



## Study on the System of Technical Innovation in Our Country's Textile Industry

Tao Ma & Qi Qi

College of Economics, Tianjin Polytechnical University, Tianjin 300160, China

Tel: 86-22-8395 6411 E-mail: tjputm@tom.com

### Abstract

After our entering WTO, the insufficient ability of new technical creating and the lags of the facilities and craftwork have become the main problems that restrict the confineable progress of our country's textile industry. In the base of having collected a great deal of data, this essay analyses the main facts that can influence technical innovation of our country's textile industry, and creating the estimating system of technical innovation of our country's textile companies which is fit for our country's textile industry.

**Keywords:** Textile industry, Technical innovation, The estimating system

The textile industry is traditional and indispensable industry of our country. It is the third biggest export industry which is only inferior to electronically machine and tourism. With the quota of some restricted goods from many main export markets, such as America, UN, being cancelled, the free trade in textile globally will help the textile industry of our country make best of the foreign and domestic resources and expand not only domestic market, but also domestic one.

But now, the insufficient ability of new technical creating and the lags of the facilities and craftwork have become the main problems that restrict the continual progress of our country's textile industry. If we want to exert more competitive advantages of our country's textile industry, and confirm correctly the position that our country's textile industry stands in the Asian and even the international textile industry, and collocate all kinds of resources reasonably to generate main competitive power, then promote the continual progress of our country's textile industry, we should change the actuality of concerning on quantity, and focus on the technical innovation of our textile industry, especially the technical innovation system's creating and efficient running.

In the course of running the system of technical innovation in textile industry, all the innovational resources get together in the company, and get the new combination which is based on the textile company, and then achieve the purpose of improving company's main competitive capabilities and economical benefits. Whether the technical of innovation in textile industry are high or not is the gist that could judge the running status of the whole technical innovation system of textile industry. In this condition, creating the judging system of technical innovation capability in textile industry externally and scientifically makes significant effort in a textile company's realizing its advantages and disadvantages, and making suitable innovation strategies, then improve the running efficiency of the whole industry system.

### 1. Picking up the index that can judge the technic innovation capability of textile industry

The technical innovation capability of a textile company is an integer which is formed by many facts. According to the process of technical innovation and the features of textile industry, and in the base of the comprehensive principle, the systemic principle and the feasible principle, we can divide the technical innovation capability of a textile company into many facts, such as policies, innovation resources, market surroundings, information surroundings, people resources, and technical serves agency. After surveying more than one hundred companies, we had created the judging system of technical innovation capability in textile industry.

Table 1. the index that can judge the technical innovation capability of a textile company

The System of Technical Innovation	index
Policy (C1)	Industrial Policy (P1)
	Technical Policy (P2)
	Financial Policy (P3)

	Resource & Surroundings (P4)
	Social Development (P5)
	Employment (P6)
	Other Policy (P7)
Innovation Resource (C2)	R&D Devotion (P8)
	R&D Personnel Devotion (P9)
	None R&D (P10)
	Innovation Risks (P11)
Market(C3)	Market Concept (P12)
	Organization Structure (P13)
	Industry Structure (P14)
	Innovation Efficiency (P15)
	Technical Import(P16)
Information(C4)	Technical Information (P17)
	Flat Of Industrial Technique (P18)
	Information Management (P19)
Human Resource(C5)	Capability Of Enterpriser (P20)
	Ability Of Innovation Personnel (P21)
Broker Serves System (C6)	Broker Serves System (P22)
	Broker Serves Manager System (P23)
	Broker Serves Organization (P24)
	Brokers (P25)

**2. Confirming the model of the judging system of technic innovation capability in textile industry**

First, according to the certain subject function relationship, calculate the results of every index. In the process of constructing certain subject, we use the method of model comparing, as to the positive index, its function is

$$A_{it} = \frac{X_{it} - X_{i\min}}{X_{i\max} - X_{i\min}}$$

In the function,  $X_{it}$  is the real value of  $X_i$ , which is the  $no_i$  company's  $no_i$  index;  $X_{i\min}$  is the min value of  $X_i$ , which the  $no_i$  index of the sample textile company.  $X_{i\max}$  is the max value of  $X_i$ , which the  $no_i$  index of the sample textile company.  $A_{it}$  is the value of  $x_i$ , which is the  $no_i$  index of  $no_i$  Textile Company.

Second, confirm index's average.

Third, calculate the sample textile company's average score.

To be convenient, we can use the method of linearity average to calculate the scores of every sample textile companies. When index judging system are  $X_1, X_2, \dots, X_{p-1}, X_p$ , and there are P textile companies judging, in this condition, the formula is

$$Z_i = \sum_{i=1}^t w_i A_{it}$$

In this formula,  $W_i$  is the average of the  $no_i$  index;  $Z_i$  is the average scores that  $no_i$  Textile Company gets.

Forth, compare in accordance to scores that every company gets, and judge

**3. Assessing the relative average of system of technic innovation capability in textile industry**

We use the analytic hierarchy process, AHP for short, to confirm the average. Our country's textile industry should optimize the effect of technical innovation to the largest extent. To achieve this goal, we should consider policy, system surroundings, market surroundings, resource supporting surroundings, people resource surroundings and information supporting surroundings. However, those facts are related to some subsidiary facts. So, the judging levels are divided into two parts in

this essay, the first is  $c_i$  and the second is  $p_i$ .

Based on a large number of researches towards all kinds of textile companies, we collect the survey results. According to the analytic hierarchy process, we form matrix to the facts of all levels to confirm the average fact in the system. Then, we compare every fact's relative importance degree with each other, and we can get the matrixes, A—Ci, C1—Pi, C2—Pi, C3—Pi, C4—Pi, C5—Pi, C6—Pi

Table 2. Matrixes A—Ci

A	c1	c2	c3	C4	c5	c6	wi	$\lambda_{\max}=6.25146$
c1	1	1/2	2	4	3	5	0.266171	
c2	2	1	3	5	4	6	0.360618	
c3	1/2	1/3	1	3	2	3	0.168871	
c4	1/4	1/5	1/3	1	1/2	3	0.056386	
c5	1/3	1/4	1/2	2	1	2	0.104471	
c6	1/5	1/6	1/3	1/3	1/2	1	0.043506	

Table 3. Matrixes C1—Pi

c1	p1	p2	p3	p4	p5	p6	p7	wi	$\lambda_{\max}=7.3373$
p1	1	4	2	3	5	5	6	0.295959	
p2	1/4	1	1/3	1/2	2	3	4	0.126162	
p3	1/2	3	1	2	4	5	6	0.244735	
p4	1/3	2	1/2	1	3	4	4	0.168848	
p5	1/5	1/2	1/4	1/3	1	2	3	0.082906	
p6	1/5	1/3	1/5	1/4	1/2	1	2	0.051034	
p7	1/6	1/4	1/6	1/4	1/3	1/2	1	0.030355	

Table 4. Matrixes C2—Pi

c2	p8	p9	p10	p11	wi	$\lambda_{\max}=4.091498$
p8	1	3	6	3	0.4756678	
p9	1/3	1	4	1	0.2317356	
p10	1/6	1/4	1	1/4	0.060983	
p11	1/3	1	4	1	0.2317356	

Table 5. Matrixes C3—Pi

C3	p12	p13	p14	p15	p16	wi	$\lambda_{\max}=5.028566$
p12	1	1	1/3	1/4	1/4	0.067412	
p13	1	1	1/2	1/4	1/5	0.070188	
p14	3	2	1	1/2	1/2	0.166548	
p15	4	4	2	1	1	0.28551	
p16	4	5	2	1	1	0.309303	

Table 6. Matrixes C4—Pi

C4	p17	p18	p19	wi	$\lambda_{\max}=3.049611$
p17	1	1/4	3	0.270701	
p18	4	1	5	0.636943	
p19	1/4	1/5	1	0.092357	

Table 7. Matrixes C5—Pi

c5	p20	p21	wi	$\lambda_{\max}=2$
p20	1	2	0.666667	
p21	1/2	1	0.333333	

Table 8. Matrixes C6—Pi

c6	p22	p23	p24	p25	wi	$\lambda_{\max}=4.04518$
p22	1	3	1	4	0.3731343	
p23	1/3	1	1/5	1	0.1050304	
p24	1	5	1	3	0.4145937	
p25	1/4	1	1/3	1	0.1071034	

$\lambda_{\max}$  — the Max Character value      CR — the index of accordance

$$AW = \lambda_{\max} W \qquad \lambda_{\max} = \sum_{i=1}^n \frac{(AW)_i}{nW_i} \qquad CR = \frac{\lambda_{\max} - n}{n - 1}$$

	CR <sub>A</sub>	CR <sub>C1</sub>	CR <sub>C2</sub>	CR <sub>C3</sub>	CR <sub>C4</sub>	CR <sub>C5</sub>	CR <sub>C6</sub>
	0.00091	0.041338255	0.034269	0.006376	0.047703	0	0.016922

CR<0.1, it means all the consequence is satisfied.

ind ex	c1	c2	c3	c4	c5	c6	the average of the index	compositor
p1	0.295959						0.078776	4
p2	0.126162						0.033581	12
p3	0.244735						0.065141	6
p4	0.168848						0.044943	9
p5	0.082906						0.022067	14
p6	0.051034						0.013584	19
p7	0.030355						0.00808	22
p8		0.475667					0.171534	1
p9		0.231735					0.083568	2
p10		0.060983					0.021992	15
p11		0.231735					0.083568	3
p12			0.067412				0.011384	21
p13			0.070188				0.011853	20
p14			0.166548				0.028125	13
p15			0.28551				0.048214	8
p16			0.309303				0.052232	7
p17				0.270701			0.015264	18
p18				0.636943			0.035914	10
p19				0.092357			0.005208	23
p20					0.666667		0.069647	5
p21					0.333333		0.034824	11

p22						0.373134	0.016233	17
p23						0.105030	0.004569	25
p24						0.414593	0.018037	16
p25						0.107103	0.00466	24

We can find from the total compositor, those facts can be made in order from high influence made to the technical innovation of textile industry to low influence: R&D devotion, R&D personnel devotion, innovation risks, industrial policy, capability of enterpriser, financial policy, technical import, innovation efficiency, resource surroundings, flat of industrial technical, ability of innovation personnel, technical information, people obtaining employment, system structure, market concept, other policies, information management, brokers, and broker serves manager system. All these facts react and are related with each other, and influence the technical innovation abilities of our country's textile industry. Through the judge of textile companies, we can judge of a certain company's ability of technical innovation better, and give the gist to the companies for them further development.

**References**

Chang, Yuanchieh & Chen, Minghuei. (2004). Comparing approaches to systems of innovation: the knowledge perspective. *Technology in Society*. Vol.26:17-37.

S. Chung. (2002). Building a national innovation system through regional innovation systems. *Technovation*. Vol.22:485-491.