Technical University of Denmark

Overview and analysis of the Japanese and US innovation systems

Jofre, Sergio

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Overview and Analysis of the Japanese and US Innovation Systems

by Sergio Jofre

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The report was elaborated on the base of a literature review and personal experiences from Japan (Department of Environmental Engineering, Osaka University).

Today's presentation includes

a) Introduction
b) Comparison of Japanese and US innovation systems
   from the point of view of the **Triple Helix** concept based on the Academy-Government-Industry interaction in Japan and the US
c) Main Findings
d) Conclusions for SUCCESS WP1
e) Suggestions for finalizing our contribution

Introduction - 1

There is no single definition of innovation systems when we observe the process at national level

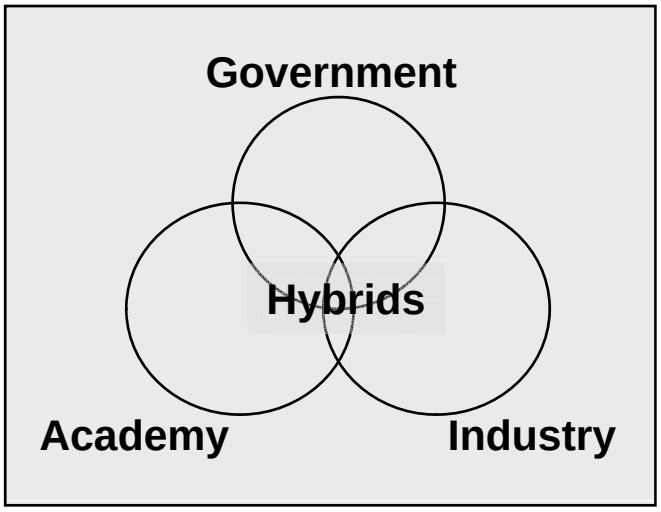
However, we can understand a **National Innovation System** (**NIS** or **National System of Innovation**) as the flow of technology and information among people, enterprises and institutions which is key to the innovative process on the national level.

According to innovation system theory, innovation and technology development are results of a complex set of relationships among actors in the system, which includes enterprises, universities and government research institutes.

Introduction - 2

Therefore,
In order to observe the complexity and dynamism of innovation systems a relatively new model has been developed:

The **“Triple Helix"** model of innovation that captures multiple reciprocal relationships at different points in the process of knowledge capitalization.

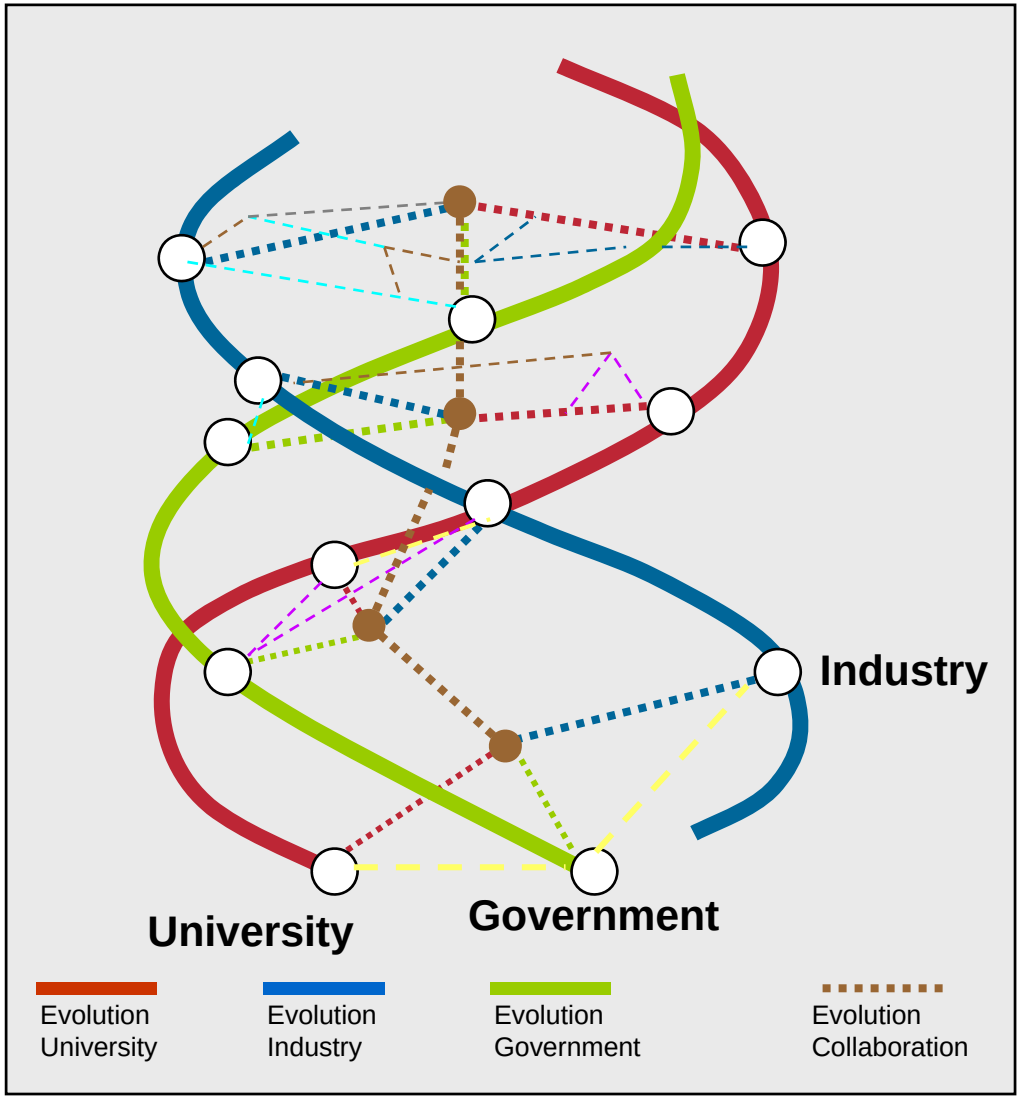


Generation of knowledge infrastructure in terms of overlapping institutional spheres, Each sphere takes the role of the other and hybrid and tri-lateral networks emerge at the Interfaces
(most countries moving towards the adoption of this model)

Introduction - 3

Evolutionary Triple Helix model

The overlay of communications and expectations at the network level guides the reconstruction of institutional arrangements overtime (system evolution)



Comparison of Japanese and US innovation systems

Current innovation systems in Japan and the US are in a state of transition. The main drivers of this transition are the need to efficiently respond to increased globalization and competitiveness of markets, and the challenge of sustainable development.

Japan:
Former innovation system based on "technology substitution for energy"
Need for increasing growth with limited resources and energy
Innovation lead by government and industry
"In-house" R&D of large companies/tacit knowledge embedded in work and sales forces
Focus on production efficiency (e.g. the lean production concept) and manufacturing power

US:
Former innovation system based on "IT substitution for manufacturing technology"
Increasing growth thought developing new functionalities
Innovation lead by a liberalized arrangement of different innovation agents
Strong incidence of foreign human resources, mobility and competitiveness
Focus on new functionality and network synergy (e.g. The silicon Valley)

Findings 1 - Triple Helix in Japan and the US

Government

JAPAN	US
Trends: •Undergoing restructuration (less divisions more autonomy and power) •design of S&T and R&D policies and strategies (including all national sectors) •Encouraging industry-academy collaboration •Aiming social consensus •Aiming less “interference” •Increasing funding of R&D **Role:** High (aiming lower)	**Trends:** •Dictating and keeping “rules of the game” •Regulation and Deregulation •Facilitating Innovation Environment •Setting up national priorities •Aiming more “presence” •Aiming more funding to R&D **Role:** Moderate (aiming Higher)

Findings 2 - Triple Helix in Japan and the US

University (academia)

JAPAN	US
Trends: •Undergoing restructuration (from public to corporate) •Aiming more liberalization and autonomy •Selective and competitive •Lower incubation business competence (aiming Higher) •Lower incidence of foreign skills (aiming higher) •Lower rate of external collaboration (aiming higher) •Aiming to increase funding variety •“in-house” IPR mechanisms •Increasing scientific production **Role:** Historically low to Moderate (aiming higher)	**Trends:** •Liberalized and autonomous •highly selective and competitive •High business incubation competence •High incidence of foreign skills (decreasing enrolment & recruitment) •High rate of external collaboration •Variety of funding sources •“In-house” IPR mechanisms •Decreasing scientific production (aiming higher) **Role:** High (aiming to sustain)

Findings 3 - Triple Helix in Japan and the US

Industry

Japan	US
Trends: •High incidence in Government S&T Policies and Strategies (sustaining) •Strong "in-house" R&D and High embedded tacit knowledge (sustaining) •Low mobility and low foreign skills dependency (increasing) •long-term and large size networks (sustain or increase) •Outsourcing Basic Research (increasing) •Use of "Open Science" and IPR mechanisms (increasing) •Passive search for external collaboration (aiming higher) •Low Venture Capital (aiming higher)	**Trends:** •Independent & Proactive (sustain/increase) •Diversify R&D and lower tacit knowledge (decreasing aiming recovery) •High mobility and foreign skill dependency (decreasing foreign recruitment/aiming recovery) •short-term collaboration networks (aiming longer) •Collaborating in Basic research (sustain) •IPR mechanisms (sustain) •Active search for external collaboration (sustaining) •Venture capital (including Angels)
Role: Historically very High	**Role:** High

Conclusions for SUCCESS WP1

Japan and the US are undergoing major changes at different organizational levels in order to align their national systems of innovation with globalization and sustainability.

Fundamental changes in both NIS has been inspired on each other history of failure and success. Therefore, there is common path of learning,

NIS in Japan and US are merging (towards the innovation ecosystem)

Results of interaction between academy-government-industry (and hybrid institutions and networks) are incidentals, there is no single formula for success, therefore:

“models of collaboration are less relevant that the benefit implicit in the simple action of collaborating”

“Collaboration at any rate and time increases the possibility to induce synergy, while flexibility and learning capability increases the chance of adaptation”

Suggestions for finalizing contributions to WP1

Regarding our contribution:

- Extending the scope of the analysis to the EU case (Triple Helix)
- Including in the analysis a chapter for “energy policy” in Japan, US and EU

Regarding WP1 in general:

- many of today’s contributions to WP1relates to innovation system studies – but with slightly different approaches (national innovation systems, technology specific innovation systems, regional innovation systems)

- Therefore, we would like to propose a final review and edition of complementary contributions based on the innovation system approach:
  - **Bruggink**, Benchmarking EU governance of energy innovation systems
  - **Markhorst**, Literature review of knowledge transfer, sustainable universities and regional models of innovation
  - **Jofre**, Overview and analysis of Japanese and US innovation systems
  - *partly **Ottani & Bou**, Innovation networks – concepts and empirical review*

Many thanks for you attention

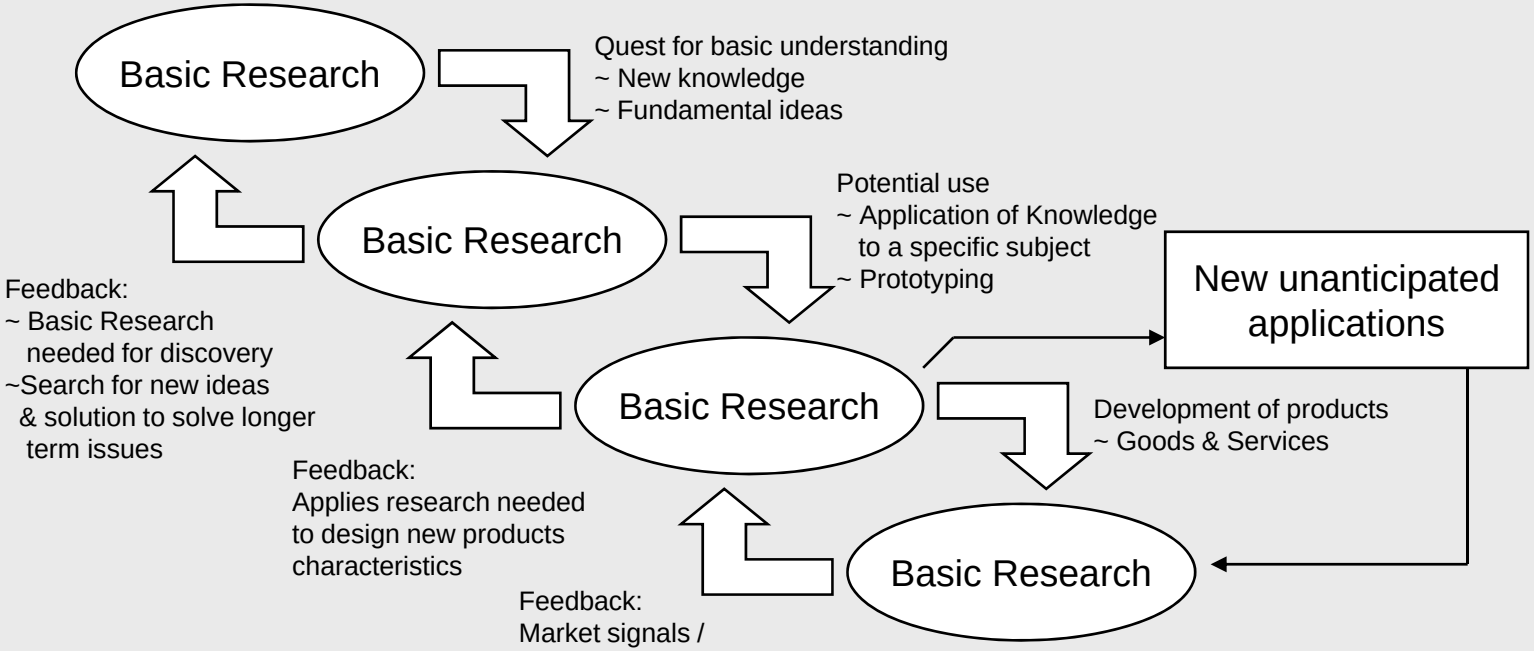
Sergio Jofre
Researcher
Phone direct +45 4677 5157
sergio.jofre@risoe.dk

Department of Management Engineering
Technical University of Denmark
Building 110, P.O. Box 49
DK-4000 Roskilde, Denmark
Tel +45 4677 5100
Fax +45 4677 5199
www.man.dtu.dk

Q&A

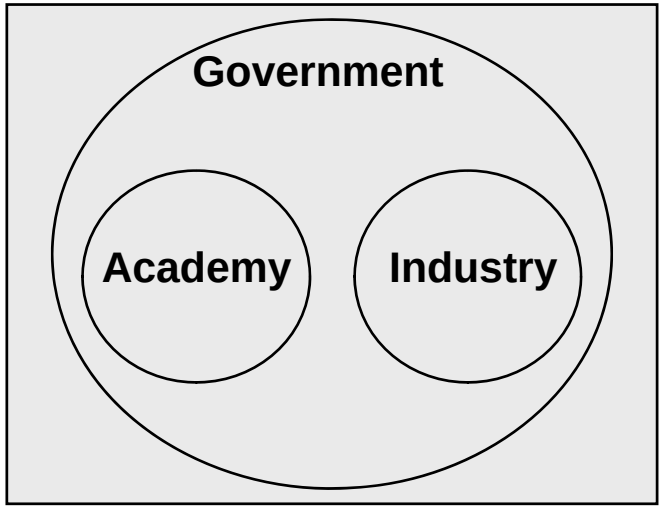
Linear Model of Innovation

Non- Linear Model of Innovation



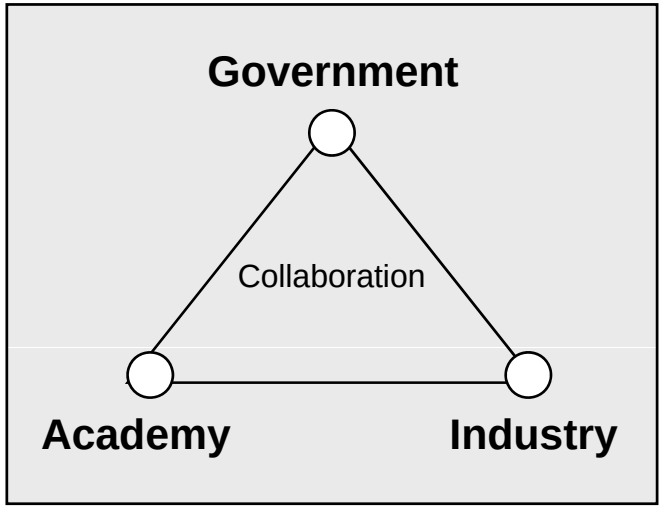
Tri-lateral Collaboration Models

Static model



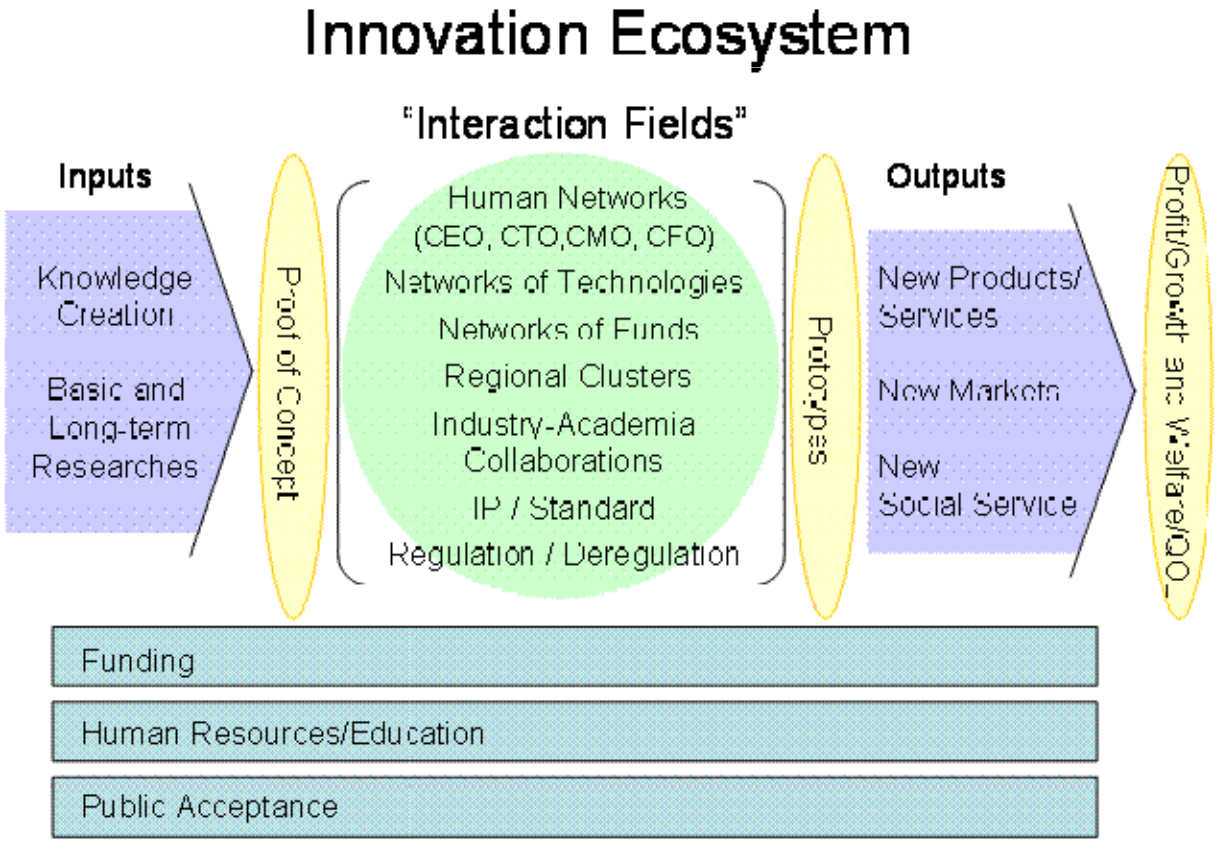
Nation state encompasses
academia and industry and
directs the relations between them
Strong form: Soviet
Soft form: Latin America & Norway

“Laissez-faire” (“let do”) model

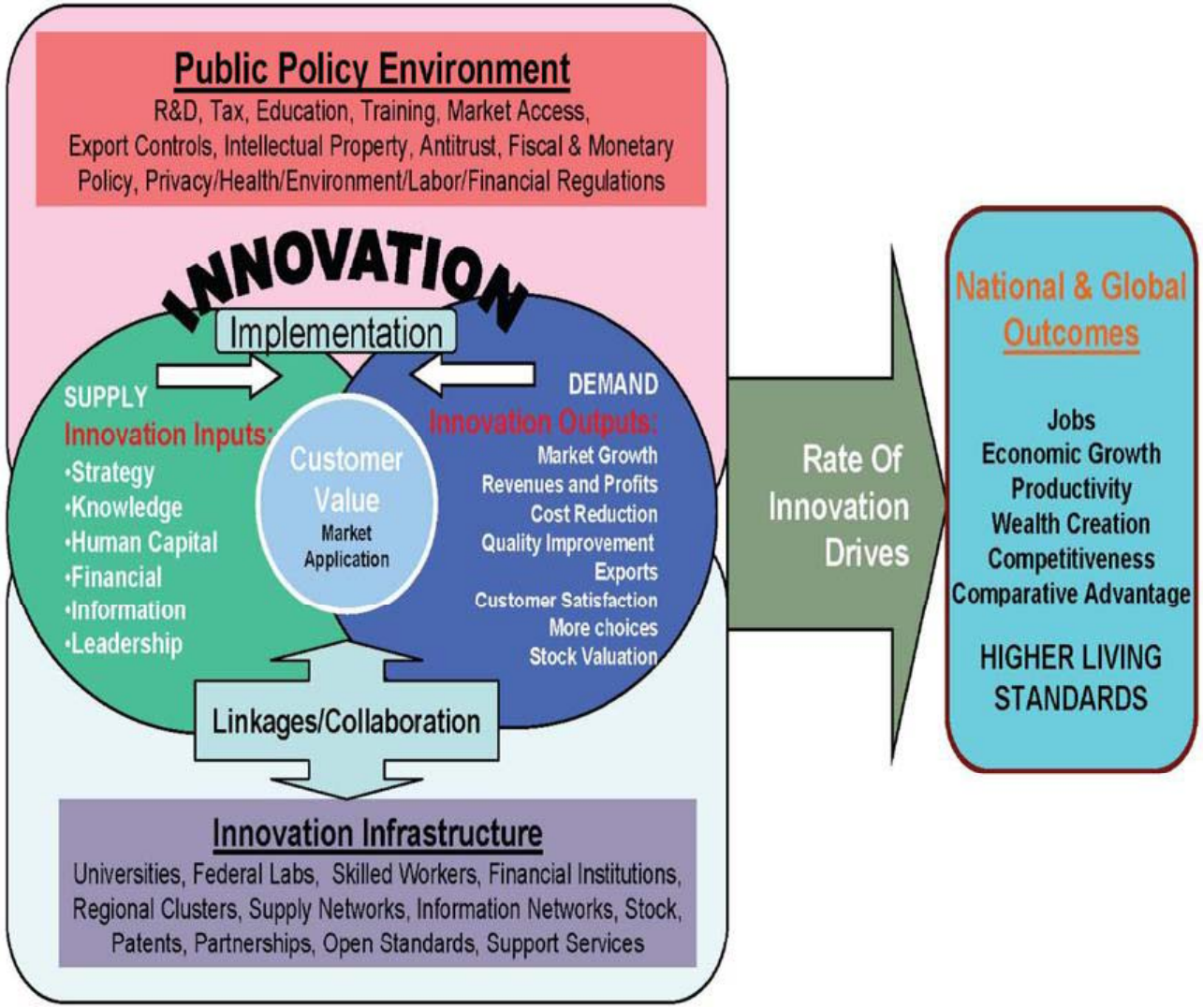


Institutional spheres with strong
borders dividing them and highly
circumscribed relations among the spheres
Examples: Sweden & US

JAPAN


Innovation Ecosystem
"Interaction Fields"
Inputs
Knowledge Creation
Basic and Long-term Researches
Proof of Concept
Human Networks (CEO, CTO,CMO, CFO)
Networks of Technologies
Networks of Funds
Regional Clusters
Industry-Academia Collaborations
IP / Standard
Regulation / Deregulation
Prototypes
Outputs
New Products/ Services
New Markets
New Social Service
Profit/Growth and Welfare/QO_
Funding
Human Resources/Education
Public Acceptance

US


Public Policy Environment
R&D, Tax, Education, Training, Market Access,
Export Controls, Intellectual Property, Antitrust, Fiscal & Monetary
Policy, Privacy/Health/Environment/Labor/Financial Regulations
INNOVATION
Implementation
SUPPLY
Innovation Inputs:
•Strategy
•Knowledge
•Human Capital
•Financial
•Information
•Leadership
Customer Value
Market Application
DEMAND
Innovation Outputs:
Market Growth
Revenues and Profits
Cost Reduction
Quality Improvement
Exports
Customer Satisfaction
More choices
Stock Valuation
Linkages/Collaboration
Innovation Infrastructure
Universities, Federal Labs, Skilled Workers, Financial Institutions,
Regional Clusters, Supply Networks, Information Networks, Stock,
Patents, Partnerships, Open Standards, Support Services
Rate Of Innovation Drives
National & Global Outcomes
Jobs
Economic Growth
Productivity
Wealth Creation
Competitiveness
Comparative Advantage
HIGHER LIVING STANDARDS