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**Policy and Strategy for the Growth of
Agriculture Industry In Korea**

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Paper presented at the 2011 NZARES Conference

Tahuna Conference Centre – Nelson, New Zealand. August 25-26, 2011

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Policy and Strategy for the Growth of Agriculture Industry in Korea

2011. 8

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Policy and Strategy
for the Growth of Agriculture Industry
in Korea

- 1 Overview of the Agriculture industry and R&D
- 2 The Future of Agricultural technology development
- 3 Issues with current agricultural technology development
- 4 Recommended Policies for the Future Agriculture Industry

Part 1.

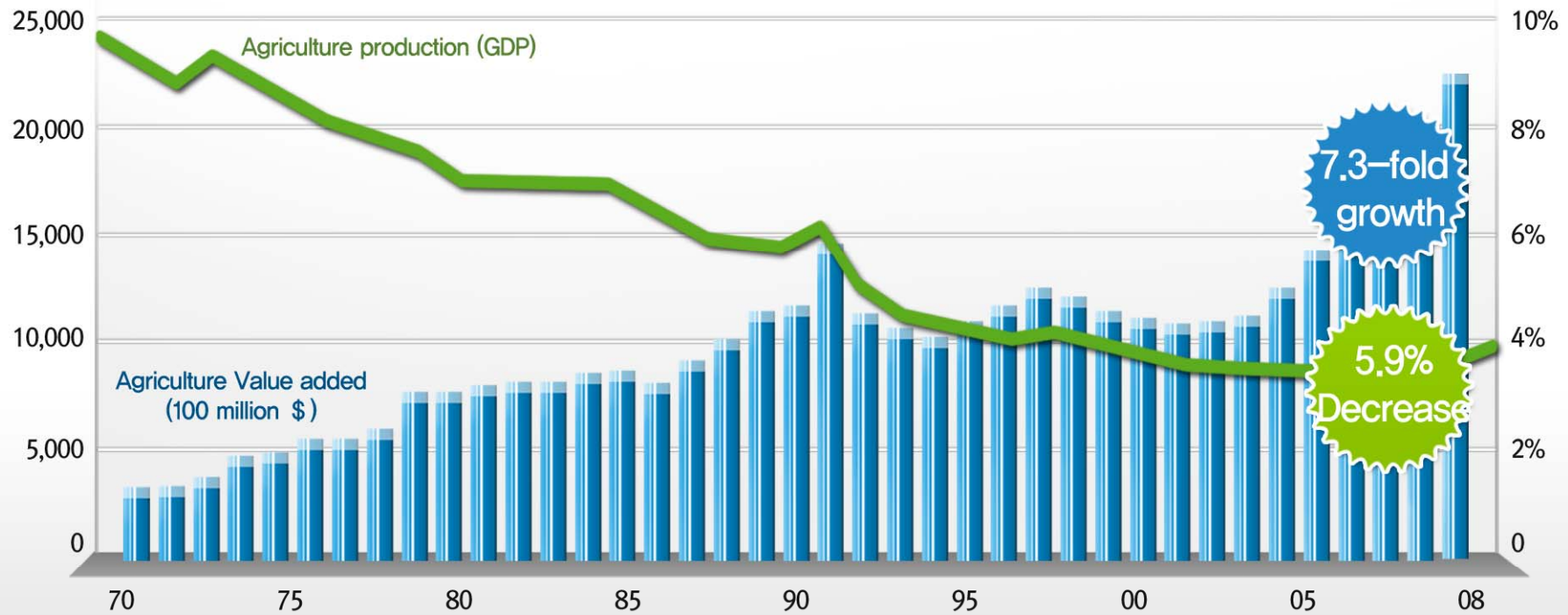
Overview of the Agriculture industry and R&D



Increasing agriculture production & reducing size of Agriculture sector

The world agricultural product's net added value grew approximately 7.3% from 1970 to 2008, which was nearly \$2.3 Trillion dollars in 2008. On the contrary, agriculture's size in the world GDP dropped almost 5.9% from 1970 to 2008. The rapid growth of developing countries and sophistication of developed countries industrial system are the major causes for these changes

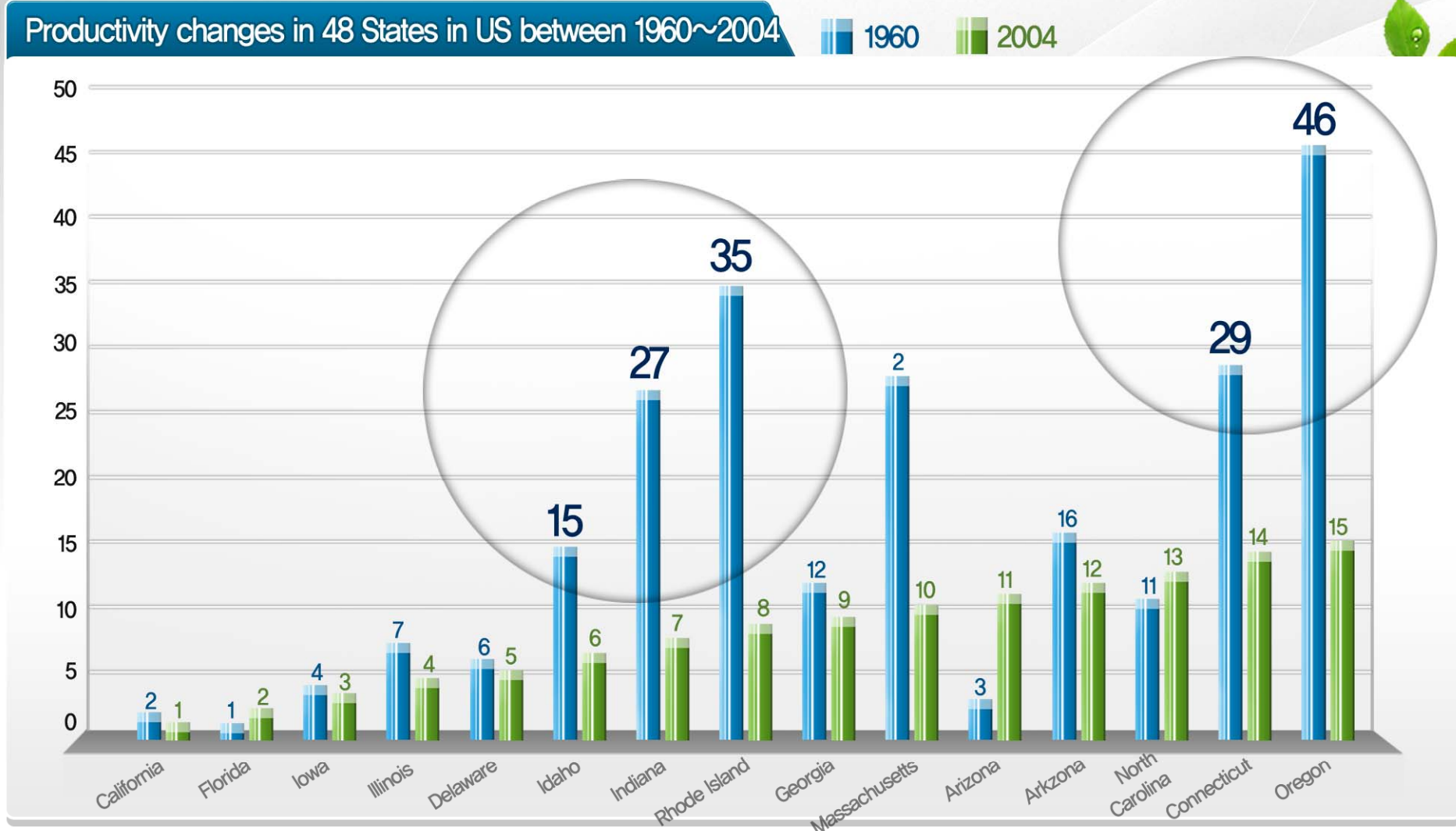
Changes in the World production and value added



Source : UN Statistics Division use statistics.

Note: The GDP of 214 countries and Agricultural value-added manufacturing sector based on the nominal amount of U.S. dollars.

Agricultural R&D and Policies are the keys to higher productivity



Source : <http://www.ers.usda.gov/Data/AgProductivity/>

Green Visions from the World Leaders

VISION



“Agriculture is facing challenges, but also in front of enormous economic opportunity”

– Obama –

“Agriculture is the key to open the future”

– Nicolas Sarkozy –



“The Future and potentials of agriculture is bright”

– Jim Rogers –



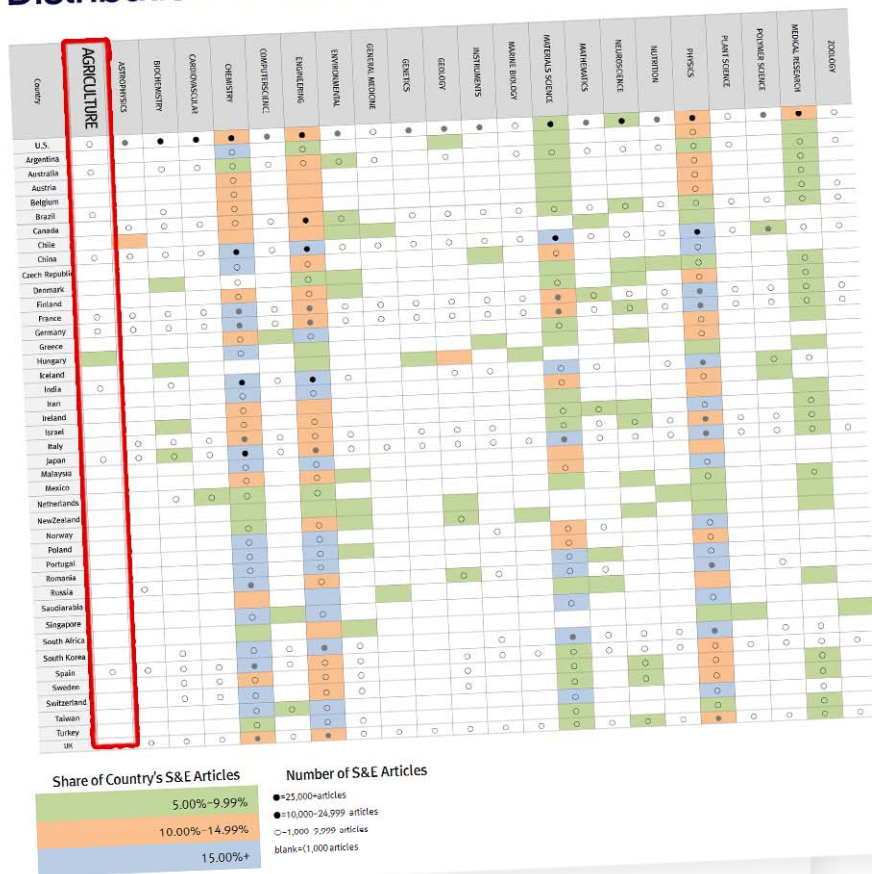
“We need to make the world without hunger, agriculture needs the best science technology”

– Bill Gates –



Nine main Countries, **Agriculture R&D innovation** is the future for Korea

Distribution of S&E articles in Major countries



Extensive agriculture R&D



Medium agriculture R&D



Intensive agriculture R&D



Part 2.

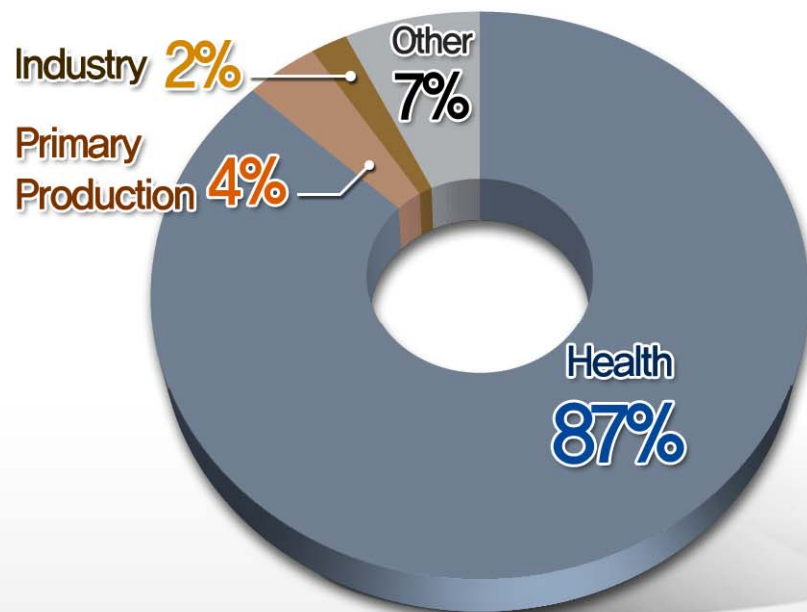
The Future of Agricultural technology development



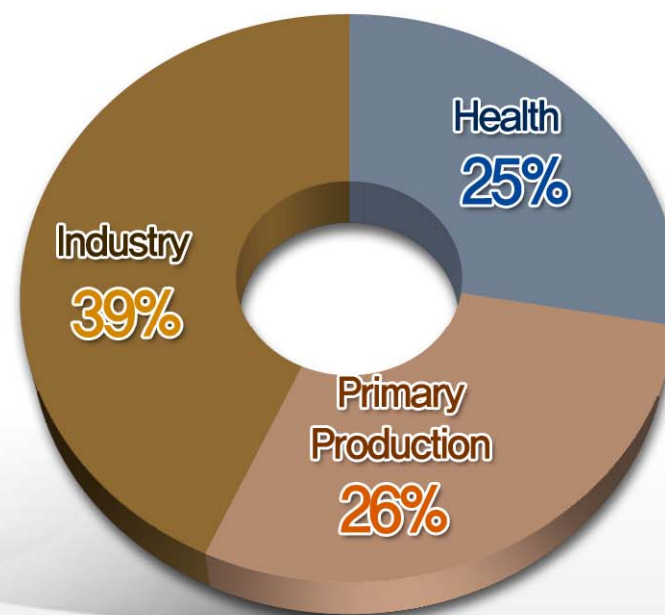
Current R&D expenditures vs. future market for biotech by application

Current R&D expenditures versus future markets for biotechnology by application

Share of total OECD business expenditures on biotech R&D in 2003



Estimated potential share of total biotechnology gross value added (GVA)¹ in the OECE area² for 2030



1. see table 7.2 and the accompanying text for the estimated potential share of biotech GVA by application

2. OECD member countries plus several EU 25 countries that are not members of the OECD. Due to a lack of data, Turkey is not included

R&D Expenditures by Leading Firms Active in Biotechnology

Estimated 2006 R&D expenditures of relevance to biotechnology by leading companies in each application

Unit: USD million

Primary production		Health		Industry	
Company(country)	Biotech R&D	Company(country)	Biotech R&D	Company(country)	Biotech R&D
Syngenta(Switzerland)	510	Pfizer (U.S.A)	7,770	Novozymes (Denmark)	95
Monsanto(U.S.A)	470	GlaxoSmithKline(United Kingdom)	4,350	BASF (Germany)	55
Bayer CropScience(Germany)	310	Sanofi–Aventis(France)	3,750	DuPont(U.S.A)	45
Du Pont Pioneer(U.S.A)	190	Roche(Switzerland)	3,450	AKZO Nobel(Netherlands)	40
BASF(Germany)	170	Novartis(Switzerland)	3,450	Dow(U.S.A)	40
LimaGrain(France)	85	Merck(U.S.A)	3,100	DSM(Netherlands)	15
KWS SAAT(Germany)	65	Genentech(U.S.A)	2,600	Kyowa Hakko Kogyo(Japan)	9
Dow Agrosciences(U.S.A)	55	Amgen(U.S.A)	2,150	Ciba(Switzerland)	6
		Novo Nordisk(Denmark)	715	Wacker Chemie(Germany)	6
		Biogen Idec(U.S.A)	460	BHP Billiton(United Kingdom)	2
Total	1,855		31,795		313

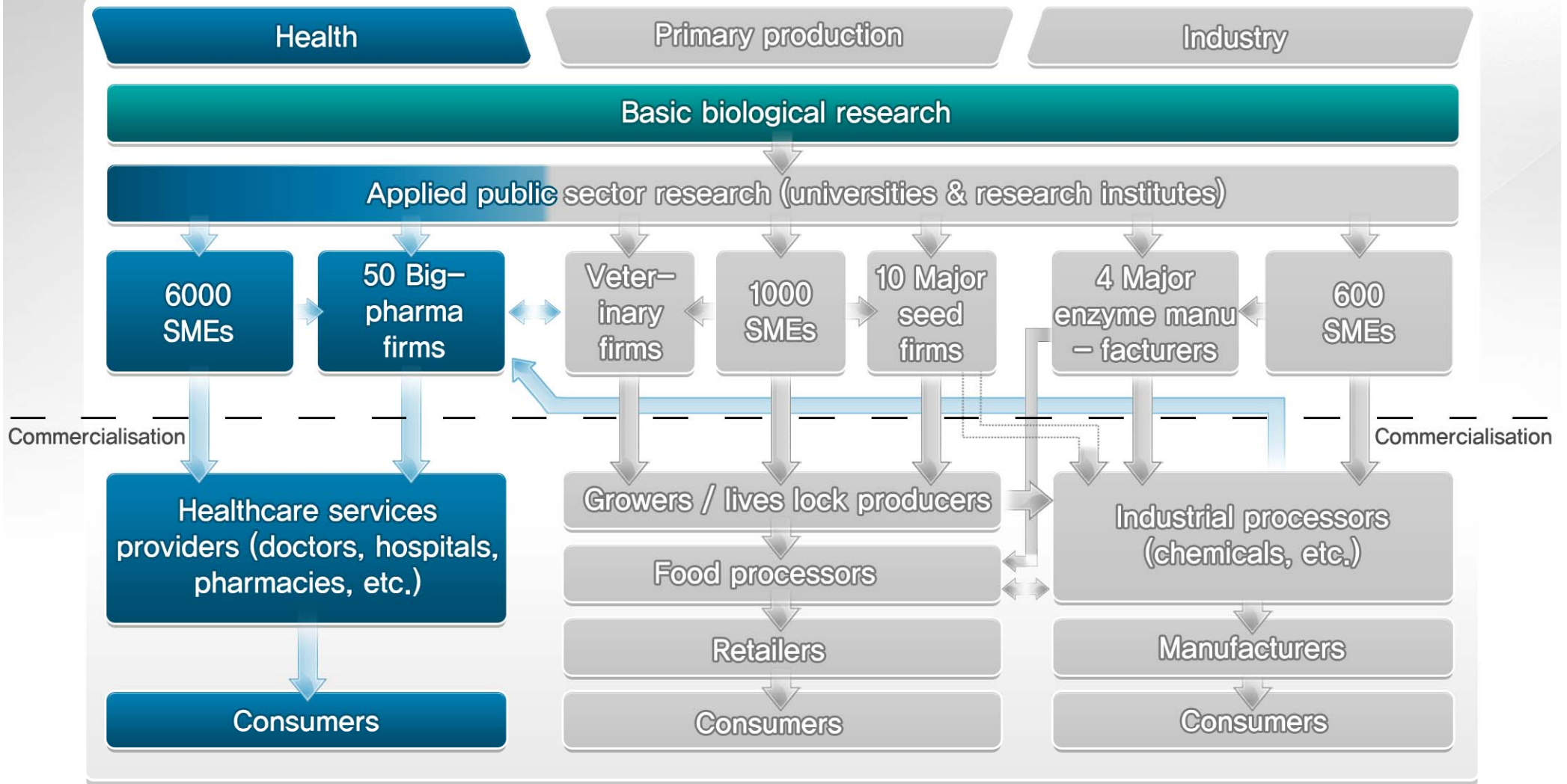
Maximum potential contribution of biotechnology to GVA and EMP

Maximum potential contribution of biotechnology to gross value added and employment

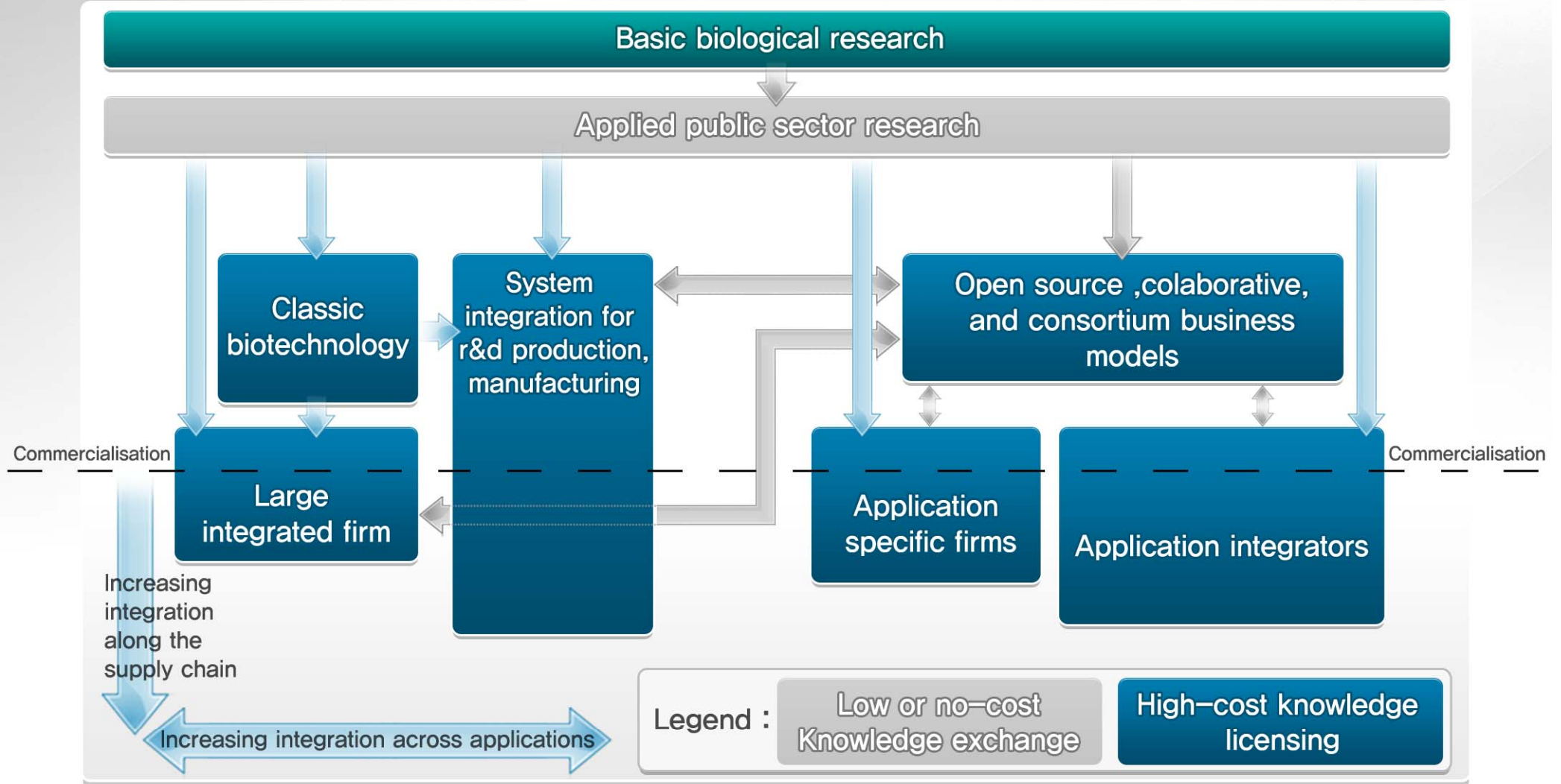
Country	GDP (USD billions)	Share of gross value added (%)			Total Employment (thousands)	Share of total employment (%)		
		(Health) Pharmaceuticals	Primary Production	Industrial sectors where biotech has some application		Pharmaceuticals	Primary production	Industrial sectors where biotech has some application
EU-25	16,379	0.66	1.77	3.13	171,247	0.31	1.87	1.96
U.S.A	13,790	1.24	1.83	2.71	141,216	0.23	1.04	1.25
Australia	890	0.27	3.08	3.83	8,741	0.13	2.06	1.41
Canada	1,406	0.36	2.21	3.99	15,314	0.19	2.65	–
Iceland	20	–	9.34	1.52	0,159	–	6.88	–
Japan	5,103	0.62	1.34	1.94	52,935	0.21	0.82	1.73
Korea	982	–	3.78	4.91	21,557	–	8.82	–
Mexico	886	0.73	3.79	6.23	–	–	–	–
New Zealand	124	–	9.19	–	1,443	–	0.65	–
Norway	369	0.23	1.46	–	2,310	–	3.60	–
Switzerland	414	–	1.36	–	–	–	–	–

Source: 2007 GDP in official exchange rates from the CIA Factbook.

Industry Dynamics of Bioeconomy



Industry Dynamics of Bioeconomy (Emerging)



Part 3.

Issues with current agricultural technology development

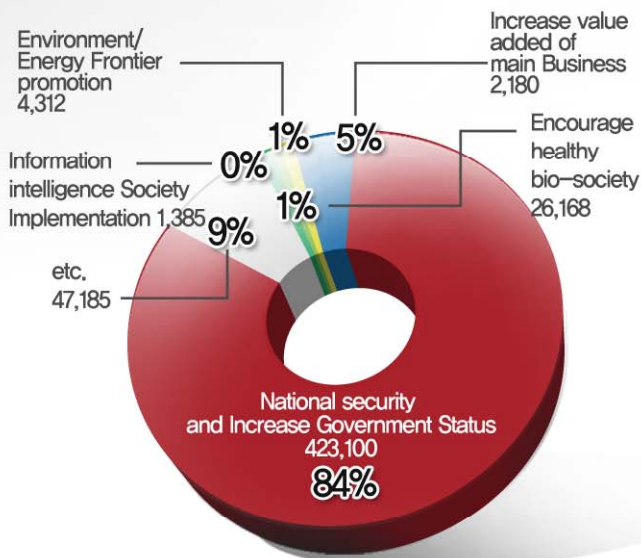


Expanding Agriculture R&D expenditure is a short-term solution



Republic of Korea

LIST	2008
Total R&D BUDGET	\$ 12.3 billion
Agriculture R&D Budget	\$ 0.7 billion
R&D / GDP	3.4%
Agriculture R&D / Total R&D	5.8%



Source : NTIS agriculture industry R&D analysis



Netherlands

LIST	2008
Total R&D BUDGET	\$ 4.8 billion
Agriculture R&D Budget	\$ 0.25 billion
R&D/GDP	2.0%
Agriculture R&D/ Total R&D	5.0%

Health, lifestyle and livelihood

behaviour and perception
food safety
consumer institutions
citizen



Food and food production

sustainable agriculture and fisheries
insectious animal diseases
nutrition and health
biomass
chains



Living environment

marine resource management
landscape and land use
nature and biodiversity
water management
competing claims

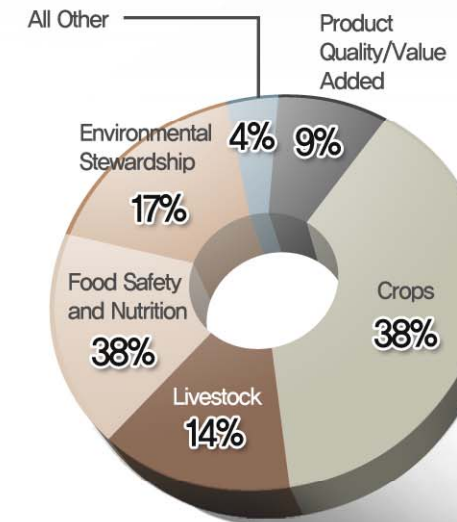


Source : Strategic Plan Wageningen UR 2007-2010



United States of America

LIST	2008
Total R&D BUDGET	\$ 144.3 billion
Agriculture R&D Budget	\$ 2.5 billion
R&D/GDP	2.8%
Agriculture R&D/ Total R&D	1.8%

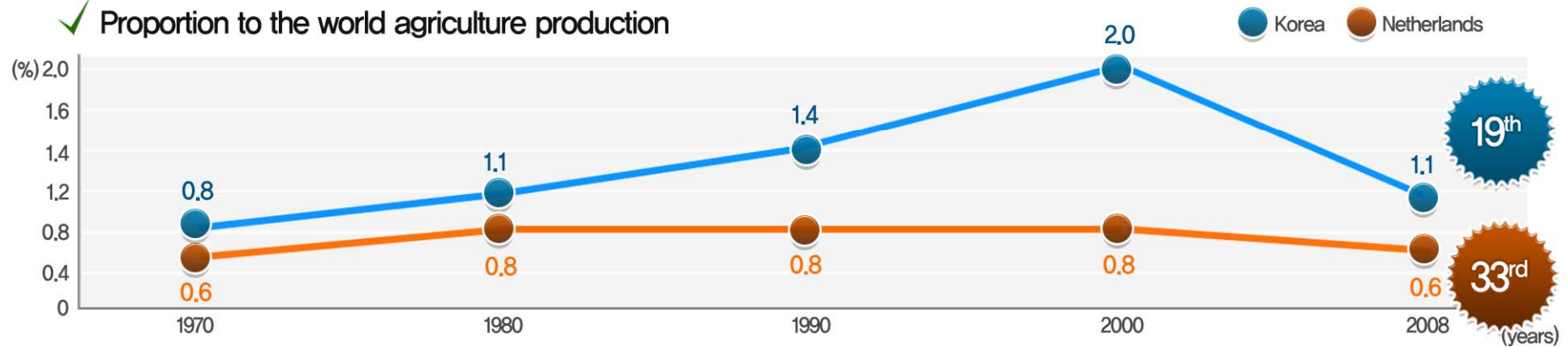


ARS research budget of the 2010 classification

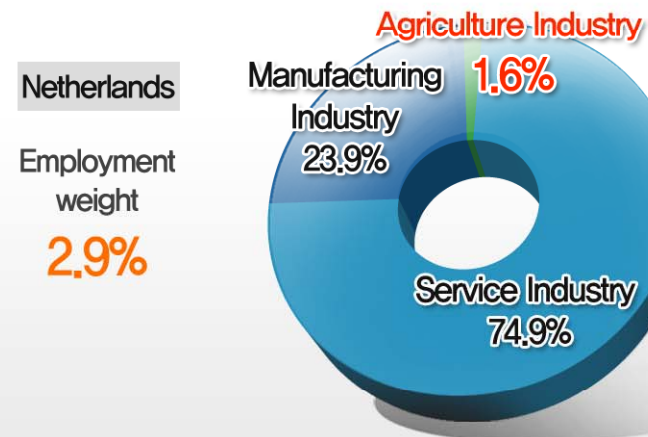
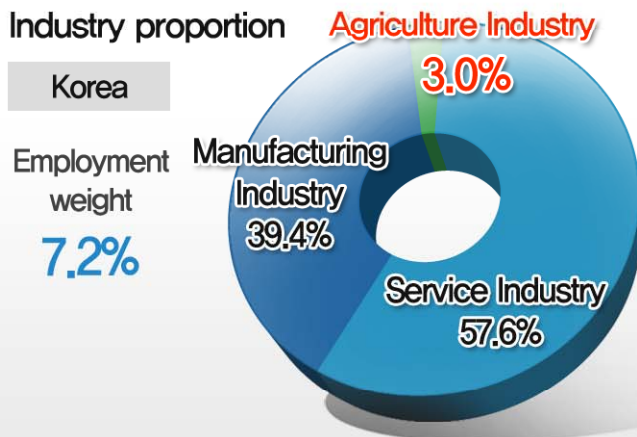
Korea's Economy, Capable of supporting growth in **Agriculture Industry**

Agriculture Industry size of Korea and Netherland

✓ Proportion to the world agriculture production



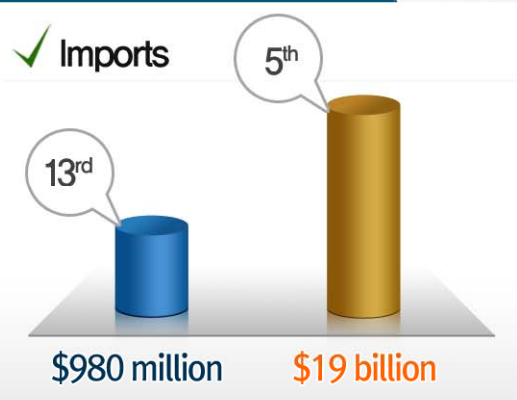
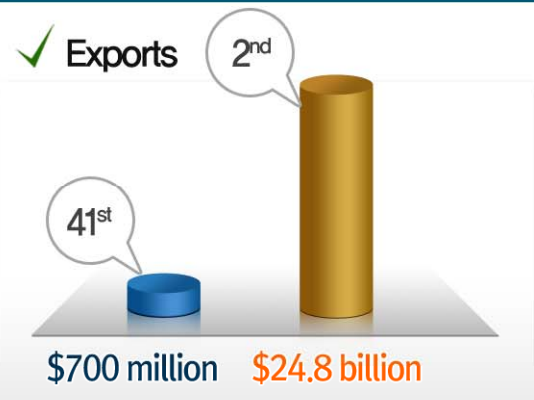
✓ Industry proportion



Lack of Globalization & Low Productivity in Korea's agriculture industry

Korea and Netherland Trade Balance (2008)

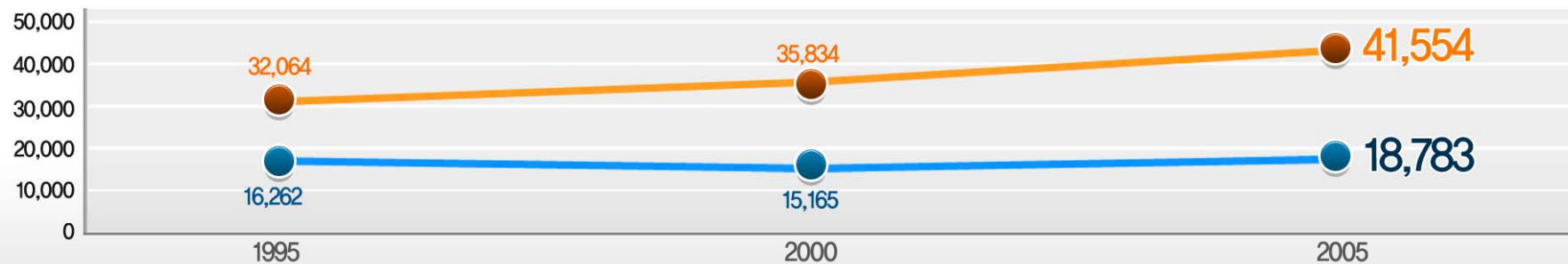
■ Korea
 ■ Netherlands



Korea and Netherland Agriculture business Productivity

✓ Agriculture value added per Capita(\$PPP)

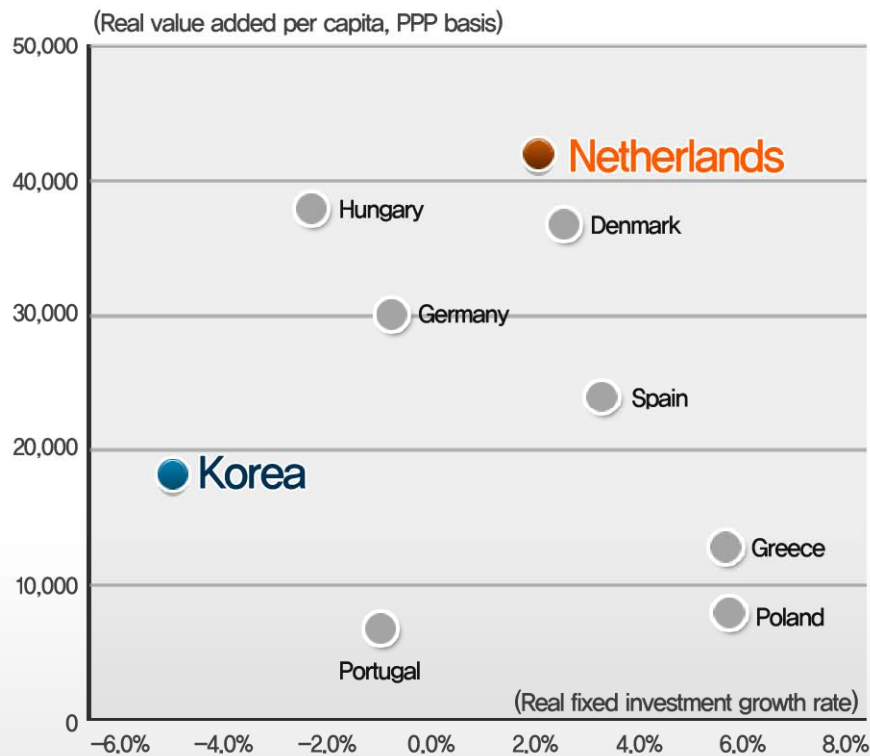
● Korea
 ● Netherlands



Source : UN Statistics Division Statistics; EU-KLEMS, Growth and Productivity Accounts; OECD, STAN, OECD, STI Input-Output 2009 edition; OECD, STAN R&D Expenditure in Industry; OECD, ANBERD database 2009; OECD, STAN BTD; OECD, Environmental Performance of Agriculture in OECD countries

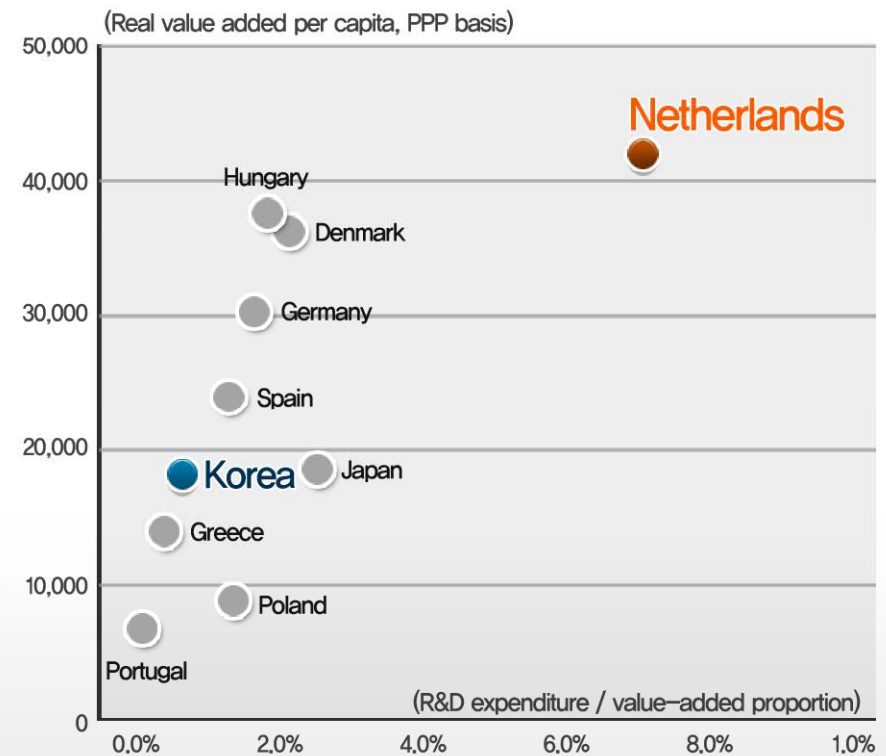
Analyze and learn from Netherland's **fixed capital** and **R&D investment**

Agriculture real-fixed investment Growth rate and real value added per Capita



Data: OECD STAN, OECD ANBERD, PennWorld Table with its own calculations.
 Note: to the lack of data, except in Japan, Hungary and Portugal during the 2000–2005 period using the average annual growth rate.

Agriculture R&D Expenditures value added Proportion and real value added per Capita



Data: OECD STAN, OECD ANBERD, PennWorld Table with its own calculations.

Facing **Small sized economy** and **distance problem** in New Zealand

Trade liberalization to overcome small sized economy

- Export industrialization
- Trade Liberalization
- International Competitiveness
- Enter world market
- R&D Intensity
- R&D Productivity

Magnifying the scarcity value and nation branding to overcome distance problem

- Scarcity value of being different
- Emphasize 'Clean and green' image



Clean & Green

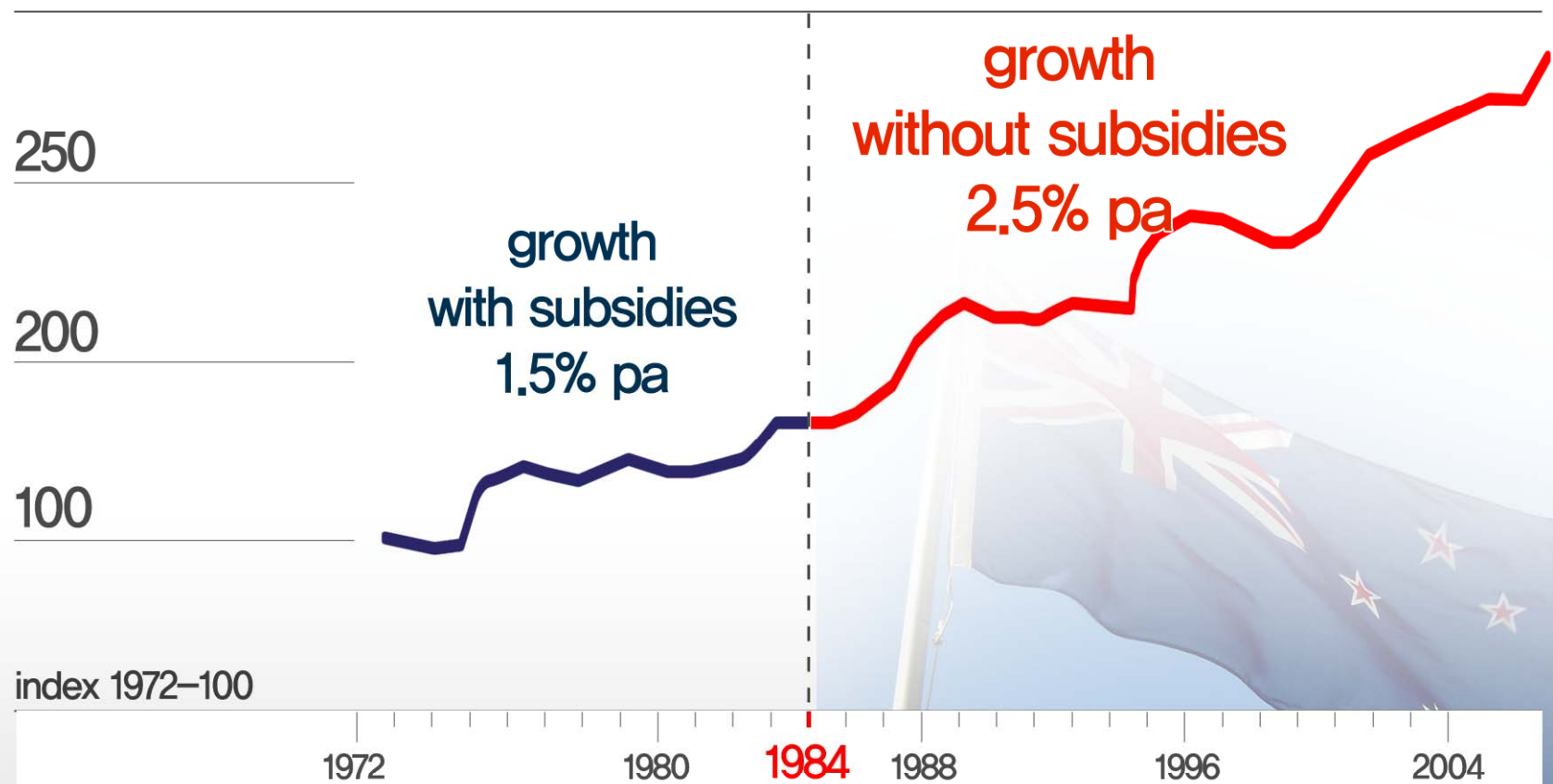
OECD Economies

: Size and Distance

	'Small' Economy	'Large' Economy
Geographically Close	Austria, Belgium, Czech Republic, Denmark, Finland, Greece, Hungary, Iceland, Ireland, Luxembourg, Netherlands, Norway, Poland, Portugal, Sweden, Switzerland, Slovak Republic, Turkey	Canada, France, Germany, Italy, Mexico, Spain, United Kingdom, United States
Geographically Distant	New Zealand	Australia, Japan, Korea

Success factors of New Zealand's Reform in Mid-80s

Total Factor Productivity Before and After the Reforms



Success factors of New Zealand's Reform in Mid-80s

1

Well-calculated welfare system to minimize the suffering of the reform

2

Abolition of subsidies ruling on production capacity, which disturb the function of free market

✓ Changes in the Export of Horticultural Products and Wine Before and After the Reforms.

	Pre-reform(1983-4)	Post-reform(real)(2004-5)
Exports of kiwifruit (US\$)	42 million	→ 405 million
Exports of all horticultural Products (US\$)	140 million	→ 827 million
Wine (US\$)	<10 million	→ 125 million

Source : statistics New Zealand and author's calculations

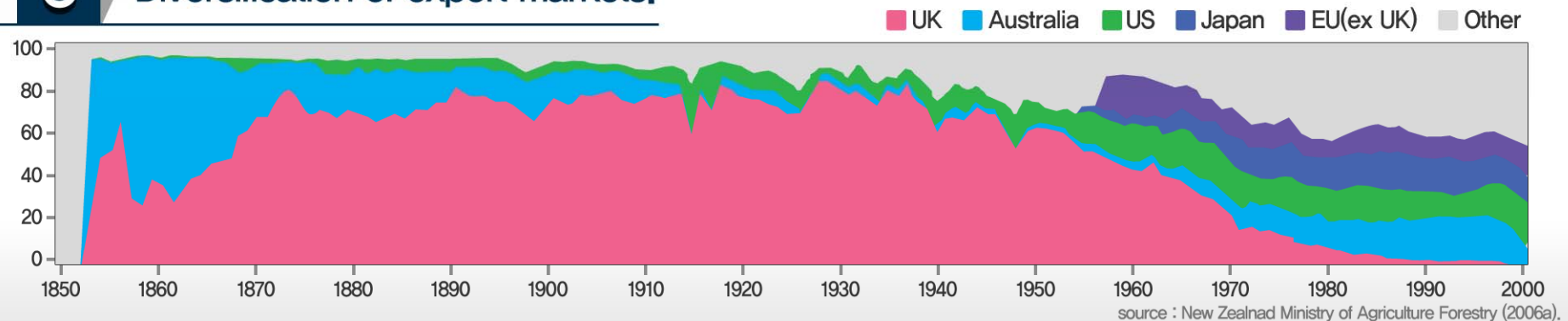
✓ Changes in Sheep, Dairy and Deer Numbers Before and After the Reforms.

	Pre-reform(1983-4)	Post-reform(real)(2004-5)
Sheep	70m	40m
Dairy herds	16,000	13,000
Dairy cattle	2.3m	5.3m
Deer	–	2m

Source : statistics New Zealand, author's calculations

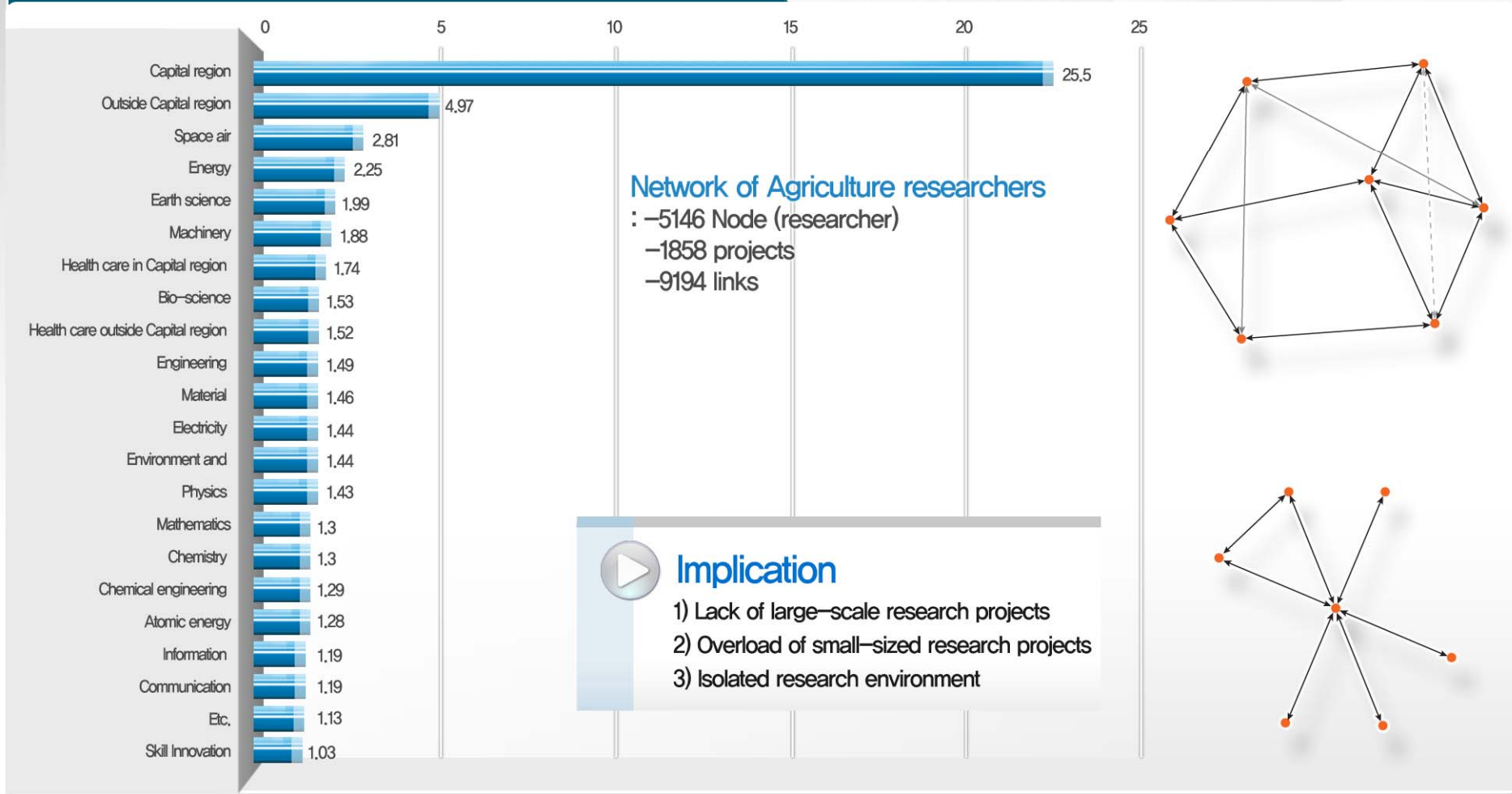
3

Diversification of export markets.



More creativity, productivity, and diversity needed for Korea's R&D

Result of SNA testing for types of researches



Source: 2009 NITS 46,000 registered in the government R & D projects analysis of results SNA

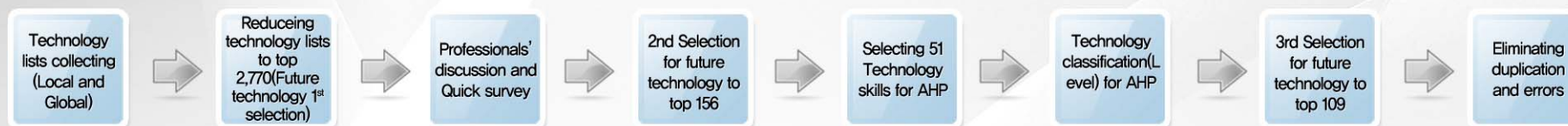
Part 4.

Recommended Policies for the Future Agriculture Industry

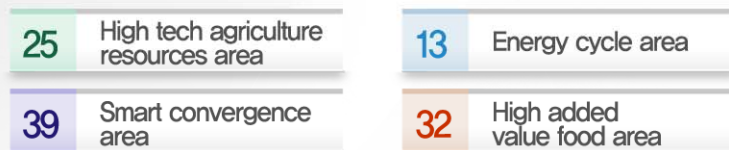


Exports and bio-technology industrialization, the future of Agriculture R&D

Selection process of future business technology



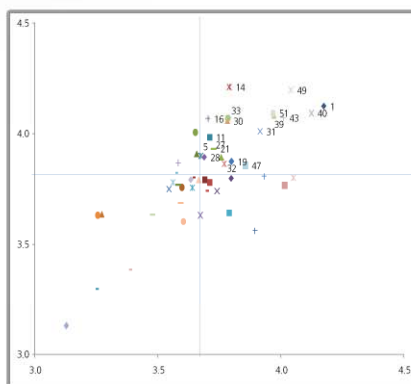
109 Selected technology



Top ten future agriculture technology for Korea

No	Name	Obtainability	Ripple effect	Importance
1	Inventing exportable breed with BT technology	4.2	4.1	4.5
2	Invention of new Bio-medicine	3.8	4.2	4.4
3	Invention of Bio-energy production tech,	3.7	4.1	4.3
4	Invention of agriculture info. System	3.8	4.1	3.9
5	Remote sensing tech,	3.9	4.0	4.0
6	Agriculture bio-sensing tech,	3.8	4.1	3.9
7	Ubiquitous food distribution system skills	4.0	4.1	4.3
8	Smart packaging skills	4.0	4.1	4.0
9	Food safety bio-sensor skills	4.0	4.2	4.3
10	By-product managing system tech,	4.0	4.1	4.1

Analysis of Matrix calculation



Economical importance
Obtainability of technology skills analysis

Note 1) solid technical evaluation of the average value of each item

Note 2) number means the unique number of technologies ((Table 7-9) Reference)

Policy suggestions to enhance competitiveness for Korea

Export Industrialization

- Exports aimed at R=2000km market
- Monsanto-like exporting companies vs. Zespri-like exporting companies
- Investment in agricultural development overseas and in domestic farms.
- Korean food globalization (Kikkoman Soy sauce, etc)



- Achieving Bio-industry through convergence
- Agriculture Plant (Biorefinery, vertical farm)
- Agri-industry cluster
- Korea needs Fonterra and Zespri like companies

Fostering
major agriculture
company



Policy suggestions to enhance competitiveness for Korea

More National level Agriculture Projects (Large-scale)

- Agri-food, health, and environment are the drivers of bioeconomy
- Agriculture lead national projects needed
- Funding for Large research teams and strategic projects (Golden seed Project)



- Person-based projects distributions vs. Goal-based projects distributions
- Agriculture R&D Control Tower activation
- Life science projects managements

Developing Advanced R&D Planning and Management System

Eliminating barriers

- Wageningen UR(University & Research)
- Currently, Korea's agriculture projects are divided into 4 departments
- Creating Natural resources department





Thank you

