}K_2}{1 - m_{12}m_{21}}, \frac{K_2 + m_{21}K_1}{1 - m_{12}m_{21}})$$

Among them, E_3 was the steady solution for the equation system. Because of the cooperation and information resource sharing, collaborative spillover effects between distribution and manufacturing sector were generated on resource, technology, management and capital. Graphical analysis for equation system solutions were:

System isocline 1： $r_1 N_1((K_1 - N_1 + m_{12}N_2)/K_1) = 0$

System isocline 2： $r_2 N_2((K_2 - N_2 + m_{21}N_1)/K_2) = 0$

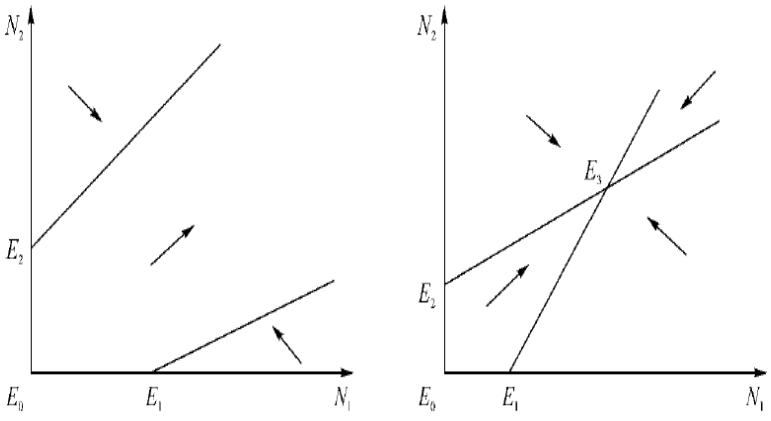

Figure 2. Co-evolution Trace for Cooperative System of Distribution and Manufacturing Sector

Figure 2 denoted that, system of distribution and manufacturing sector reached the equilibrium on E_3, then the system was in the status of stable.

3. Statistical Descriptive Analysis of Order Degree

3.1. Estimation on Chinese Order Degree of Distribution Sector

Supposed the order parameter variable of distribution system were:

$g^d = (g_1^d, g_2^d, ...g_n^d)$, and $n \geq 2$, $b_i^d \leq g_i^d \leq a_i^d, i \in [0,1]$

Among them, the greater or smaller of $(g_1^d, g_2^d, ...g_n^d)$ value, the higher or lower the order degree of system, the greater or smaller of $(g_{k+1}^d, g_{k+2}^d, ...g_n^d)$ value, the lower or higher the order degree of system.

Definition 1: system order degree component parameter of distribution system were

$$\mu(g_i^d) = \begin{cases} (g_i^d - b_i^d)/(a_i^d - b_i^d), i \in [1,k], \textit{positive indicators} \\ (a_i^d - g_i^d)/(a_i^d - b_i^d), i \in [k+1,n], \textit{inverse indicators} \end{cases}$$

Among them, $\mu(g_i^d) \in [0,1]$, the bigger of $\mu(g_i^d)$ value, the greater the order degree of distribution system contribution. In this article, method of linear weighted sum was applied.

$$\bar{\mu}(g_i^d) = \sum_{i=1}^{n} w_i \mu(g_i^d), w_i \geq 0, \sum_{i=1}^{n} w_i = 1$$

Among them, the weight of w_i were determined by subjective weighting and objective weighting method. In this article, Analytic Hierarchy Process (AHP) method was applied.

Definition 2: $\bar{\mu}(g_i^d)$ were on behalf of distribution system order degree

$\bar{\mu}(g_i^d) \in [0,1]$, the bigger or smaller of $\bar{\mu}(g_i^d)$ value, the greater or lower the order degree of distribution system were.

Variables of distribution value-added, total retail sales, total assets, total employees, total profit and enterprises numbers were included in order parameter of distribution system. By applying AHP weighing method, the weight of variables of distribution value-added, total retail sales, total assets, total employees, total profit and enterprises numbers were （0.2564，0.2469，0.1624，0.1469，0.1037，0.0837）.

Because the parameter units were different, all indicators had to be normalized by the following formula:

$$\mu(g_i^d) = \begin{cases} (g_i^d - b_i^d)/(a_i^d - b_i^d), i \in [1,k], \textit{positive indicators} \\ (a_i^d - g_i^d)/(a_i^d - b_i^d), i \in [k+1,n], \textit{inverse indicators} \end{cases}$$

Table 1. The Order Degree of Distribution System of China in 1986-2010

year	$\mu(g_1^d)$	$\mu(g_2^d)$	$\mu(g_3^d)$	$\mu(g_4^d)$	$\mu(g_5^d)$	$\mu(g_6^d)$	$\bar{\mu}(g_i^d)$
1986	0.0000	0.2630	0.0000	0.0000	0.0316	0.0005	0.0683
1987	0.0127	0.2766	0.0018	0.0201	0.0340	0.0115	0.0763
1988	0.0339	0.2149	0.0135	0.0406	0.0397	0.0115	0.0690
1989	0.0196	0.0856	0.0105	0.0440	0.0203	0.0000	0.0300
1990	0.0009	0.0689	0.0321	0.0525	0.0034	0.0054	0.0232
1991	0.0348	0.0961	0.0454	0.0720	0.0000	0.0108	0.0409
1992	0.0639	0.1110	0.0542	0.0980	0.0077	0.0212	0.0552
1993	0.0564	0.1045	0.0567	0.1288	0.0744	0.0233	0.0591

1994	0.0763	0.0308	0.0582	0.1857	0.1146	0.0609	0.0536
1995	0.0911	0.0000	0.0615	0.2314	0.0940	0.0791	0.0497
1996	0.1145	0.0091	0.0756	0.2584	0.0910	0.0987	0.0616
1997	0.1435	0.0256	0.0964	0.2933	0.0783	0.1191	0.0769
1998	0.1789	0.0601	0.1169	0.2749	0.0634	0.1297	0.0971
1999	0.2089	0.1033	0.1249	0.2879	0.0669	0.1451	0.1184
2000	0.2278	0.1458	0.1291	0.2799	0.0763	0.1343	0.1345
2001	0.2702	0.1907	0.1346	0.2861	0.0750	0.1393	0.1577
2002	0.3169	0.2682	0.1705	0.3148	0.0961	0.1555	0.1981
2003	0.3572	0.3104	0.1931	0.2960	0.1153	0.1692	0.2257
2004	0.3854	0.3445	0.3118	0.5808	0.2382	0.4119	0.2937
2005	0.4208	0.4091	0.3022	0.6231	0.3590	0.3712	0.3263
2006	0.4925	0.4911	0.3464	0.6785	0.4257	0.4210	0.3832
2007	0.6122	0.5459	0.4321	0.7825	0.5121	0.4724	0.4546
2008	0.7238	0.6238	0.6511	1.0000	0.8605	0.9178	0.6114
2009	0.8573	0.8646	0.8076	0.7851	0.7823	0.8572	0.7173
2010	1.0000	1.0000	1.0000	0.9260	1.0000	1.0000	0.8531

The order degree of distribution system in China has steadily improved better, except a short slice decline from year 1986 and 1989. The lowest value were 1989 and 1990, the highest value was 2010. After 2002, the growth of value has accelerated significantly, see Table 1.

3.2. Estimation on Chinese Order Degree of Manufacturing Sector

Supposed the order parameter variable of manufacturing system were:

$g^m = (g_1^m, g_2^m, ...g_n^m)$, and $n \geq 2$, $b_i^m \leq g_i^m \leq a_i^m$, $i \in [0,1]$

Definition 3: System order degree component parameters of manufacturing system were.

$$\mu(g_i^m) = \begin{cases} (g_i^m - b_i^m)/(a_i^m - b_i^m), i \in [1,k] \\ (a_i^m - g_i^m)/(a_i^m - b_i^m), i \in [k+1,n] \end{cases}$$

$$\bar{\mu}(g_i^m) = \sum_{i=1}^{n} w_i \mu(g_i^m), w_i \geq 0, \sum_{i=1}^{n} w_i = 1$$

Definition 4: $\bar{\mu}(g_i^m)$ were on behalf of manufacturing system order degree, then $\bar{\mu}(g_i^m) \in [0,1]$, the bigger or smaller of $\bar{\mu}(g_i^m)$ value, the greater or lower the order degree of manufacturing system were. Variables of manufacturing value-added, total assets, total employees, total profit, and high technology industry ratio and enterprises numbers were included in order parameter of manufacturing system. By applying AHP weighing method, the weight of variables of distribution value-added, total retail sales, total assets, total employees, total profit and enterprises numbers were (0.2586, 0.2227, 0.1787, 0.1446, 0.1137, 0.0782). Because the parameter units were different, all indicators had to be normalized by the following formula:

$$\mu(g_i^m) = \begin{cases} (g_i^m - b_i^m)/(a_i^m - b_i^m), i \in [1,k] \\ (a_i^m - g_i^m)/(a_i^m - b_i^m), i \in [k+1,n] \end{cases}$$

$$\bar{\mu}(g_i^m) = \sum_{i=1}^{n} w_i \mu(g_i^m), w_i \geq 0, \sum_{i=1}^{n} w_i = 1$$

Table 2. The Order Degree of Manufacturing System of China in 1986-2010

year	$\mu(g_1^m)$	$\mu(g_2^m)$	$\mu(g_3^m)$	$\mu(g_4^m)$	$\mu(g_5^m)$	$\mu(g_6^m)$	$\bar{\mu}(g_i^m)$
1986	0.0000	0.0000	0.0000	0.0358	0.0393	0.0000	0.0096
1987	0.0090	0.0078	0.0497	0.0421	0.0000	0.0318	0.0215
1988	0.0165	0.0192	0.0925	0.0589	0.0609	0.1433	0.0517
1989	0.0166	0.0209	0.0771	0.0365	0.0467	0.1411	0.0443
1990	0.0177	0.0302	0.0884	0.0097	0.0068	0.1373	0.0400
1991	0.0257	0.0398	0.1198	0.0112	0.0661	0.1388	0.0569
1992	0.0403	0.0888	0.1588	0.0285	0.1515	0.1298	0.0901
1993	0.0494	0.0821	0.1864	0.0191	0.3975	0.1433	0.1235
1994	0.0574	0.0937	0.2329	0.0126	0.3861	0.1567	0.1353
1995	0.0475	0.1088	0.2606	0.0084	0.4226	0.1701	0.1456
1996	0.0600	0.1323	0.2548	0.0000	0.4618	0.1661	0.1560
1997	0.0699	0.1609	0.2327	0.0042	0.5245	0.1287	0.1658
1998	0.0728	0.1801	0.0438	0.0012	0.6862	0.1330	0.1554
1999	0.0853	0.1997	0.0131	0.0234	0.7557	0.1250	0.1680
2000	0.1054	0.2103	0.0035	0.0542	0.8018	0.1282	0.1837
2001	0.1277	0.2347	0.0093	0.0667	0.8622	0.1537	0.2066
2002	0.1626	0.2620	0.0421	0.1004	0.9476	0.1841	0.2446
2003	0.2243	0.3056	0.4119	0.1606	1.0000	0.2437	0.3557
2004	0.3453	0.3490	0.4897	0.2469	0.8479	0.3142	0.4112
2005	0.3736	0.4127	0.5947	0.2316	0.8867	0.4641	0.4654
2006	0.4692	0.4814	0.7069	0.3132	0.8924	0.5513	0.5447
2007	0.5994	0.5706	0.8353	0.4787	0.8628	0.6572	0.6501
2008	0.7085	0.6655	0.8719	0.4952	0.8092	0.9201	0.7228
2009	0.8208	0.8472	0.9242	0.6853	0.8656	0.9458	0.8376
2010	1.0000	1.0000	1.0000	1.0000	0.8759	1.0000	0.9824

The order degree of manufacturing system in China has steadily improved, except a short slice decline from year 1989, 1990. The lowest value were 1986 and 1990, the highest value was 2010. After 2002, the growth of the value has accelerated significantly and entered the rapid development period, see Table 2..

4. Estimation on Synergy Degree of Distribution and Manufacturing System

4.1. Model of System Synergy Degree

Supposed that, t_0 was the initial moment(or a specific time period), then the order degree of distribution sector system was $\bar{m}_0(g_i^d)$, the order degree of manufacturing sector system was $\bar{m}_0(g_i^m)$.When the system evolution to the time of t_1, then the order degree of distribution sector system was $\bar{m}_1(g_i^d)$, the order degree of manufacturing sector system was $\bar{m}_1(g_i^m)$.If $\bar{m}_1(g_i^d) \geq \bar{m}_0(g_i^d)$ and $\bar{m}_1(g_i^m) \geq \bar{m}_0(g_i^m)$, then the system of distribution and manufacturing sector was in the status co-evolutionary development.

The synergy degree model of distribution and manufacturing sector were:

$$C=\mathrm{sig}(.)\sqrt{\left|\bar{m}_1(g^d)-\bar{m}_0(g^d)\right|\left|\bar{m}_1(g^m)-\bar{m}_0(g^m)\right|}$$

Among them,

$$\mathrm{sig}(.)=\begin{cases}1, & \bar{m}_1(g^d)-\bar{m}_0(g^d)\geq 0;\ \bar{m}_1(g^m)-\bar{m}_0(g^m)\geq 0\\ -1, & \text{others}\end{cases}$$

So, $C \in [-1,1]$, The greater or smaller the value of C, the higher or lower the synergy degree of system. If $C \in [-1,0]$, demonstrated that, the increase rate of order degree of one system was high, the increase rate of order degree of another system would be low or decrease, then the whole system was in uncoordinated.

The criterion of system synergy degree was:

$C \in (0,0.3)$, system in low collaborative,

$C \in (0.3,0.5)$, system in medium collaborative,

$C \in (0.5,0.8)$, system in high collaborative,

$C \in (0.8,1.0)$, system in extreme collaborative.

Relative data of distribution and manufacturing sector order degree in China and synergy degree estimation model were applied as follows:

$$C=\mathrm{sig}(.)\sqrt{\left|\bar{m}_1(g^d)-\bar{m}_0(g^d)\right|\left|\bar{m}_1(g^m)-\bar{m}_0(g^m)\right|}$$

Among them, $\mathrm{sig}(.)=\begin{cases}1, & \bar{m}_1(g^d)-\bar{m}_0(g^d)\geq 0;\ \bar{m}_1(g^m)-\bar{m}_0(g^m)\geq 0\\ -1, & \text{others}\end{cases}$

4.2. Model of System Synergy Degree

Order degree of subsystem as intermediate variables, the beginning of each period segment (year 1986-1987, year 1987-1988, year 1988-1989…, year 2008-2009, year 2009-2010) as base year, the synergy degree of distribution and manufacturing sector in China could be estimated, see Table 3.

Table 3. The Order Degree of System of China in 1986-2010

year	Order degree of distribution	Order degree of manufacturing	System synergy degree (C)
1986	0.0683	0.0096	——
1987	0.0763	0.0215	0.0098

1988	0.0690	0.0517	-0.0148
1989	0.0300	0.0443	-0.0170
1990	0.0232	0.0400	-0.0054
1991	0.0409	0.0569	0.0173
1992	0.0552	0.0901	0.0218
1993	0.0591	0.1235	0.0114
1994	0.0536	0.1353	-0.0081
1995	0.0497	0.1456	-0.0063
1996	0.0616	0.1560	0.0111
1997	0.0769	0.1658	0.0122
1998	0.0971	0.1554	0.0145
1999	0.1184	0.1680	0.0164
2000	0.1345	0.1837	0.0159
2001	0.1577	0.2066	0.0230
2002	0.1981	0.2446	0.0392
2003	0.2257	0.3557	0.0554
2004	0.2937	0.4112	0.0614
2005	0.3263	0.4654	0.0420
2006	0.3832	0.5447	0.0672
2007	0.4546	0.6501	0.0867
2008	0.6114	0.7228	0.1068
2009	0.7173	0.8376	0.1103
2010	0.8531	0.9824	0.1402

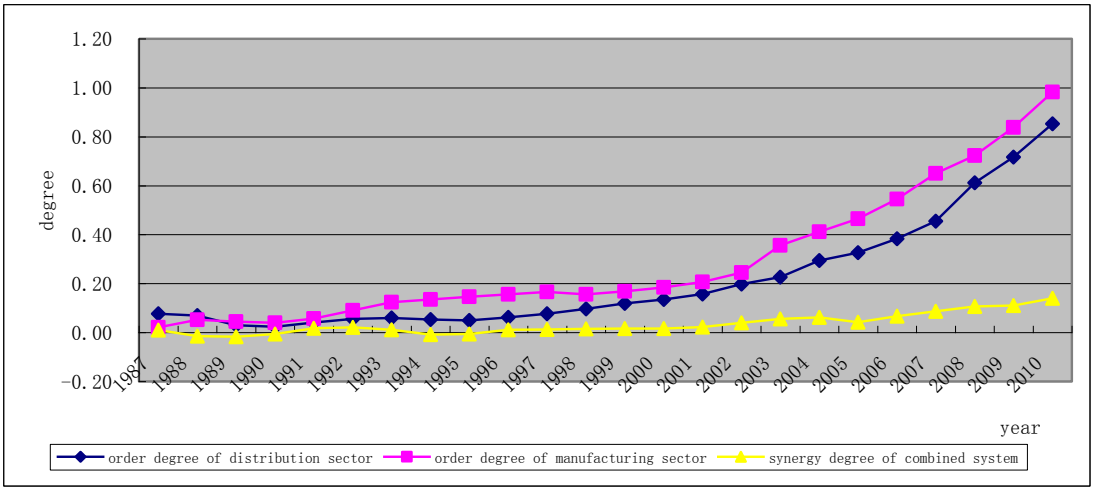

Figure 3. The Synergy Degree of Distribution and Manufacturing Sector

Figure 3 demonstrated that, the total level of manufacturing sector order degree was higher than distribution sector. The medium level of distribution sector order degree was 0.2153, while the manufacturing sector was 0.2900. The development trend of both sectors was obvious consistency and overall convergence. Both curves were moving

upward steadily from year 1987-2002, the increase rate was relatively slow and after year 2002, the value increase rated was improved significant. The synergy degree of combined system for distribution sector and manufacturing sector was relatively low. The medium value was 0.034, far below 0.10. the maximum value was 0.4102, the minimum value was -0.0170, the wave of value was small .Most of the value were positive, except year 1998-1990 and year 1994-1995, which means that the combined system was in collaborative development overall.

5. Conclusion

The empirical study results demonstrated that,

(1)There existed interaction relation between distribution sector and manufacturing industry. The combined system of distribution and manufacturing sector was cooperative system. An equilibrium stable solution was existed in system evolution. Because of the cooperation and information resource sharing, collaborative spillover effects between distribution and manufacturing sector were generated on resource, technology, management and capital. Distribution sector had the positive impact on manufacturing sector, so was the manufacturing.

(2) The development trend of both sector on order degree were obvious consistency and overall convergence. Both order degree curves were moving upward steadily. The total level of manufacturing sector order degree was higher than distribution sector. The synergy degree of combined system for distribution sector and manufacturing sector was relatively low. The combined system was in collaborative development overall.

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References

[1] D. Riddle, “Service-led Growth: the Role of the Service Sector in the World Development”, Praeger, New York, **(1986)**.
[2] W. Ethier, “National and International Return to Scale in the Modern Theory of International Trade”, American Economic Review, vol. 6, **(1982),** pp. 389-405.
[3] J. R. Markusen, “Trade in Producer Services and in Other Specialized Intermediate Inputs”, American Economic Review, vol. 3, **(1989),** pp. 85-95.
[4] J. F. Francois, “Trade in Producer Service and Return Due to Specialization under Monopolistic Competition”, Canadian Journal of Economics, vol. 23, **(1990),** pp. 109-124.
[5] F. D. Diaz, “On the Limits of Post-industrial Society Structural Change and Service Sector Employment in Spain”, International Review of Applied Economics, vol. 12, **(1998),** pp. 483-495.
[6] N. Pappas and P. Sheehan, “The New Manufacturing: Linkages between Production and Service Activities in P. Sheehan and G. Tegart (eds.) Working for the future”, Victoria University Press, Melbourne, **(1998)**.
[7] D. Karaomerlioglu and B. Carlsson, “Manufacturing in Decline: A Matter of Definition Economy”, Innovation New Technology, vol. 8, **(1999),** pp. 175-196.
[8] R. Rowthorn and R. Ramaswamy, “Growth, Trade and Deindustrialization”, IMF Staff Paper, vol. 1, **(1999),** pp. 18-41.
[9] G. Shafter, “Slotting, Allowances and Retail Price Maintenance: A Comparison of Facilitating Practices”, Rand Journal of Economics, vol. 1, **(1991),** pp. 120-135.

[10] P. Dobson and M. Waterson, "Retailer Power: Recent Development and Policy Implications", The Rand Journal of Economics, vol. 31, **(2002),** pp. 412-425.
[11] X. Chen and J. F. Huang, "Division of Labor, Interaction and Integration", An Empirical Study on Relationship Evolution between Service Industry and Manufacturing, China Soft Science, vol. 10, **(2004),** pp. 65-71.
[12] J. C. Zheng and Q. Xia, "Study on Competitive Power Relationship between Modern Service Industry and Manufacturing", Finance and Trade Economy, vol. 9, **(2004),** pp. 110-116.
[13] B. H. Peng, "Study on Modern Logistic Industry and Manufacturing Co-evolutionary", China Soft Science, vol. 10, **(2009),** pp. 149-153.
[14] J. M. Gao and X. H. Li, "Interactive Mechanism on Production Service Industry and Manufacturing", Theory and Empirical Study, China Industrial Economy, vol. 6, **(2011),** pp. 151-160.
[15] Z. Song, D. L. Chang and N. Ding, "Distribution Sector Influence Power and Manufacturing Structure Adjustment", China Industrial Economy, vol. 8, **(2010),** pp. 5-14.
[16] C. C. Xu and Q. Shi, "Support to Industrial Process from Distribution Sector Development", Finance and Trade Economy, vol. 9, **(2000)**, pp. 49-53.
[17] S. Humphrey, "How Does Insertion in Global Value Chains Affect Upgrading in Industrial Clusters", Regional Studies, vol. 9, **(2002),** pp. 1017-1027.
[18] J. Wang, "Impact on Manufacturing Efficiency from Distribution Sector", Based on Provincial Panel Data, Economist, vol. 1, **(2011),** pp. 70-77.
[19] R. Rowthorn and R. Ramaswamy, "Growth Trade and Deindustrialisation", IMF Staff Papers, vol. 1, **(1999),** pp. 18-41.
[20] D. Karaomerlioglu and B. Carlsson, "Manufacturing in Decline? A Matter of Definition Economy Innovation", New Technology, vol. 8, **(1999),** pp. 175-196.
[21] K. Eswaran, "The Role of the Service Sector in the Process of Industrialization Manuscript", University of British Columbia Press, Vancouver, **(2001)**.

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