Assessment of Taiwan's Growth and Current Competitiveness

CHU, Yun-eng, KAO, Yuang-kuang

Summary

The World Economic Forum assesses national competitiveness on the basis of three indexes: science and technology, public institution and system, and macroeconomic environment. Two more indexes – enterprise competitiveness and infrastructure construction – are included in an assessment of Taiwan's growth and current competitiveness. The resulting evaluation scheme comprises five factor indexes: science and technology, public institution and system, macroeconomic environment, enterprise competitiveness, and infrastructure construction.

The Delphi Method is adopted for this survey. Five groups of advisors have chosen by as many groups of scholars and experts as the respondents in the survey. Altogether 150 respondents have been selected.

The assessment of Taiwan's growth and current competitiveness on the basis of the five factor indexes results in an overall average rating of 4.9747. In two of them, public institution and system and macroeconomic environment, the scores are below the average. The scores in the other three – science and technology, enterprise competitiveness, and infrastructure construction – are above the average.

The WEF evaluation indexes are applied for a comparison in competitiveness among six nations (regions) in East Asia (Japan, South Korea, Taiwan, Hong Kong, Singapore and China). Their standings, as found in this study, are as follows:

- 1. Technology Index: Japan, South Korea, Taiwan, Singapore, Hong Kong and China.
- 2. Public Institution and System Index: Singapore, Japan, Hong Kong, Taiwan, South Korea and China.
- 3. Macroeconomic Environment Index: Singapore, South Korea, China, Hong Kong, Taiwan, and Japan.

General Advisor	Chu, Yun-peng	President, Jin Wen Institute of Technology					
General Monitor	Kao, Yuang-kuang	M.E.P.A Executive Director, College of Social Sciences, National Chengchi University					
Director	Liu, Pei-yi	Assistant Professor, Hsuan Chuang University					
Technology Index Panel	Chien, Chao-hsin	Lecturer, Da Han Institute of Technology					
Director	Song, Sheau-yuan	Professor and Chairman , Center for General					
Public Institution and		Education, Central Police University					
System Index Panel	Kuo, Chung-ling	Lecturer, Kuang Wu Institute of Technology					
Director	Chao, Pi-hua	Associate Professor, Soochow University					
Macroeconomic	Yu, Yi-wen	Lecturer, National Taipei College of Business					
Environment Index Panel							
Director	Hsu, Shu-ming	Associate Professor, Taipei Municipal Teachers					
Enterprise Competitiveness		College					
Index Panel	Wu, Ta-ping	Lecturer, Jin Wen Institute of Technology					
Director	Liu, Teng-chung	Dean for Student Affairs, Kang Ning Jr. College of					
Infrastructure Construction		Nursing					
Index Panel	Niu, Tso-chien	Lecturer, Providence University					

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.Background

With the forthcoming of the Earth Village, the commodities, services, information, technology, manpower and capital are moving from country to country at a fast speed. Each nation will have to work on promoting its national competitiveness so as to take a position here. National competitiveness is an ability of a nation to create and accumulate national wealth. The stronger the competitiveness is, the more the national wealth will become, vice versa. The units to create the national wealth include individuals, enterprises and the governments. Governments can perfect legal system, strengthen financial system, reform administration and improve infrastructure, thereby creating the sustainable environment in which enterprises operate, arouse the vigor of non-governmental societies, eventually for national sustainable development.

As regards the definition of the national competitiveness, according to Michael E. Porter, of Harvard University, it means that a nation has a good industrial development environment, thus ensure its ability to obtain competitive advantage. So how to raise productivity is an essential factor to strengthen competitiveness¹. According to International Institute for Management Development located in Loussane, Switzerland, the national competitiveness means an ability of a nation to create added value and accumulate national wealth 2 . However, according to World Economic Forum, loated Geneva, Switzerland , national competitiveness refers to an overall ability of a nation in the high sustained economic growth rate and high national income 3 .

Since the national competitiveness is differently defined, different patterns are employed in its rating principles, rating indexes and index statistical data application. Of the patterns, the annual competitiveness reports produced by WEF and IMD have been given high weight on by the governments and enterprises, and used as their reference for decision making. So they are the most authoritative.

National competitiveness is an ability to assess whether a nation has an environment favorable for enterprises to maintain its competitiveness, thus obtain the sustainable development of the whole nation. In this case, rating indexes and methods must be expanded, so that their assessment results will be representative and generally accepted. Both WEF and IMD employ measure-based Multiple Index Overall Rating as their rating pattern for national competitiveness assessment. Their index pattern employs multi-story Tree-like Structure. The first story is overall national competitiveness. The second story is the competitiveness of major factors rating indexes. The third story is the competitiveness of sub-factor rating index. The fourth story is the competitiveness of the components rating of the subindex.

The calculation method employed by WEF and IMD for national competitiveness rating index is step integration. That is, the rating values of each component index from all the nations are calculated by weighted average method, to obtain the rankings of each nation in subindex and major index. Thus the global ranking in the overall competitiveness is given. The two organizations are quite subjective on weighted average method and weighted average set, thus naturally some controversies often arise among the rated nations.

WEF report has revealed the rankings of all the economies on two major factor indexes. In addition to the growth competitiveness index of economic growth potential in the next five years, it describes current

¹ Michael E. Porter, The Competitive Advantage of Nations, New York: The Free Press, 1990.

² IMD, The World Competitiveness Yearbook 2001.

³ WEF, The Global Competitiveness Report 2001-2002.

competitiveness index of the current productivity and economy from economical angle. Of them, growth competitiveness index is divided into three major factor indexes, i.e. science and technology, public institution and system, and macroeconomic environment. The current competitiveness index introduced in 2000 is also divided into two major factor indexes, i.e, enterprise operation and strategy maturity and quality of business environment. Each major factor index is composed of subindexes and component indexes. This project is based on the WEF assessment design slightly corrected. It divides Taiwan's Growth and Current Competitiveness into 5 major factor indexes for assessment, namely, science and technology, public institution and system, macroeconomic environment, enterprise competitiveness, and infrastructure construction. Among them, the former three items respond to the Growth Competitiveness Index of the WEF and the latter two items respond to the Current Competitiveness Index of the WEF. Therefore, for Taiwan's growth and current competitiveness, the index structure for the assessment is illustrated as follows (Table 1):

	Major factor index	Subindex and compone indexes	ent index under ma	ajor factor	Remarks		
		Subindices	Component	indices			
		Education	8				
		Patents	6		5 subindices		
ب	Technology index	Information	12				
Taiwan's growth and current competitiveness index		Government	11		49 component indices		
'an'		Enterprises	12				
s gr		Personnel	8				
owt	Public institution and	Quality	6		4 subindices		
h an	system index	Fairness	12		34 component indices		
d cu		Efficiency	8				
urrer	Macroeconomic	Market	14		3 subindices		
it co	environment index	Society	14				
mpe		Government	8		36 component indices		
etiti		Human resource	2				
vene		Marketing	3				
SS i	Enterprise	R&D	4		6 subindices		
nde	competitiveness index	Finance	1		14 component indices		
×		Information	1				
		Operation strategy	3				
		Environment	5				
	Infrastructure	safety			3 subindices		
	construction index	Quality		28 component indices			
		Fairness	3				

 Table 1
 Taiwan's Growth and Current Competitiveness Index Structure

1.Methodology

The project adopts Delphi Method, which is based on the following basic principles:

- Structuring of information flow: In order to have an effective communication among participants, Delphi Method offers a kind of structured infomration flow, featuring repeated investigations by way of a continuous structured questionnaire.
- (2) Anonymity for the participants' decisions. Delphi Method offers a series of inquiries, usually by means of questionnaires. Each subsequent inquiry is accompanied by information regarding the preceding round of replies. It is a kind of research method existing between questionnaire and meeting.
- (3) Expert judgment. After each survey, the respondents make new judgments based on feedback materials. Repeat such steps until the opinion discrepancies

between experts are reduced to minimum level. The final conclusion and opinion analysis presented by the participants can reflect their common recongnition as well as their different opinion areas.

2.Procedures

The respondents of this assessment project consist of 5 groups of scholars and experts selected by 5 groups of advisors (Table 2). The assessment for each major factor index requires 30 experts. There are a total number of 150 scholars and experts selected for the assessment of Taiwan' s growth and current competitiveness (Tables $1 \sim 5$). Their specialty background covers management, economy, law, politics, society and education. They work in 17 different departments and institutes. For the experts and scholars who accepted the invitations as the respondents to the questionnaire, please see Table 3, Table 4, Table 5, Table 6 and Table 7.

Full Names	Abbreviations
Academia Sinica	SINICA
Chinese Culture University	PCCU
Fu Jen Catholic University	FJU
National Central University	NCU
National Cheng Kung University	NCKU
National Chengchi University	NCCU
National Chiao Tung University	NCTU
National Chung Cheng University	CCU
National Sun Yat-Sen University	NSYSU
National Taipei University	NTPU
National Taiwan University	NTU
National Tsinghua University	NTHU
Soochow University	SCU
Tamkang University	TKU
Tunghai University	THU

Abbreviations of Institutions

	Table 2 List of Advisors							
	Advisors of Technology Index Panel							
Chen, Yu -wu	Former President, Chuang-Shan Institute of Science and Technology							
Chao, Pi-hua	Chao, Pi-hua Associate Professor, Department of Social Work, Soochow University							
	Advisors of Public Institution and System Index Panel							
Chou, Yu -jen	Professor, Department of Public Administration & Policy, National Taipei University							
Chiang, Min-hsiu	Professor, Department of Public Administration, National Chengchi University							
	Advisors of Macroeconomic Environment Index Panel							
Kao, An-pang	Dean, College of Social Sciences, National Chengchi University							
Cheng, Jen-hung	Secretary General, Consumers' Foundation, Taiwan							
Huang, Jr-tsung	Assistant Professor, Sun Yat-Sen Graduate Institute of Social Sciences and Humanities							
	Advisors of Enterprise Competitiveness Index Panel							
Jacob Y.H. Jou	Dean, College of Business Administration, National Chiayi University							
Cheng, Hsing-ti	Professor, Department of Public Administration, National Chengchi University							
	Advisors of Infrastructure Construction Index Panel							
Liang, Chi-yuan	Research Fellow, Institute of Economics, Academia Sinica							
Feng, Cheng-ming	Professor, Institute of Traffic and Transportation, National Chiao Tung University							
Chen, Yin-yan	Chairman, Department of Political Science, National Chengchi University							

Table 2List of Advisors

Schools	NTU	NCCU	TPU	SCU	PCCU	NTHU	NCTU	CCU	NCKU	NSYSU	Total
Number of Respondents	4	6	1	2	1	2	2	5	5	1	30
Number of respondents selected by advisors	24	25	4	5	4	5	4	15	6	8	100
Percentage	16.67%	24%	25%	40%	25%	40%	50%	33.33%	83.33%	12.5%	30%
Schools	NTU	NCCU	TPU	SCU	PCCU	NTHU	NCTU	CCU	NCKU	NSYSU	Total
Departments and institutes in which respondents work	4	6	1	2	1	1	1	4	3	1	24
Number of respondents	4	6	1	2	1	1	1	4	3	1	24
Number of departments and institutes selected by advisors		10	3	4	4	2	1	6	3	4	46
Number of respondents selected by advisors	9	10	3	4	4	2	1	6	3	4	46
Percentage	44.44%	60%	33.33%	50%	25%	50%	100%	66.67%	100%	25%	52.17%

 Table 3 Technology Index Questionnaire

Schools	NTU	NCCU	TPU	SCU	PCCU	SINICA	THU	CCU	NSYSU	TOTAL
Number of respondents	5	6	4	4	2	2	1	1	5	30
Number of respondents selected by advisors	53	47	19	14	5	2	11	8	9	168
Percentage	9.43%	12.77%	21.05%	28.57%	40%	100%	9.09%	12.50%	55.56%	17.86%
Schools	NTU	NCCU	TPU	SCU	PCCU	SINICA	THU	CCU	NSYSU	TOTAL
Departments and institutes in which respondents work	3	3	1	3	2	2	1	1	3	19
Number of departments and institutes selected by advisors	7	8	2	4	3	2	1	2	3	32
Percentage	42.86%	37.50%	50%	75%	66.67%	100%	100%	50%	100%	59.38%

Table 4 Public Institution and System Index Questionnaire

Table 5 Macroeconomic Environment Index Questionnaire

Table 5 Macrocconomic Environment muck Questionnane												
Schools	NTU	NCCU	TPU	SCU	FJU	SINICA	NTHU	THU	CCU	NCKU	NSYSU	TOTAL
Number of respondents	3	9	1	3	2	2	1	1	5	2	1	30
Number of respondents selected by Advisors	26	27	8	5	14	4	3	4	10	3	3	107
Percentag	11.54%	33.33%	12.5%	60%	14.29 %	50%	33.33%	25%	50%	66.67 %	33.33%	28.04%
Schools	NTU	NCCU	TPU	SCU	FJU	SINICA	NTHU	THU	CCU	NCKU	NSYSU	TOTAL
Departments and institutes in which respondents work	3	6	1	2	1	1	1	1	3	2	1	22
Number of departments and institutes selected by advisors	9	11	3	3	1	3	2	3	4	2	2	43
Percentage	33.33%	54.55%	33.33 %	66.67 %	100%	33.33%	50%	33.33 %	75%	100%	50%	51.16%

Schools	NTU	NCCU	FJU	SINICA	NCU	THU	CCU	NCKU	NSYSU	TOTAL
Number of respondents	5	5	4	4	2	1	5	2	2	30
Number of respondents selected by advisors	58	43	34	25	16	2	10	10	22	220
Percentage	8.62%	11.63%	11.76%	16%	12.50%	50%	50%	20%	9.09%	13.64%
School	NTU	NCCU	FJU	SINICA	NCU	THU	CCU	NCKU	NSYSU	TOTAL
Departments and institutes in which respondents work	3	3	3	1	2	1	3	2	2	20
Number of departments and institutes selected by advisors	11	11	3	3	3	2	4	5	6	48
Percentage	27.27%	27.27%	100%	33.33%	66.67%	50%	75%	40%	33.33%	41.67%

 Table 6 Enterprise Competitiveness Index Questionnaire

 Table 7
 Infrastructure Construction Index Questionnaire

Tuble / Influbric Constitución Index Questionnaire														
Schools	NTU	NCCU	SCU	PCCU	TKU	SINICA	NTHU	NCTU	NCU	THU	CCU	NCKU	NSYSU	TOTAL
Number of respondents	7	2	2	1	1	2	1	3	2	1	2	4	2	30
Number of respondents selected by advisors	17	15	5	5	6	8	2	7	5	2	5	9	6	97
Percentage	41.18 %	13.33 %	40%	20%	16.67 %	25%	50%	42.86 %	40%	50%	40%	44.44 %	33.33%	30.93%
Schools	NTU	NCCU	SCU	PCCU	TKU	SINICA	NTHU	NCTU	NCU	THU	CCU	NCKU	NSYSU	TOTAL
Departments and institutes in which respondents work	5	1	2	1	1	1	1	3	2	1	2	3	2	25
Number of departments and institutes selected by advisors		12	5	5	5	3	2	5	4	2	5	6	5	70
Percentage	45.45 %	8.33%	40%	20%	20%	33.33%	50%	60%	50%	50%	40%	50%	40%	35.71%

We have carried out two surveys for this project. The first survey took place on Jan.19-29, 2003. We collected 141 copies of questionnaires at the rate of 94%, including 29 copies for technology index, 28 copies for public institution and system index, 27 for macroeconomic environment index, 30 for enterprise competitiveness and 27 for infrastructure construction. The second survey took place on Jan.31- Feb.20, 2003. We collected 143 copies of questionnaires at the rate of 95.33%, including 29 copies for technology index, 27 for macroeconomic environment index, and 30 for enterprise competitiveness, 28 for infrastructure

construction.

Each index was evaluated at full score of 10. The higher the score is, the better this index performs and the higher the competitiveness is, and vice versa. By 10-score expression, it suggests that 10 scores indicates competitiveness extremely high. 9 scores indicates very high towards extremely high, 8 scores for very high, 7 scores for higher toward very high, 6 scores for higher, 5 scores for Ordinary, 4 scores for lower, 3 scores for lower towards very low, 2 scores for very low, one score for very low to very low and Zero for quite low (see Fig.1 below).

				Fig.1	l 10-	Score 2	Expr	ession			
0	1	2	3	4	5	6		7	8	9	10
Quite low +	Very low to quite low	Very low	Lower toward very low	Lower	Ordinary	Higher -	Higher towards Very high	r Very high	Very high toward extremely high	- Extremely hgih - +	

3. Overall Assessment of Taiwan's Growth and Current Competitiveness

From the above, the project has obtained the average value of 4.9747 based on overall assessment on five major factor indexes, including technology, public institution and system, enterprise competitiveness, infrastructure construction, and macroeconomic environment. This suggests that the performance of **Taiwan's Growth and Current Competitiveness is**

Ordinary. The competitiveness performance of the 5 major factor indexes is described in 5 chapters as follows.

. Technology Index Assessment

1.Quantitive Analysis Results for Technology Index

Technology index is divided into 5 subindexes,

namely, education, patents, information, government and enterprise. Of them, education includes 8 component indexes; patents includes 6 component indexes; information includes 12 component indexes; government includes 11 component indexes; and enterprise includes 12 component indexes. Technology index contains a total of 49 component indexes. The statistic value of technology index and all of its subindexes is obtained based on its component index statistics. Analysis results show that average value of assessment on technology index is 5.2023. This indicates that the technology competitiveness under **Taiwan's growth and current competitiveness is Ordinary**. For the statistics, please see Table 8.

Number	Valid cases	24
	Missing cases	5
Mean		5.2023
Median		5.2803
Mode		3.53a
Standard D	eviation	.82233
Minimum V	/alue	3.53
Maximum	Value	6.7
Percentile	25	4.8890
	50	5.2803
	75	5.4867

 Table 8 Technology Index Statistics

a. contains several modes, and the value shown here is the min.

2. Quantitative Analysis Results of Subindices under Technology Index

Education under technology index is evaluated at 5.7545 on average, which suggests education competitiveness higher. Patent is evaluated at 5.0494 on average, which suggests its competitiveness

Ordinary. Information is evaluated at 5.7619 on average, which suggests its competitiveness higher. Government is evaluated at 4.6477 on average, which suggests its competitiveness Ordinary. Enterprise is evaluated at 4.4483 on average, which suggests its competitiveness lower. For statistics, please see Table 9, Table 10, Table 11, Table 12, Table 13, and Fig.2.

Table 9 Technology Index--- Education Subindex Statistics

Number	Valid cases	28
	Missing cases	1
Mean		5.7545
Median		5.6875
Standard I	Deviation	.95409
Percentile	25	5.1563
	50	5.6875
	75	6.0938

Number	Valid cases	27
	Missing cases	2
Mean		5.0494
Median		5.1667
Standard D	1.22894	
Percentile	25	4.3333
	50	5.1667
	75	5.6667

Table 10 Technology Index— Patent Subindex Statistics

Table 11	Technology	Index-	-Information	Subindex	Statistics
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Number Valid cases	28
Missing cases	1
Mean	5.7619
Median	5.7500
Standard Deviation	.71604
Percentile 25	5.2500
50	5.7500
75	6.1667

Table 12 Technology Index—Government Subindex Statistics

Number	Valid cases	28
	Missing cases	1
Mean		4.6477
Median		4.7727
Standard De	.89309	
Percentile	25	4.2045
	50	4.7727
	75	5.0682

Table 13 Technology Index—Enterprise Subindex Statistics

Number	Valid cases	29
	Missing cases	0
Mean		4.4483
Median		4.4167
Standard D	eviation	.78535
Percentile	25	3.9583
	50	4.4167
	75	4.9583

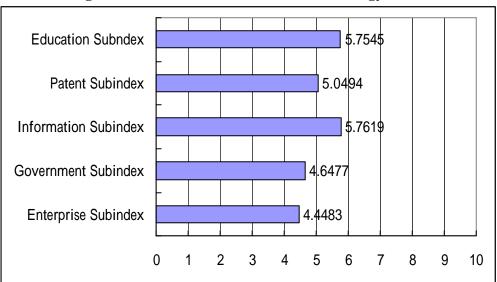


Fig.2 Subindexes Statistics under Technology Index

Since the aggregate average of 5 subindexes is 5.2023, we can see that in technology index, Taiwan's growth and current competitiveness was adversely affected by the subindexes of patent, government and enterprise.

3. Quantitative Analysis Results of Component Indices under Technology Index

Please see Table 14, Fig.3 to Fig.7. Competitiveness assessment is measured by the average, with median and Mode as the reference value.

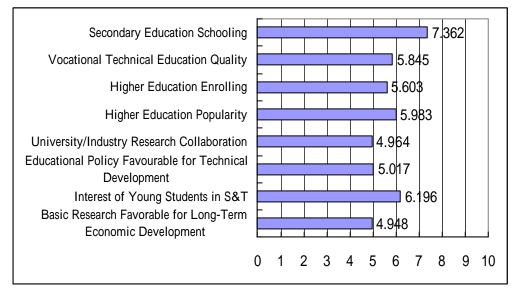
Title	Index	Average	Assessment	Median	Assessment	Mode	Assessment
1. Educa	1. Education sub-index						
1	Secondary education schooling	7.362	Higher toward very high	8	Very high	8	Very high
2	Vocational Technological education quality	5.845	Higher	6	Higher	6	Higher
3	Higher education enrollment	5.603	Higher	6	Higher	6	Higher
4	Higher education popularity	5.983	Higher	6	Higher	6	Higher
5	University/industry research collaboration	4.964	Ordinary	5	Ordinary	5	Ordinary
6	Educational policy favorable for S&T development	5.017	Ordinary	5	Ordinary	5	Ordinary
7	Interest of young students in S&T	6.196	Higher	6	Higher	6	Higher
8	Basic research favorable for long-term economic development	4.948	Ordinary	5	Ordinary	5	Ordinary

 Table 14 Component Indices Statistics under Technology Index

2 Patent	subindex						
2. 1 atem 9	Patent right protection	3.914	Lower	4	Lower	4	Lower
10	Domestic patent right	4.155	Lower	4	Lower	5	Ordinary
10	Patent acquisition	5.339	Ordinary	6	Higher	6	Higher
12	Overall ranking of number of international patents	5.946	Higher	6	Higher	6	Higher
13	Average ranking of international patent rights	6.259	Higher	7	Higher toward very high	7	Higher toward very high
14	Technological sophistication	4.589	Ordinary	5	Ordinary	6	Higher
3. Inform	nation subindex				•		•
15	International phone cost	3.983	Lower	4	Lower	3	Lower toward very low
16	Indoor telecommunication popularity	7.190	Higher toward very high	8	Very high	8	Very high
17	Mobile communication	8.328	Very high	8	Very high	8	Very high
18	Internet access	5.845	Higher	6	Higher	5	Ordinary
19	Broad band utilization	5.534	Higher	5	Ordinary	5	Ordinary
20	Website proportion	5.125	Ordinary	5	Ordinary	5	Ordinary
21	Internet access in schools	6.293	Higher	6	Slightly high	6	Higher
22	Broad band networking cost	6.259	Higher	6	Higher	6	Higher
23	Quality of competition in ISP sector	4.052	Lower	4	Lower	4	Lower
24	PC popularity	5.707	Higher	6	Higher	5	Ordinary
25	ICT standardization	5.500	Higher	5	Ordinary	5	Ordinary
26	ICT internationalization	5.500	Higher	6	Higher	6	Higher
4. Gover	nment subindex						-
27	Overall expenditures on R&D	3.362	Lower towards very low	3	Lower towards very low	2	Very low
28	Rent and tax preferential treatment	4.948	Ordinary	5	Ordinary	5	Ordinary
29	Industrial water cost	4.672	Ordinary	5	Ordinary	5	Ordinary
30	Industrial electricity cost	4.741	Ordinary	5	Ordinary	5	Ordinary
31	Domestic R&D manpower	3.603	Lower	4	Lower	4	Lower
32	R&D manpower growth	4.017	Lower	4	Lower	5	Ordinary
33	R&D expenditure growth	3.741	Lower	4	Lower	4	Lower
34	Laws relating to ICT use	3.983	Lower	4	Lower	4	Lower
35	Government Prioritization of ICT	6.411	Higher	6	Higher	6	Higher
36	Production and technological development Prioritization	6.362	Higher	6	Higher	6	Higher
					1		T

38	Enterprise R&D reseachers	5.017	Ordinary	5	Ordinary	6	Higher
39	Company spending on research and development	3.534	Lower	3	Lower towards very low	2	Very low
40	R&D expenditure percentage	3.603	Lower	4	Lower	4	Lower
41	Number of R&D personnel	4.121	Lower	4	Lower	5	Ordinary
42	Financial resources	3.984	Lower	4	Lower	4	Lower
43	Technical cooperation between enterprises	4.397	Lower	4	Lower	4	Lower
44	R&D growth	4.534	Ordinary	5	Ordinary	5	Ordinary
45	Increased R&D expenditure	4.224	Lower	4	Lower	4	Lower
46	Firm-level innovation	5.362	Ordinary	6	Higher	6	Higher
47	Gap between enterprise circle and advanced countries in R&D expenditure	6.224	Higher	6	Higher	6	Higher
48	Internet services	4.328	Lower	4	Lower	4	Lower
49	Training of technical talents	4.086	Lower	4	Lower	4	Lower

Fig.3 Component Indices Statistics under Education Subindex



The average of education subindexes is 5.7545, which suggests higher competitiveness. Of the subindex, higher education enrollment, enterprise/school collaboration, educational policies favorable for the technological development and the basic research favorable for long-term economic development are below the average, while the secondary education schooling, vocational technical education quality, higher education popularity and the interest of young students in science and technology are higher than the average.

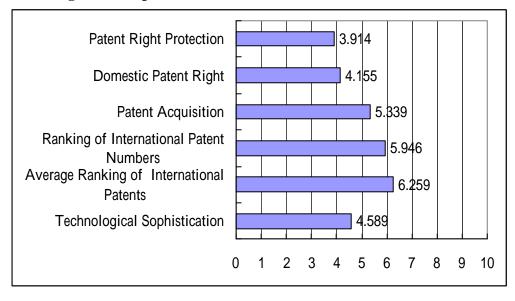
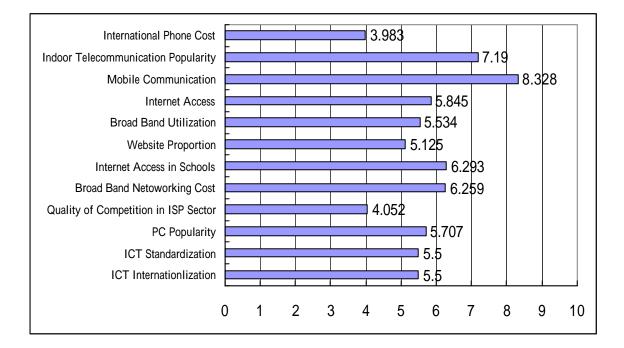


Fig.4 Component Indices Statistics under Patent Subindex

The average of patent subindex is 5.0494, which suggests Ordinary competitiveness. Of the subindex, patent right protection, domestic patent right and national technological level are below the average, while patent acquisition, the ranking of international patent numbers and the average ranking of international patent right are higher than the average.

Fig.5 Component Index Statistics under Information Subindex



The average of information subindex is 5.7619, which suggests higher competitiveness. Of them, International telephone cost, broad band utilization, website proportion, ISP level, personal computer popularity, ICT standardization and ICT internationalization are below the average, while indoor telecommunication popularity, mobile communication popularity, internet access popularity, internet access at school and broad band networking cost are higher than the average.

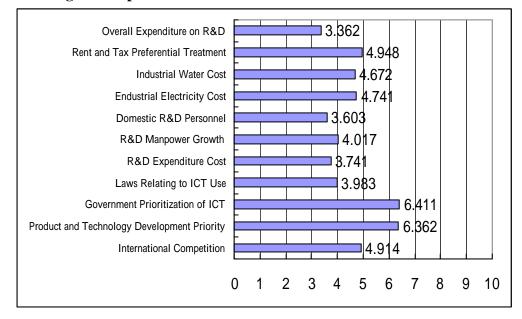
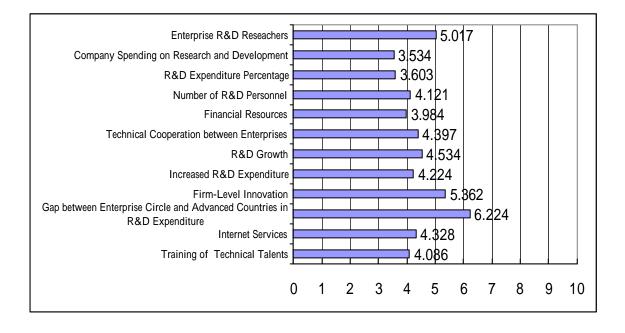


Fig.6 Component Index Statistics under Government Subindex

The average of government subindex is 4.6477, which suggests Ordinary competitiveness. Of the subindex, overall expenditure on R&D, domestic R&D manpower, R&D manpower growth, increased R&D expenditure and governmental decrees to protect technological research and development are below the average, while rent tax preference, industrial water cost, industrial power cost, information development prioritization, production and technological development prioritization and international competition are higher than the average.





The average of enterprise subindex is 4.4483, which suggests lower competitiveness. Enterprise expenditure on R&D, R&D expenditure percentage, the number of enterprise R&D personnel, enterprise financial resources, technological cooperation between enterprises, increased enterprise R&D expenditure, enterprise networking services and the chances for the enterprise to train technicians are below the average, while R&D excellent talents, enterprise R&D growth, enterprise innovation activities and the gap between enterprise circles and advanced nations in R&D expenditures are higher than the average.

. Public Institution and System

Assessment

1. Quantitative Analysis Results for Public Institutions and System Index

Public institutions and system index is composed of 4 subindexes, namely, personnel, quality, fairness, and efficiency. Of the subindexes, personnel contains 8 component indices, quality 6 component indices, fairness 12 component indices and efficiency 8 component indices. The component indices total 34.

The value of public institution and system index and all its subindex are based on their component index statistics. Analysis results show that public institution and system index is evaluated at 4.3500. This indicates that public institution and system competitiveness under <u>Taiwan's growth and current competitiveness</u> is rated as lower. For its statistics, please see Table 15 H

Table 15 Public Institutions and System Index Statistics

Number Valid cases	25
Missing cases	2
Mean	4.3500
Median	4.2813
Mode	4.05
Standard Deviation	.58102
Minimum Value	2.83
Maximum Value	5.56
Percentile 25	4.0417
50	4.2813
75	4.7708

2. Subindex Quantitative Analysis Results under Public Institution and System Index

In Public institutions and system index, the evaluation value of personnel subindex is 4.8889, which suggests Ordinary competitiveness. The evaluation value of quality subindex is 3.1543, which

suggests its competitiveness lower towards very low. The evaluation value of fairness subindex is 5.0733,which suggests Ordinary competitiveness. The evaluation value of efficiency subindex is 4.1389,which suggests lower competitiveness. For statistics, please see Table 16, Table 17, Table 18, Table 19, as well as Fig. 8.

Number	Valid cases	27
	Missing cases	0
Mean		4.8889
Median		4.8750
Standard D	.86764	
Percentile	25	4.1250
	50	4.8750
	75	5.3750

Table 16 Public Institutions and System Index- Personnel Subindex Statistics

Table 17 Public Institutions and System Index – Quality Subindex Statistics

Number	Valid cases	27
	Missing cases	0
Mean		3.1543
Median		3.1667
Standard D	1.04792	
Percentile	25	2.1667
	50	3.1667
	75	3.8333

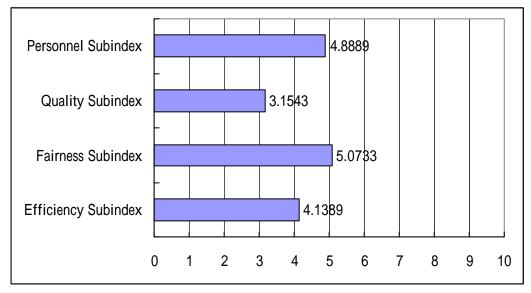
Table 18 Public Institutions and System Index – Fairness Subindex Statistics

Number Valid cases	25
Missing cases	2
Mean	5.0733
Median	5.0833
Standard Deviation	1.02213
Percentile 25	4.7083
50	5.0833
75	5.5417

Number	Valid cases	27
	Missing cases	0
Mean		4.1389
Median		4.2500
Standard D	Deviation	.63580
Percentile	25	3.7500
	50	4.2500
	75	4.6250

Table 19 Public Institution and System Index – Efficiency subindex Statistics





The average of public institutions and system subindexes is 4.35. It is obvious that in public institutions and system, the efficiency and quality are below the average.

3. Quantitative Analysis Results of Component Indices under Public Institution and System

Index

Please see Table 20, and Fig.9 to Fig.12. The competitiveness assessment is measured by the average, with median and mode as the reference values.

Title	Index	Average	Assessment	Median	Assessment	Mode	Assessment
1.Pers	sonnel subindex						
1	Public confidence	2.037	Very low	2	Very low	2	Very low
2	Ability of public servants	4.944	Ordinary	5	Ordinary	4	Lower
3	Performance merit fairness	4.870	Ordinary	5	Ordinary	4	Lower
4	Employment rules	5.889	Higher	6	Higher	6	Higher
5	Employment fairness	5.407	Ordinary	6	Higher	6	Higher
6	Promotion fairness	4.889	Ordinary	5	Ordinary	5	Ordinary
7	Reasonable retirement	5.333	Ordinary	6	Higher	6	Higher
8	Reasonable allowances	5.741	Higher	6	Higher	5	Ordinary
2.Qua	llity subindex						
9	Common ground of governmental policy	3.000	Lower toward very low	3	Lower toward very low	4	lower
10	Parliament legislation meets economic competition needs	2.852	Lower toward very low	3	Lower toward very low	2	Very low
11	Financial deterioration	3.852	Lower	2	Very low	2	Very low
12	Administration quality	3.444	Lower toward very low	4	Lower	4	Lower
13	Objective clearness of policy communication	2.852	Lower towards very low	3	Lower towards very low	2	Very low
14	Conflict between administration and legislation	2.926	Lower towards very low	2	Very low	2	Very low
3. Fai	rness subindex		-				
15	Judicial independence	3.407	Lower towards very low	4	Lower	4	Lower
16	Judicial intervention	6.333	Higher	6	Higher	8	Very high
17	Corruption	4.963	Ordinary	5	Ordinary	5	Ordinary
18	Favoritism in decisions of government officials	4.333	Lower	4	Lower	4	Lower
19	Irregular payments in exports & imports	5.080	Ordinary	5	Ordinary	5	Ordinary
20	Irregular payments in government procurement	6.370	Higher	6	Higher	8	Very high

Table 20	Component	t Index Statistic	s under Public	Institution and	d System Index
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21	Irregular payments in tax collection	5.778	Higher	6	Higher	6	Higher
22	Government procurement fairness	4.370	Lower	4	Lower	4	Lower
23	Election fairness	5.889	Higher	6	Higher	4	Lower
24	Government support for fair trade	5.000	Ordinary	5	Ordinary	5	Ordinary
25	Government service fairness	5.630	Higher	5	Ordinary	5	Ordinary
26	Policy transparency	3.889	Lower	4	Lower	4	Lower
4.Effi	ciency subindex				-	-	
27	Complicated Redtape operation	3.481	Lower towards very low	4	Lower	4	Lower
28	Public services cost	3.815	Lower	4	Lower	4	Lower
29	Government adaptability to economic challenge	3.074	Lower towards very low	3	Lower towards very low	2	Very low
30	Government fiscal stability	3.370	Lower towards very low	3	Lower towards very low	2	Very low
31	Public institution efficiency	4.796	Ordinary	5	Ordinary	5	Ordinary
32	Policy implementation efficiency	4.296	Lower	4	Lower	4	Lower
33	Facilitation of government service	5.444	Ordinary	5	Ordinary	5	Ordinary
34	Ease of access to government information	4.833	Ordinary	5	Ordinary	5	Ordinary

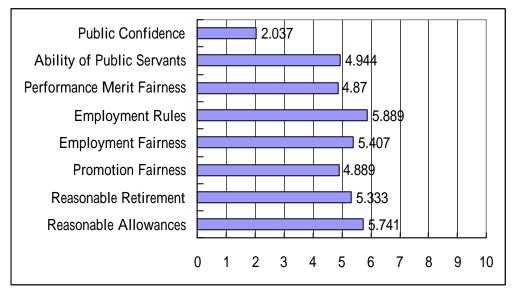


Fig.9 Component Index Statistics under Personnel Subindex

The average of personnel subindexes is 4.8889, which suggests Ordinary competitiveness. Of them, the public confidence and performance merit fairness are below the average, and promotion fairness is equal to the average, while the ability of public servants , permanent employment system, employment fairness, promotion fairness, reasonable retirement and reasonable allowance are higher than average.

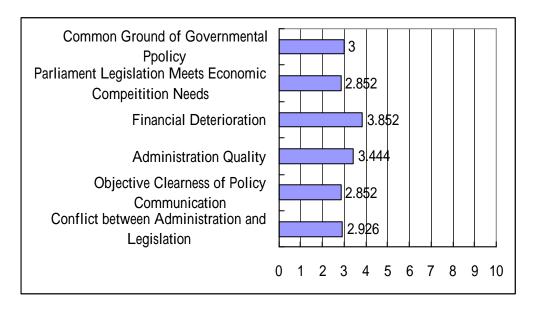


Fig. 10 Component indexes statistics under Quality Subindex

The average of quality subindex is 3.1543, which suggests lower towards very low competitiveness. Of the subindexes, the common ground of governmental policy, legislation meets the needs of economic competition, objective clearness of policy communication and conflict between administration and legislation are below the average, while financial deterioration and administration quality are higher than the average.

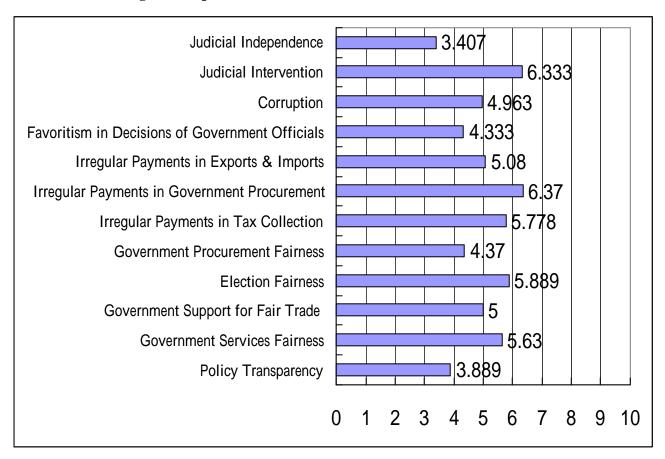


Fig.11 Component Index Statistics under Fairness Subindex

The average of fairness subindex is 5.0733, which suggests Ordinary competitiveness. Of the index, judicial independence, corruption, election fairness, governmental procurement fairness, governmental support for fair trade and policy transparency are below the average, while governmental intervention in judicial system, irregular payment for issuing output license, irregular payment for application for water and electricity, irregular payment for tax collection, election fairness and governmental services fairness are higher than average.

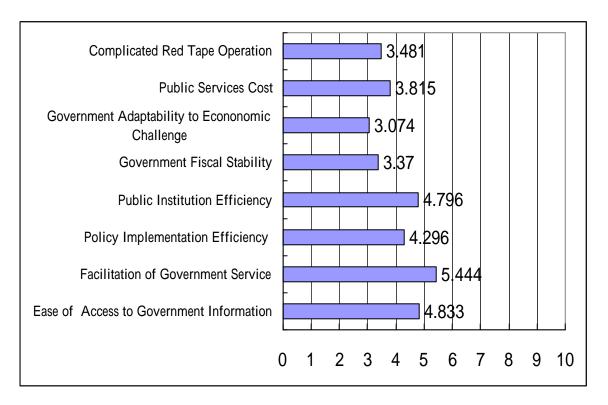


Fig. 12 Component Index under Efficiency Subindex

The average of efficiency subindexes is 4.1389, which suggests lower competitiveness. Of them, the complicated red tape operation, the cost of official duty, the ability of government meeting economical challenge and financial stability are below the average, while public institution efficiency, policy implementation efficiency, facilitation of government services and ease of access to government information are higher than the average.

. Macroeconomic Index Assessment

1. Macroeconomic Environment Index Analysis Results

Macroeconomic environment index is divided into

three subindexes, namely, market, society and government. Of them, market subindex contains 14 component indices, society 14 component indices and Government 8 component indices. Component indices total 36.

The values for macroeconomic environment index and all of its subindices are based on its component indices statistics. The analysis results show that macroeconomic environment index is evaluated at 4.2738. This indicates that in <u>Taiwan's growth and</u> <u>current competitiveness, the competitiveness for the</u> <u>macroeconomic environment is rated as lower</u>. For statistics, please see Table 21.

Number	Valid cases	27
	Missing cases	2
Mean		4.2738
Median		4.4107
Mode		4.23a
Standard I	Deviation	.54839
Minimum	2.99	
Maximum	Nalue	5.05
Percentile	e 25	4.0952
	50	4.4107
	75	4.5357

Table 21 Macroeconomic Environment Index Statistics

a contains several modes, and the value shown here is the min.

2. Subindices Analysis Results under Macroeconomic Environment Index

In macroeconomic environmental index, market subindex is evaluated at 4.1336, which indicates lower market competitiveness. Society subindex is evaluated at 5.1342, which indicates Ordinary social competitiveness. Government subindex is evaluated at 3.5388, which indicates lower governmental competitiveness. For analysis statistics, please see Table 22, Table 23, Table 24 and Fig.13.

 Table 22
 Macroeconomic Environment Index--- Market Subindex Statistics

Number	Valid cases	27
	Missing cases	2
Mean		4.1336
Median		4.1429
Standard De	eviation	.60525
Percentile	25	3.8571
	50	4.1429
	75	4.5714

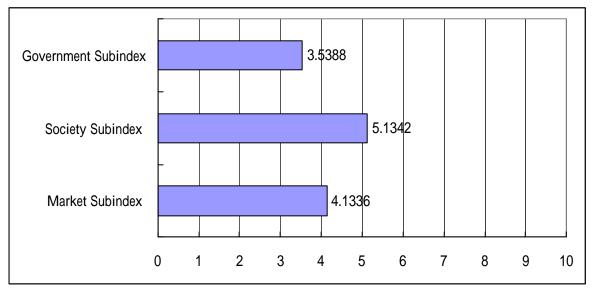
	Table 23	Macroeconomic	Environment	Index	Society	Subindex Statistics
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Number	Valid cases	29
	Missing cases	0
Mean		5.1342
Median		5.1429
Standard D	eviation	.72414
Percentile	25	4.7143
	50	5.1429
	75	5.6071

Number	Valid cases	29
Ν	Missing cases	0
Mean		3.5388
Median		3.6250
Standard D	.65814	
Percentile	25	3.1250
	50	3.6250
	75	3.9375

 Table 24 Macroeconomic Environment Index---Government Subindex Statistics

Fig. 13 Subindices Statistics under Macroeconomic Environment Index



The average of macroeconomic environment subindices is 4.2738. It is obvious that in macroeconomic environment, government and market subindices are below average. Of them, government is the most unfavorable factor.

3. Component Indices Analysis Results of Macroeconomic Environment Index

Please see Table 25, Fig.14 to Fig.16. (The competitiveness assessment is measured by the average, with the median and mode as the reference values.)

Title	Index	Average	Assessment	Median	Assessment	Mode	Assessment
	et Subindex	Twendge	Assessment	Weedlah	Assessment	Mode	Assessment
1	Exchange rate fluctuation	4.776	Ordinary	5	Ordinary	5	Ordinary
2	Exchange rate subsidy	4.648	Ordinary	5	Ordinary	5	Ordinary
3	Financial market openness	4.621	Ordinary	5	Ordinary	4	Lower
4	Soundness of insurance practices	4.017	Lower	4	Lower	4	Lower
5	Soundness of bond markets	3.983	Lower	4	Lower	4	Lower
6	Stock interval transaction	2.552	Lower towards very low	3	Lower towards very low	3	Lower towards very low
7	Access to credit	4.586	Ordinary	4	Lower	4	Lower
8	Attracting foreign capital	4.155	Lower	4	Lower	4	Lower
9	Ease of FDI	4.534	Ordinary	4	Lower	4	Lower
10	Government intervention in market	3.879	Lower	4	Lower	4	Lower
11	Soundness of banks	3.103	Lower towards very low	3	Lower towards very low	3	Lower towards very low
12	International call cost	4.483	Lower	5	Ordinary	5	Ordinary
13	Industrial water	3.793	Lower	4	Lower	3	Lower towards very low
14	Industrial electricity	4.793	Ordinary	5	Ordinary	4	Lower
2. Societ	y Index						
15	Living cost	3.931	Lower	4	Lower	5	Ordinary
16	Manpower utilization	3.966	Lower	4	Lower	5	Ordinary
17	Unemployment rate	3.103	Lower towards very low	3	Lower towards very low	3	Lower towards very low
18	Well-educated people emigrate abroad	4.862	Ordinary	5	Ordinary	4	Lower

Table 25 Component Indices Statistics under Macroeconomic Environment Index

19	Running water drinking	2.000	Very lower	2	Very lower	2	Very lower
20	Living quality	3.690	Lower	4	Lower	4	Lower
21	Inflation	5.414	Ordinary	5	Ordinary	5	Ordinary
22	Higher education enrollment	6.586	Higher toward very high	6	Higher	6	Higher
23	Weight on technical courses	6.397	Higher	7	Higher toward very high	6	Higher
24	Loss resulting from labor disputes	5.052	Ordinary	5	Ordinary	5	Ordinary
25	Mobile phone subscribers	8.466	Very high	9	Very high towards extremely high	9	Very high towards extremely high
26	Social value for hardworking and innovation	6.379	Higher	6	Higher	6	Higher
27	Adaptability to challenge	6.103	Higher	6	Higher	6	Higher
28	Bank saving rate	5.931	Higher	6	Higher	6	Higher
3. Gover	rnment subindex						
29	Governmental subsidy	3.845	Lower	4	Lower	4	Lower
30	Legislation activities meet economic competition	2.603	Lower towards very low	2	Very low	2	Very low
31	Government fiscal management	2.586	Lower towards very low	3	Lower towards very low	2	Very low
32	Recession expectations	2.448	Very low	2	Very low	2	Very low
33	Stable monetary rules	3.414	Lower towards very low	4	Very low	4	Very low
34	Environment laws obstruct enterprise development	4.724	Ordinary	5	Ordinary	5	Ordinary
35	Tax percentage in GDP	4.172	Very low	4	Very low	4	Very low
36	Rent and tax incentives attracting investment	4.517	Ordinary	5	Ordinary	5	Ordinary

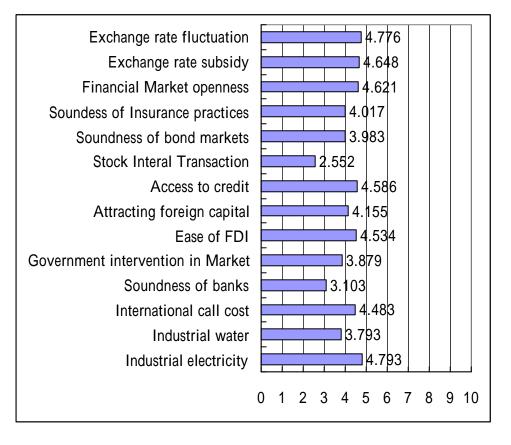


Fig. 14 Component Indices Statistics under Market Subindex

The average of market subindexes is 4.1336, which suggests lower competitiveness. Of the subindexes, soundness of insurance practices, soundness of bond market, the internal transaction of stocks, government intervention in market, soundness of banks and industrial water are below average, while exchange rate fluctuation, exchange rate subsidies, monetary market openness, ease of access to loan, attracting foreign capital, the ease of foreign direct investment, international telephone cost and industrial electricity are higher than average.

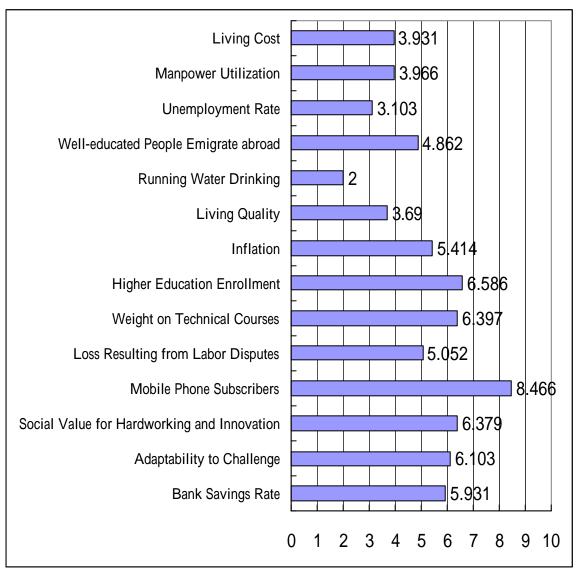


Fig.15 Component Indices Statistics under Society Subindex

The average of society subindices is 5.1342, which suggests Ordinary competitiveness. Of them, living cost, manpower utilization, unemployment rate, well-educated people emigrate abroad, running water drinking, life quality and loss resulting from labor disputes are below average, while inflation, higher education enrollment, weight on scientific courses, mobile telephone subscribers, social value by hardworking and innovation and savings rate are higher than average.

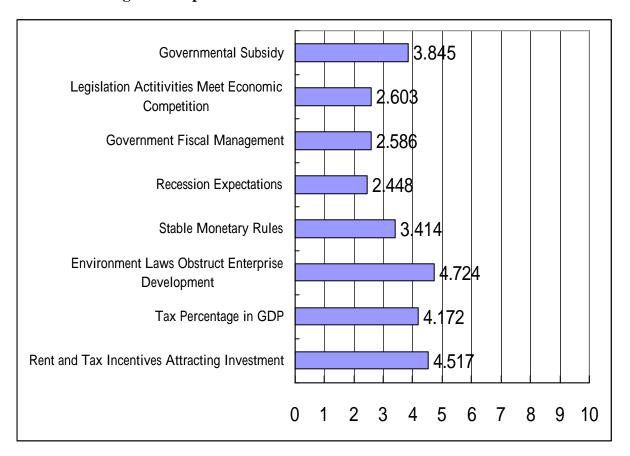


Fig.16 Component Indices Statistics under Government Subindex

The average of government subindexes is 3.5388, which suggests lower competitiveness. Of the subindex, the legislative activities meet economic competitive needs, government fiscal management, government ability in economic challenge and stable financial laws are below average, while government subsidies, environmental protection regulations obstruct enterprise development, tax percentage in GDP and rent and tax incentives attracting investment are higher than average.

. Enterprise Competitiveness Index Assessment

1. Quantitative Analysis Results of Enterprise Competitiveness Index The enterprise competitiveness index is divided into 6 subindices, namely, human resource, marketing, R&D, finance, information and operation strategy. Of them, human resource contains 2 component indices; R&D, 4 component indices; finance 1 component index; information, 1 component index; operation strategy, 3 component indices and marketing, 3 component indices. There are altogether 14 component indices.

The value of the enterprise competitiveness index and all its subindices are based on their component indices statistics. The analysis results show that the evaluation value of the enterprise competitiveness index is 6.0456. This indicates that in **Taiwan's growth and current competitiveness. the enterprise is rated as higher**. For its statistics, please see Table 26.

Number	Valid cases	30
	Missing cases	0
Mean		6.0456
Median		6.0625
Mode		4.11a
Standard 1	.70920	
Minimum	4.11	
Maximum	8.04	
Percentile	25	5.6215
	50	6.0625
	75	6.5069

Table 26 Enterprise Competitiveness Index Statistics

a. contains several modes, and the value shown here is the min.

2. Subindex Quantitative Analysis Results under Enterprise Competitiveness Index

The human resource subindex in the enterprise competitiveness index is evaluated at 6.1167, which suggests higher competitiveness. The marketing is evaluated at 6.8889, which rates its competitiveness as higher toward very high. R&D is evaluated at 6.1292, which suggests R&D competitiveness higher. Finance is evaluated at 4.8500, which suggests Ordinary competitiveness. Information is evaluated at 6.1167, which suggests higher competitiveness. Operation strategy is evaluated at 6.1722, which suggests higher competitiveness. For statistics, please refer to Table 27, Table 28, Table 29, Table 30, Table 31, Table 32 and Fig. 17.

Table 27	Enterprise	Competitiveness	Index	Human	Resource	Subindex Statistics
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Number Valid cases	30
Missing cases	0
Mean	6.1167
Median	6.5000
Standard Deviation	1.14232
Percentile 25	5.5000
50	6.5000
75	6.5000

Number Valid cases	30
Missing cases	0
Mean	6.8889
Median	7.0000
Standard Deviation	.95926
Percentile 25	6.3333
50	7.0000
75	7.6667

Table 28 Enterprise Competitiveness Index —Marketing Subindex Statistics

 Table 29 Enterprise Competitiveness Index — R&D Subindex Statistics

Number Valid cases	30
Missing cases	0
Mean	6.1296
Median	6.1875
Standard Deviation	.78406
Percentile 25	5.7500
50	6.1875
75	6.5000

Table 30	Enterprise	Competiveness	Index	Finance Subindex Statistics
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Number	Valid cases	30
	Missing cases	0
Mean		4.8500
Median		5.0000
Standard De	1.40902	
Percentile	25	4.0000
	50	5.0000
	75	6.0000

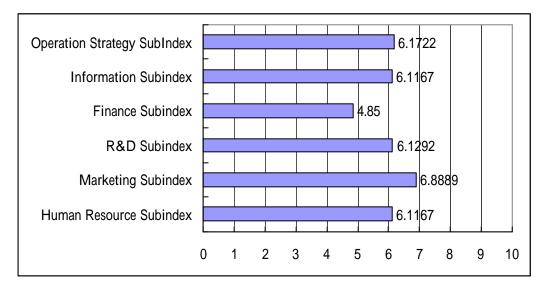
Table 31 Enterprise Competitiveness—Information Subindex Statistics

Number	Valid cases	30
	Missing cases	0
Mean		6.1167
Median		6.0000
Standard De	1.57394	
Percentile	25	5.0000
	50	6.0000
	75	7.0000

Table 32	Enterprise	Competitiveness	Index O	peration S	Strategy	Subindex Statistics

Number Valid cases	30
Missing cases	0
Mean	6.1722
Median	6.3333
Standard Deviation	1.05089
Percentile 25	5.6667
50	6.3333
75	6.6667

Fig.17 Subindex Statistics under Enterprise Competitiveness Index



The average of enterprise competitiveness subindices is 6.0456. It is obvious that in enterprise competitiveness, enterprise finance subindex is below the average. That is to say, the enteprise finance performs poorly.

3. Quantitative Analysis Results of Component

Indices under Enterprise Competitiveness Index

Please refer to Table 33 and Fig.18. Competitiveness evaluation is measured by the average, with median and mode as the reference values.

	Table 33	Enterpris	e Compen	iveness	Subindices	Statist	ics
Title	Index	Average	Assessment	Median	Assessment	Mode	Assessment
1. Huma	an resource subind	lex					
1	Internal merit rules	6.983	Higher toward very high	7	Higher toward very high	7	Higher toward very high
2	Labor dispute	5.250	Ordinary	5	Ordinary	5	Ordinary
2. Mark	eting subindex		ž		ž		
3	Meeting market demands	7.550	Very high	8	Very high	8	Very high
4	Customer satisfaction	7.250	Higher toward very high	8	Very high	8	Very high
5	Market ability	5.867	Higher	6	Higher	6	Higher
3. R&D	subindex						
6	Innovation capability	5.500	Higher	6	Higher	6	Higher
7	R&D capability	4.400	Lower	4	Lower	4	Lower
8	Manufacturing capability	7.517	Very high	8	Very high	8	Very high
9	Production capacity	7.100	Higher toward very high	7.25	Higher toward very high	8	Very high
4. Finan	ce subindex						
10	Fiscal structure	4.850	Ordinary	5	Ordinary	5	Ordinary
5. Inform	nation subindex						
11	Information technology	6.117	Higher	6	Higher	6	Higher
6. Opera	ation strategy subi	ndex		-			
12	Sense of Entrepreneurship	6.483	Higher	7	Higher toward very high	7	Higher toward very high
13	Common value of executives	5.733	Higher	6	Higher	6	Higher
14	Operation strategy	6.300	Higher	6	Higher	6	Higher

 Table 33
 Enterprise Competitiveness Subindices Statistics

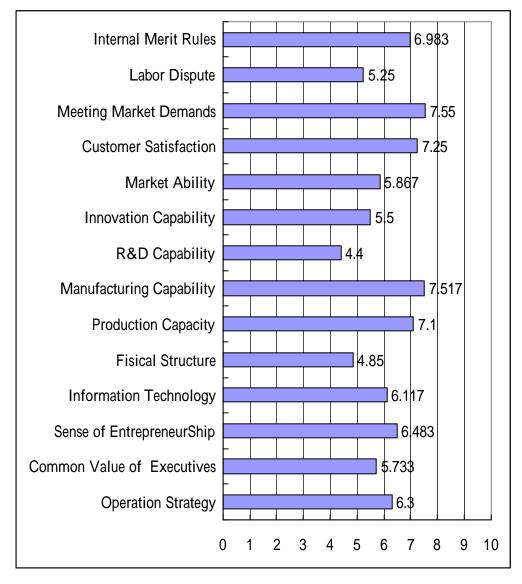


Fig.18 Component Indices Statistics under Enterprise Competitiveness Index

The average of the enterprise competitiveness indexes is 6.0456, which suggests higher competitiveness. Of them, labor dispute, enterprise marketability, enterprise innovation capability, enterprise R&D capability, fiscal structure and the common value of enterprise executives are below the average, while internal merit rules, meeting market demands, customer satisfaction, manufacturing technology, production capability, information technology, the sense of entrepreneurship and operation strategy are higher than average.

. Infrastructure Construction Index Assessment

1. Infrastructure Construction Index Analysis Results

Infrastructure construction index is divided into 3 subindices, namely, environmental safety, quality and fairness. Of the subindices, environmental safety

subindex lists 5 component indices, 20 component indices for quality, and 3 component indices for fairness. The component indices total 28.

The values for infrastructure construction index and all of its subindices are based on the component indices statistics. Its analysis results show that infrastructure construction index is evaluated at 5.0028. This indicates that in **Taiwan's growth and current competitiveness**, **infrastructure construction competitiveness is rated as Ordinary**. For statistics, please see Table 34.

Number Valid cases	20
Missing cases	6
Mean	5.0028
Median	5.1028
Mode	4.07
Standard Deviation	.49627
Minimum Value	4.07
Maximum Value	5.83
Percentile 25	4.6569
50	5.1028
75	5.4139

Table 34 Infrastructure Construction Index Statistics

2. Subindices Analysis Results under Infrastructure Index

Under the Infrastructure construction index, environmental safety subindex is evaluated at 4.0320, which shows its competitiveness is lower. Quality subindex is evaluated at 5.1548, which shows its competitiveness Ordinary. Fairness subindex is 5.7273, which shows that its competitiveness is higher. For statistics, please see Table 35, Table 36, Table 37 as well as Fig.19.

Table 35 Infrastructure Construction Index – Environmental Safety Subindex Statistics

Number Valid cases	25
Missing cases	1
Mean	4.0320
Median	4.0000
Standard Deviation	.91775
Percentile 25	3.5000
50	4.0000
75	4.6000

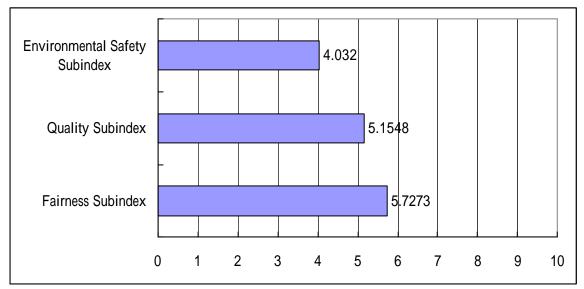
Number	Valid cases	21
I	Missing cases	5
Mean		5.1548
Median		5.2000
Standard D	eviation	.42659
Percentile	25	4.8250
	50	5.2000
	75	5.4250

Table 36 Infrastructure Construction Index – Quality Subindex Statistics

Table 37	Infrastructure	Construction	Index –	Fairness	Subindex	Statistics
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Number	Valid cases	22
	Missing cases	4
Mean		5.7273
Median		5.8333
Standard D	1.24992	
Percentile	25	5.1667
	50	5.8333
	75	6.1667





The average of infrastructure construction subindices is 5.0028. It is obvious that in the infrastructure construction index, environmental safety subindex is below the average, that is to say, the environmental safety performs poorly.

3. Component Indices Analysis Results under Infrastructure Construction Index

Please refer to Table 38, and Fig.20 to Fig.21. The competitiveness evaluation is measured by the average, with median and mode as its reference values.

Title	Index	Average	Assessment	Median	Assessment	Mode	Assessment
1. Envi	ironmental safety subi	indexes					
1	Environmental pollution	3.692	Lower	4	Lower	4	Lower
2	Medical level difference from region to region	3.885	Lower	4	Lower	4	Lower
3	Disaster relief system	3.846	Lower	4	Lower	5	Ordinary
4	Infrastructure aging	4.154	Lower	4	Lower	4	Lower
5	Disaster protection regulations	4.520	Ordinary	4	Lower	4	Lower
2. Qua	lity subindices						
6	Road infrastructure quality	4.960	Ordinary	5	Ordinary	5	Ordinary
7	Railroad infrastructure quality	4.885	Ordinary	5	Ordinary	5	Ordinary
8	Railroad network	6.500	Higher	6.500	Higher toward very high	6	Higher
9	Port infrastructure quality	5.885	Higher	6	Higher	6	Higher
10	Airport infrastructure quality	5.731	Higher	5.5	Higher	5	Ordinary
11	Public transportation convenience	6	Higher	6	Higher	6	Higher
12	Network transmission speed	6.538	Higher toward very high	6	Higher	6	Higher

Table 38 Component Indices Statistics under Infrastructure Construction Index

13	Communication network transmission cost	4.923	Ordinary	5	Ordinary	5	Ordinary
14	Sewerage quality	2.923	Lower toward very low	2.5	Lower toward very low	2	Very low
15	Sewage disposal sites	3.692	Lower	4	Lower	4	Lower
16	Running water supply	6.920	Higher toward very high	7	Higher toward very high	8	Higher toward very high
17	Energy adequacy	6.280	Higher	6	Higher	6	Higher
18	Educational recreational facilities	3.875	Lower	4	Lower	4	Lower
19	Mechanism of infrastructure construction quality	4.480	Lower	4	Lower	4	Lower
20	Living environment	6.240	Higher	6	Higher	6	Higher
21	Infrastructure quality for production environment	6.080	Higher	6	Higher	6	Higher
22	Infrastructure quality for ecological environment	4.040	Lower	4	Lower	3	Lower towards very low
23	Reasonable allocation of construction resources	4.682	Ordinary	5	Ordinary	5	Ordinary
24	Mastery of construction progress as scheduled	3.840	Lower	4	Lower	4	Lower
25	BOT level	4.375	Lower	4	Lower	4	Llower
3. Fair	ness subindices				-		
26	E-commerce tender management	5.909	Higher	6	Higher	6	Higher
27	Tender fairness	5.542	Higher	6	Higher	6	Higher
28	Contracting fairness	5.417	Higher	б	Higher	6	Higher

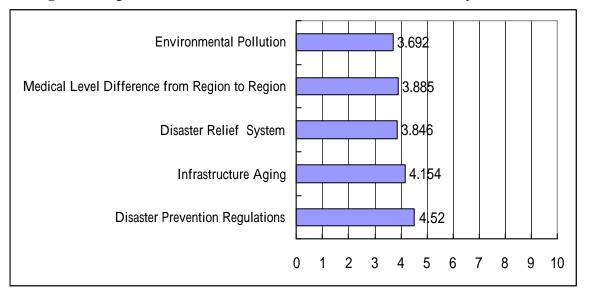


Fig.20 Component Indices Statistics under Environmental Safety Subindexes

The average of environmental safety subindices is 4.0320, which suggests lower competitiveness. Of them, environmental pollution, medical level difference from

region to region and disaster relief system are below average, while infrastructure aging and disaster relief stipulations are higher than average.

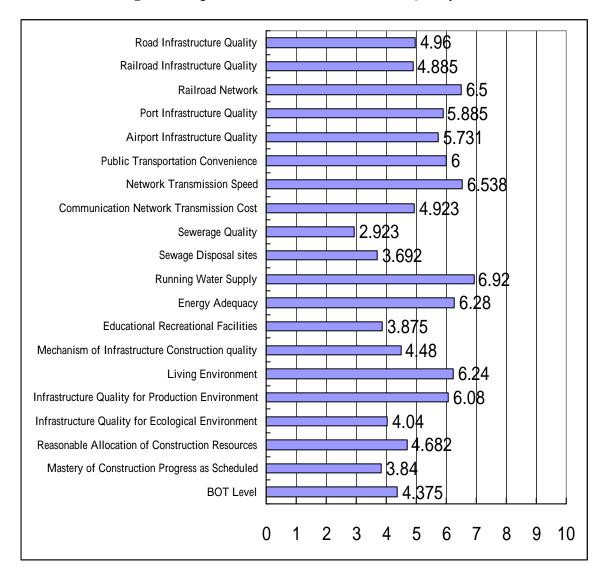


Fig. 21 Component Indices Statistics under Quality Subindex

The average of quality subindices is 5.1548, which suggests Ordinary competitiveness. Of them, road infrastructure quality, railway infrastructure quality, communication network transmission cost, sewerage system quality, sewage disposal sites, educational recreational facilities, the mechanism for the infrastructure construction quality, infrastructure construction quality for the ecological environment, reasonable allocation of construction resources, mastery of construction progress as scheduled and BOT level are below average, while railroad network, port infrastructure quality, airport infrastructure quality, public transportation convenience, network transmission speed, running water supply, energy adequacy, infrastructure construction quality for living environment and infrastructure construction quality for production environment are higher than average.

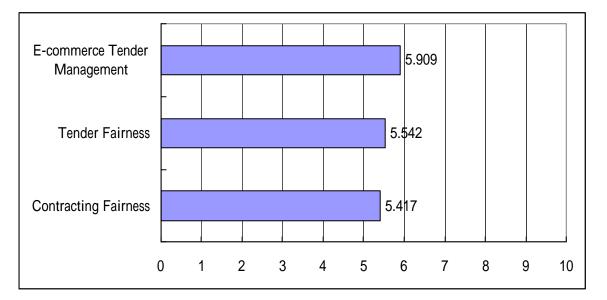


Fig. 22 Component Indices Under Fairness Subindex

The average of fairness subindex is 5.7273, which suggests higher competitiveness. Of them, the tender fairness and contracting fairness are below average, while ecommerce tender management is higher than average.

. Comparison Assessment of Five Indexes

In Taiwan's growth and current competitiveness, technology, public institutions and system, enterprise

competitiveness, infrastructure construction, and macroeconomic environment are evaluated at 5.2023, 4.3500, 6.0456, 5.0028 and 4.2738, respectively, shown as the figure below. This suggests their competitiveness as ordinary, lower, higher, ordinary and lower, respectively. The average of the aggregate five evaluation values is 4.9747, which indicates that the performance of **Taiwan's growth and current competitiveness is Ordinary**.

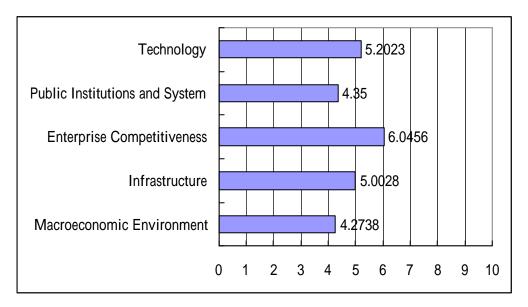


Fig.23 Five Major Indexes Statistics

The average of five evaluation values in Taiwan's growth and current competitiveness is 4.9747, which suggests Ordinary competitiveness. Of them, public institutions and system and macroeconomic environment are below average, while technology, enterprise competitiveness and infrastructure construction are higher than average.

. Comparison among Six Nations (Regions) in East Asia

Since the growth competitiveness index by WEF consists of three major factor indexes, namely, Science and technology index, public institution and system index and macroeconomic environment index, this project adopts the same evaluation index for the comparison of competitiveness among 6 nations in East Asia (Japan, South Korea, Taiwan, Hong Kong, Singapore, and China) in terms of technology index, public institution and system index, macroeconomic environment index. The analysis results are shown as follows:

1. Technology Index

In terms of mode, the competitiveness ranking of the six countries in Eastern Asia is Japan, South Korea, Taiwan, Singapore, Hong Kong and China. For statistics, please refer to Table 39.

	50. Do you					
	think in					
	technology	technology	technology	technology	technology	technology
	index scores,					
	Japan :	S. Korea:	Taiwan:	Hong Kong:	Singapore:	China:
Unit	29	29	29	29	29	29
Effective	0	0	0	0	0	0
	5.8966	4.2759	4.1034	1.7586	3.3448	1.7586
Omission Value	6.0000	4.0000	4.0000	2.0000	3.0000	1.0000
Average	6.00	5.00	4.00	2.00	3.00	1.00
Median	.55709	.84077	.81700	.68947	1.11085	1.15434
Mode						
Normal Error						

Table 39 Statistics for Technology Index for Six Countries (Regions) in East Asia

From the above technology index, we can see Taiwan is in the third position.

2. Public Institutions and System Index

In term of mode, the competitiveness ranking of 6

countries in East Asia is Singapore, Japan, Hong Kong, Taiwan, South Korea and China. For statistics, please refer to Table 40.

Table 40 Statistics for Public Institution and System Index for Six Countries (Regions) inEast Asia

	35. Do you think in public institution and system index scores, Japan:	35. Do you think in public institution and system index scores, S. Korea:	35. Do you think in public institution and system index scores, Taiwan:	35. Do you think in public institution and system index scores, Hong Kong:	35. Do you think in public institution and system index scores, Singapore:	35. Do you think in public institution and system index scores, China:
Unit	27	27	27	27	27	27
Effective	0	0	0	0	0	0
	5.0000	2.5556	2.8519	3.81480	5.7407	1.0370
Omission Value	5.0000	2.0000	3.0000	4.0000	6.0000	1.0000
Average	5.00	2.00	3.00	4.00	6.00	1.00
Median	.73380	.75107	.71810	1.00142	.44658	.19245
Mode						
Normal Error						

From the above public institution and system index, we can see Taiwan is in the fourth position.

3. Macroeconomic Environment Index

In term of mode, the competitiveness ranking of

six countries(regions) in East Asia is Singapore, South Korean, China, Hong Kong, Taiwan, and Japan. For statistics, please refer to Table 41.

Table 41 Statistics of Macroeconomic Environment Index for Six Countries (Regions) in East Asia

	35. Do you					
	think in					
	macroecono	macroecono	macroeconom	macroecono	macroecono	macroeconom
	mic	mic	ic	mic	mic	ic
	environment	environment	environment	environment	environment	environment
	index scores,					
	Japan:	S. Korea:	Taiwan:	Hong Kong:	Singapore:	China:
Unit	29	29	29	29	29	29
Effective	0	0	0	0	0	0
	2.6207	4.3448	2.4828	2.8276	5.2414	3.7931
Omission	2.0000	5.0000	2.0000	3.0000	6.0000	4.0000
Value	1.00	5.00	2.00	3.00	6.00	4.00
Average	1.89763	1.26140	.91107	1.33815	1.29987	1.52079
Median						
Mode						
Normal Error						

From the above microeconomic environment index, we can see that Taiwan is in the fifth position.

4. Comparison with WEF and IMD Assessments

From our statistics on three major indexes of technology, public institution and system and macroeconomic environment, we can conclude that in the competitiveness ranking for the above 6 countries (regions), Singapore is in the first place, Japan and S. Korea in the second place, Taiwan and Hong Kong in the third and China in the fourth.

According to WEF assessment, the global growth competitiveness index ranking for the above 6 countries (region) is Singapore the 4th, Taiwan 7th, Hong Kong 13th, Japan 21st, South Korea 23rd and China 39th.

Therefore, we can conclude from the above ranking that Singapore is ranked 1^{st} , Taiwan 2^{nd} , Hong Kong 3^{rd} , Japan 4^{th} and South Korea 5^{th} and China 6^{th} .

According to IMD assessment, the global growth competitiveness index rankings for the above 6 countries (regions) is Singapore the 5th, Taiwan 24th, Hong Kong 9th, South Korea 27th, Japan 30th and China 31st. Therefore, we can conclude from the above ranking that Singapore is ranked the 1st, Hong Kong 2nd, Taiwan 3rd, South Korea 4th, Japan 5th and China 6th.

Compared with the appraisels conducted by WEF and IMD (see the table below), we can find that Taiwanese experts gave Taiwan a lower competitiveness rating than that by WEF and IMD. Their ratings, which we call Taiwan Growth and Current Competitiveness (TGCC) Assessment, are compared with those of the WEF and the IMD below.

	TGCC Assessment	WEF Assessment	IMD Assessment
Singapore	1	1	1
Japan	2	4	5
S. Korea	3	5	4
Taiwan	4	2	2
Hong Kong	5	3	3
China	6	6	6

Table 42 TGCC, WEF and IMD Rankings

5. Comparison with WEF Major Factor Indexes

According to the statistics of this project on the six East Asian countries (regions), technology index competitiveness ranks Japan, South Korea, Taiwan, Singapore, Hong Kong and China. Public institution and system index competitiveness ranks Singapore, Japan, Hong Kong, Taiwan, South Korea and China. Macroeconomic environment index competitiveness ranks Singapore, S. Korea, China, Hong Kong, Taiwan and Japan.

According to WEF assessment, technology index competitiveness ranks Taiwan the 4th, South Korea 9th, Singapore 18th, Japan 23rd, Hong Kong 33rd and China 53rd. Therefore, from the rankings of the six countries (regions), we can see that Taiwan is in the first place, S. Korea 2rd, Singapore 3rd, Japan 4th, Hong Kong 5th and China 6th.

Public institution and system index

competitiveness ranks Singapore the first, Hong Kong the 10th, Japan 19th, Taiwan the 24th, South Korea 44th and China 50th. Therefore, from the rankings of the six countries (regions), we can conclude that Singapore is in the first place, Hong Kong 2nd, Japan 3rd, Taiwan 4th, S. Korea 5th and China 6th.

Macroeconomic environment index competitiveness ranks Singapore the 1^{st} , Hong Kong 4^{th} , China 6^{th} , S. Korea 8^{th} , Taiwan 15^{th} and Japan 18^{th} . Therefore, from the rankings of the six countries (regions), we can conclude that Singapore is in the first place, Hong Kong 2^{nd} , China 3^{rd} , S. Korea 4^{th} , Taiwan 5^{th} and Japan 6^{th} .

Compared with WEF assessment (please see Table 43), we can see that in technology index, the assessment by the Taiwanese experts gives Taiwan a lower ranking than that given by WEF, ie. 3^{rd} and 1^{st} . In the public institution and system index and macroeconomic environment index, they rank Taiwan in the same position, 4^{h} and 5^{th} , respectively.

Table 43 Factor Index Rankings by TGCC and WEF

	Technology index		Public institution and system index		Macroeconomic environment index	
	TGCC	WEF	TGCC	WEF	TGCC	WEF
Singapore	4	3	1	1	1	1
Japan	1	4	2	3	6	6
S. Korea	2	2	5	5	2	4
Taiwan	3	1	4	4	5	5
Hong Kong	5	5	3	2	4	2
China	6	6	6	6	3	3

Attachment 1 Technology Index Panel Name List

Name	University	Department	Position
HSUEH, Cherng- tay	National Taiwan University	Department of Sociology	Professor
SUN, Yea-li	National Taiwan University	Department of Information Management	Associate Professor
HWANG, Chun- chieh	National Chung Cheng University	Department of Financial and Economic Laws	Professor
SOONG, Jenn- jaw	National Cheng Kung University	Department of Political Science	Professor
LEE, Bo-ywe	National Cheng Kung University	Department of Political Science	Professor
FANN, Guang-jong	National Cheng Kung University	Department of Economics	Assistant Professor
CHU, Paul C.	Chinese Culture University	Graduate Institute of Sun Yet-Sen	Associate Professor
YANG Shou-jung	Soochow University	Department of Sociology	Professor
LI, Lamp	Soochow University	Department of International Business	Professor
SHIEH, Li- ya	National Tsing Hua University	Department of Economics	Professor
NI, Kuei-jung	National Chiao Tung University	Institute of Technology Law	Assistant Professor
YU, Chow-ming	National Chengchi University	Department of Business Administration	Professor
LIN, Hsien-tiung	National Chengchi University	Department of Sociology	Professor

TSENG, Chu-wei	National Chengchi University	Department of Public Finance	Professor
LIN, Chu-chia	National Chengchi University	Department of Economics	Professor
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ROAN, Jin-sheng	National Chung Cheng University	Department of Management Information System	Associate Professor
YANG, Jiann-min	National Chengchi University	Department of Management Information System	Professor
CHEN, Ching	National Cheng Kung University	Department of Political Science	Associate Professor
LIN, Hui-lin	National Taiwan University	Department of Economics	Professor
CHIOU, Chang-tay	National Taipei University	Department of Public Administration & Policy	Professor
BAI, Jan-erh	National Taiwan University	Department of Business Administration	Professor
TAN, Ber-tram	National Cheng Kung University	Department of Business Administration	Professor
HO, Chin-fu	National Sun Yat-sen University	Department of Management Information	Professor

Attachment 2 Public Institutions and System Index Panel Name List

Name	University	Department	Position
HSUEH, Cherng-tay	National Taiwan University	Department of Sociology	Professor

	1	· · · · ·	
SOONG, Jenn- jaw	National Cheng Kung University	Department of Political Science	Professor
	· · ·		
LEE, Bo-ywe	National Cheng Kung	Department of Political	Professor
	University	Science	
CHU, Paul C.	Chinese Culture	Graduate Institute of Sun	Associate Professor
ente, i uui e.	University	Yet-Sen	1155001410 1 10105501
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LIN, Hsien-tiung	National Chengchi University	Department of Sociology	Professor
CHIOU, Chang-tay	National Taipei	Department of Public	Professor
	University	Administration & Policy	
CHIANG, Hsim-li	National Sun Yat-sen	Institute of	Professor
	University	Interdisciplinary Studies	110103501
CHANC Heim shih	National Taipei	Department of Public	Professor
CHANG, Hsien-shih	University	Administration & Policy	Professor
	National Cheng Kung	Graduate Institute of	
PENG, Chien-wen	University	Political Economy	Professor
	, ,	Institute of Sociology	
CHIU, Hei-yuan	Academia Sinica	Academia Sinica	Professor
		Institute of	
	A 1 . C		
PENG, C.P.	Academia Sinica	European&American	Associate Professor
		Studies, Academia Sinica	
LU, Ya-li	Chinese Culture	Graduate Institute of Sun	Professor
20,14 1	University	Yet-sen	110100001
WONG Sang lag	National Taipei	Department of Public	Professor
WONG, Seng-lee	University	Administration & Policy	FIOLESSOL
LIN, Cheng-hero	Soochow University	Department of Law	Professor
HSIEH, Chen-yu	Soochow University	Department of Political Science	Associate Professor
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WU, Chung-li	University	Science	Associate Professor
	National Sun Yat-sen	Institute of	
CHU, Jou-juo	University	Interdisciplinary Studies	Professor
	National Chengchi	Department of Political	
CHING James Jih	÷	-	Professor
	University	Science	
YUN, Tung-wang	National Taiwan University	Department of Sociology	Assistant Professor
WANG, Jenn-hwan	Tunghai University	Sociology Department	Professor
	National Chengchi	Department of Public	
WU, Samuel	University	Administration	Professor
	National Taiwan	Department of Political	
LU, Ray-chong	University	Science	Professor
	Chryonaty	Science	

Name	University	Department	Position
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LIN, Cheng-hero	Soochow University	Department of Law	Professor
HONG, Min-Chou	National Taiwan University	Department of Business Administration	Professor
FU, Tsu-tan	Academia Sinica	Institute of Economics	Research Fellow
WANG, Yung-jang	National Chung Cheng University	Department of Finance	Professor
HUANG, Bwo-nung	National Chung Cheng University	Department of Economics & Graduate Institute of International Economics	Professor
CHEN, An-sing	National Chung Cheng University	Department of Finance	Professor
CHEN, Shu-heng	National Chengchi University	Department of Economics	Professor
LEE, Bih-hearn	National Taiwan University	Graduate Institute of National Development	Professor
CHEN, Show-lin	Fu Jen Catholic University	The Department of Economics	Associate Professor
CHEN, Kun-ming	National Chengchi University	Department of International Trade	Professor
LEE, Thomas	National Chengchi University	Department of Money and Banking	Professor

Attachment 3 Macroeconomic Environment Index Panel Name list

HUANG, Chi	National Chung Cheng University	Department of Political Science	Professor
LI, Kung-cheh	National Taiwan University	Graduate Institute of Environmental Engineering	Professor
SHEI, Shunyi	Academia Sinica	The Institute of Economics	Research Fellow
YAU, Ruey	Fu Jen Catholic University	The Department of Economics	Associate Professor
YU, The-pei	Soochow University	The Department of Economics	Professor
HUANG, Chuang- huang	National Tsing Hua University	The Department of Economics	Professor
HOU, Han-jyun	National Taipei University	Department of Public Administration & Policy	Associate Professor

Attachment 4 Enterprise Competitiveness Index Panel Name List

Name	University	Department	Position
YU, Chwo-ming	National Chengchi	Department of Business	Professor
re, chwo ning	University	Administration	110103501
LIN, Chu-chia	National Chengchi	Department of Economics	Professor
LIN, Chu-chia	University	Department of Economics	PIOLESSOI
	National Chung Cheng	Department of Management	
ROAN, Jin-sheng	University	Information System	Associate Profess
VANC Lines min	National Chengchi	Department of Management	Dueferren
YANG, Jiann-min	University	Information System	Professor
DENC Chier man	National Cheng Kung	Graduate Institute of Political	Professor
PENG, Chien-wen	University	Economy	Professor
WILD:	Fu Jen Catholic	Graduate Institute of	Dueferren
WU, Bingeng	University	Management	Professor
	Fu Jen Catholic	Department of International	Associate
LIN, Miao-que	University	Trade and Finance	Professor
	Fu Jen Catholic	Graduate Institute of	Dueferren
LEE Tain-shyug	University	Management	Professor
	Fu Jen Catholic	Business of Administration	
KAO Jem-lung	University	Department	Professor

HONG, Min-chou	National Taiwan University	Department of Business Administration	Professor
SAN, Gee	National Central University	Graduate Institute of Industrial Economics	Professor
FU, Tsu-tan	Academia Sinica	Institute of Economics	Research Fellow
WANG, Yung-jang	National Chung Cheng University	Department of Finance	Professor
HUANG, Bwo-nung	National Chung Cheng University	Department of Economics & Graduate Institute of International Economics	Professor
HSU, Song-ken	Academia Sinica	Institute of Economics	Research Fellow
WU, Jyh-lin	National Chung Cheng University	Department of Economics & Graduate Institute of International Economics	Professor
BAI, Jan-erh	National Taiwan University	Department of Business Administration	Professor
TAN, Bertram	National Cheng Kung University	Department of Business Administration	Professor
CHEN, Andin	National Sun Yat-sen University	Department of Business Administration	Professor
KUNG, Cheh-li	National Taiwan University	Graduate Institute of Environmental Engineering	Professor
MU, Lan-hsu	National Taiwan University	Department of Business Administration	Professor
CHIN, Fu-ho	National Sun Yat-sen University	Department of Management Information	Professor
SHUN, Yi	Academia Sinica	Institute of Economics	Research Fellow
SHIN, Kun-peng	Academia Sinica	Institute of Economics	Research Fellow
YU, Syue-ming	National Taiwan University	Department of Law	Professor
CHEN, An-sing	National Chung Cheng University	Department of Finance	Professor
CHEN, Yen-liang	National Central University	Department of Information Management	Professor

Name	University	Department	Position
YANG Shou-jung	Soochow University	Department of Sociology	Professor
LI, Lamp	Soochow University	Department of International Business	Professor
CHIANG, Hsim-li	National Sun Yat-sen University	Sun Yat-sen Institute of Interdisciplinary Studies	Professor
PENG, Chein-wen	National Cheng Kung University	Graduate Institute of Political Economy	Professor
LU, Ya-li	Chinese Culture University	Department of Political Science	Professor
WANG, Jenn-hwan	Tung Hai University	Department of Sociology	Professor
HONG, Min-chou	National Taiwan University	Department of Business Administration	Professor
CHEN, Yen-liang	National Central University	Department of Information Management	Professor
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LIU, Shang-jyh	National Chiao Tung University	Institute of Technology Law	Professor
YOW, Nie-jia	National Central University	Institute of Construction Engineering and Management	Professor
LO, S.L.	National Taiwan University	Graduate Institute of Environmental Engineering	Professor
KUO, Jan-tai	National Taiwan University	Department of Civil Engineering	Professor
CHO, Hsun-jung	National Chiao Tung University	Department of Transportation Technology & Management	Professor
WEI, Chien-hung	National Cheng Kung University	Department of Transportation & Communication Management Science	Professor

Attachment 5 Infrastructure Construction Index Panel Name List

CHEN An-lin	National Sun Yat-sen University	Department of Business Management	Professor
YU, Syue-ming	National Taiwan University	Department of Law	Professor
SHEI, Shunyi	Academia Sinica	Institute of Economics	Research Fellow
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FANG, I-kuang	National Cheng Kung University	Department of Civil Engineering	Professor
HUANG, Tai-sheng	National Chiao Tung University	Department of Transportation & Communication Management Science	Professor
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