TAIWAN’S “SILICON VALLEY”

HSINCHU SCIENCE PARK

IRVING T. HO, Ph. D.
CHAIRMAN, EIC CORP.
45738 NORTHPORT LOOP WEST
FREMONT, CA 94538

THE TRANSFORMATION OF R & D IN EAST ASIA AND JAPAN, FALL 99 SEMINAR/PUBLIC LECTURE SERIES

US-JAPAN TECHNOLOGY MANAGEMENT CENTER
SCHOOL OF ENGINEERING, STANFORD UNIVERSITY
OCTOBER 7, 1999
TAIWAN’S “SILICON VALLEY”

HSINCHU SCIENCE PARK

1. INTRODUCTION
2. SCIENCE PARK VS. INDUSTRIAL PARK
3. GOAL, STRATEGY, PLANNING AND EXECUTION
4. PROBLEMS AND SOLUTION
5. CURRENT STATUS OF HSINCHU PARK
6. EFFECT OF HSINCHU PARK TO TAIWAN ECONOMY
7. CONCLUSION
INTRODUCTION:
(TO LEARN FROM SILICON VALLEY)
SUCCESSFUL STORY OF SILICON VALLEY

- EFFECT ON CALIFORNIA ECONOMY, FROM A REGIONAL AGRICULTURE-BASED ECONOMY TO BECOME THE WORLDWIDE SEVENTH LARGEST ECONOMY*

- HI-TECH PANTHEON OF THE WORLD (SAN JOSE BECAME NO. 1 EXPORT CITY IN U. S. IN 1997)

- THIRTY-SEVEN PERCENTS OF U. S. HI-TECH MARKET VALUE ($452 BILLION)**

* QUOTED CALIFORNIA FORMER GOVERNOR, PETE WILSON

** THIS AMOUNT WAS FOUR TIMES OF THAT OF U. S. AUTO INDUSTRY IN DETROIT, BUSINESSWEEK, AUGUST 18 - 25, 1997
KEY SUCCESSFUL FACTORS IN SILICON VALLEY

- A CHAMPION IN STANFORD’S DEAN TERMAN TO LURE BACK HIGH-TECH TELANTS
- STRONG COLLABORATIVE TIES BETWEEN UNIVERSITIES AND LOCAL INDUSTRIES
- A “REGIONAL NETWORK - BASED INDUSTRIAL SYSTEM THAT PROMOTE COLLECTIVE LEARNING”*

* ANNALEE SAXENIEN’S BOOK, “REGIONAL ADVANTAGE” 1994
IDEAL ENVIRONMENT FOR HIGH-TECH ENTREPRENEURS

- VENTURE CAPITAL
- TOLERANCE OF FAILURE
- CULTURE OF “COOPETITION”
- CLUSTER EFFECT
TAIWAN’S "SILICON VALLEY"

HSINCHU SCIENCE PARK

SCIENCE PARK VS. INDUSTRIAL PARK
“(SILICON) MICROCHIPS FINDS THEIR VALUE NOT IN THEIR SUBSTANCE BUT IN THEIR INTELLECTUAL CONTENT. BY OVERCOMING THE CONSTRAINTS OF MATERIAL RESOURCES, THE MICROCHIP DEVALUATED MOST LARGE ACCUMULATION OF PHYSICAL CAPITAL “

GEORGE GILDER’S BOOK “MICROCOSM - THE QUANTUM REVOLUTION IN ECONOMICS AND TECHNOLOGY” 1989
"WITH EVERYTHING ELSE DROPPING OUT OF THE COMPETITIVENESS EQUATION, KNOWLEDGE HAS BECOME THE ONLY SOURCE OF LONG - RUN SUSTAINABLE COMPETITIVE ADVANTAGE"

LESTER THUROW'S BOOK, "THE FUTURE OF CAPITALISM", 1996
## SCIENCE PARK vs. INDUSTRIAL PARK

<table>
<thead>
<tr>
<th>Category</th>
<th>Science Park</th>
<th>Industrial Park</th>
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<tr>
<td><strong>CLIENTS</strong></td>
<td>Hi-tech firms with R&amp;D capability</td>
<td>Manufacturing</td>
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<tr>
<td><strong>MANPOWER</strong></td>
<td>Technical manpower</td>
<td>Low wage labor</td>
</tr>
<tr>
<td><strong>PRODUCTS</strong></td>
<td>New, innovative products</td>
<td>MATURED PRODUCTS</td>
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<tr>
<td><strong>PRODUCT CYCLE</strong></td>
<td>COMPLETE PRODUCT CYCLE</td>
<td>MANUFACTURING ONLY</td>
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SCIENCE PARK vs. INDUSTRIAL PARK

INDUSTRIAL PARK - MANUFACTURING
SCIENCE PARK vs. INDUSTRIAL PARK

- SCIENCE PARK CLIENTS; WITH INNOVATIVE ABILITY TO SELF-SUSTAIN THEIR GROWTH AND CONTROL THEIR OWN DESTINY

- INDUSTRIAL PARK CLIENTS; LACK OF R&D RESOURCE AND INNOVATIVE ABILITY, RELYING MOSTLY ON MATURER TECHNOLOGIES
TAIWAN’S “SILICON VALLEY”

HSINCHU SCIENCE PARK

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GOAL, STRATEGY, PLANNING AND EXECUTION
STATUS OF TAIWAN INDUSTRY IN LATE ’70s

- TAIWAN’S INDUSTRIAL PARKS - EXPORT PROCESSING ZONES (SINCE 1965) - GRADUALLY RAN OUT OF ITS COMPETITIVE ADVANTAGE IN LOW COST MANUFACTURING DUE TO RAPIDLY RISING WAGE.

- FOREIGN INVESTMENT IN EPZS SLOWED DOWN AND SOME OF THEM MOVED GRADUALLY TO NEIGHBORING SE ASIA COUNTRIES

- STAGNATION OF ECONOMIC GROWTH IN TAIWAN
GOAL AND STRATEGY OF HSINCHU PARK

- GOALS:
  - TO HELP IMPROVE TAIWAN ECONOMY,
  - TO ESTABLISH TAIWAN INDIGENOUS HIGH-TECH INDUSTRY BASE,

TAIWAN GOVERNMENT OFFICIALS RECEIVED VALUABLE ADVICE FROM STNAFORD’S DEAN TERNAN
GOAL AND STRATEGY OF HSINCHU PARK

- STRATEGIES;
  TO CREATE SCIENCE PARK ENVIRONMENTS AS CLOSE TO SILICON VALLEY'S AS POSSIBLE,
  TO LURE BACK SOME EXPATRIATE ENGINEERS, SCIENTISTS AND OTHER HIGH-TECH PROFESSIONALS,
  TO INCREASE UNIVERSITY ENGINEERING ENROLLMENT,
PARK ADMINISTRATION

- PLANNING
  A TEN YEAR US$500 MILLIOM, 500-HECTARE PARK DEVELOPMENT PLAN,

- EXECUTION
  BUILDING INFRASTRUCTURE,
  SELECTING AND RECRUITING PARK CLIENTS,
  FACILITATING INVESTMENT ENVIRONMENT,
  FACILITATING LIVING ENVIRONMENT,
  BUILDING BRIDGE BETWEEN UNIVERSITIES, R & D INSTITUTES AND PARK CLIENTS,
INVESTMENT ENVIRONMENT IN HSINCHU PARK

- ABUNDANT SUPPLY OF ENGINEERING GRADUATES & SKILLED WORKERS
- FIVE YEAR TAX HOLIDAY
- UNIVERSITY COOPERATION PROGRAM
- RENTAL OFFICE AND FACTORY BUILDINGS
- R & D GRANTS
- CUSTOM SERVICE / WAREHOUSING
- OPERATOR TRAINING
LIVING ENVIRONMENT IN HSINCHU SCIENCE PARK

- PARK LIKE ENVIRONMENT
- RENTAL VILLAS, APARTMENTS AND CONDOS
- RECREATION / ENTERTAINMENT
- SHOPPING / RESTAURANTS
- MEDICAL CLINIC
- TRANSPORTATION
- BANKS / POST OFFICE
- ENVIRONMENT PROTECTION / SECURITIES
TAIWAN’S “SILICON VALLEY”
HSINCHU SCIENCE PARK

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PROBLEMS AND SOLUTIONS
HIGH-TECH HUMAN RESOURCE PROBLEM

- UNIVERSITIES INCREASING ENGINEERING SCHOOL ENROLLMENT (MOE), MAJOR R & D PROJECTS IN FOUR NATIONAL UNIVERSITIES (NSC), SETTING UP FOUR CENTERS OF EXCELLENCE (NSC)

- INSTITUTES FOR R & D INDUSTRIAL TECHNOLOGY RESEARCH INSTITUTES (MOEA)
There was no high-tech venture fund available to entrepreneurs in Taiwan before 1980.

Executive Yuan (Cabinet) set up a venture fund of NT$800 million specially for Hsinchu Park clients.

This fund was managed by Taiwan’s Bank of Communication (Government owned), Park Administration helped handle applicant screening.
BUREAUCRATIC EFFICIENCY PROBLEM

- Many government agencies delegated power to Hsinchu Science Park Administration to make “one stop operation” possible,

- Special commerce and tax laws passed by Taiwan Legislative Yuan (Congress) for Hsinchu Science Park operation (to be transparent to park clients),
EXPATRIATE CHILDREN EDUCATION PROBLEM

- SPECIAL LAWS PASSED BY TAIWAN LEGISLATIVE YUAN (CONGRESS) TO ESTABLISH A UNIQUE SCHOOL INSIDE THE HSINCHU PARK WITH BILINGUAL EDUCATION,

- THIS SCHOOL WAS SPECIALLY FOUNDED FOR THE CHILDREN OF RETURNING EXPATRIATE ENGINEERS AND HIGH-TECH PROFESSIONALS

- THIS SCHOOL ACCOMMODATES CHILDREN FROM KINDERGARTEN TO TWELVE GRADE
LOCAL STOCK MARKET PROBLEM

- BEFORE HSINCHU PARK PROJECT, TAIWAN HAD ONLY ONE STOCK EXCHANGE MARKET,

- AFTER THE ESTABLISHMENT OF HSINCHU SCIENCE PARK, AN OVER-THE-COUNTER STOCK EXCHANGE MARKET, WHICH WAS SIMILAR TO THE UNITED STATES’ NASDAQ EXCHANGE WAS FOUNDED BY TAIWAN GOVERNMENT
TAIWAN’S “SILICON VALLEY”

HSINCHU SCIENCE PARK

CURRENT STATUS OF HSINCHU PARK
CURRENT STATUS OF HSINCHU PARK

- TOTAL 1998 ANNUAL REVENUES OF PARK CLIENTS, $14 BILLION US DOLLARS
- RETURNING EXPATRIATE ENGINEERS AND PROFESSIONALS TO HSINCHU PARK, OVER 3000 PERSONS
- HSIP'S TOTAL EMPLOYMENT, 74,700 WITH OVER 11,000 WORKERS HOLDING M. S. OR Ph. D. DEGREES
- SEMICONDUCTOR INDUSTRY CAPABILITY - TSMC
- COMPUTER INDUSTRY CAPABILITY - ACER

HSIP ADMINISTRATION STATISTICS
### JUNE/1999 HSINCHU PARK STATISTICS

<table>
<thead>
<tr>
<th>INDUSTRIES</th>
<th>NO. OF FIRMS</th>
<th>JUNE SALES</th>
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<tbody>
<tr>
<td>INTEGRATED CIRCUITS</td>
<td>116</td>
<td>NT$26.2 BILLION</td>
</tr>
<tr>
<td>COMPUTERS AND PERIPHERALS</td>
<td>50</td>
<td>NT$17.6 BILLION</td>
</tr>
<tr>
<td>TELECOMMUNICATION</td>
<td>45</td>
<td>NT$ 3.2 BILLION</td>
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<tr>
<td>OPTOELECTRONICS</td>
<td>45</td>
<td>NT$ 4.0 BILLION</td>
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<tr>
<td>OTHERS</td>
<td>28</td>
<td>NT$ 0.5 BILLION</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>284</strong></td>
<td><strong>NT$51.6 B</strong></td>
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(US$ 1.6B)
“HSINCHU SCIENCE PARK (IS) PERHAPS THE CLOSEST ASIA HAS COME TO REPLICATING CALIFORNIA’S SILICON VALLEY. ITS 173 MOSTLY SMALL, NIMBLE ENTREPRENEURIAL COMPANIES GENERATED $5 BILLION IN SALES IN THE FIRST HALF OF 1995, PRIMARILY IN INTEGRATED CIRCUITS, PCs AND PERIPHERALS. - - - THE HSINCHU PARK IS TOP - HEAVY WITH RETURNNEES, MANY FROM SILICON VALLEY.”

THE WALL STREET JOURNAL, OCTOBER 24, 1995
“TAIWAN REINVENTS SILICON VALLEY”

“TAIWAN’S HSINCHU SCIENCE PARK: THE LOCAL VERSION OF SILICON VALLEY HELPED TO REVERSE THE BRAIN DRAIN”

“TAIWAN’S REACH: QUICK, NIMBLE COMPANIES HAVE GRABBED A COMMANDING GLOBAL SHARE OF MANY PC COMPONENTS”

* QUOTED FROM AN ARTICLE “SILICON VALLEY EAST”, FORBES MAGAZINE, JUNE 1, 1998 ISSUE
MEDIA REVIEW OF HSINCHU PARK

- “IT LOOKS LIKE A MINIATURE SILICON VALLEY, AND IT IS NO ACCIDENT”,
- “BY ANY MEASURE, THE 1430-ACRE PARK HAS BEEN A ROARING SUCCESS THAT TRANSFORM TAIWAN INTO A HIGH-TECH POWERHOUSE”,

QUOTED FROM A THREE-PAGE ARTICLE “SILICON VALLEY FAR EAST”, BY SAN JOSE MERCURY NEWS STAFF WRITER, SARAH LUBMAN, SEPTEMBER 19, 1999
Q & A WITH PROF. A. SAXENIAN BY SAN JOSE MERCURY NEWS REPORTER*

Q. BESIDES SILICON VALLEY, ARE THERE OTHER REGIONS OF THE WORLD THAT HAVE YOUR ATTENTION?


*MIRANDA EWELL, SAN JOSE MERCURY NEWS, SEPT. 29, 1997; A. SAXENIAN, AUTHOR OF REGIONAL ADVANTAGE, 1994, HARVARD UNIVERSITY PRESS
TAIWAN’S “SILICON VALLEY”
HSINCHU SCIENCE PARK

EFFECT OF HSINCHU PARK TO TAIWAN ECONOMY
“TAIWAN, ALMOST ALONE IN ASIA, REMAINS ECONOMICALLY HEALTH. THE LITTLE ISLAND HAS MUCH TO TEACH JAPAN AND KOREA”

QUOTED FROM AN ARTICLE “SILICON VALLEY EAST”, FORBES MAGAZINE, JUNE 1, 1998 ISSUE
EFFECT OF HSINCH PARK TO TAIWAN ECONOMY

- HSINCHU PARK INDUSTRIES HELP SUSTAIN TAIWAN’S HIGH-RATE ECONOMIC GROWTH, PER CAPITA GNP ROSE FROM $1,920* IN 1979 TO $13,198* IN 1997

TAIWAN GOV’T STATISTICS, ALSO ASIAWEEK,
TAIWAN’S ECONOMIC ACHIEVEMENT

- IN THE CURRENT WORLDWIDE TOP 100 EMERGING-MARKET COMPANIES*, ASIA LEADS ALL OTHER GROUPS WITH 43 ENTRIES
- TAIWAN LEADS ASIA WITH 20
- AMONG TAIWAN’S ENTRIES ARE TSMC, UMC, WINBOND IN SEMICONDUCTORS AND ASUSTEK, QUANTA, ACER IN PCS AND PERIPHERIALS

* BUSINESSWEEK GLOBAL 1000, JULY 12, 1999
TAIWAN’S “SILICON VALLEY”

HSINCHU SCIENCE PARK

CONCLUSION
REQUIREMENT OF GOVERNMENT COMMITMENT

- Initial investment for Hsinchu Park infrastructure including amenities
- Venture capital funding for startups
- Tax holiday and other financial incentives
- Industrial laws and regulations simplification
- Cooperation programs among universities, research institutes and park clients
- Delegation of power from several other government agencies to park administration for “one stop operation”
SUMMARY

- CHAMPION: HSIP RECEIVED VERY STRONG SUPPORT FROM TAIWAN GOVERNMENT
- STRONG EDUCATION TRAINING TO PROVIDE ABUNDANT SCIENCE / ENGINEERING GRADUATES AND SKILLED WORKERS
- RETURNING EXPATRIATE ENGINEERS
- ENTREPRENEURIAL SPIRIT
- RIDING THE TIDE OF PC REVOLUTION
- FOR HSIP TO SUSTAIN IT’S HIGH GROWTH, INCREASING R & D INVESTMENT BY PARK CLIENTS TO RIDE THE TIDE OF “INTERNET REVOLUTION” SHOULD BE EMPHASIZED
OTHER CONTRIBUTING INSTITUTIONS

- TSING-HWA UNIVERSITY
- CHAO-TUNG UNIVERSITY
- ITRI (INDUSTRIAL TECHNOLOGY AND RESEARCH INSTITUTE)
- VENTURE CAPITAL FIRMS
- OVER THE COUNTER STOCK MARKET
LOCAL CONTACT FOR
HSINCHU SCIENCE PARK

DR. JEN-CHANG CHOU
DIRECTOR, SCIENCE DIVISION
TAIPEI ECONOMIC &
CULTURAL OFFICE IN
SAN FRANCISCO

5201 GREAT AMERICA PARKWAY SUITE 426
SANTA CLARA, CA 95054

TEL: (408) 986-8686
FAX: (408) 986-8066
E-MAIL: sdsf@x.netcom.com

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