Policy Issues in the Economics and Financing of Medical Technology in the Asia-Pacific Region

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Introduction
- Overview of health care trends in Asia-Pacific
- Growth of health technologies
- Economics and financing of medical technology
- Policy issues in medical technology
- Conclusion

Healthcare Consumption versus Investment in Economic Growth

Health → Economic Development
- Investments in health can yield returns in labour productivity and cost-saving, thereby contributing to GNP growth
- Economic development can lead to better health and higher expenditure
- Consumption of excessive high-cost medical technologies at marginal or negative returns is inefficient

The Healthcare Sector in Asia - Current Situation
- High level of private provision and financing of health services in the Asia-Pacific region
- Growing private and informal sectors
- Increasing privatization and deregulation
- Lack of legal and regulatory framework
- Weak enforcement of laws and regulations
- Infringement of copyrights and intellectual property rights
- Poor quality and potential safety risks
- ? Impact of liberalization and globalization

GATS Commitments by Asia-Pacific Trading Partners in Health Services
- Australia
- India
- Malaysia
- New Zealand
- Singapore

Only 32 out of 134 WTO members have negotiated and made commitments in health sector services under the General Agreement on Trade in Services (GATS)

Projected Healthcare Expenditure
- Healthcare expenditure projected to grow at annual rate of 9% in developing countries (2000-2004)
- Healthcare expenditure for Asia-Pacific nations - US$207 billion (excl Japan, Australia, New Zealand)
  - China accounts for largest health expenditure (US$82 billion)
  - Out-patient care will account for fastest growth
  - Hospital care continues to be largest share of expenditure

The Freedonia Group
Development Phases of Medical Technology

• Basic and Clinical Research
• Product and Process Development
• Clinical Trials and Development
• Manufacturing
• Global Sales and Marketing
• Mass Production and Consumption

Phases of the Product Life Cycle (after Kotler)

• Development (short – low development costs)
• Growth (short and high – early maximum revenue)
• Maturity (long and stable – extended profits)
• Decline (slow or none – alternative development)

Projected Consumer Healthcare Expenditure in Asia (US$ million)

<table>
<thead>
<tr>
<th>Country</th>
<th>1999</th>
<th>2015</th>
<th>2030</th>
</tr>
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<tbody>
<tr>
<td>Japan</td>
<td>301,085</td>
<td>421,974</td>
<td>591,401</td>
</tr>
<tr>
<td>China</td>
<td>11,423</td>
<td>64,593</td>
<td>365,250</td>
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<tr>
<td>Taiwan</td>
<td>19,274</td>
<td>36,759</td>
<td>70,106</td>
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<tr>
<td>Korea</td>
<td>16,484</td>
<td>30,584</td>
<td>56,745</td>
</tr>
<tr>
<td>India</td>
<td>11,423</td>
<td>26,343</td>
<td>60,751</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>4,786</td>
<td>8,505</td>
<td>15,114</td>
</tr>
<tr>
<td>Singapore</td>
<td>2,073</td>
<td>3,930</td>
<td>7,450</td>
</tr>
<tr>
<td>Total (Asia)</td>
<td>390,644</td>
<td>610,163</td>
<td>953,039</td>
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SingaporeMedicine – Promotion by the Singapore Tourism Board

Economic Review Committee (ERC) 2003 – recommendation targets of the Health Services Working Group
Aims:
• Attract 1 million foreign patients by 2012
• Grow market share from 1% - 3% of GNP
• Generate $3 billion in health expenditure or $2.6 billion value-added to economy
• Create 13,000 new jobs

Four Pillars of Economic Growth in Singapore

• Trade
• Tourism
• Financial Services
• Manufacturing
• Electronics
• Information technology
• Chemicals
• Life sciences

Vision of the Singapore Economic Development Board

To become a Global Medical Hub providing a comprehensive range of world-class value-added Medical Services
Biomedical Industry Promotion by the Economic Development Board

- In 2002, pharmaceuticals contributed $8 billion, or 82% of total industry’s manufacturing output, while employment enjoyed a growth of 31%. Medical technology contributed 14% growth in manufacturing output to reach $1.8 billion.
- By year 2010, EDB aims for Singapore to be key business base for 15 world-class companies, and a regional centre for clinical trials and drug development. EDB will invest in R&D and HRD, and nurture start-up companies through co-investments and venture capital.
- The current $11 billion biomedical industry will grow to $20 billion, employing 10,000 in 2010.

Recent Investments in Biomedical/Life Sciences Industry in Singapore

- Total venture capital $10.2 billion raised (1983-2000)
- $1 billion Biomedical Sciences Investments Fund (2000)
- Government venture capital fund – $20 million for R&D
- Pfizer plans US$350M API plant (2000)
- Eli Lilly’s Singapore System Biology Centre (2001)
- Pfizer’s ward at Singapore General Hospital for Phase I Clinical trials (2003)

Recent Government Initiatives for Biomedical/Life Sciences

- Ministerial Committee for Biomedical Sciences Industry
- International Advisory Council
- $1 billion Biomedical Sciences Investment Fund
- Biomedical Research Council to oversee R&D activities
- Bioethics Advisory Committee
- National Science & Technology Board restructured into Agency for Science, Technology & Research (A*STAR)
- Bio*One Capital – new biomedical sciences capital investment division of Economic Development Board

Completed Investments in the Pharmaceutical Industry in Singapore

- 1971 Smith Kline Beecham US$118M API plant
- 1979 Glaxo Wellcome US $147M API plant
- 1990 Glaxo Wellcome US$153M API plant
- 1993 Rhone-Poulenc Rover US$59M API plant
- 1995 Glaxo Wellcome US$47M NMPD pilot plant
- 1996 Schering-Plough US$118M API plant and US$100M manufacturing plant
- 1998 Rhone-Poulenc Rover US$41M API plant
- 1999 Schering-Plough US$18M formulation facility Aventis (formerly RPR) US35M API plant
- 2001 Merck US$400M plant
- 2003 Merck expanded US$100M plant
- 2003 Pfizer US$350M API plant (API- Active Product Ingredient)
Biomedical/Life Sciences Training and Research Institutes in Singapore

• 1987 – Institute of Molecular & Cellular Biology
• 1990 – Bioprocessing Technology Centre (BTC)
• 1993 – Centre for National Products Research
• 1996 – Bioinformatics Centre
  – Lilly-NUS Centre for Clinical Pharmacology
• 1998 – Centre for Drug Evaluation
  – Kent Ridge Digital Labs
• 2000 – Johns Hopkins-NUH Centre
  – Singapore Genomes Program (SGP)
• 2001 – SGP renamed Genomes Institute of Singapore
• 2003 – BioPolis hub for biomedical research

Biomedical/Life Sciences in the National University of Singapore

• $30 million Office of Life Sciences
• Main biomedical thrust on basic mechanisms of human diseases
  - prevention and treatment
• Main activities – 1) education
  2) research 3) training & recruitment
• New life sciences curriculum jointly launched by faculties of science and medicine in 2002
• Linkages with other institutes and centres

Biomedical/Life Sciences Research in National University of Singapore

• Coordinated research involving faculties of medicine, science, engineering and computing; also law, arts & social sciences and business for ethical, legal, social and economic implications
• 5 target diseases
  – cancer, ageing/neurobiology, cardio-vascular, liver and infectious diseases
• 5 platform technologies
  – bioinformatics, bioengineering, experimental therapeutics, immunology and structural biology (genomics, proteomics, etc)

Trends and Issues in the Biomedical/Healthcare Industry

• Genes, Genomes and Medicine
  - Human Genome
  - Molecular Breeding
  - Human Stem Cells
• Research to Business
  - Bioscience, Biotechnology
  - Global Biotech Investing
• Intellectual Property Rights
  - Publication, Research Products
  - Patent Laws, Licensing
• Emerging Technologies
• Social & Ethical Issues
  - Gene Testing
  - Whole Genome Scanning

APEC Annual Forum – Issues in Life Sciences Innovation

Drivers for Innovation
  - role of government, industry and academia
  - role of regulation and the regulator
Elements of the Life Sciences Value Chain
• Research – building research capacity, public-private partnerships, funding, IP
• Development – clinical trials, harmonizing regulations, bioethics
• Manufacturing and Marketing – promoting trade & investment, best practices, safety, supply chain management, QA
• Health Services – quality, cost and access, cost-effectiveness, consumer education

Factors for Conducting R&D and Clinical Trials in Asia

• Marketing – promote new products
• Registration – satisfy local regulatory requirements
• Product development – gather data on safety and efficiency
• Quality control – upgrade local standards
• Recruitment of patients as subjects – greater ease and lower costs
Key Factors for Investments in the Biomedical Industry

- Skilled labour and relative costs
- Quality assurance
- Intellectual property protection
- Regulatory framework
  - efficiency of political/legal system
  - fair and transparent rules
  - clear guidelines and procedures
- Low transaction costs, and not only tax incentives/subsidies

Essential Health Services Research in the Biomedical Industry

- Ethical, legal & social issues of new technology
  - diagnostic, therapeutic, preventive, regulatory
- Management/administrative issues regarding production, distribution, quality control and service development
- Economic evaluation including costs, financing, efficiency and cost-effectiveness

Components of Evidence-Based Technology Assessment

- Safety – risks (technical and clinical)
- Efficacy – benefits under controlled or experimental conditions
- Effectiveness – individual and population
- Economic – costs and financial aspects
- Social – cultural, ethical and legal issues

Policy Issues in Economics and Financing of Medical Technology

- EQUITY Who pays? Who benefits?
  - Distribution
  - Access
- EFFICIENCY Supply and Demand
  - Allocation
  - Production
- EFFECTIVENESS Outcomes
  - Quality of care
  - Health status

Economic Evaluation and Health Technology Assessment

Future Directions - European Community Project

- Improve range and quality of economic evaluation
- Educate key user groups
- Strengthen links between medical technology industry and health care sector
- Encourage multi-disciplinary research
- Mount collaborative studies in economic evaluation
- Develop policies on efficient use of medical technology
- Improve practical application of economic evaluation of medical technology

Economic Evaluation of Medical Technology

- Cost-Benefit Analysis
  - does it pay off?
- Cost-Effectiveness Analysis
  - what is most effective and at least cost?
- Cost-Utility Analysis
  - what impact on the quality of life and at what cost?
What Roles for Government and Market for Health Technologies?

Balancing EQUITY and EFFICIENCY
- Provision
  - Public goods vs private consumption
- Financing
  - Subsidies and pricing
- Regulation
  - Quality and safety
- Information
  - Choices and preferences

Conclusions
- The life sciences era offers much potential for medical progress and the health industries
- Healthcare can be source of consumption or potential investment in economic growth
- Social costs to be weighed against economic benefits of developing health technologies
- Evidence-based economic evaluation is an essential tool for health technology assessment
- Balanced future roles of government vs market

Thank you for your attention!