

Ex Ante Portfolio Analysis of Public R&D Programs for Industrial Technologies in Korea: Practices at the ITEP

Presented at

*American Evaluation Association (AEA)
2007 Annual Conference*

*Baltimore, MD
November 9, 2007*

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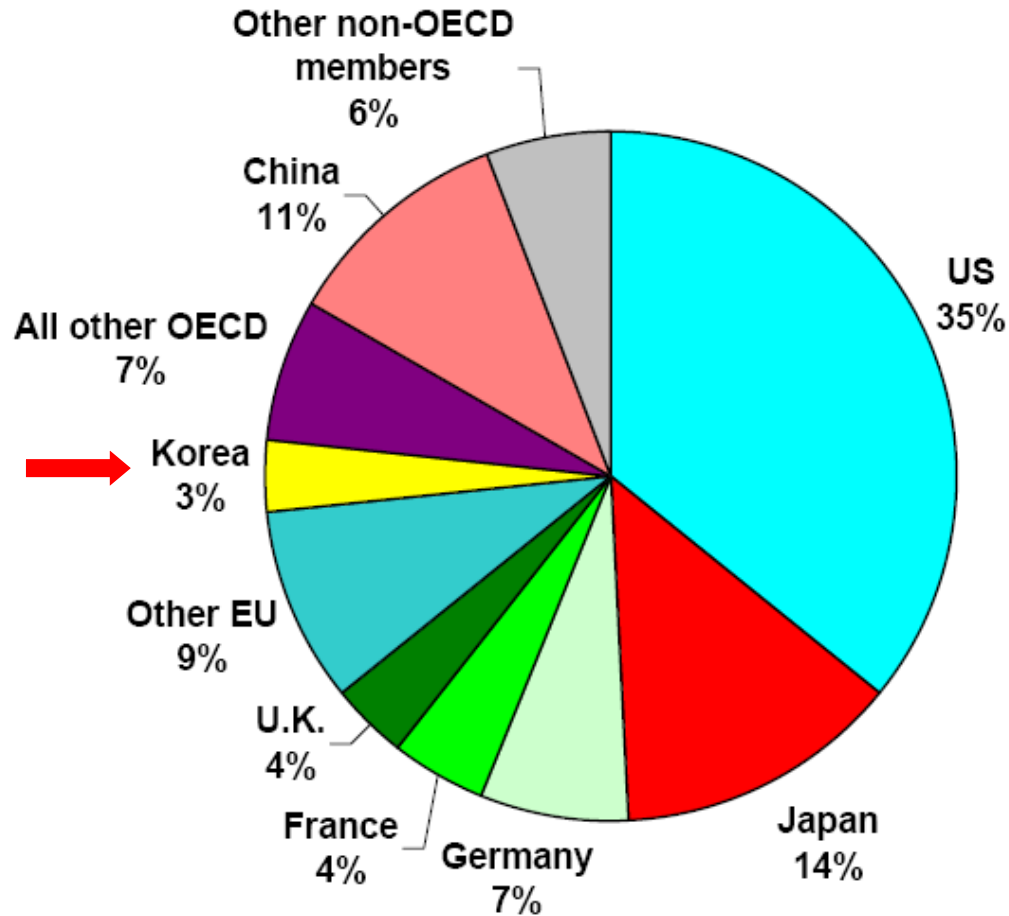
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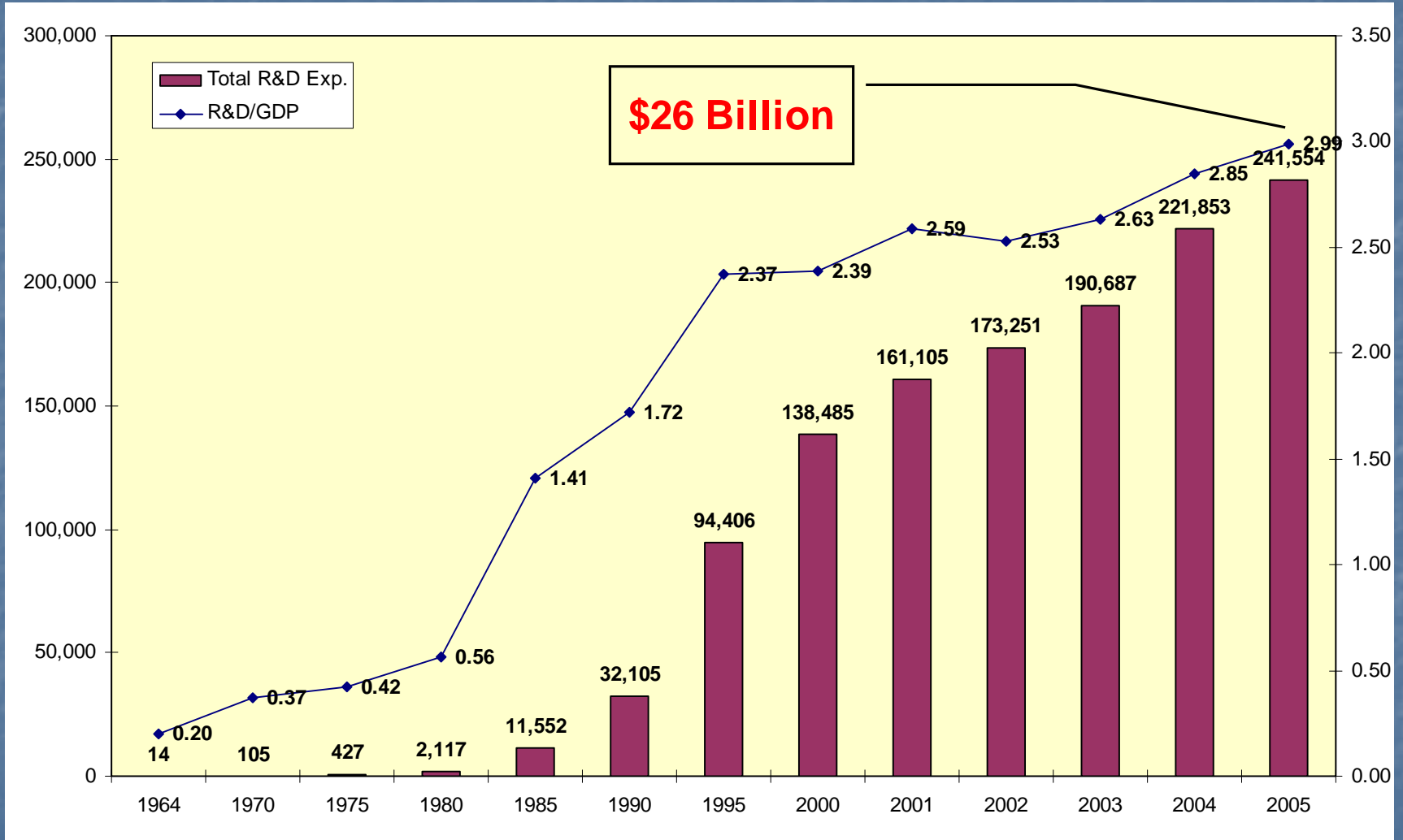
Share of Total World R&D (2004)



**Total World* R&D =
U.S. \$874 billion****

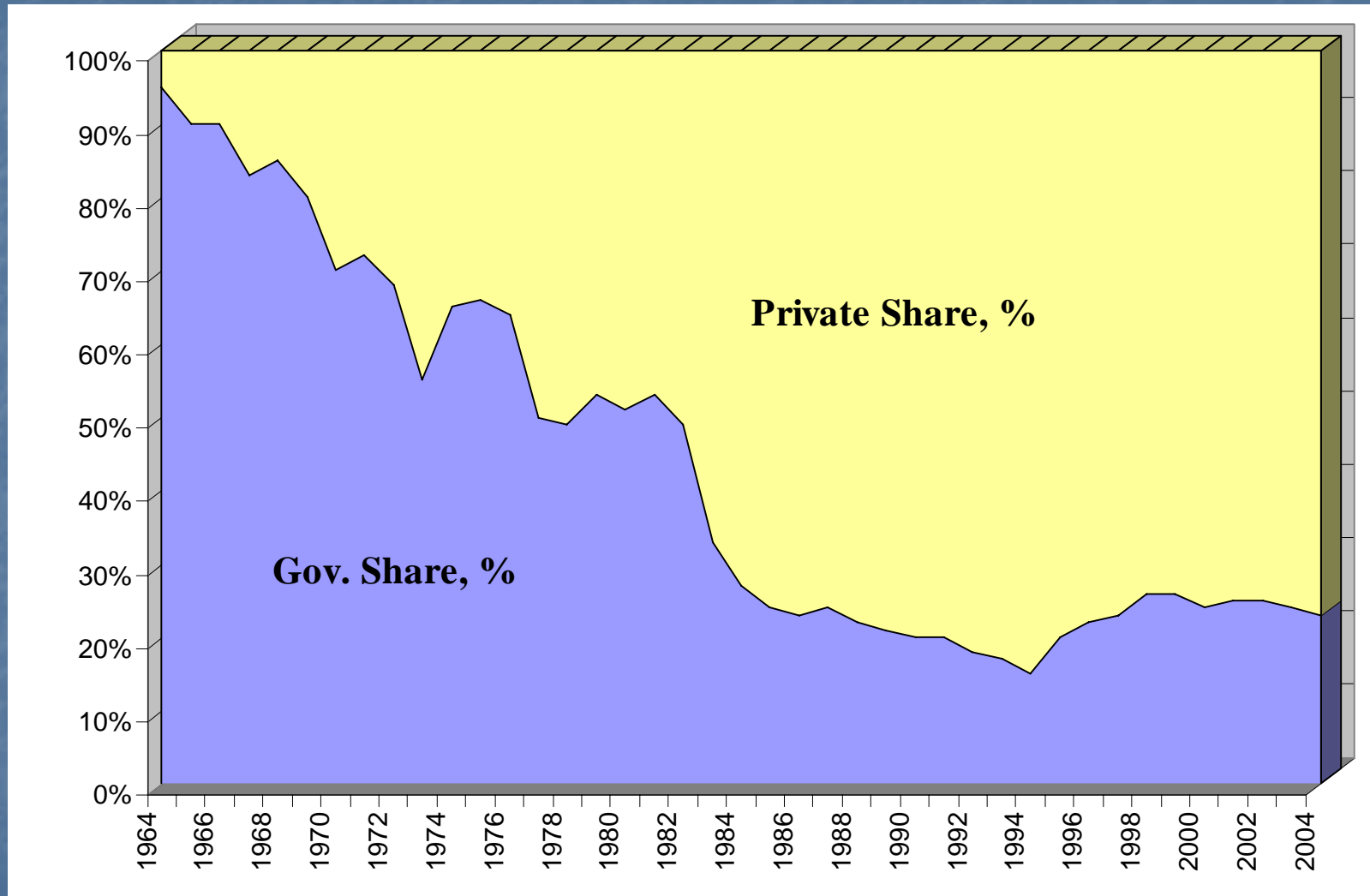
* World = OECD members plus Argentina, China, Romania, Israel, Russia, Singapore, Slovenia, South Africa, Taiwan

Trend of Total R&D Exp. and GERD/GDP



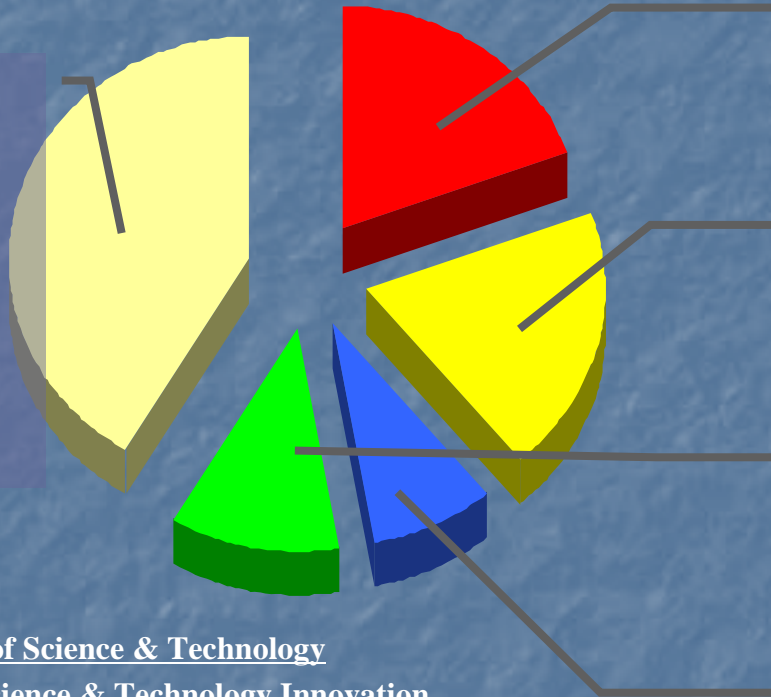
Source: MOST (www.most.go.kr)

Trend of Public vs. Private R&D Funding



Public R&D Exp. : \$8.9 Billion (2006)

Other Agencies
(Defense, Agriculture, Transportation, etc.)



MOCIE : 19% for Industrial Technology Development

MOST : 19% for Scientific R&D

MOST (OSTI) : 11% for GRI

MIC : 9% for Information & Communication Technology

MOST : Ministry of Science & Technology

OSTI : Office of Science & Technology Innovation

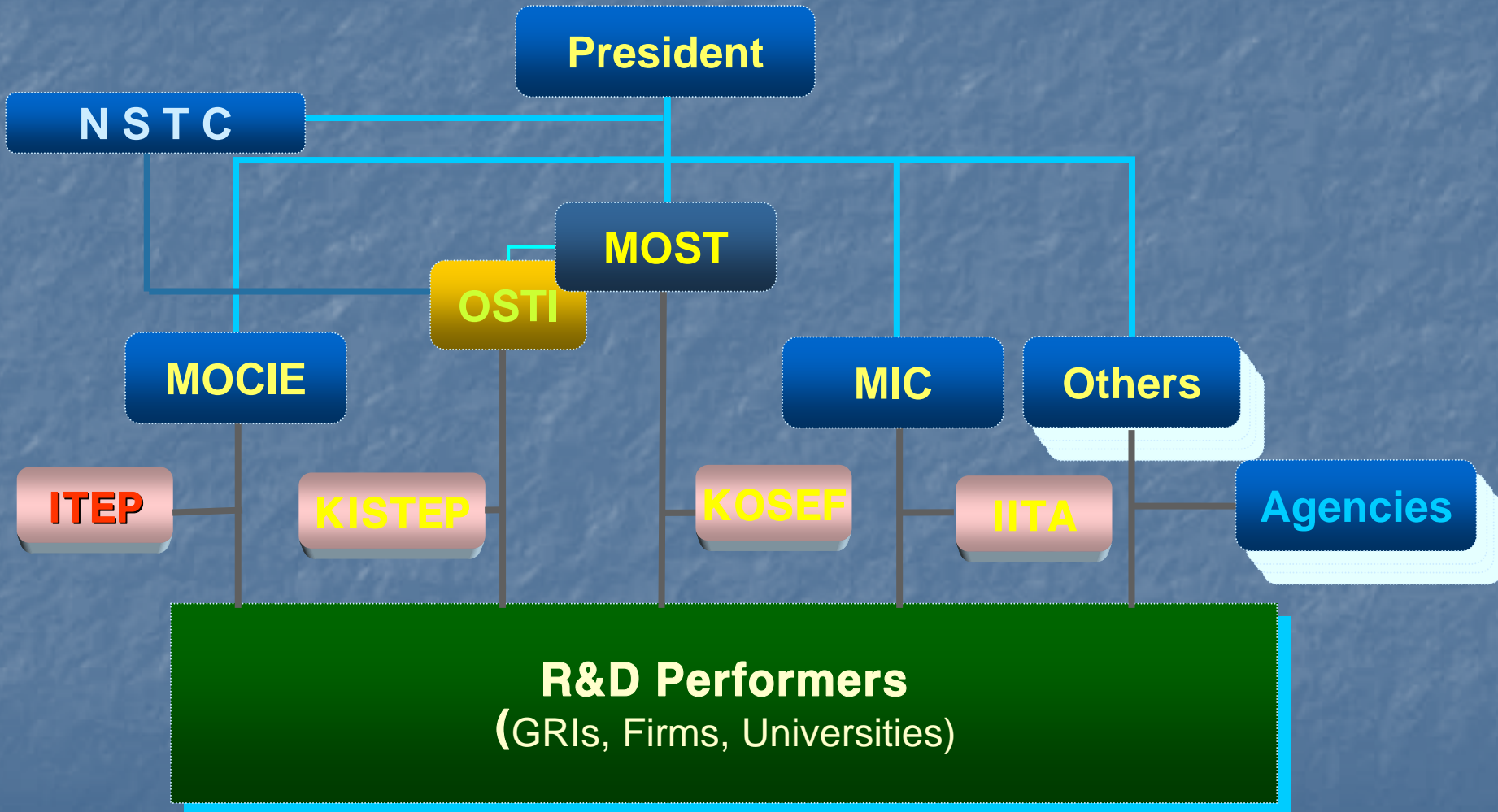
MOCIE : Ministry of Commerce, Industry & Energy

MIC : Ministry of Information & Communication

GRI : Government supported Research Institutes

Source: Nam (2005)

Organizational Structure for Public R&D in Korea



ITEP

- **Korea Institute of Industrial Technology Evaluation and Planning**

- Government-Funded Agency for R&D funding
- Under Ministry of Commerce, Industry, and Energy (MOCIE)
- Established in 1989
- 5 Depts and 2 Centers
- Approx. 160 Staffs
- www.itep.re.kr

- **Industrial Technology R&D Programs**

- Plan/ Design Program Structures
- Implement R&D funding
- Monitor / Follow-Up R&D Projects
- Evaluate Program Performance
- Also, Manage SMEs' Innovation Technology Program

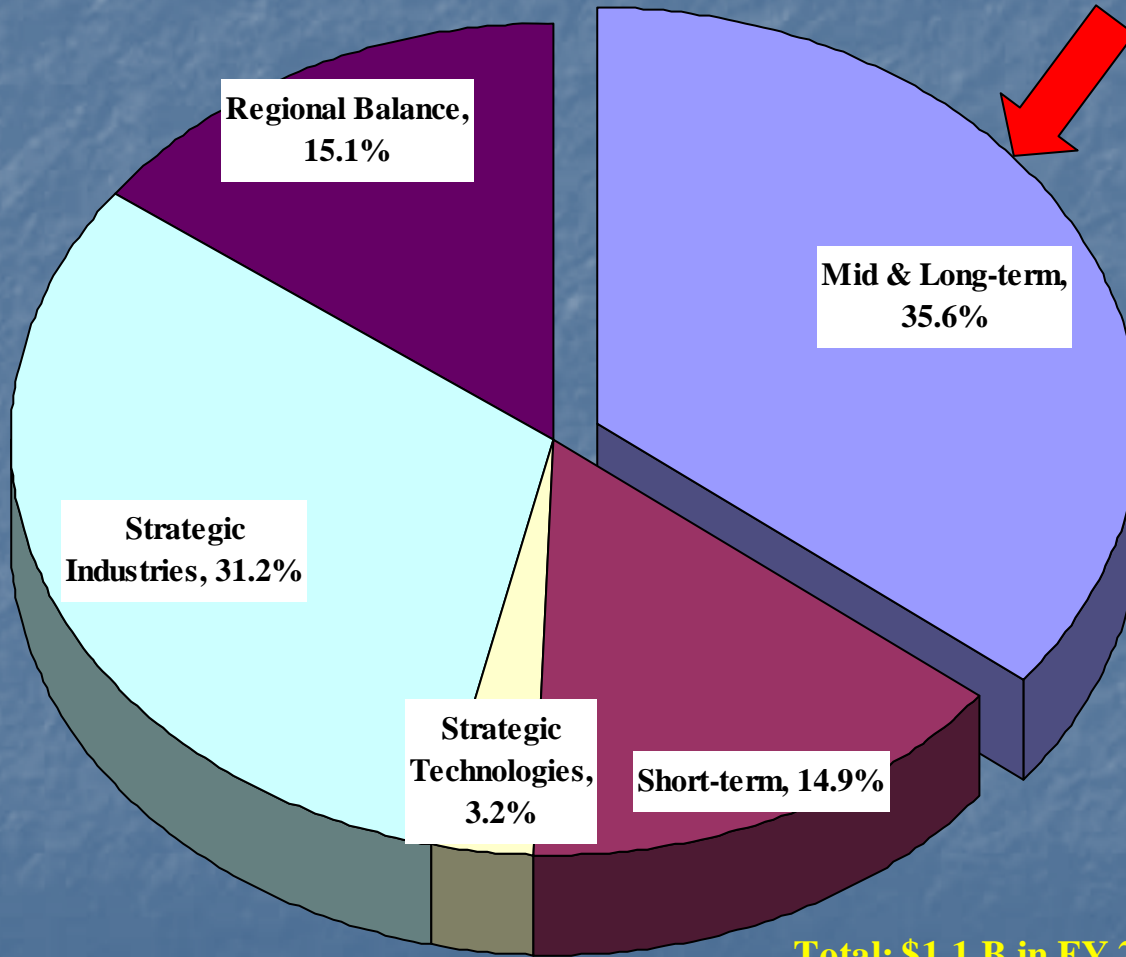
Industrial Technology R&D Programs

- Provide Funding for Generic Industrial Technology R&D
- Collects 'Payback' (20% - 40% of Gov't Funding) only if Succeed

Mid & Long Term	Short Term	Strategic Technologies	Strategic Industries	Regional Balance
<ul style="list-style-type: none"> - Mid Term Strategic Tech. - Growth Engine Tech. (Multiagency) - Next Generation New Tech. 	<ul style="list-style-type: none"> - Generic Tech. - Core Generic Tech. - Advance Tech. Center - International Joint R&D 	<ul style="list-style-type: none"> - E-Commerce Tech. - Design Tech. - Dual Use Tech. 	<ul style="list-style-type: none"> - Parts & Material Tech. - Aviation & Aerospace Tech. - Clean Tech. 	<ul style="list-style-type: none"> - Short & Mid Strategic Tech.

Source: Park (2006)

Types of Industrial Technology R&D Programs



Total: \$1.1 B in FY 2006

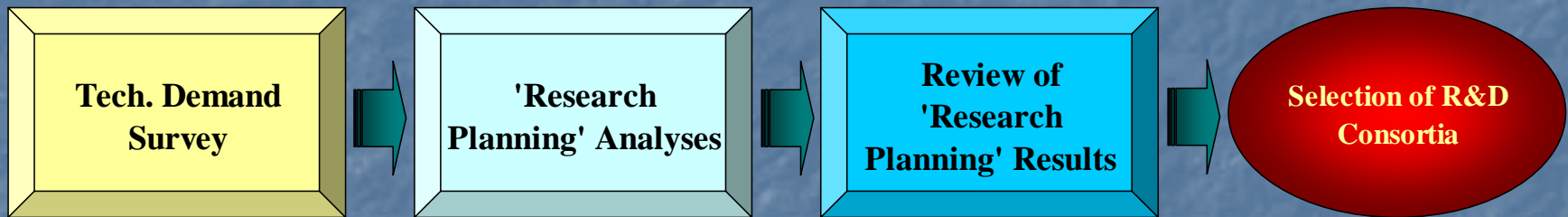
Mid & Long-term R&D Programs

- **Mid-term Strategic Tech. Program**
 - Develop Complex System and/or Core Techs for Generic Use
 - Focus on Competitiveness of the Current Core Industries
 - Maximum 5 years in two stages
 - \$2 million / year
- **Growth Engine Tech. Program**
 - Focus on 10 Strategic Areas that can Further Technological Frontiers
 - Multiagency Initiative
 - Maximum 5 years in two stages
 - \$2 million / year
- **Next Generation New Tech. Program**
 - Develop New Tech. in New Industrial Fields
 - Large Potential Technological & Economical Impacts
 - Maximum 7 years in three stages
 - \$2 million / year

“Research Planning”

- **Ex Ante Portfolio Analysis at Program Level**
 - A Review Process to Identify Proper Techs for R&D
 - Focus on All Mid & Long-term R&D Programs
 - Relatively Large Scale R&D (\$2 million / year for 5 ~ 7 years)
 - Purports to Reduce Selection Errors & Research Risks
 - Criteria : Industrial Demands & Strategic Concerns
- **Tech. Demand Survey**
 - Solicit Tech. Demands Proposals
 - Identifies High Demand Industrial Techs for Further Analyses
- **‘Research Planning’ Analyses**
 - Industrial Trend Analysis
 - Technology Analysis
 - Patent Analysis
 - Economic Impact Analysis
- **Review of ‘Research Planning’ Results**
 - A Comprehensive Committee Review at ITEP

“Research Planning” Processes



- Relevance
- Appropriateness
- Tech Impacts
- Economic Impacts

- Tech Analysis
- Industrial Analysis
- Patent Analysis
- Economic Impact Analysis

- Appropriateness of 'Research Planning'
- Technological Excellence
- Business Excellence

- R&D Consortia
- Committee Review
- R&D Excellence
- Performers' Capability

Source: Nam (2005)

Technology Demand Survey

• Solicitation

- Prepare Background Data on Tech. Demands, Trends, & Roadmaps
- Solicit Proposals widely from Univ., GRIs, Industrial Firms
- 2 ~ 3 pages of Proposals

• Selection Criteria

- Relevance to Program Purposes (30%)
- Appropriateness of Research Planning (30%)
- Technological Impacts (20%)
- Economic Impacts (20%)

• Review Committee

- Identify High Demand Techs for 'Research Planning' Analyses
- Based on Review Results and Budget Limits
- Selection Rate : less than 10%

‘Research Planning’ Analyses I

- **Solicit ‘Research Planning’ Analyses**
 - Any type of Entity (Univ., GRIs, Firms) can Apply
 - Acting Committee comprised of 10 experts from Univ., GRIs, and Firms (at least 5 Industrial Experts)
 - Duration : Two Months
 - Cost : approx. \$15 K
- **Technology Analysis**
 - Define Technological Characteristics
 - Estimate Current Technological Status
 - World Technological Environments
 - Technological Impacts of Proposed R&D
- **Industrial Analysis**
 - Define Industrial Characteristics
 - Estimate Current Industrial Status in World Market
 - World Industrial Environments
 - Industrial Impacts of Proposed R&D

'Research Planning' Analyses II

- **Patent Analysis**

- KIPRIS (Korea Industrial Property Rights Information Service)
- Acting Committee provides Keywords
- Search Worldwide Patents as well as Korean Patents
- Tech Trends and Competitiveness Analysis
- Create Patent Map
- Suggest specific R&D foci

- **Economic Impact Analysis**

- KTTC (Korea Technology Transfer Center)
- Acting Committee Defines Proposed Tech. & Industrial Characteristics
- Review & Forecast of Market Trends
- Review of Commercialization Plan
- Analyze Tech. Values (NPV, BC Ratio, Export, Import, Cost Saving, Job Creation, etc.)

Review of 'Research Planning' Analyses

- **A Comprehensive Review of 'Research Planning' Results**
 - In-House Review at ITEP
 - 12 Committees across 12 Tech Areas
 - Committee Members from Academy, GRIs, and Industries
 - Encourage Industrial Participation : Over 50% from Industrial Firms
 - Tech Experts : Business Experts = 7 : 3
- **Committee Review on Technological and Economical Aspects**
 - Tech Experts focus on Technological aspect of 'Research Planning' Results
 - Business Experts focus on Economical aspect of 'Research Planning' Results
- **Review Criteria**
 - 'Research Planning' Results (20% or 30%)
 - Technological Excellence (50%)
 - Business Excellence (20% or 30%)

Selection of R&D Consortium

- **Solicitation of R&D Projects**
 - Solicit Joint R&D Projects based on 'Research Planning' Results
 - Encourage Research Collaboration – All R&D Projects are conducted by Consortia
 - One Coordinating Body + Multiple R&D Performer + Multiple Subcontractors
- **ITEP Screening**
 - Preview of Administrative Requirements (e.g., Relevance, Eligibility, Funding Overlap, Background Credit Investigation, Restrictions, etc.)
 - Favorable to SMEs, Int'l Collaboration, & New Participation
 - Form A Selection Committee for each R&D Project
 - 7 Experts (at least 1 Business Expert, Over 50% Experts from Industrial Firms) at each Selection Committee
- **Selection Criteria & Grading Ratio**
 - R&D Excellence (60%)
 - Performers' Capability (40%)
 - Overall Project Scheme (30%) + Individual Tasks (70%)
- **Select R&D Consortium**
 - Final Selection done by Coordinating Committee at MOCIE
 - One Time Appeal is Allowed

Contributions

- **Transparency (Objectivity)**
 - Improve Transparency (Objectivity) in Project Selection Process to a Greater Extent
 - Three-layers of Committee Reviews
 - Quantitative Analyses (KIPRIS & KTTC)
- **Demand Pull R&D Programs**
 - Strategic Selection based on Industrial Demands
 - Tech. Demand Survey
 - Active Industrial Participation (Over 50% from Industrial Firms)
- **Outreach to Industry**
 - Wide Open Access Channels to/from Industrial Firms
 - Effective Delivery of Government Policy (Strategy)
 - Policy Development based on Industrial Demands

Challenges

- **Excessive Committee Review but Small Pool of Experts**
 - Committee Review at Each Stage
 - After Excluding Experts in Conflict-of-Interests, the Remaining Pool is too Small
 - May Systematically Exclude Innovative R&D Ideas
- **Time and Budget for ‘Research Planning’ Analyses**
 - Two Months are Sufficient or Not?
 - \$15 K is Enough or Not?
- **No Systematic Portfolio Analysis on Technical Areas**
 - “Research Planning” focuses on Specific Techs for R&D within each Technical Area
 - Allocation among Technical Areas is remained under Policy Decision
- **Effectiveness of “Research Planning”**
 - Not Yet Sure How Effective the “Research Planning” is for Better R&D Performance
 - Proposed Policy Evaluation on “Research Planning”
 - Need More Years to Evaluate – Only 5 Years of Operation
 - With What Evaluation Methodologies?