Intellectual Capital in Taiwan

Intellectual Capital for Communities in the Knowledge Economy

University of Marne-La-Vall'ee & World Bank

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Topics

- I. Previous Research
  - Knowledge Economy Index
- II. Current Research
  - TICRC Project
- III. Future Research
  - Intellectual Capital for Communities

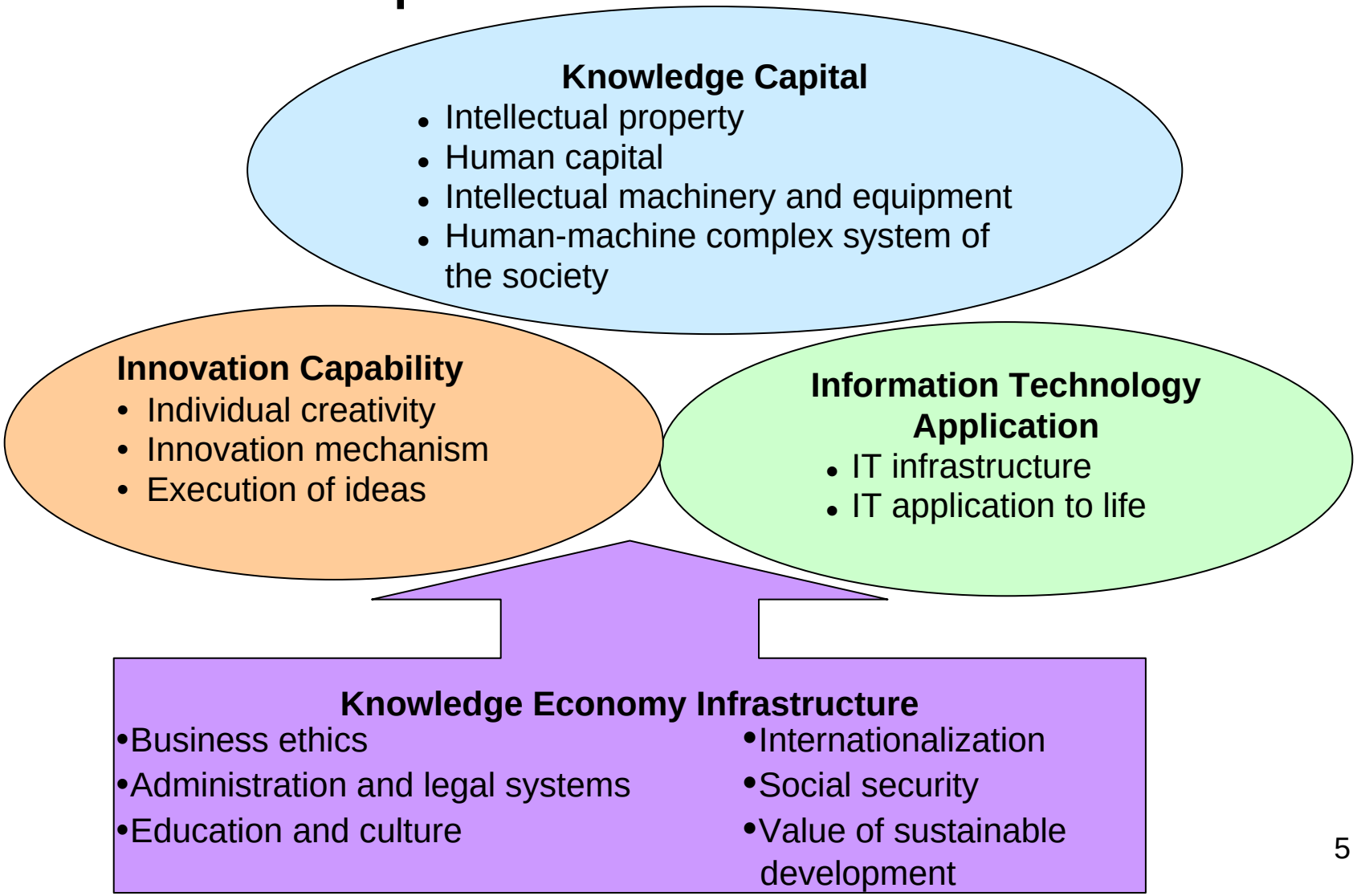
I. Previous Research

Knowledge Economy Index (KEI)

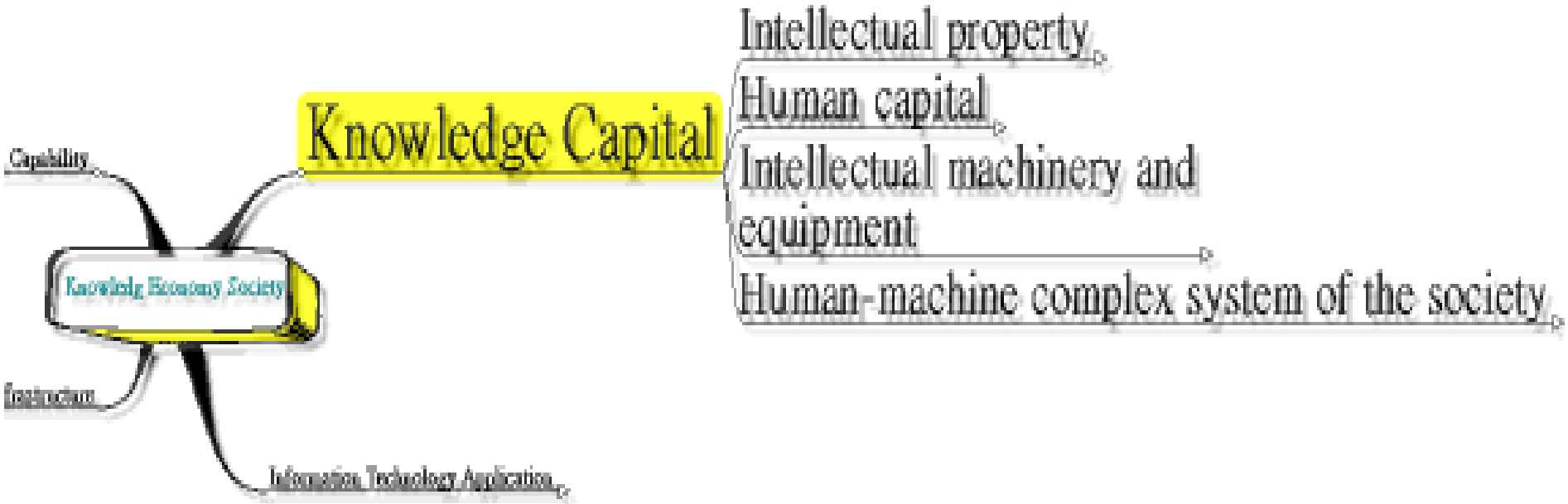
The Introduction of Knowledge Economy Index in Taiwan

- Taiwan government declared 2001 as the first year of Knowledge Economy (KE) and has put a series of plans into action since then.
- The Knowledge Economy Promotion Committee comprised by 23 opinion leaders such as Morris Chang (TSMC) and Stan Shih (Acer), was established to promote the concept of Knowledge Economy.
- A two-year research project supported by the Knowledge Economy Promotion Committee and the Council for Economic Planning and Development was launched in 2001 to develop a knowledge assessment framework for Knowledge Economy.

Conceptual Framework of KE



Knowledge Capital



Knowledge Capital

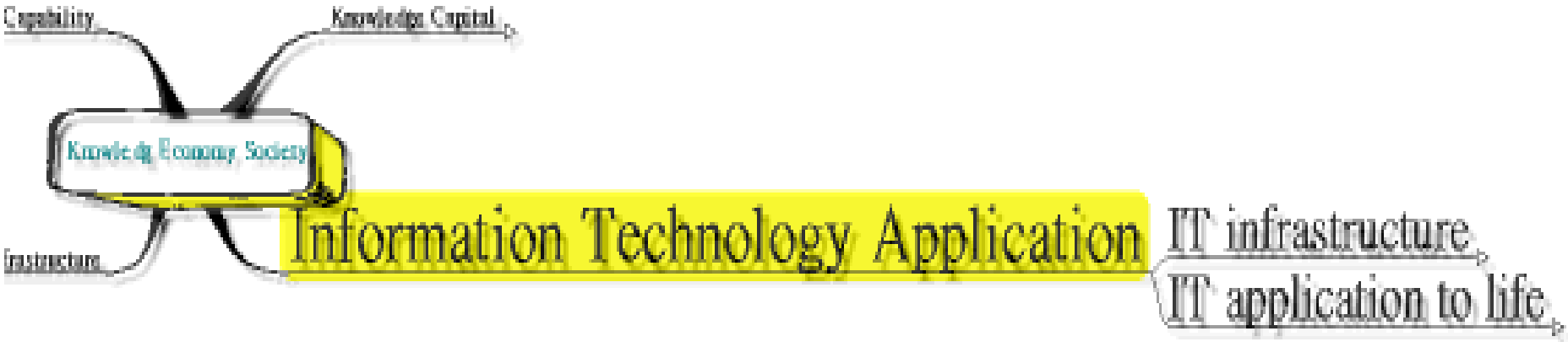
1.1 Intellectual Property	1.1.1 Quality and quantity of invention and design patents 1.1.2 Number of original literature and art publications and performances, and sales ensued 1.1.3 Novelty and originality of commercial designs 1.1.4 Global awareness of corporate brands 1.1.5 Net value and balance of technology trading
1.2 Human Capital	1.2.1 Quantity and quality of human resources 1.2.2 Technology and humanities accomplishments of the people 1.2.3 On-the-job training and development
1.3 Intellectual Machinery and Equipment	1.3.1 Production and utilization of machinery and equipment with embedded knowledge
1.4 Human-machine Complex System of the Society	1.4.1 The speed of commodity, capital, and manpower flow within and across borders

Innovation Capability

Innovation Capability

2.1 Individual Creativity	2.1.1 Creativity demonstrated by the general public in various fields 2.1.2 Quality and quantity of research institutions
2.2 Innovation Mechanism	2.2.1 Incubation mechanism and industry clusters 2.2.2 Incentives for entrepreneurship and innovative activities 2.2.3 Knowledge exchanges among industrial, academic, and research circles 2.2.4 International collaboration of innovative research and development 4.2.5 The comprehensiveness of the intellectual property promotion and transaction mechanisms
2.3 Execution of Ideas	2.3.1 The speed and success rate of new product introduction 2.3.2 Demonstration of entrepreneurship

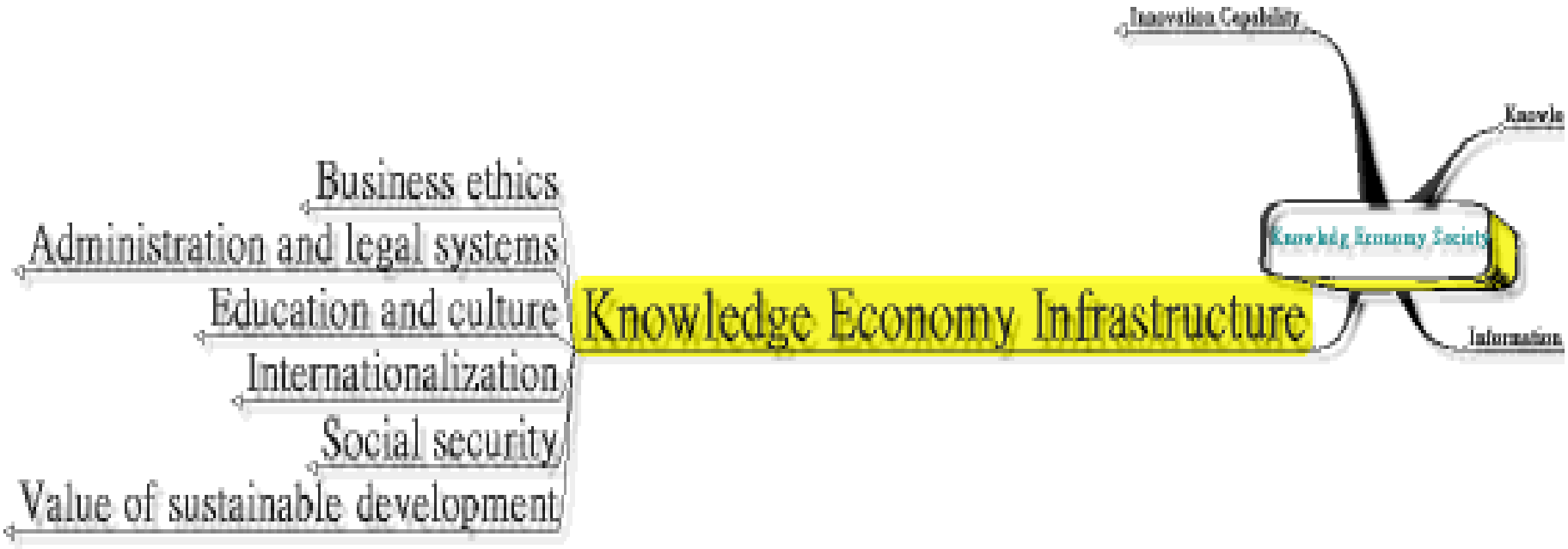
Information Technology Application



Information Technology Application

3.1 IT infrastructure	3.1.1 Penetration rate of broadband 3.1.2 Penetration rate of wireless communication 3.1.3 Internet prevalence
3.2 IT application to life	3.2.1 Level of e-business 3.2.2 Level of government e-service 3.2.3 E-commerce prevalence 3.2.4 E-learning prevalence at home/school/others 3.2.5 Richness of digital contents 3.2.6 Quality of information network

Knowledge Economy Infrastructure



Knowledge Economy Infrastructure

4.1 Business ethics	4.1.1 Transparency and impartiality of corporate governance
4.2 Administration and legal systems	4.2.1 Transparency and efficiency of government administration 4.2.2 The comprehensiveness and enforcement of regulatory systems related to intellectual property and technology
4.3 Education and culture	4.3.1 Dynamics of creative teaching and educational innovations 4.3.2 Comprehensiveness of lifetime learning environment 4.3.3 Press freedom and justice
4.4 Internationalization	4.4.1 Internationalization level of the society
4.5 Social security	4.5.1 Disparity in the distribution of wealth 4.5.2 Digital discrepancy and network security 4.5.3 Security and support for the unemployed and job changers
4.6 Value of sustainable development	4.6.1 Ecosystem, environmental protection, and the utilization efficiency of natural resources

Statistics information

Indicator	Variable	1999	2000	2001
• **Knowledge Capital**				
1.1.1 Quality and quantity of invention and design patents	1.Number of invention and design patents granted by the US（USPTO）	4526(4)	5802(4)	6539(4)
		8944(19)	9203(19)	9525(19)
	2.Number of scientific publications（NSC）	1.02	1.19	1.14
	3.Number of patent applications CII(TIER)			
1.1.2 Number of original literature and art publications and performances, and sales ensued	1.Number of art performances and exhibitions（social indicator）	16350	17709	18375
	2.Number of publications（social indicator）	30871	34533	36546
	3.Sales of local music works (IFPI)	21886.99	-	8913.12
1.2 Human Capital	1.Number of researchers per 10,000 people（NSC）	39.7	39.3	-
	2.Number of researchers per 10,000 workers (NSC)			
	3.Percentage of the population with higher education (IMD）	90.4	88.5	-
	4.Number of R&D (FTE) workers per 1,000 people (IMD)	33.5(8)	-	-
		4.721(13)	4.673(15)	-

Note: ( ) refers to the source of the data

Knowledge Economy Satisfaction Survey – Findings

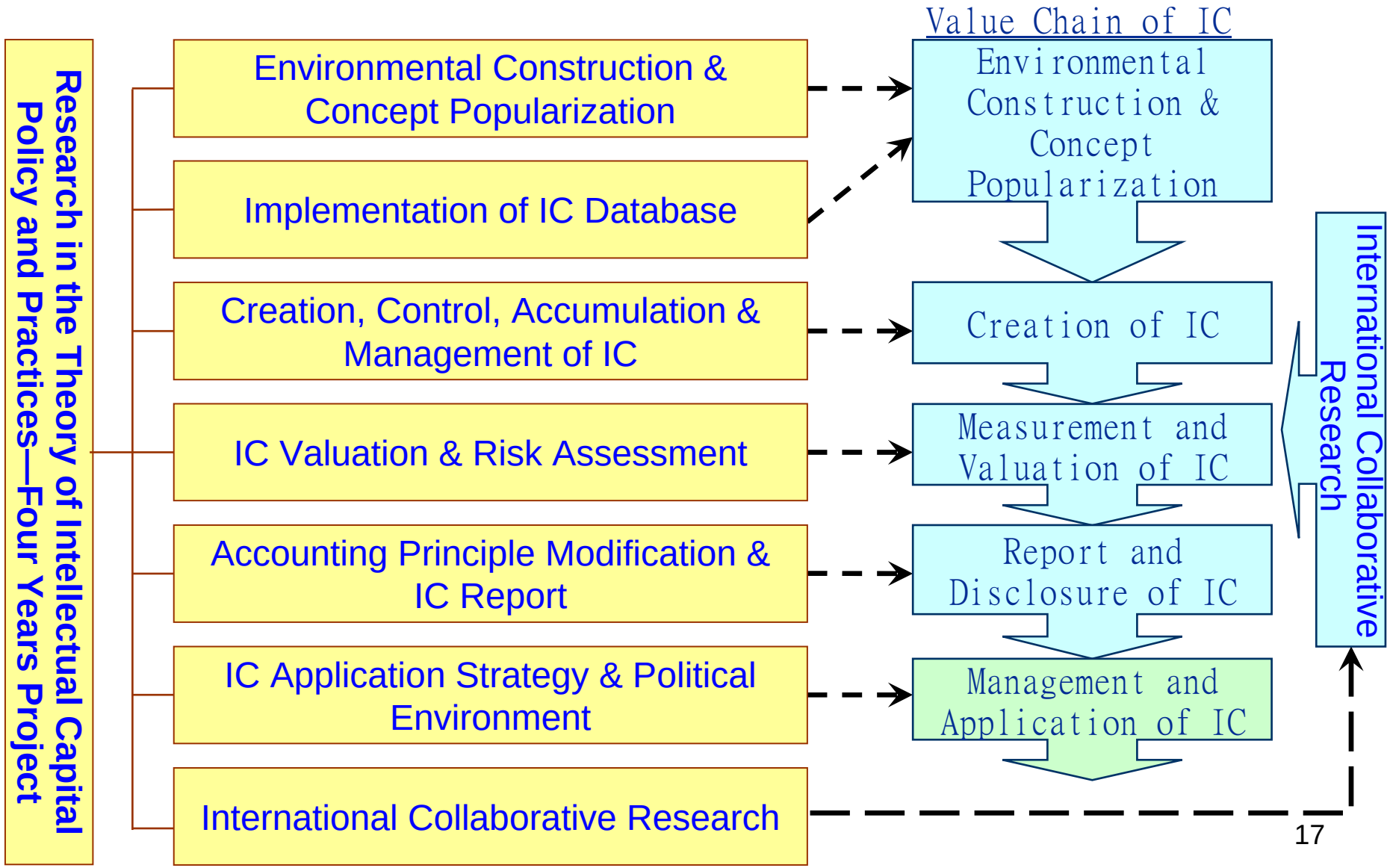
Indicator	Opinion Leaders*	Intellectuals**	Discrepancy
Knowledge Capital	5.40***	5.27	0.13
Innovation Capability	5.13	5.11	0.02
Information Technology Application	5.71	5.89	-0.18
Knowledge Economy Infrastructure	4.47	3.95	0.52

* Opinion leaders refer to the 23 members of Knowledge Economy Promotion Committee.
** Intellectuals refer to the selective senior managers aged over 40.
*** Score from 1 to 10.

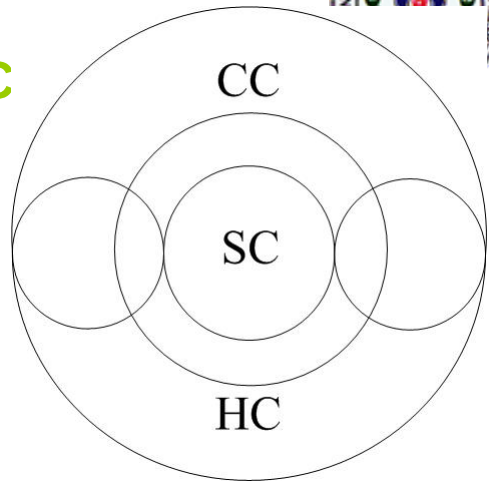
II. Current Research

TICRC Project

Introduction of TICRC



Creation, Control, Accumulation & Management of IC



- The Creation and Accumulation of IC in Organizations
  - Collect qualitative and longitudinal data in supplement to other quantitative projects
  - Explore the interactions among various components of intellectual capital
  - Investigate the change of intellectual capital over the four years Compare and contrast qualitative vs. quantitative research results
- The Integration between Balanced Scorecard and Intellectual Caiptal
  - The Linkage between process perspective and process & innovation capital
  - The Linkage between learning perspective and IT & organizaion capital
  - lead the formation of IC & Strengthen the management of IC

Accounting Principle Modification & IC Report

Objective: to propose accounting standards and disclosure requirements for reporting firms' intellectual capital.

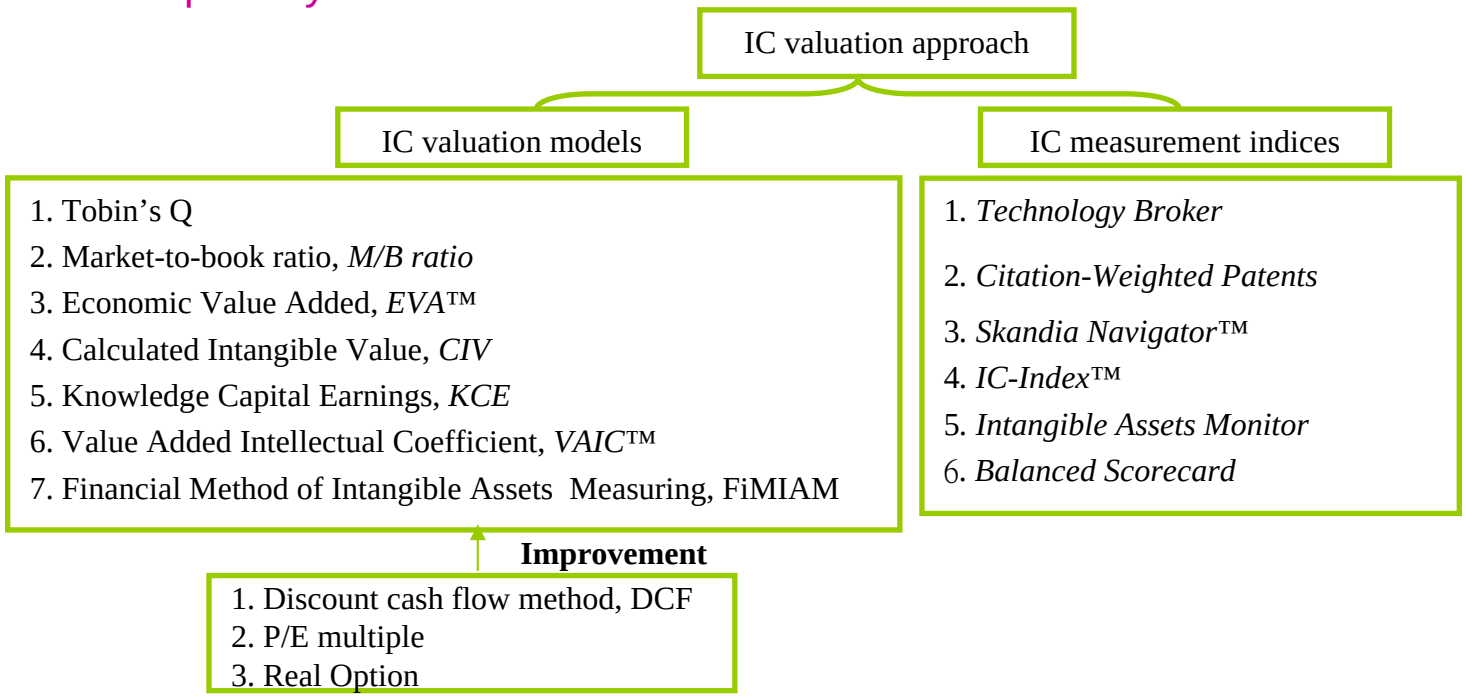
Three layers of IC information:

- Financial statements—conform with GAAP.
- Pro forma IC statements—those IC expensed (e.g., R&D expenditures) or not recognized (e.g., employee compensation contracts) in financial statements may be re-capitalized in pro forma IC statements, provided some criteria are met.
- Disclosures—provide a common set of IC metric disclosures, relating firms' strategy to important IC components.

IC Valuation & Risk Assessment

The IC Valuation Models & Risk Assessment

- As no sufficient secondary data is available for relevant IC markets, there is a need to develop consistent and empirically testable models for the measurement and valuation of IC.



The Integration of Human Resource and IC:

- Fitness survey: Human Capita Indicators (10 suitable and 10 unsuitable)

Process Capital:

- Operation management, Customer management, Innovation management, Knowledge management

IC Valuation & Risk Assessment

■The Integration of Customer Capital and IC: Construct Customer Capital through Relation Management

- How to create and increase customer capital?
- How to correctly measure customer capital and using it as a guideline to develop business and management strategies?
- How to effectively integrate customer capital and other aspects of intellectual capital in order to create a synergy to upgrade organizational competence?
- Case studies on what is the best management mechanism practice for a market-oriented company in order to develop research hypotheses.
- Studying empirically the relationships among management mechanism, customer knowledge competence, and performance by means of survey.

IC Deploying Strategy & Policy Environment

■Discoveries

- Consolidating the human capital of employee is the most important thing for firms to manage IC.
- There are dynamic interaction between human capital and organizational capital .
- Firms will lock in employee by building up specific organizational capital which is complementary to the human capital of employee .
- Employee will utilized the organizational capital by their own way to address their benefits.

■Utilizing Capability of IC

- With the same IC stock, different utilizing strategies will lead to different performance.
- firms may have different Utilizing Capability to carry out the strategy.
- Utilizing Capability is the key to Utilize IC

TICRC Activities

Research Reports

(1)Research Reports(quarterly)
(2)PowerPoint of Knowledge Sharing Meeting
(3)Academic Papers
(4)Records of Activities
(5)Executive Reports

Meeting

(1)Knowledge Sharing Meeting (monthly)

International Activities

(1)IC Researchers' Visit
(2) 2004 International Conference on Intellectual Capital in Taiwan
(3) 26th Annual McMaster World Congress
(4) Intellectual capital for cmoomunities & JIC(Vol.6, No.2)-Tiger Brainpower

Activities for Business

(1) Workshops of IC Theory and IC Practice for Business
(2)Cross-industry IC survey
(3)Cross-industry IC Case Studies
(4)Interaction with Taiwanese Industries
(5) NCCU EMBA Popularizing Courses
(6)Book：IC of Taiwan
(7) Brochure：IC Concept Popularization

Digital information

(1)English & Chinese Website (http://www. ticrc.nccu.edu.tw)
(2)English & Chinese Epaper
(3)Literatures & Industrial Database

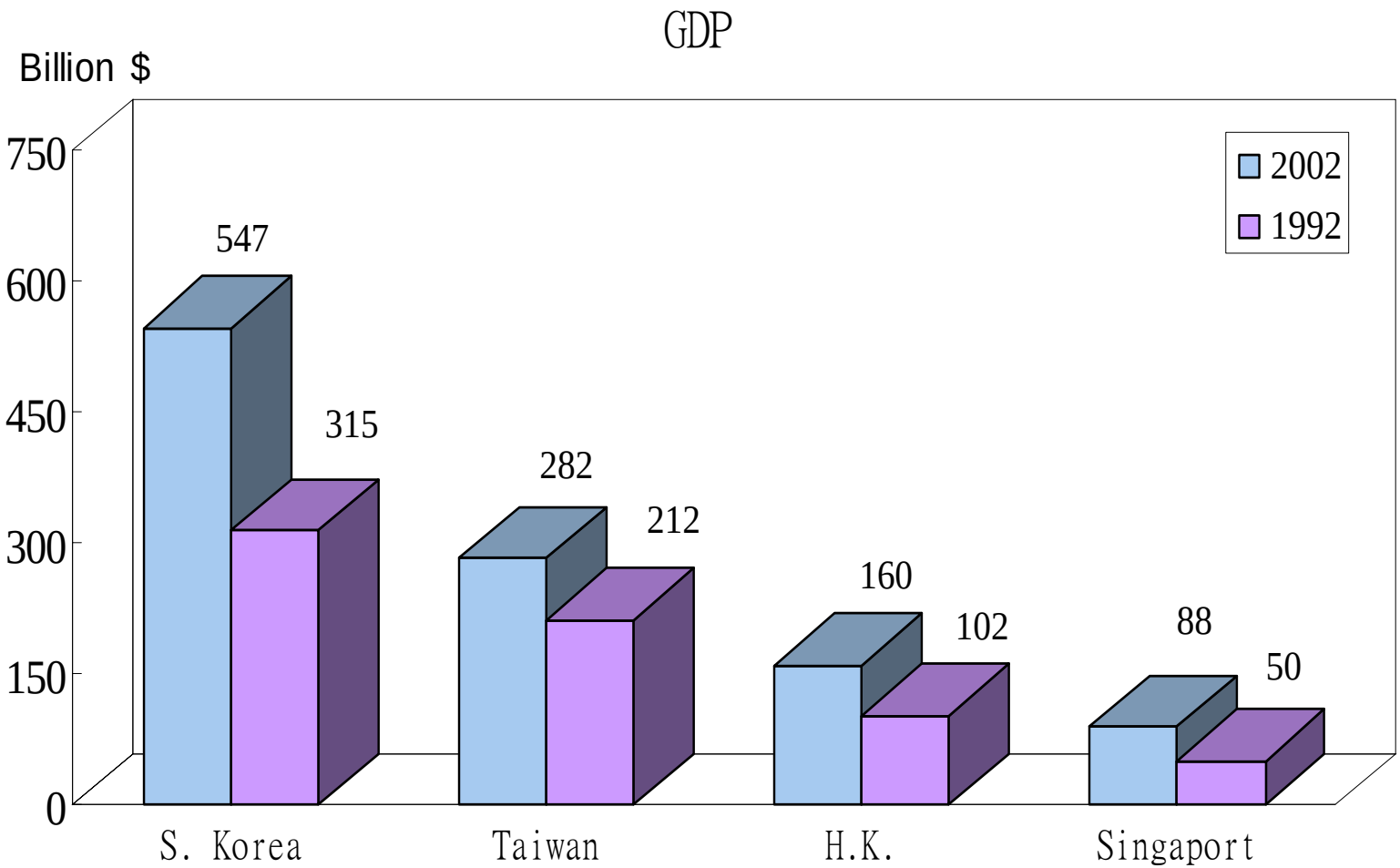
III. Future Research

Intellectual Capital for Communities

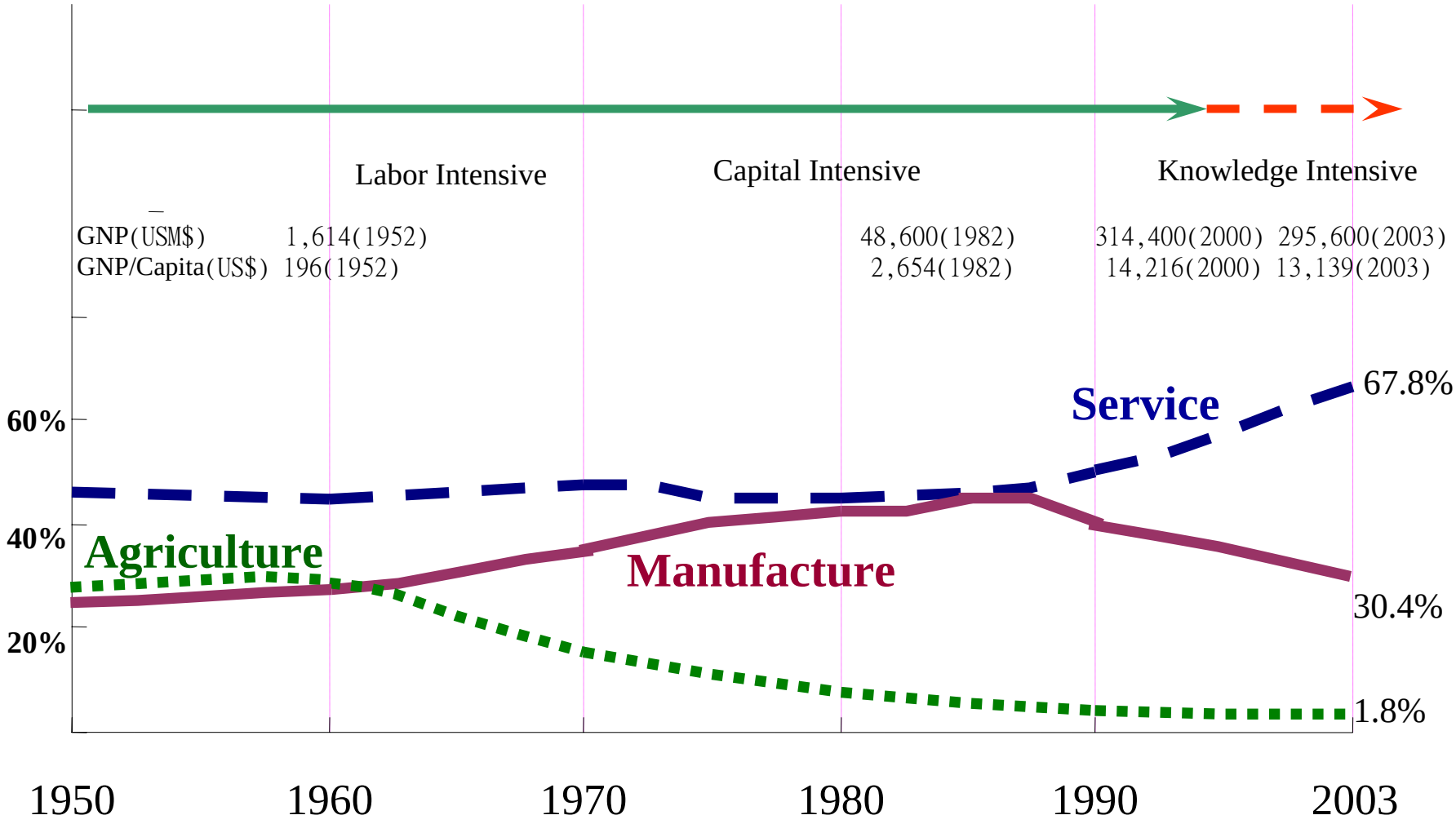
Taiwan Economy

- Formally in WTO, Customs Territory of Taiwan,Penghu, Kinmen and Matsu.
- Population=22,715,030 (2005/5)
- GDP >200 billion Dollars (after 1990)
- Growth rate= 3.63% (2005)
- Unemployed rate= 4.04%(2005)
- After 1960, Manufacturing sector leads the growth.
- After 1990, Service sector (with knowledge intensive industries) dominates the economy.

Scale of Taiwan Economy



The Shifting of Industrial Structure in Taiwan



Source：Statistics Dep. Of MOEA

Intellectual Capital of Taiwan

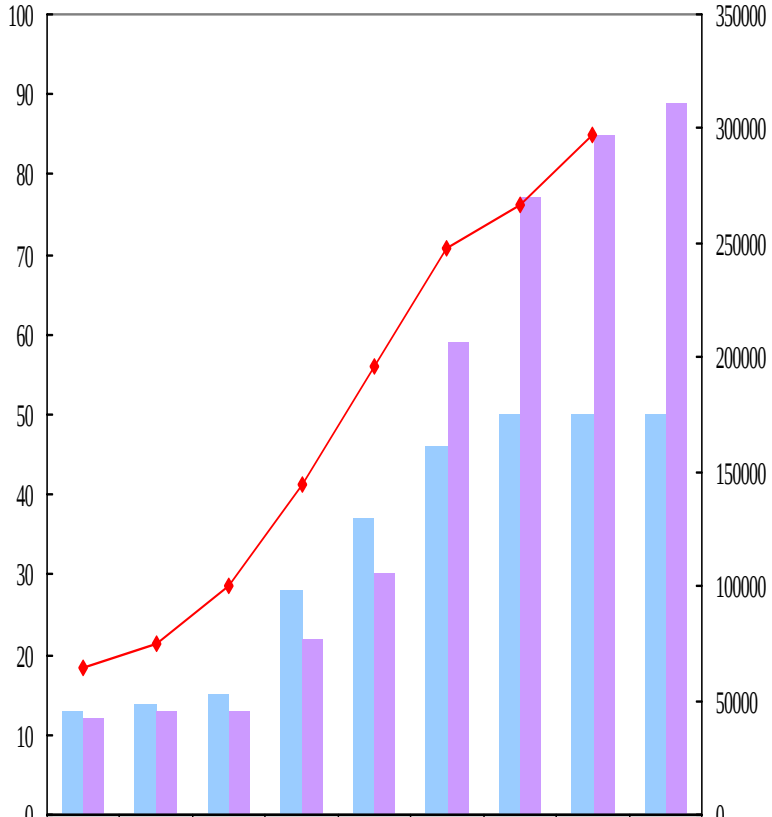
- Human Capital
  - Education
  - Human Network
- Structural Capital
  - Intellectual Property
  - IT Infrastructure
  - City Infrastructure –Taipei
  - Institutions-ITRI/HSIP
- Social Capital
  - Venture Capital
  - Industrial Network
  - International links:
    - Brands,
    - MNC's R&D centers/IPO
    - Trade Shows

Human Capital
-Education

- Higher educations continue to grow
- High Quality Human Capital focus on Science and Technology
- Chinese culture of industriousness:
  - Working hour=2280hr/year
  - 24-hours working factory
  - 24-hours convenient store (not just 7-11)

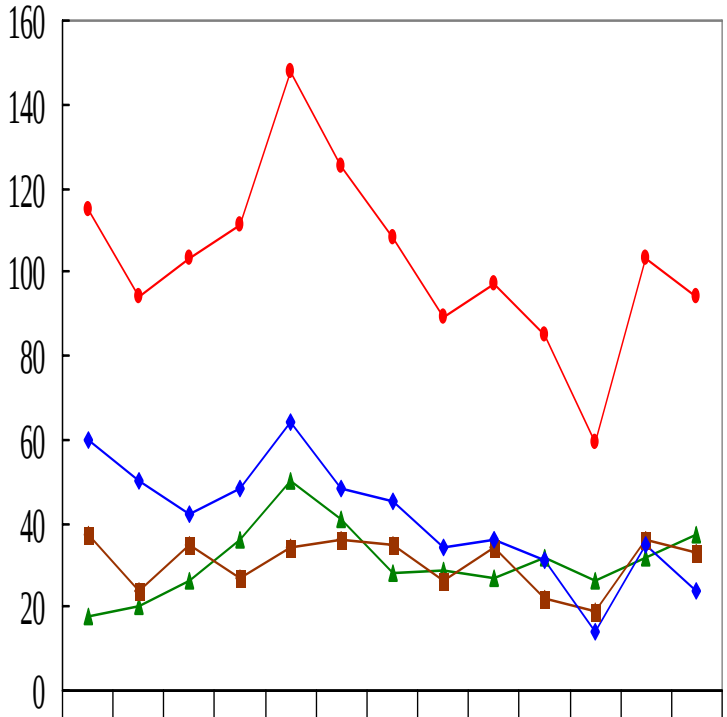
Sufficient Human Input

Statistics of student amount in public and private universities



	1976	1981	1986	1991	1996	1999	2000	2001	2002
public universities	13	14	15	28	37	46	50	50	50
private universities	12	13	13	22	30	59	77	85	89
total graduated	64057	75128	99838	144354	196384	247890	266561	296884	-

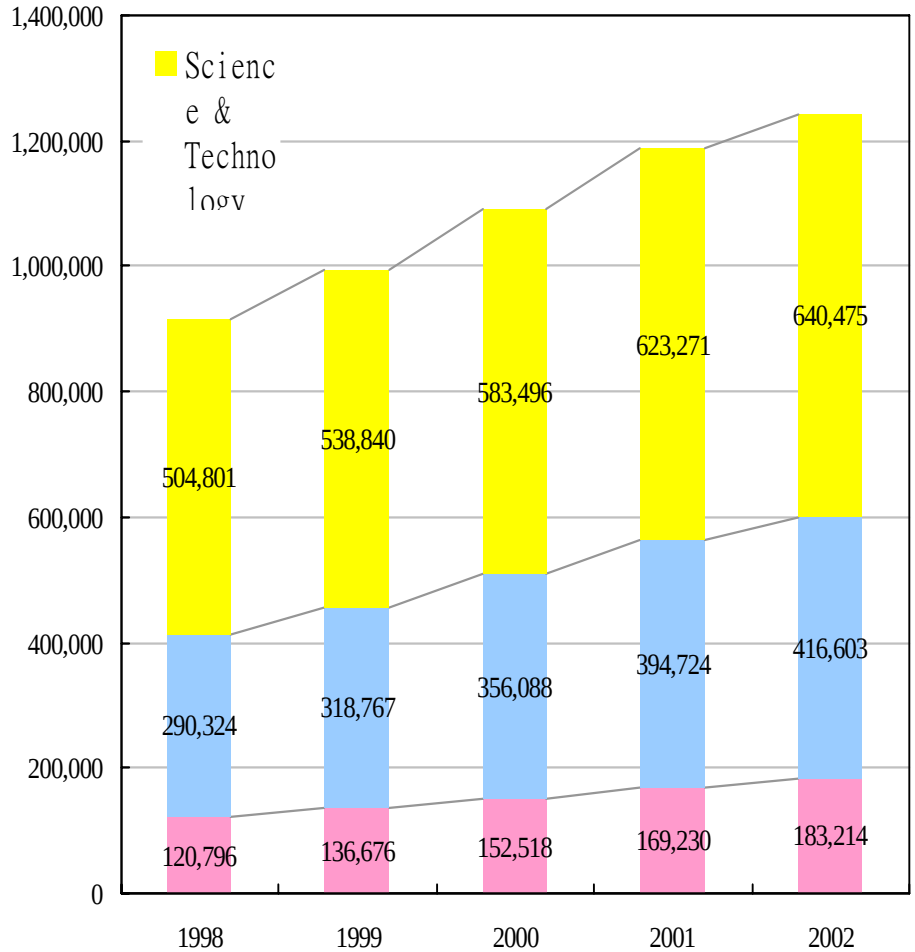
Statistics of students study abroad within government support



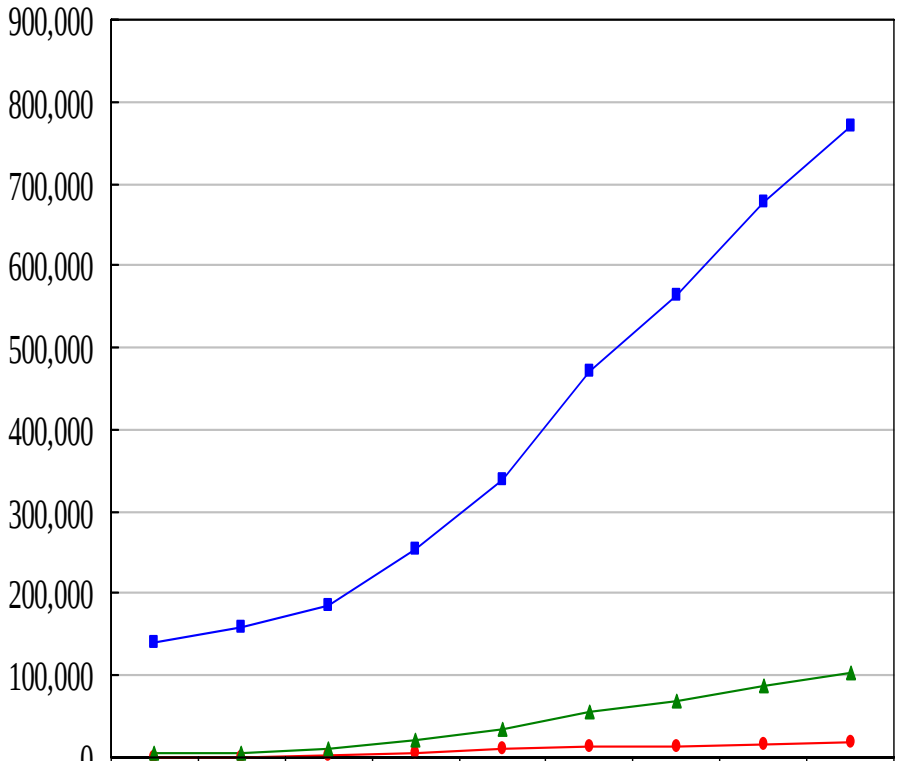
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Humanality	18	20	26	36	50	41	28	29	27	32	26	32	37
Total	115	94	103	111	148	125	108	89	97	85	59	103	94
Socal Science	37	24	35	27	34	36	35	26	34	22	19	36	33
Science & Technology	60	50	42	48	64	48	45	34	36	31	14	35	24

High Quality Human Capital focus on Science and Technology

Profile of Academy Domain



Percentage of Student profile



	1976	1981	1986	1991	1996	1999	2000	2001	2002
Ph.D students	363	800	2,143	5,481	9,365	12,253	13,822	15,962	18,705
Master students	4,138	6,555	11,294	21,306	35,508	54,980	70,039	87,251	103,425
College students	140,857	158,181	184,729	253,462	337,837	470,030	564,059	677,171	770,915

Human Capital
-Human Network

- Intelligence flows within and between Knowledge Capital Clusters of Taiwan, U.S., Japan and Mainland China.
- Taiwanese students were eager to study abroad and returned to work after learning the international working experiences.

→*How to develop intelligence flows within and between knowledge capital clusters*

Japan

US,

Silicon Valley

Product

Marketing

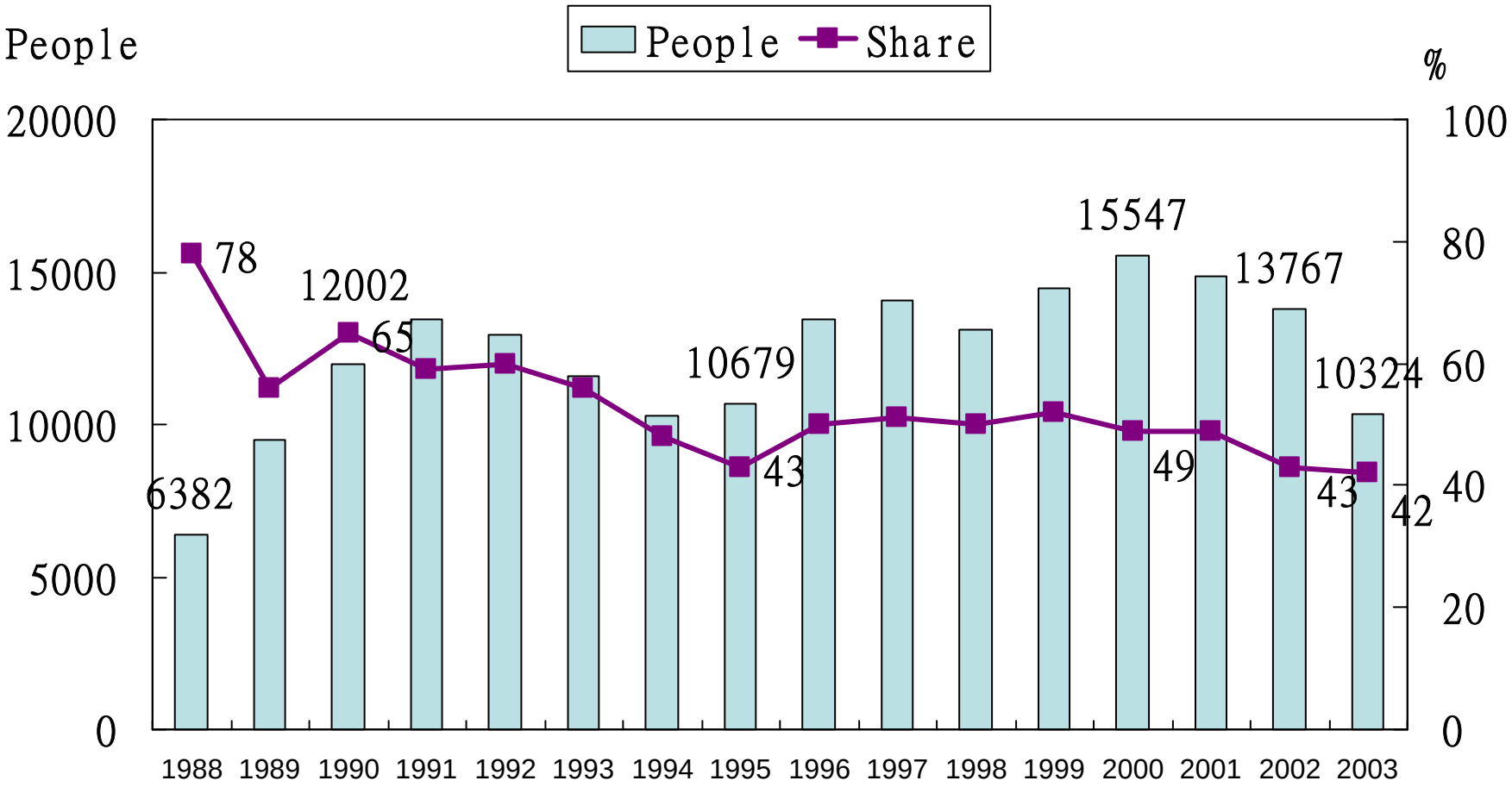
Contract Outsourcing

Management Skills

Talents with Entrepreneurship

- **Start-ups**
- **Originality**
- **Market**

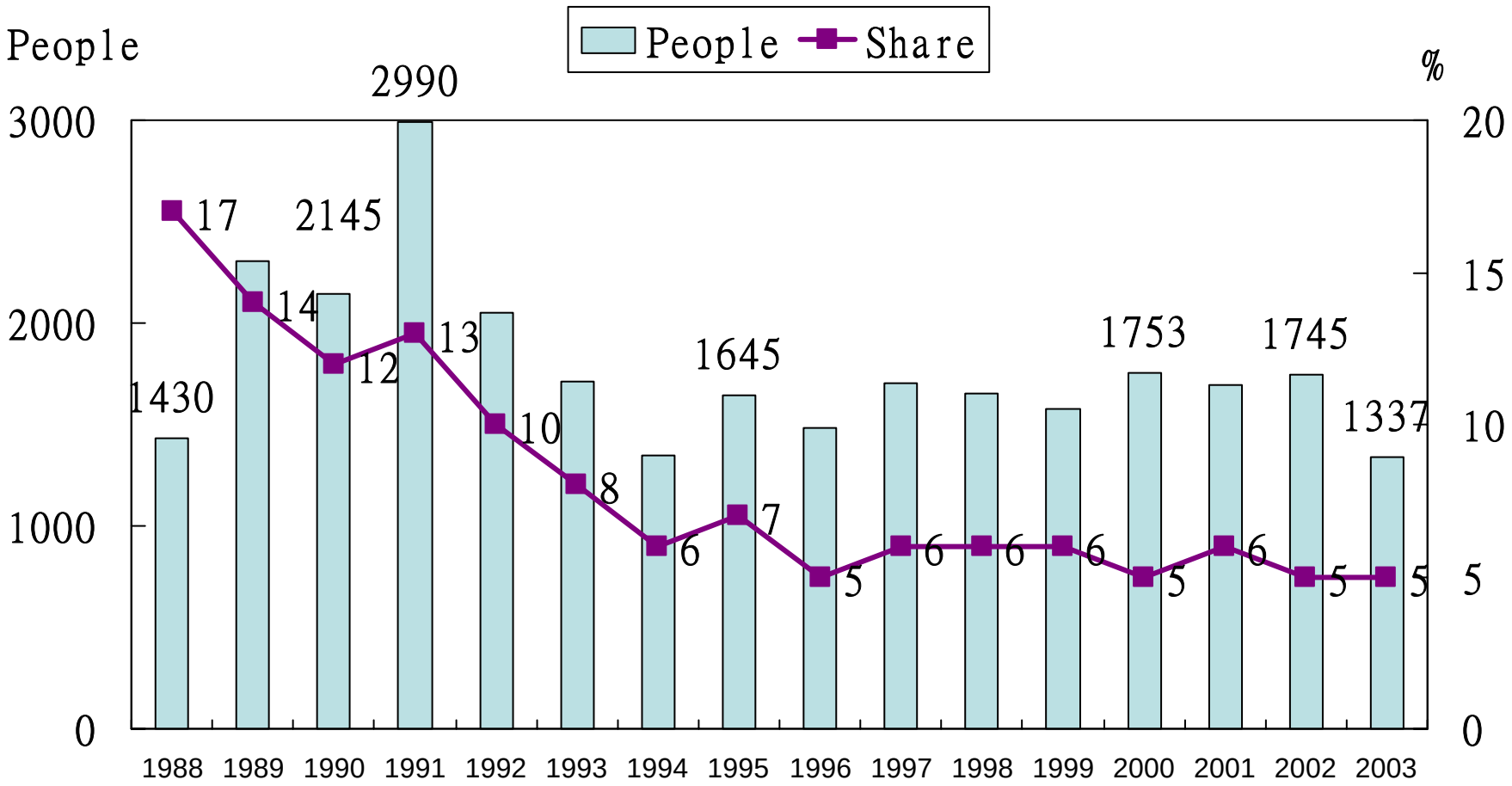
Taiwan Students Abroad-United State



Source: Ministry of Education

*Share is ratio to total students abroad

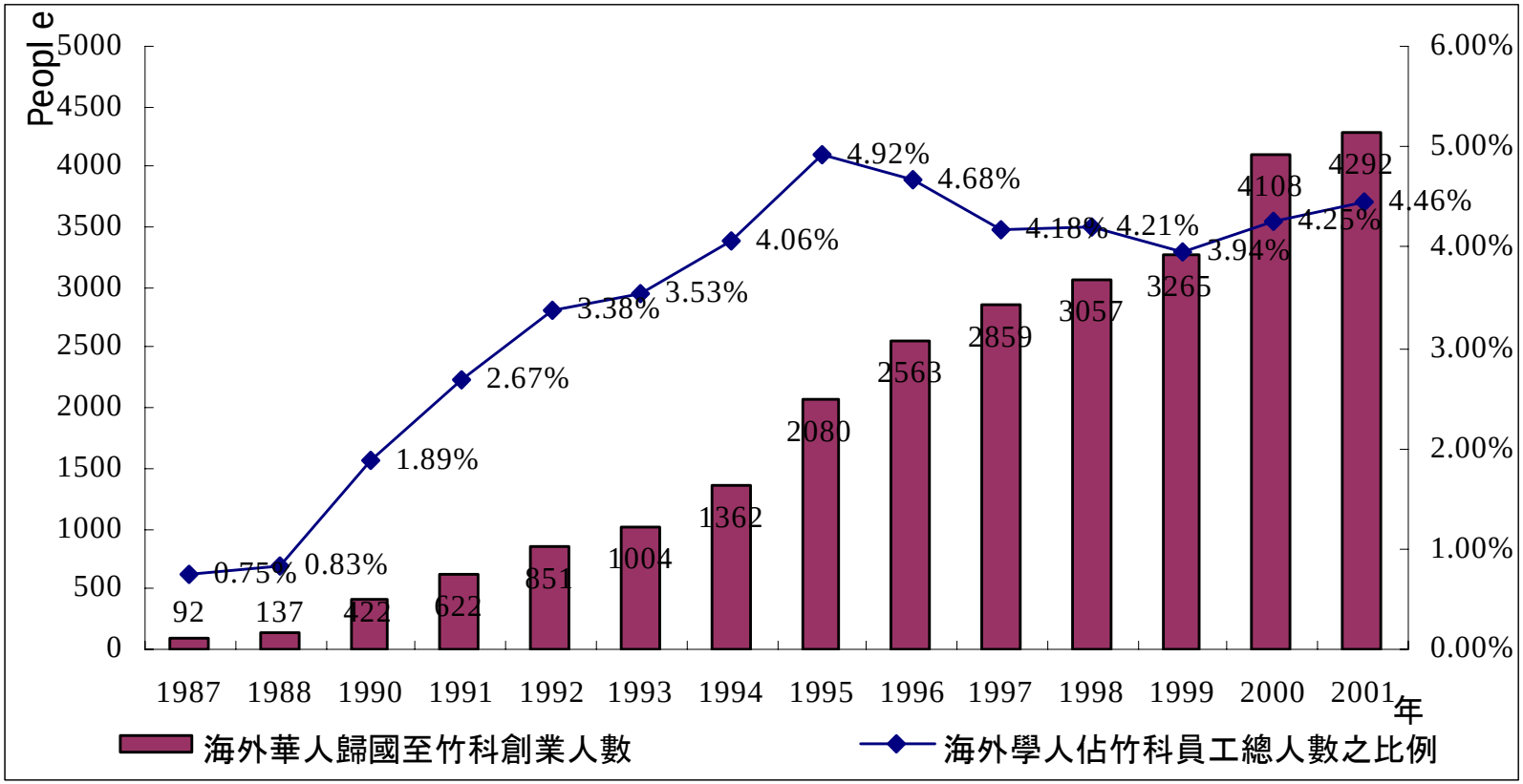
Taiwan Students Abroad-Japan



Source: Ministry of Education

*Share is ratio to total students abroad

The Number and percentage of Employee Coming back from Oversea to HSIP

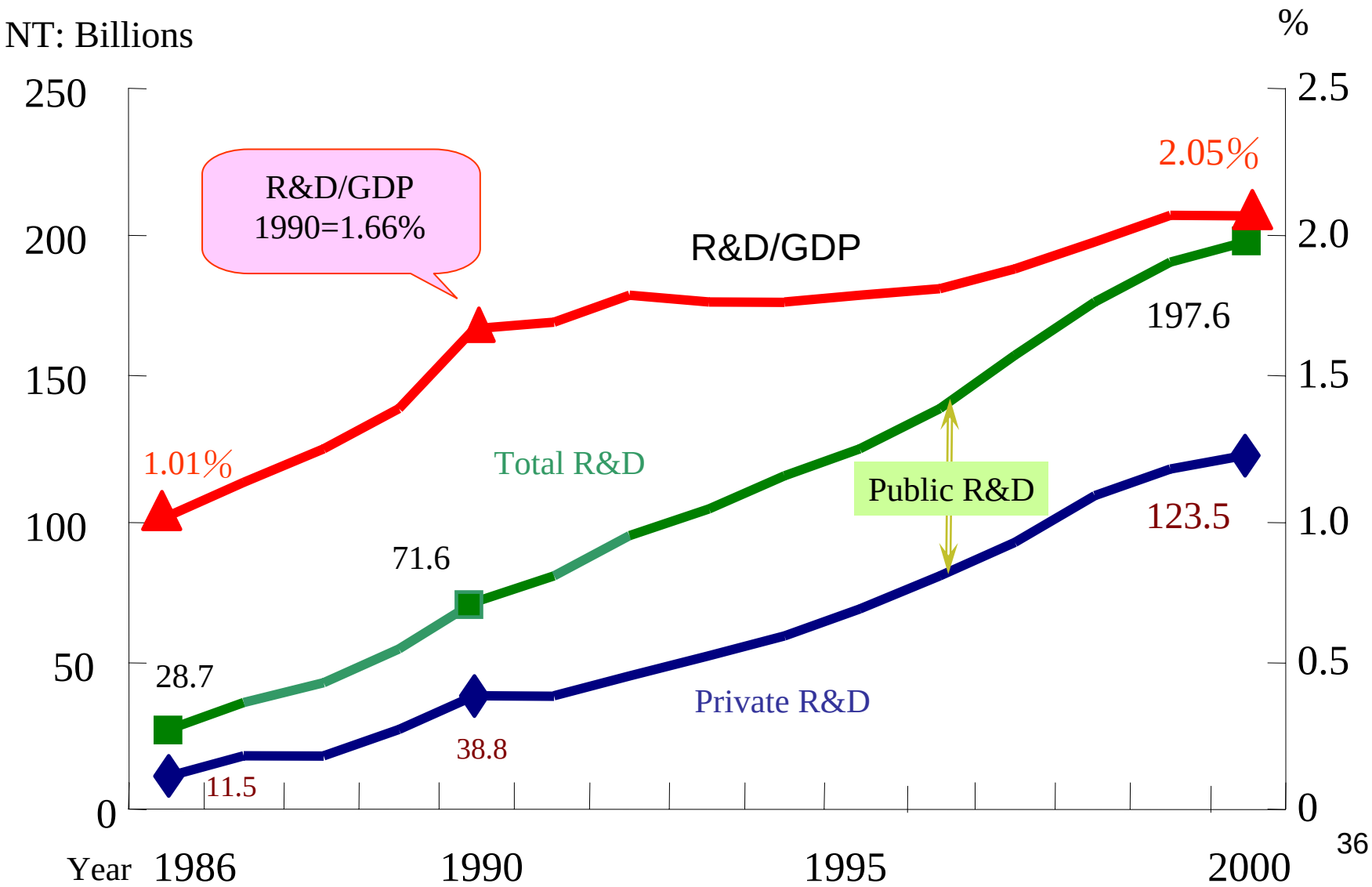


Source: Administration Bureau of HSIP

Structural Capital
-R&D, IP

- R&D Investments are steadily increasing.
- R&D/GDP ratio is around 2%
- R&D output grows dramatically
  - Number of US patents (2001) Rank 4th.
  - Patent per million people (2001) rank 2nd.
  - Papers in SCI (2001) : Ranking No.17
  - Papers in EI (2001) : Ranking No.10

R&D Investment of Taiwan



The Percentage of Taiwanese Patents Granted in US

1990			1995			1999			2000			2001		
	Rank	%		Rank	%		Rank	%		Rank	%		Rank	%
1	US	60.75	1	US	64.02	1	US	61.42	1	US	59.21	1	US	55.71
2	Japan	20.94	2	Japan	19.08	2	Japan	19.33	2	Japan	19.64	2	Japan	20.65
3	German	5.39	3	German	3.90	3	German	3.65	3	German	4.02	3	German	4.28
4	UK	2.48	4	UK	1.90	4	Taiwan	2.68	4	Taiwan	3.30	4	Taiwan	3.56
5	France	2.24	5	France	1.84	5	S. Korea	2.11	5	S. Korea	2.11	5	S. Korea	2.43
6	Canada	1.83	6	Canada	1.83	6	Canada	1.94	6	Canada	1.93	6	Canada	2.11
7	Swiss	0.94	7	Taiwan	1.50	7	UK	1.69	7	UK	1.82	7	UK	1.74
8	Italy	0.84	8	S. Korea	0.99	8	France	1.55	8	France	1.51	8	France	1.51
9	Netherlands	0.74	9	Swiss	0.66	9	Sweden	0.69	9	Sweden	0.78	9	Sweden	0.65
10	Taiwan	0.66	10	Sweden	0.62	10	Italy	0.57	10	Italy	0.62	10	Italy	0.53
	Total%	100.00			100.00			100.00			100.00			100.00

Source: Computed from Data of US PTO

Structural Capital -Infrastructure

- S & T Infrastructure of Taiwan
  - *Taiwan: Worldwide top 5*
- Well-equipped ICT infrastructure
  - *Taiwan: Worldwide top 5, Asia top 3*
- E-Government
  - Taiwan: *Worldwide top 2*

S & T Infrastructure of Taiwan

- **According to IMD (2003)**
  - **Science Infrastructure : Ranking No. 5**
  - **Technology Infrastructure : Ranking No. 6**

- **According to WEF (2002/2003)**
  - **S&T Index: Ranking No. 2**
  - **Innovation Index: Ranking No. 2**

Well-equipped ICT infrastructure

2002 Digital Access Index (DAI)

2002 Rank	1998 Rank	Country	2002 Rank	1998 Rank	Country	2002 Rank	1998 Rank	Country
1		Sweden	**6**		Dutch	**11**	5 ↓	U.S.
2	7 ↑	Demark	**7**	13 ↑	H.K.	**12**		U.K.
3		Iceland	**8**		Finland	**13**		Swiss
4	24↑	Korea	**9**	22 ↑	**Taiwan**	**14**	20 ↑	Singapore
5		Norway	**10**		Canada	**15**		Japan

Source：ITU, 2003/11

Taiwan:
Worldwide top 5
Asia top 3

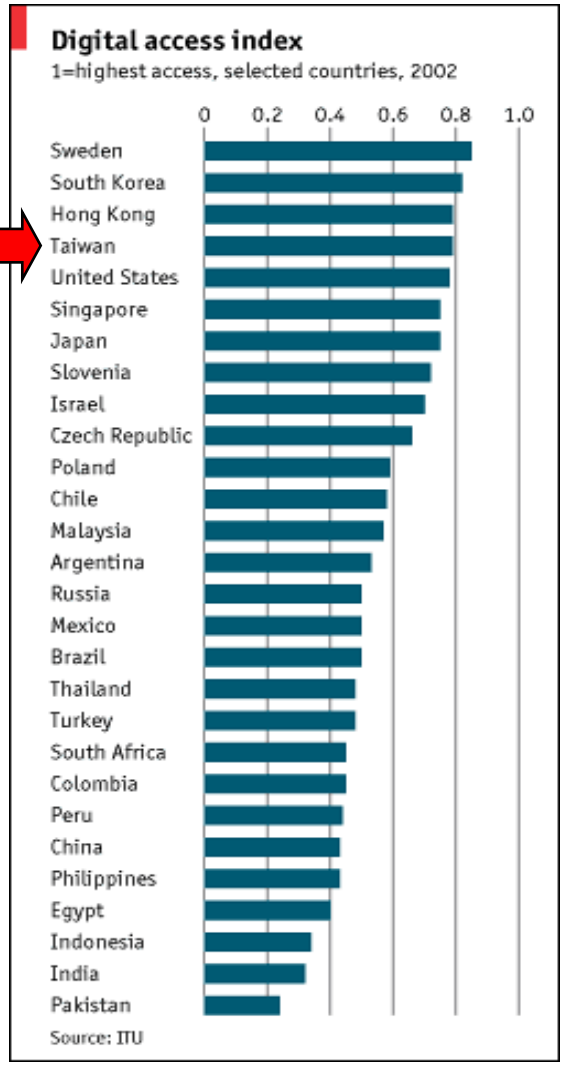
Items	**Taiwan**	H.K.
Infrastructure	**0.98**	0.93
Consuming ability	**0.99**	0.998
Education	**0.95**	0.83
ICT service quality	**0.56**	0.68
Internet usage	**0.45**	0.51

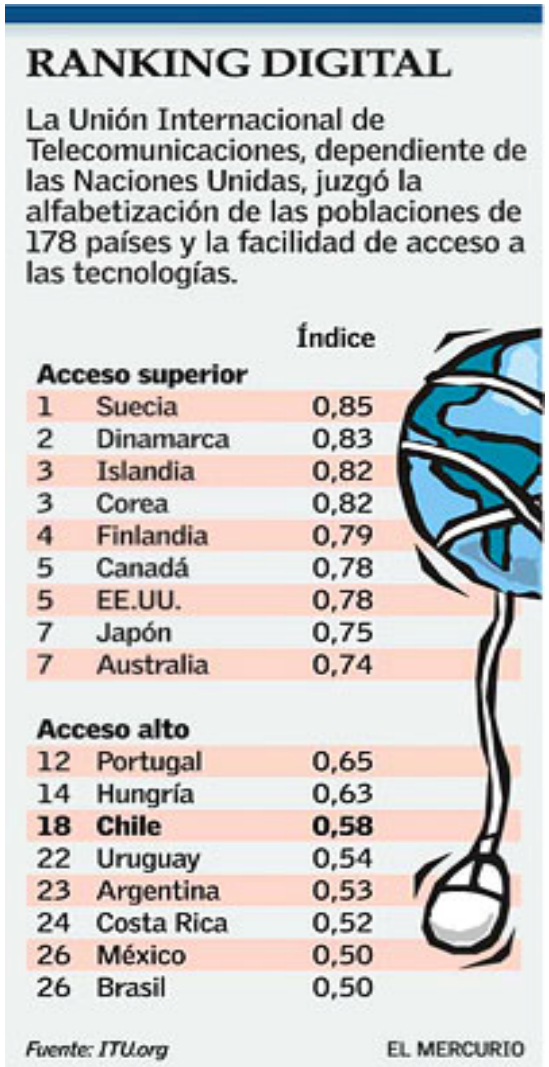
Wideband density: worldwide top 6

No.	Country	Units (thousand)	01~02Growh%	Density%	Penetration %
1	Korea	10,405	33%	21.9%	96%
2	H.K.	989	38%	14.6%	42%
3	Canada	3,500	23%	11.1%	50%
4	Iceland	25	140%	8.7%	21%
5	Belgium	870	90%	8.4%	51%
6	Taiwan	1,825	62%	8.1%	27%
7	Sweden	700	96%	7.8%	23%
8	Demark	360	61%	6.7%	11%
9	Australia	540	123%	6.5%	22%
10	Dutch	1,060	127%	6.5%	10%
11	U.S.	18,000	41%	6.2%	18%
12	Japan	7,806	104%	6.1%	27%

Source：ITU

ITU Digital Access Index(DAI)
World's First Global ICT Ranking





Top 5 in developed Asia Pacific

RANK	OVERALL	ECONOMY	DAI*
1	4	South Korea	0.82
2	7	Hong Kong	0.79
3	9	Taiwan	0.79
4	14	Singapore	0.75
5	15	Japan	0.75

*DAI: Digital Access Index
Source: ITU

Top 5 gains in ranking

RANK '98	RANK '02	ECONOMY
24	4	South Korea
22	9	Taiwan
20	14	Singapore
13	7	Hong Kong
7	2	Denmark

Source: ITU

註：http://www.itu.int/ITU-D/ict/dai/index.html

source：ITU Digital Access Index: World's First Global ICT Ranking, (2003)

E-Government index for Taiwan

	e-Government	US	UK	Japan	S.Korea	Singaport	Taiwan	Range
1	IMD index	5.9	3.9	3.2	3.1	7.4	4.6	0-10
2	E-Ledership	7	8	4	1	7	3	Rank
3	E-Services, G2B, G2C	4	3	2	1	5	2	Rank
4	E-Operation, G2G, G2E	4	4	3	1	5	2	Rank
	IT application	52	47	31	15	61	29	0-100

Source: ITU

Structure Capital
-City Infrastructure

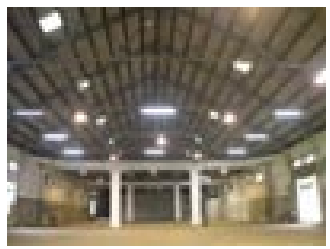
Intellectual Capital: Taipei City

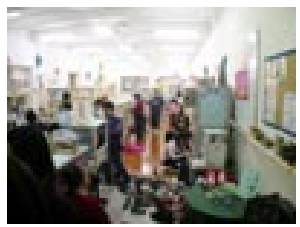
- Creative Taipei
  - Culture innovation
  - Software Park
- Wireless Taipei
  - the world's first mobile city

→How to make cities "intelligent"

Creative Taipei Infrastructure for Culture Innovation

- Huashan Creative Culture Center
- Renovated from old winery into modern theatres for artists to perform various kinds of arts.





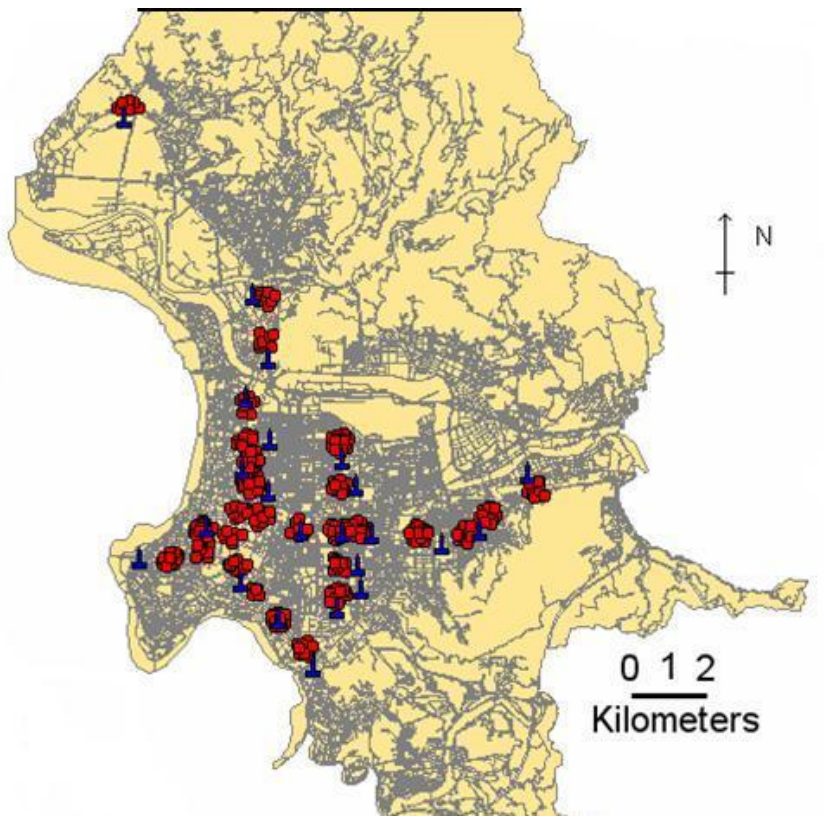
Creative Taipei

Infrastructure for Software Creation

- NanKang Software Park
- One stop for all services related to idea creation

Wireless Taipei

- Currently 86.2% of the city's households are equipped with personal computers, among which 89.4% have Internet access and 69% broadband usage rate .
- The Main hot point with "100% WLAN Coverage," "Anytime, Anywhere, Any-device Access" will create new value-added applications and business opportunities.



Structure Capital Institutions

- For example:
  R&D Cluster :ITRI/HSP
  - ITRI=Industrial Technology Research Institute
    - http://www.itri.org.tw/eng/index.jsp
  - HSP=Hsinchu Science Park
    - http://eweb.sipa.gov.tw/en/visitor/about/

→***How to capitalize on knowledge capital, by new innovative social systems, in terms of the collective wealth of nations***

→***How to cultivate efficiency and renewal of the knowledge capital of regions***

ITRI as a Hub of R&D Cluster

- Roles
  - Establish ITRI as the go-between for itself and the private sector
  - ITRI play important role as “bridge” and “partner”
    - Lead in National R&D projects
    - Facilitate technological diffusion & spillovers
    - Human capital flow
- Ways of Technology Sharing
  - Spin-off company
  - Incubation center
  - Open Lab for technology R&D sharing
  - Bridging foreign technology and partners

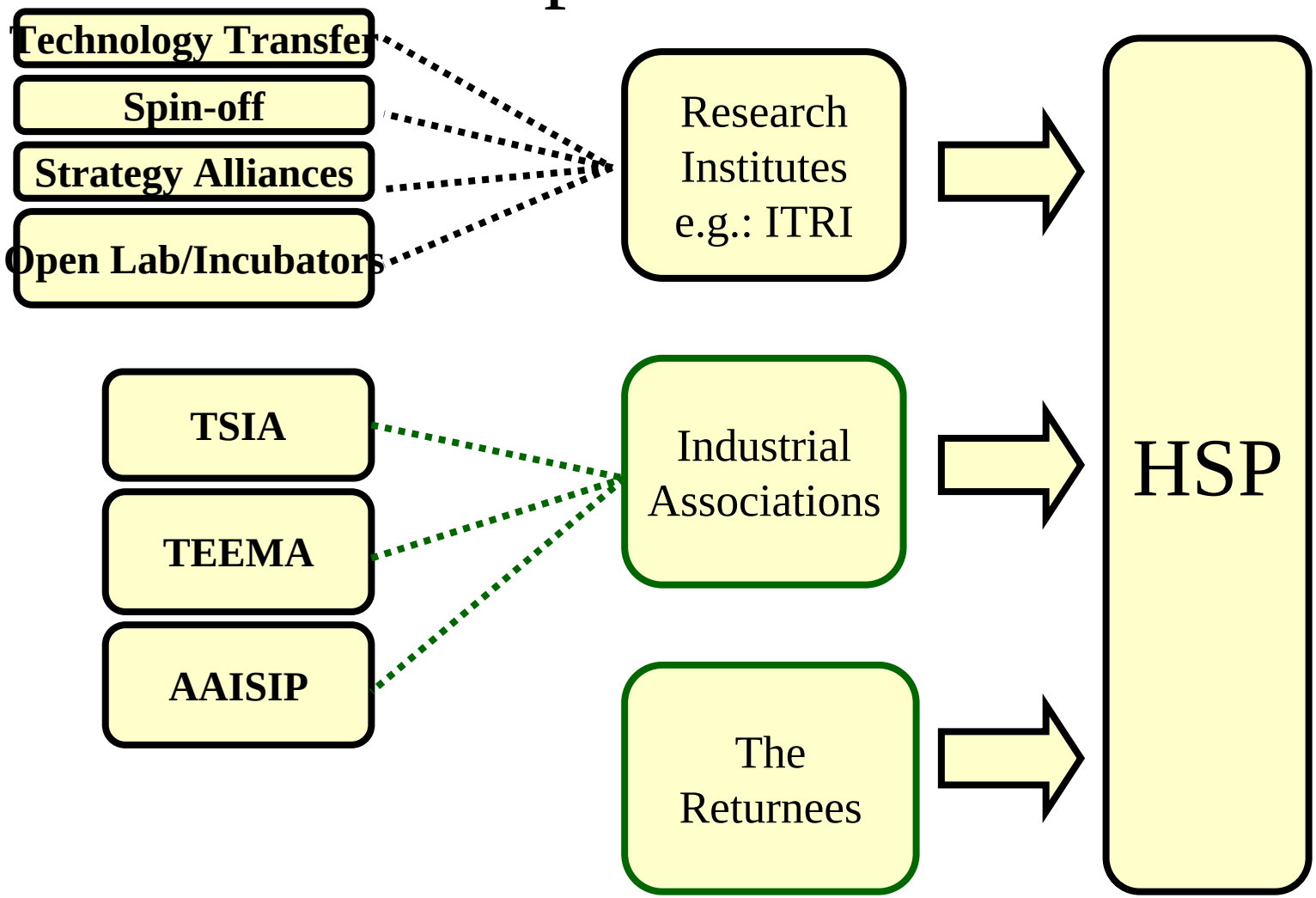
ITRI's Contribution to Taiwan IT Industry

- **TTLA**
  1st TFT LCD Alliance in TWN, 2001
- **VISC: spin-off company from ERSO/ ITRI**
  1st 8" Wafer Fab in TWN, 1994 (260M US$, 2001)
- **TMC: spin-off company from ERSO/ ITRI**
  1st Mask Fab in TWN, 1988(76M US$, 2001)
- **TSMC: spin-off company from ERSO/ ITRI**
  1st 6" Wafer Fab in TWN, 1987 (3,597M US$, 2001)
- **UMC: spin-off company from ERSO/ ITRI**
  1st 4" Wafer Fab in TWN, 1979 (1,843M US$, 2001)
- **IC process and design technology was transferred from RCA, 1976**

Major Impact

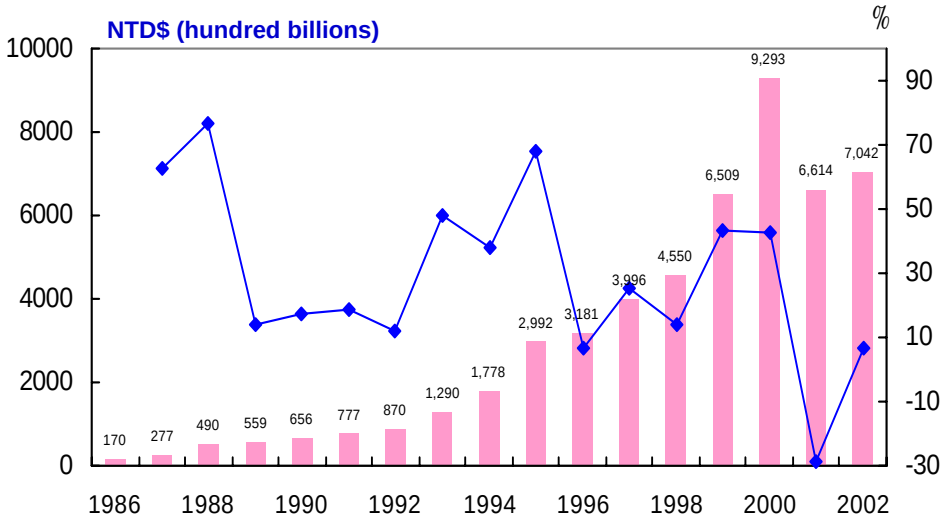
1980 1985 1990 1995 2000 2005

The Cluster and Network of Experts in HSP

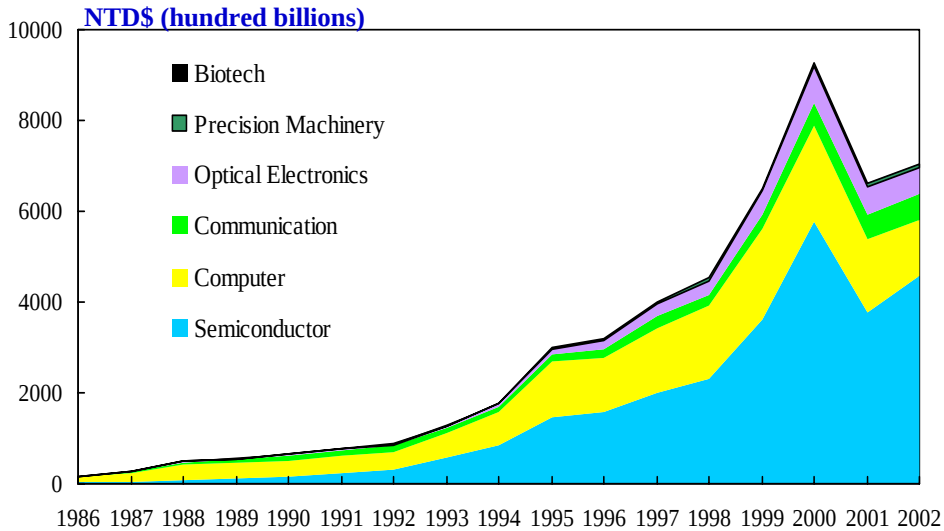


Science and Technology Park & High-Tech Clusters

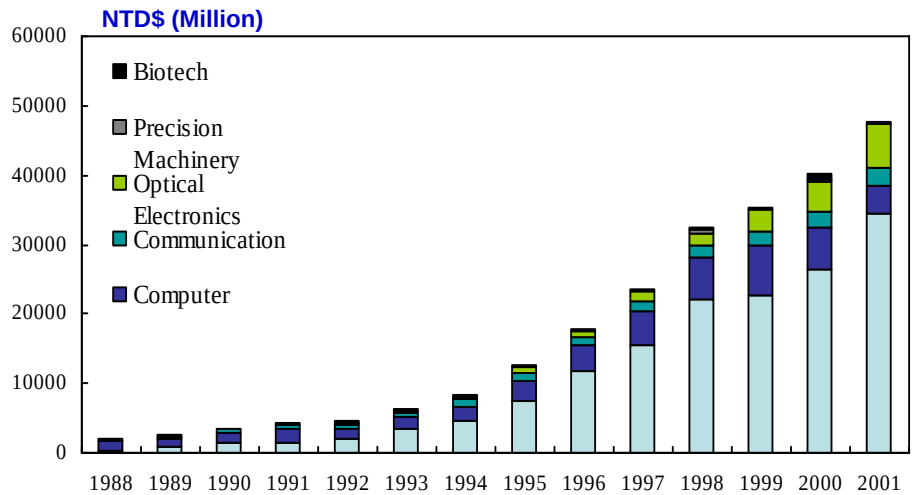
Science and Technology Park Sales Growth%

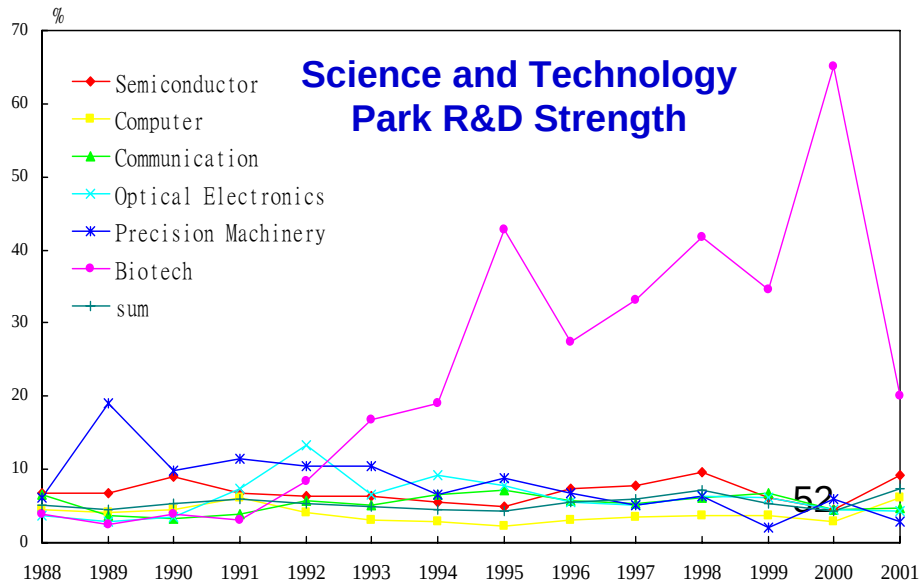


Science and Technology Park Sales Growth%



Science and Technology Park R&D expenditure





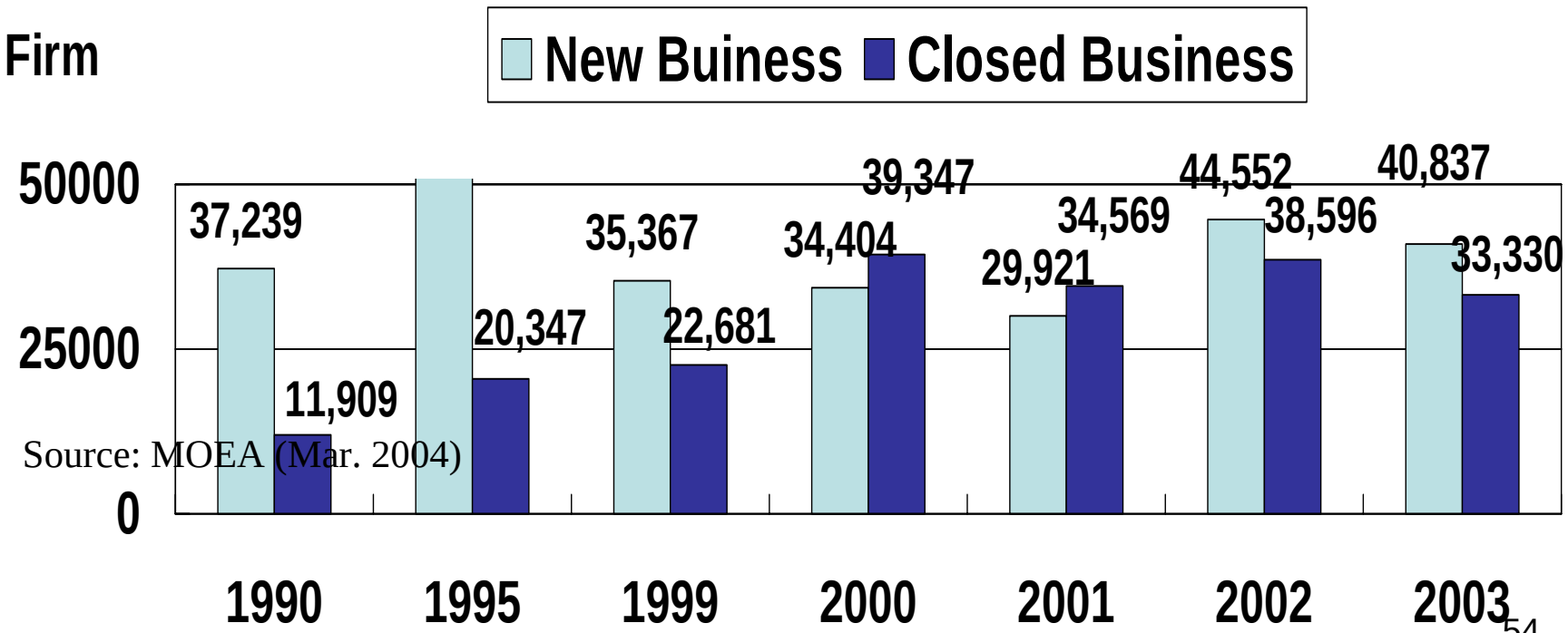
Source: HSIP Yearbook

Social Capital

- Venture Capital
- Industrial Network
- International links:
  - Brands of Taiwan
  - MNC's R&D centers/IPO
  - Trade shows

Prosperous entrepreneur environment

The Rise and Fall of SME in Taiwan



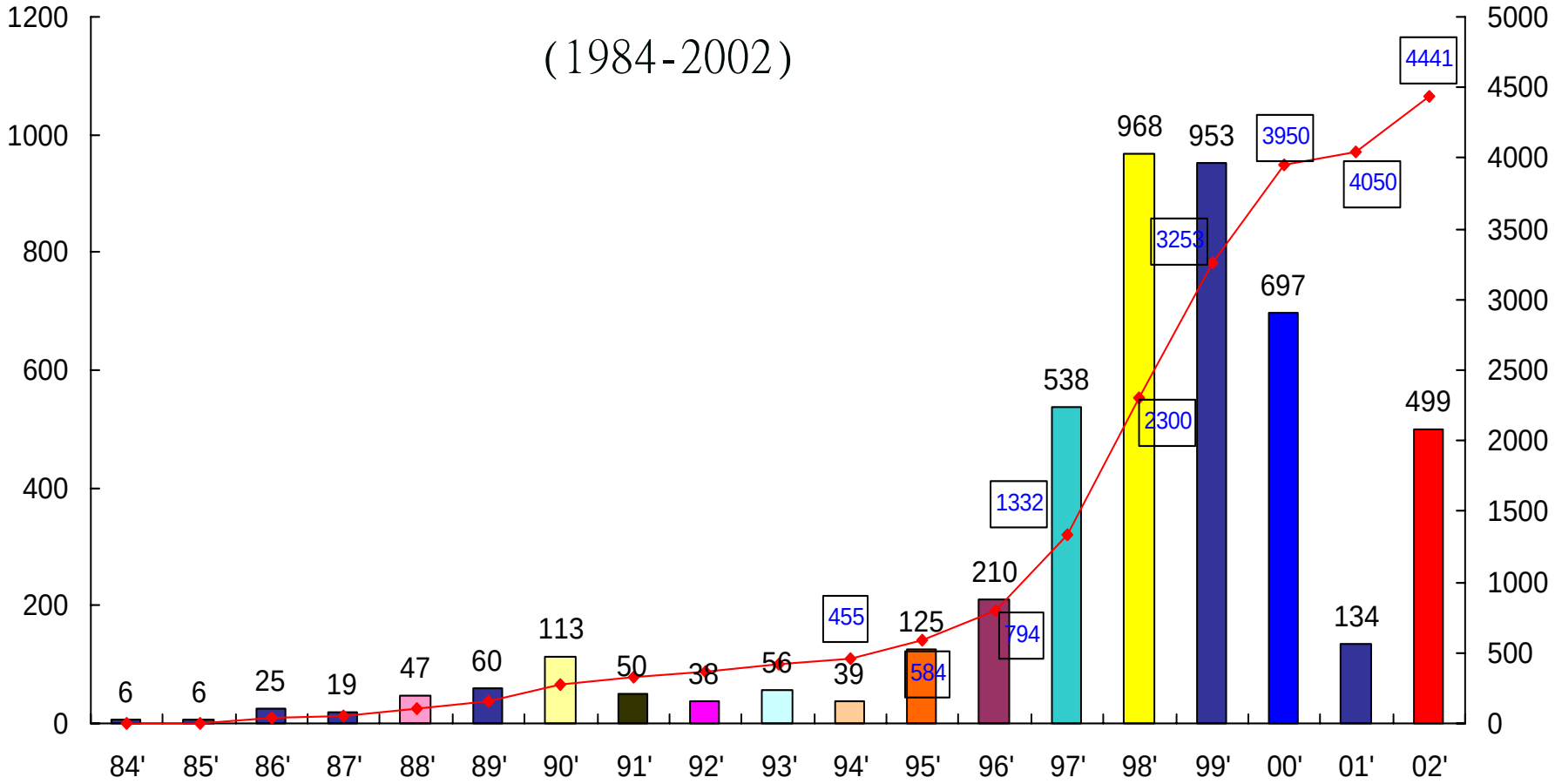
Source: MOEA (Mar. 2004)

Social Capital
-Venture Capital

- 2004 IMD Index for Venture Capital
  1. US 7.95
  2. Hong Kong 7.06
  3. Finland 6.8
  4. Taiwan 6.76
     Average 4.72

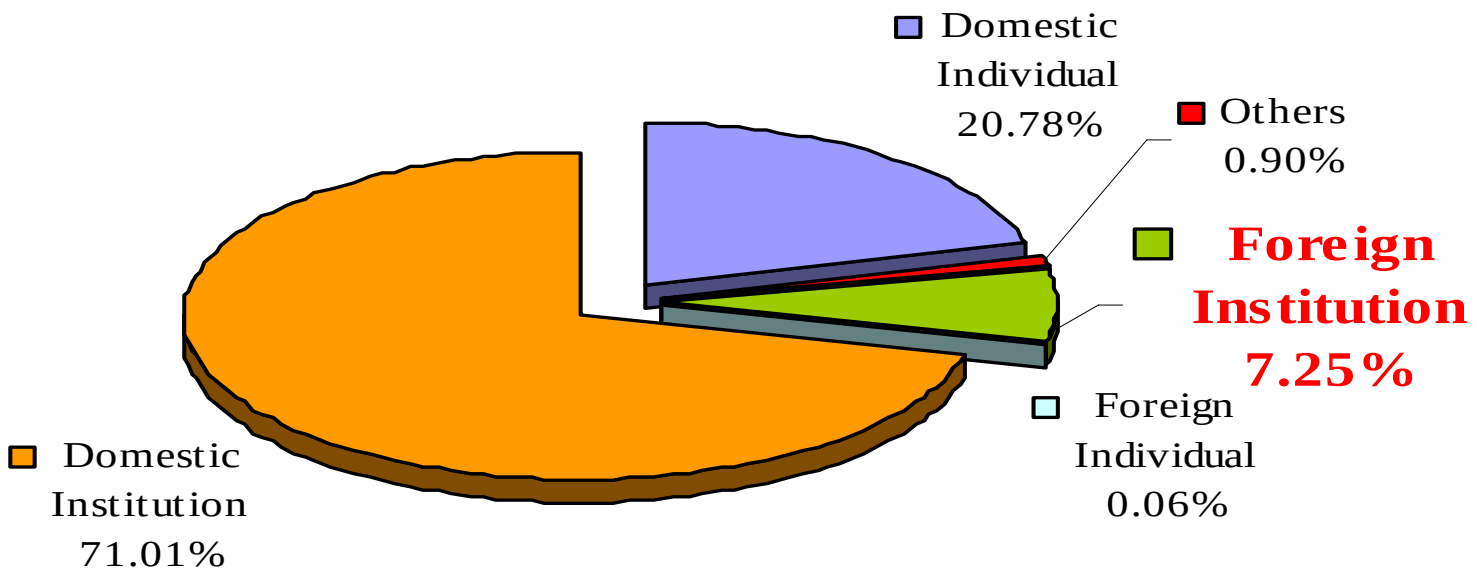
- 241 Venture Funds, 8719 investment cases with 4 Billion Euro Investment (Up to 2003).
- 92% fund from domestic relationship
- 56.34% of funds come from industries
- Focus on IT and semiconductor-related industries.
- Leverage the relationships among Taiwan, US and Mainland China

Capital Formation of Venture Funds



Shareholder Structure of VC Funds

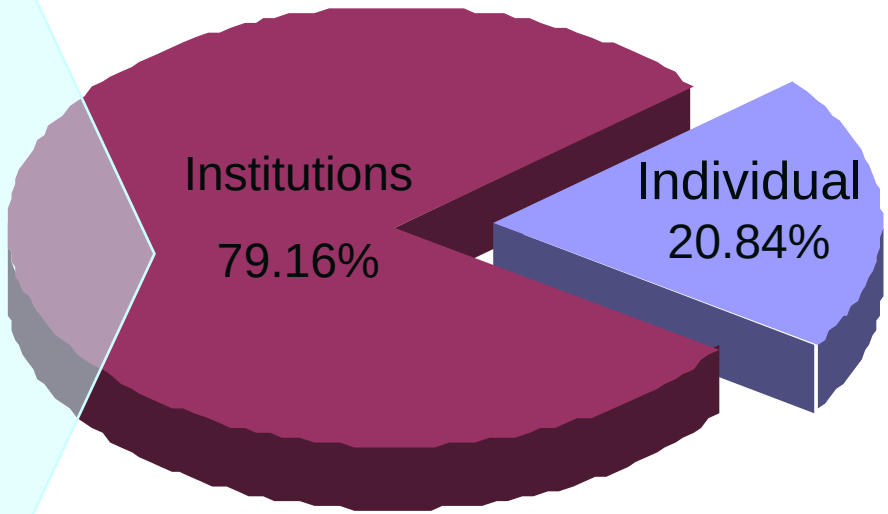
- 92% of fund come from domestic relationships
- Room for growth for foreign investors: 39% of funds of Asian VC funds come from outside of Asia, versus 7.3% for Taiwan.



Strong Industry Connections

- 56.34% of funds come from industries.

Industries	56.34%
Insurance Co. and Bank	13.84%
Foreign Investors	7.25%
Government Agencies	1.73%



Source: TVCA 2001 , CDIB

Grow with IT and Semiconductor Industries

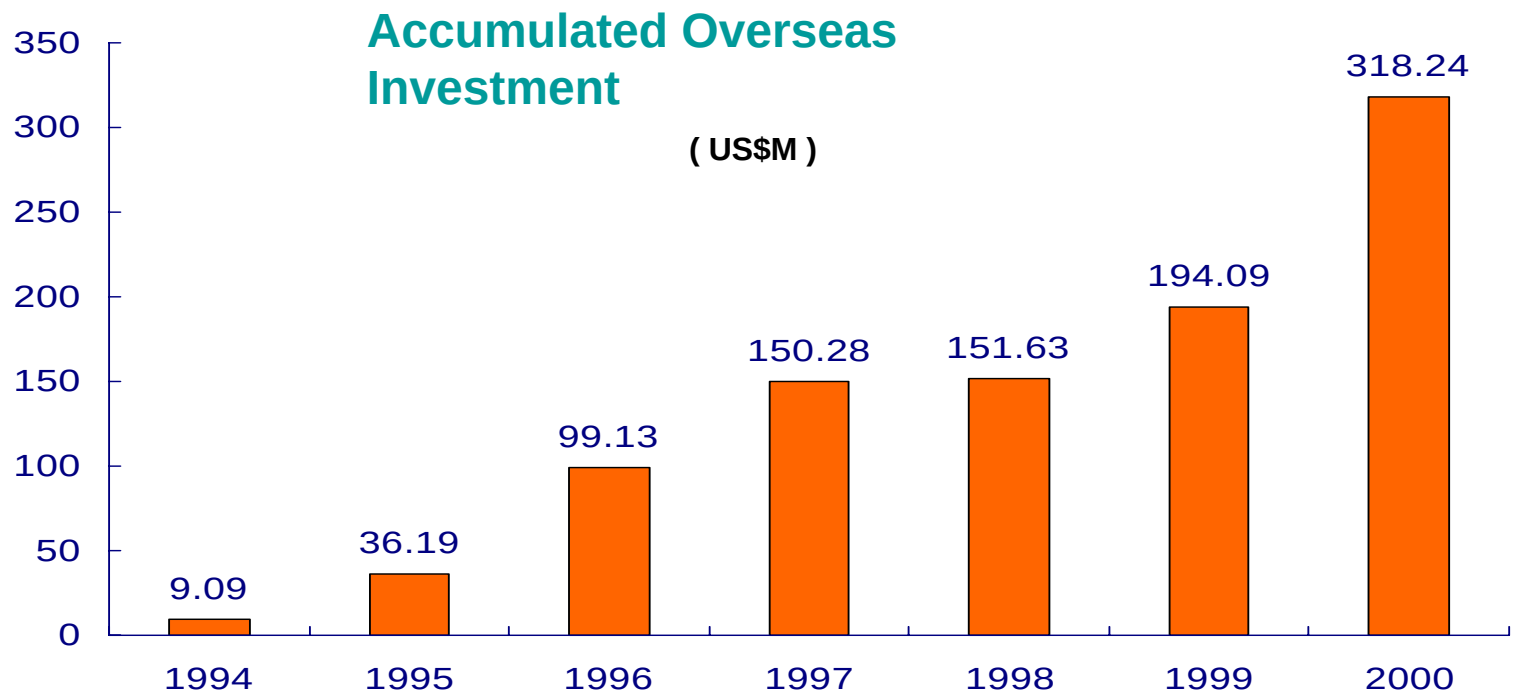
- Focus on IT and semiconductor-related industries.
- Telecom and opto-electronics will see most growth in near future.

	1996	1997	1998	1999	2000	2001
Semiconductor	27.84%	15.77%	18.67%	20.52%	18.40%	22.30%
Information	30.52%	21.57%	15.13%	18.25%	17.60%	2.80%
Telecom	8.75%	4.64%	15.44%	12.18%	12.30%	16.30%
Opto-Electronics	6.22%	12.23%	10.34%	10.33%	9.80%	23.60%
Software	2.86%	5.01%	9.06%	5.78%	6.20%	4.20%
Biotech	0.34%	2.64%	3.23%	2.18%	2.90%	5.20%
Others	23.47%	38.14%	28.13%	30.76%	32.90%	25.60%

Source： tvca 2001

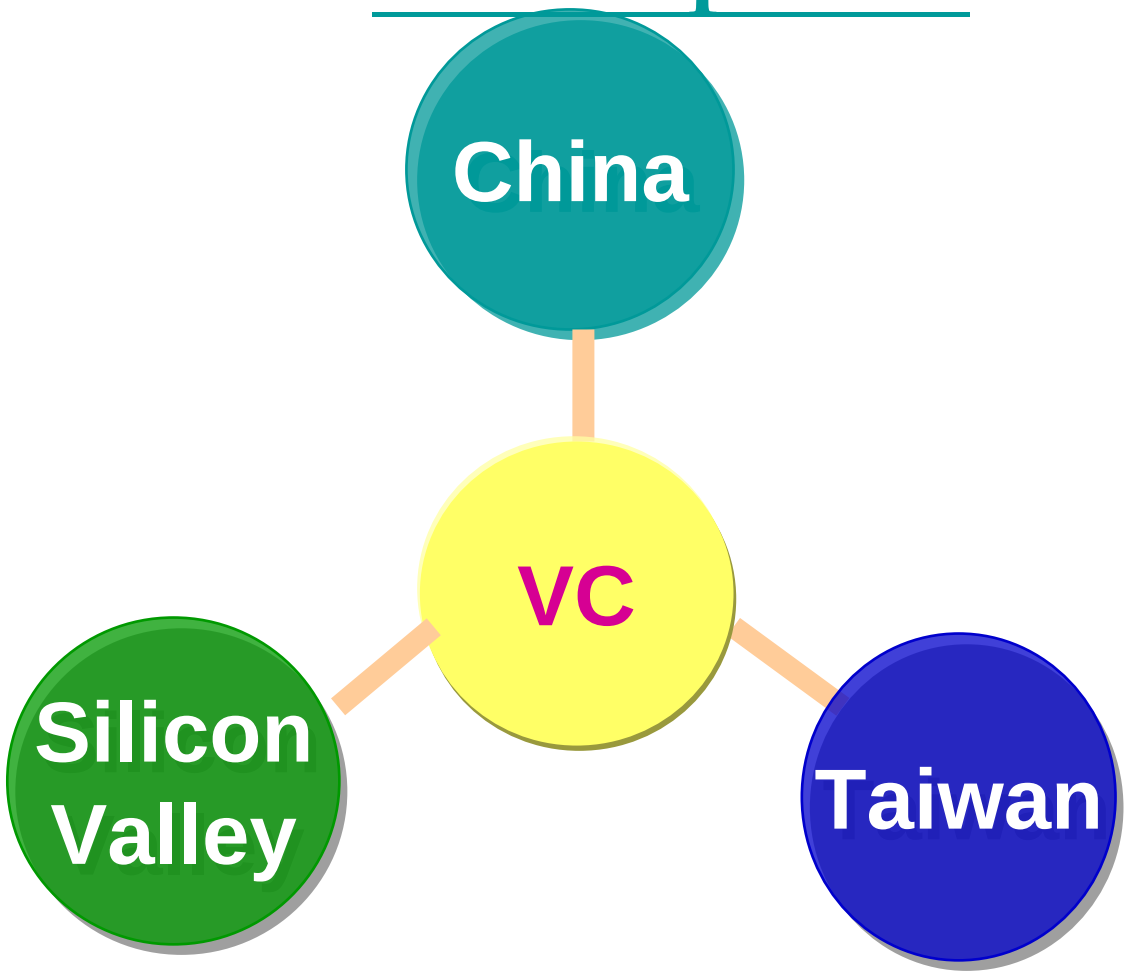
Future Trend: Globalization

- Taiwan VCs are actively pursuing global diversification
- Capital and technology flow toward the best opportunities wherever they are



Source: TVCA 2001

Venture Capital's Role in Hi-Tech Development



Japan

US,

Silicon Valley

Product

Marketing

Contract Outsourcing

Management Skills

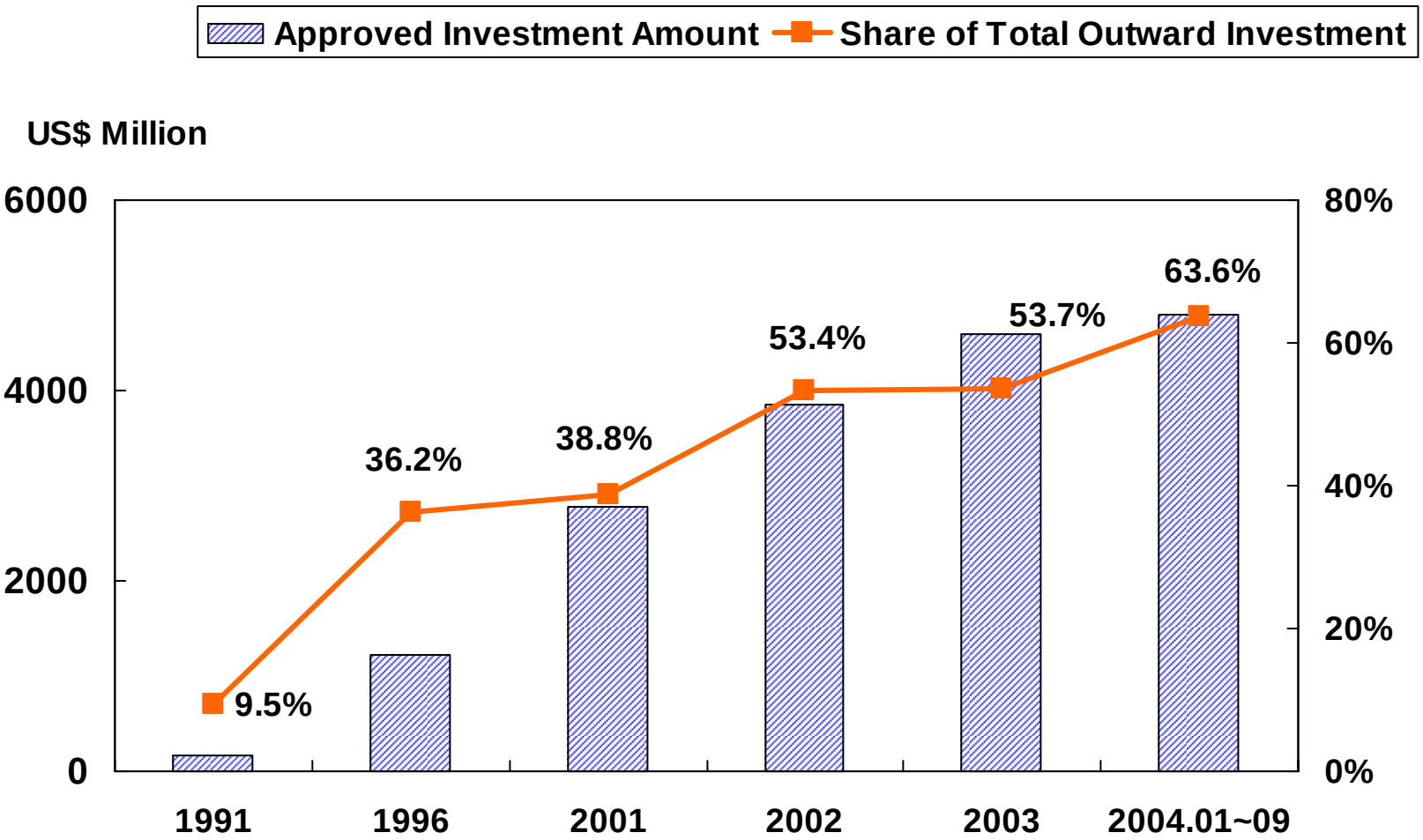
•Start-ups
•Originality
•Market

Talents with Entrepreneurship

Leverage by Region for Future Cooperation in Hi-Tech Industry

- Taiwan
  - Experience
  - Product Commercialization
  - Market & Sales
- China
  - Resources
  - Local Market Opportunity
- Silicon Valley
  - Innovation
  - Technology

Taiwanese Investments in Mainland China

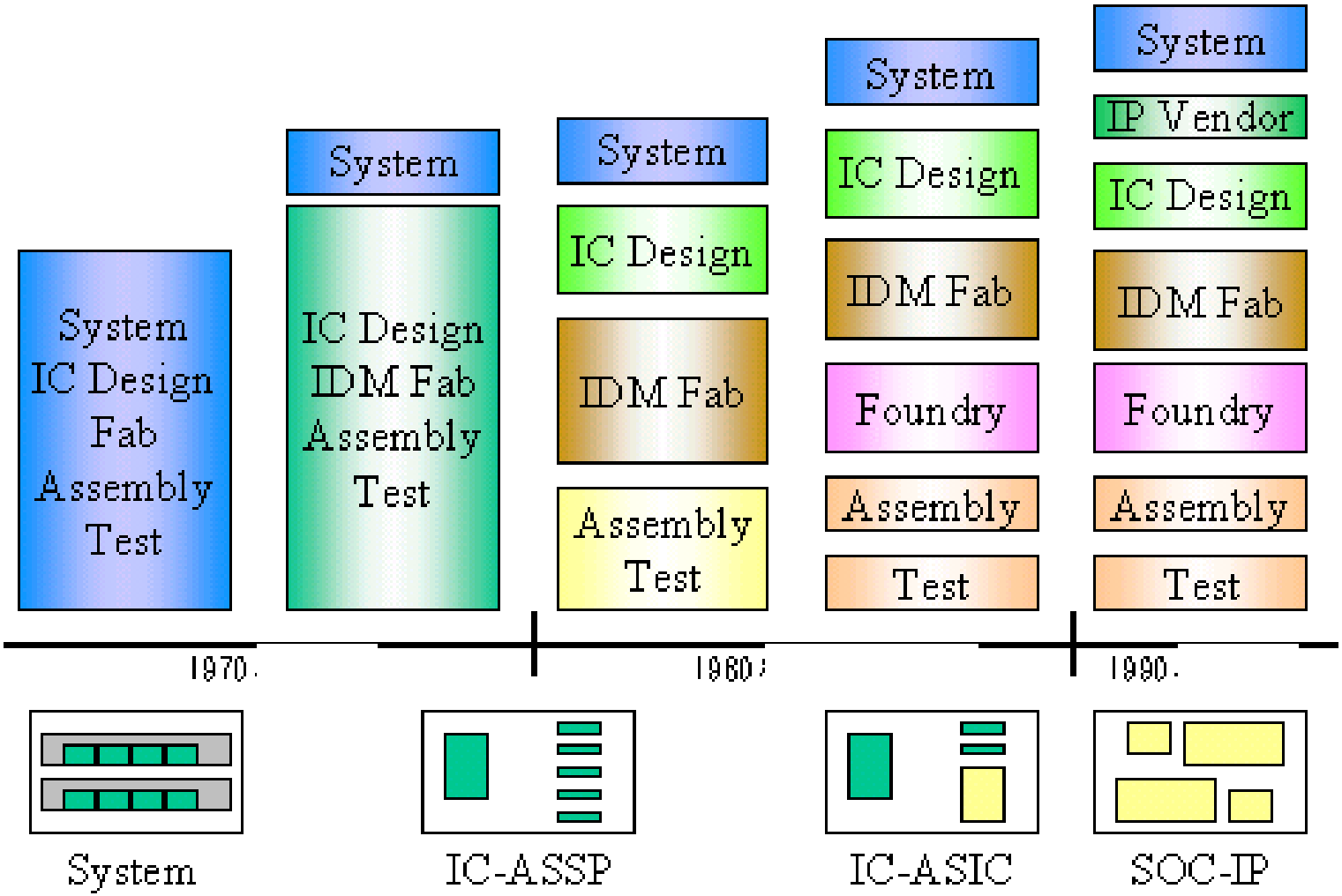


Source: Directorate General of Budget and Accounting(Nov. 2004)

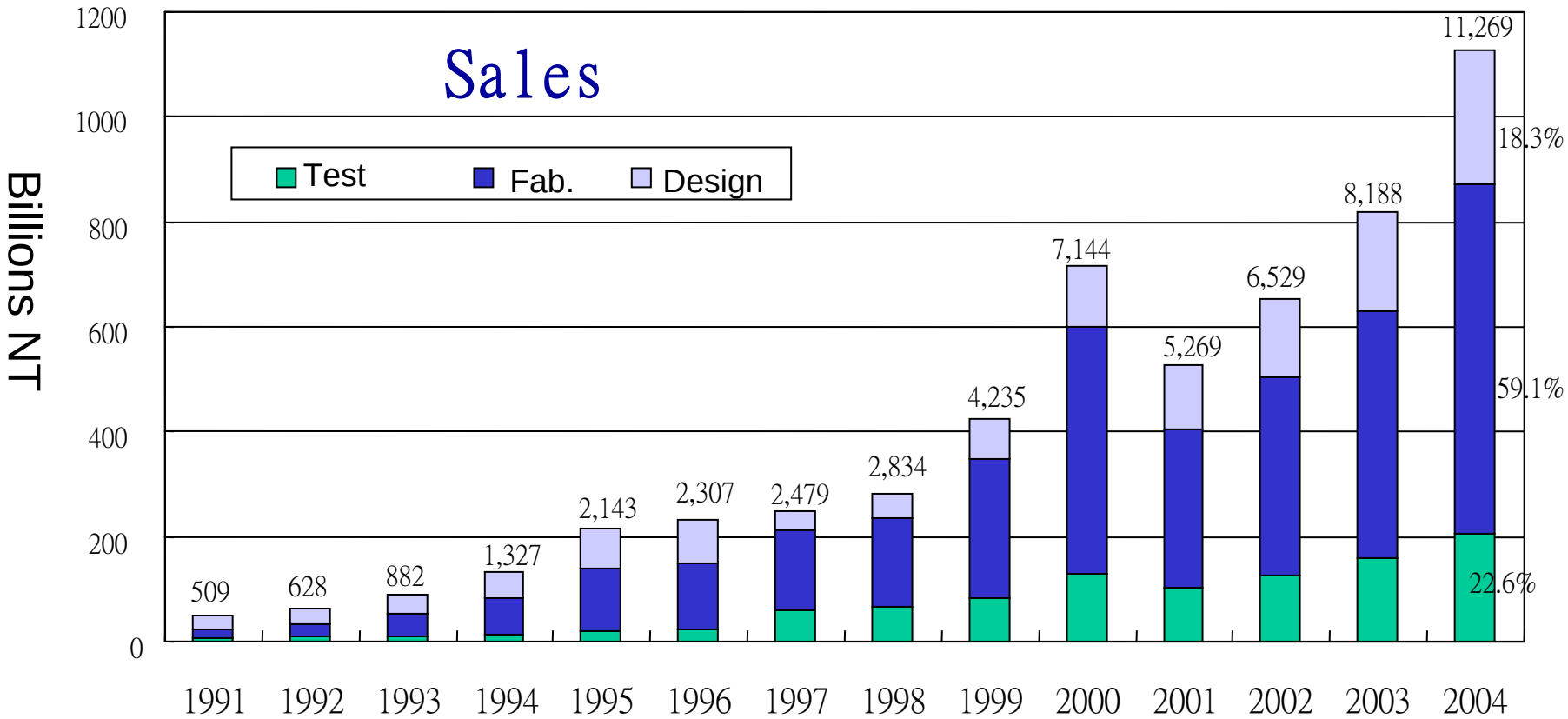
Social Capital
-Industrial Network

- Semiconductor
  - Spin-off from ITRI planted the seeds of key companies, like UMC and TSMC.
  - Specialized foundry of Taiwan initiated the vertical disintegration of IC industry
- R&D Alliance of PC
  - Technology Transfer from ITRI fostered the R&D Alliance of PC
  - Above 60% of PC and Notebook are made in Taiwan.

Vertical Disintegration of IC Industrv



The Growth of Semi-conductor Industry in Taiwan



Source：2003 Yearbook of Taiwan IC Industry

R&D Alliance of PC

- IN 1982, ERSO/ITRI launched a research project of IBM PC／XT compatible PC .
- In 1983, ERSO developed PC compatible to IBM PC／XT and obtained the licensing of DOS from Microsoft.
- Government supported ERSO to transfer technology and formed a R&D Alliance with industry.
- 9 local firms participated the R&D Alliance , including Acer.
- ASUS and BENQ are spin-off from Acer latterly.
- In 1982, Taiwan imported 92% PC; after 10 years, Taiwan exported 95% PC to the world.

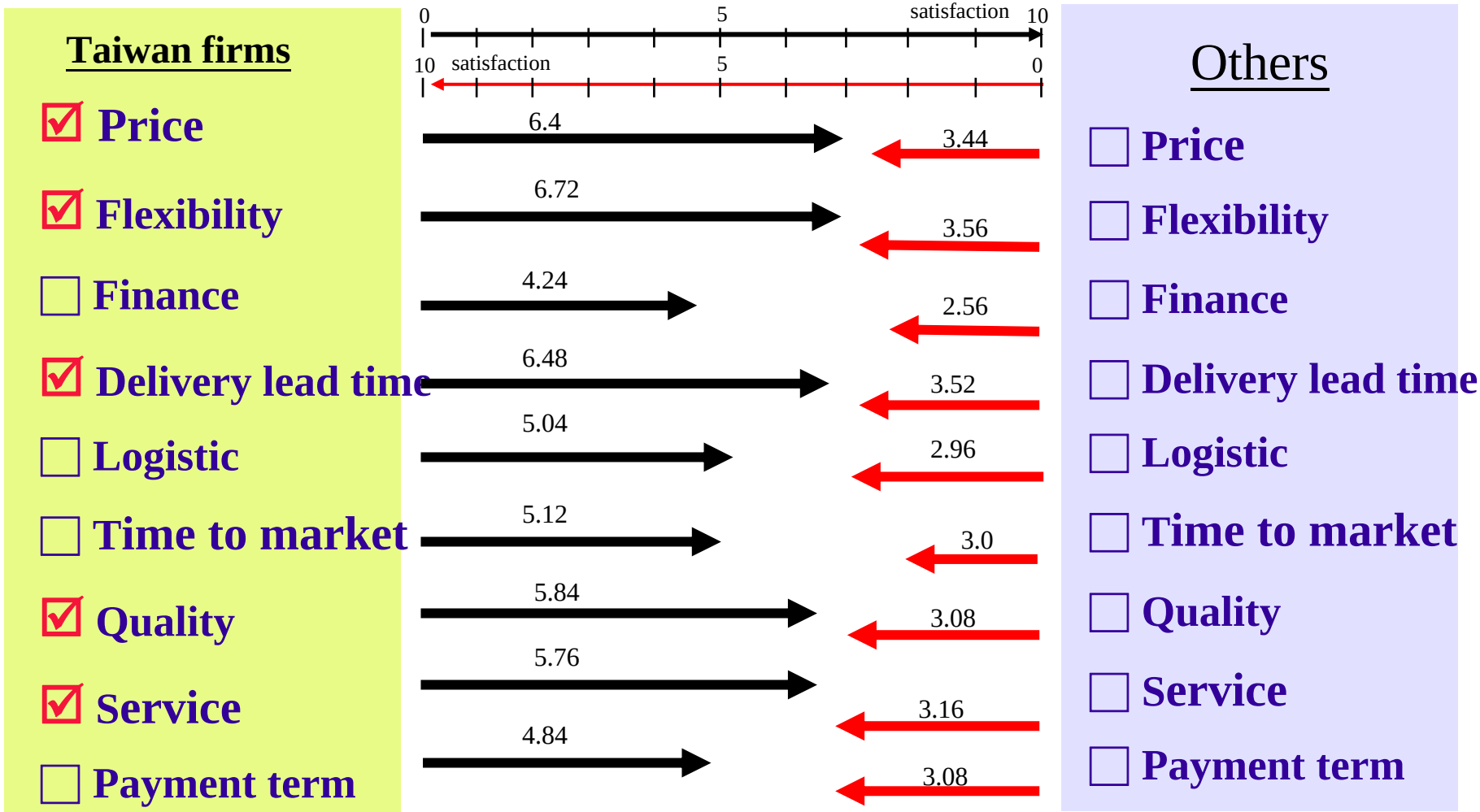
Social Capital
-International Link

- Customer Capital
  - International Brands
  - Reputation to International Purchasing Offices
- Market share around the world
- R&D centers established by MNC's
- Trade shows

High-Tech Brands of Taiwan

Reputation of Taiwan Evaluated by International Purchasing Office

Comparison between Taiwan firms and others: Speed & Flexibility



Source：III-MIC, 2000

Note: N=25, 10 represent its satisfaction

The Global Market Share of Taiwanese Products

IC

NO.1
Foundry : US$ 6,070M (72.9%)
Mask ROM : US$ 400M (56.7%)
IC Packaging : US$ 2,285M (30.4%)
NO.2
IC Design : US$ 3,616M (25.9%)
NO.3
DRAM : US$ 1,896M (16.9%)

Networking Products

Note: Excluding overseas production, source:ITIS (2002)

NO.1
Ethernet Card : 35.8M Ports (66.0%)
Hub : 41.9M Ports (74.8%)
ADSL Modem : 5.1M Sets (59.6%)
Wireless LAN : US$ 482M (29.5%)
Analog Modem : 38.8M Sets (41.7%)
NO.2
Ethernet Switch : 45.6M Ports (24.5%)
Cable Modem : 3.3M Sets (39.9%)

B:Billion
M:Million
K:Thousand
M.T :Metric Ton
( ) : World Penetration

Computer & Peripheral Devices

NO.1
Notebook PC : US$ 11.6B (23.9%)
LCD Monitor : US$ 2,308M (41.1%)
CD-R Disk : 4.68B Pcs (83.3%)
CD-RW Disk : 167.2M Pcs (70.3%)
DVD Disk : 257M Pcs (74.5%)
PC Camera : 8.7M Sets (58.0%)
NO.2
Mother Board : US$ 2,640M (33.9%)
Digital Camera : US$ 678M (9.0%)
S&M Scale TN/STN LCD module : US$ 703M (16.0%) , etc.
NO.3
Large Scale TFT-LCD Panel : US$ 2,524M (23.3%)

Other

NO.1
Hand Tools : Export US$ 1,196M (16.8%)
ABS Resin : 982K M.T (22.4%) , etc.
NO.2
Polyester filament : 1,525K M.T (14.0%)
Nylon Fiber : 391K M.T (10.6%) , etc.
NO.3
Bicycle : 4,750K Sets (4.0%)
Polyester Staple : 830K M.T (10.4%) , etc.

MNC that established R&D centers in Taiwan.

Ten more foreign enterprises are currently looking into or are engaged in negotiations to establish R&D centers.

Trade Shows

- For Example:

  The 25th anniversary of **COMPUTEX TAIPEI**, now the world's second most important IT show and the largest in Asia.

  – http://www.computextaipei.com.tw/index.htm

Conclusion

- From the experiences of Taiwan,
  we provide the primitive answers to the four questions of this conference

How to develop intelligence flows within and between knowledge capital clusters?

- Encourage students to study abroad and facilitate the environment for returnee.
- Attract the foreign student from oversea.
- Improve the living environment and the convenience for foreign experts to live.
  - May start from specific community, like HSP.
- Promote various kinds of trade show.

How to make cities "intelligent"?

- Software
  - Creative Culture
    - City life with security but without limits.
    - Easy to work and relax (live)24 hrs a day,7 day a week.
  - Creative Education
    - Creative Education Projects in Taiwan, 2000-2004
- Hardware—wireless wideband
  - Convenient transportation for people to move.
  - Bookstore and Coffee stop for people to meet.
  - Easy to surf on the web anywhere and anytime.

How to capitalize on knowledge capital, by new innovative social systems, in terms of the collective wealth of nations ?

- Encourage the venture capital industry by tax incentives or co-funding the innovative projects by pubic funds to share the risk.
- Facilitate the mutual investment among vertically related firms to increase the possibility of cooperation and successful commercialization.

How to cultivate efficiency and renewal of the knowledge capital of regions?

- Provide higher education
  - Sustainable supply of high-quality human capital
- Establish R&D center- Knowledge Capital of firm
  - Encourage firms, especially MNCs, to establish R&D center or training center here.
- Create the R&D hub, like ITRI
  - To facilitate the flow of human capital and accommodate its temporary shock/stock.
  - By R&D alliance, spin-off, technology transfer and seminar.

Reference

- Chintay Shih(2005), Experiences of leading University, and Research Institution in US,Taiwan, and Mainland China, *College of Technology Management*, NTHU,*Special Advisor*, ITRI, Jan.25,2005, tvca, Taipei
- Teresa Yang(2005), Venture Capital in Taiwan , Secretary-General of tvca, Nov 5, 2003

The data and help from MIC of III are highly appreciated.

Academic Papers

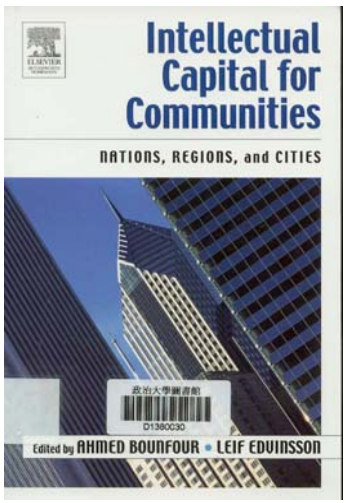
A Balanced Scorecard-based Framework for the Management and Reporting of Intellectual Capital in Not-for-profit Research Organizations：A Case Study of ITRI
A Process View of the Impact of Information Technology on the Management of Intellectual Capital in the Banking Industry
An Empirical Investigation of the Relation between Intellectual Capital and Firms' Market Value and Financial Performance
An Exploratory Set of Indicators between Information Technology And Process Capital & Innovation Capital--Based on A Simple Case Study
Building customer capital throguh relationship marketing
Building Customer Capital through Relationship Marketing Activities-the Case of Taiwanese Multilevel Marketing Companies
Computer-integrated manufacturing and human capital-enhancing human resource management
Do Capital Markets Value Intellectual Capital。
How Corporate Government Structure Affects the Performance of Insurance Companies
IC dynamic lapabilities, and organizational innovation performance
Integrating Human Resource Management and Performance Measurement：Effects on Organizational Performance
Intellectual capital and Performance in Causal Models ：Evidence from the Information Technology Industry in Taiwan
Intertemporal Stable Pension Funding
Mobilizing Factors of Intellectual Capital
Noise Trading and Market Quality
On the relation of Systematic Risk and Accounting Variables
Progression Of IC：EEEC Model
Re-examining the Association between IT Investments and Firm Porfitability：A Componet --Based Approach。
Successful organizational transformation：The perspective of bifurcation and self-organization
The Achieving Factors Model of Intellectual Capital Management
The Effects of Green Intellectual Capital upon Competitive Advantage of Enterprises
The Role of Social in the Relationship between Human Capital and Career Mobility：Moderator or Mediator
Top Management Team Social Capital in Taiwan： Impact on Firm Value in an Emerging Economy
……

Conference	27
Journal	10

Mr. Leif Edvinsson

Mr. Nick Bontis
&
Giovanni Schiuma

Author (s)	Title
Ming-Chin Chen Shu-Ju Cheng Yuhchang Hwang	An empirical investigation of intellectual capital, market value and financial performance
Chaur-Shiuh Young	Top management team social capital in Taiwan: Impact on firm value in an emerging economy
Shu-Chi Lin Yin-Mei Huang	The role of social capital in the relationship of human capital and career mobility: Moderator or mediator?
Wen-Ying Wang Chingfu Chang	Intellectual capital and performance in causal models: Evidence from the information technology industry in Taiwan
Aihwa Chang Chiung-Ni Tseng	Building customer capital through relationship marketing activities in Taiwanese multilevel marketing companies
Anne Wu	The integration between balanced scorecard and intellectual capital
Victor W. N. Tsan Chao-Ching Chang	Intellectual capital system interaction in Taiwan



augmenting learning environments, so-called campus with integrated high-tech structural capital.

- In December 2002, the Minneapolis–St. Paul region in U.S. was ranked as number one on the global competitive index, outpacing Silicon Valley and Austin, Texas, as knowledge regions.
- In Taiwan, the governmental department of industrial technology founded the Taiwan Intellectual Research Center (TICRC) to create international authoritative knowledge repository for IC and assisting to progress the IC in Taiwan.
- Austria adapted a law during 2002 that requires all universities and colleges to report, at the latest, their knowledge capital, in so-called Wissenbilanz as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http://www.ticrc.nccu.edu.tw

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