





**Promote the Utilization of Science and
Technology Resources Through Business
Model Innovation: Case from Beijing, China**

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Abstract

To open and share S&T resource of universities and research institutes to enterprises and support innovation in industry, Beijing, the capital of China, explored new business model with win-win mechanism to develop dozens of **“research and development (R&D) service base”** in 2009. From 2009-2011, 25 R&D service bases are constructed, facilitating 475 national and municipal key laboratories and engineering centers with billions of S&T equipment open to the society. This presentation first elaborates the background of constructing R&D service bases, introduces organizational structure, working mechanism and benefit distribution mechanism of R&D service bases in general and gives case study of Peking University R&D service base in detail. Furthermore, it summarizes the highlights of R&D service bases, discusses their future direction for sustainable development and makes discussions on promoting the utilization of S&T resources through business model innovation.

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Background

✦ **Beijing, the capital of China, occupies about one-third of the whole nation's science and technology (S&T) infrastructure resources.**

- ✦ In 2008, Beijing had 68 State Key Laboratories, 47 National Engineering Technology Research Centers, 37 National Engineering Research Centers, 23 National Engineering Laboratories and 34 National Enterprise Technology Centers, each accounting for 34.2%, 31.5%, 30.1%, 55% and 6% on the national level.

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Background

✦ **Universities and research institutes owns the majority of S&T resources In Beijing: “two 80%”**

- ✦ Universities and research institutes get more science and technology input than enterprises. China's central government and local government made S&T input of 49.5 billion RMB in Beijing in 2007, among which research institutes got 34.5 billion RMB and universities got 6.3 billion RMB, altogether accounting for **82.4%** of the total input.
- ✦ According to a survey conducted by Beijing government in 2008, among 6709 sets of surveyed equipment (each is worth more than 100 thousand RMB) located in Beijing, **79.0%** were owned by research institutes and universities.

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Background

- ✦ **Large resource owners, i.e., Research institutes and universities didn't have good innovation output performance**
 - ❖ In 2008, research institutes and universities were granted patents accounting for only one quarter of Beijing's total patent authorization, output technology contracts turnover accounting for less than 5% of Beijing technology market trading amount .
- ✦ **Enterprises, especially SEMs, which are considered to be main innovative actors in innovation system, lack sufficient S&T resources to implement their innovative activities.**

Irrational allocation of S&T resources !

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How to solve the problem?

- ✦ In long-term perspective, more S&T resources should be allocated in enterprises.

- ✦ In short-term perspective, S&T resources in universities and research institutes should be open and shared to the society to meet the demand of enterprises.

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How to solve the problem?

✦ **The constraints of sharing S&T resources by universities and research institutes :**

- ❖ **Unwillingness:** due to current performance evaluation and compensation system in universities and research institutes, publishing papers, applying for patents and teaching students are main areas, while there is little requirement for professors and researchers to share S&T resources; equipment use fee and other related technical service fee can be allocated to individuals is strictly limited.
- ❖ **Inability:** research institutes and universities lack personnel and special skills to market their S&T resources and communicate with enterprises.

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How to solve the problem?

A new business model is constructed !




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Research and development (R&D) Service Base

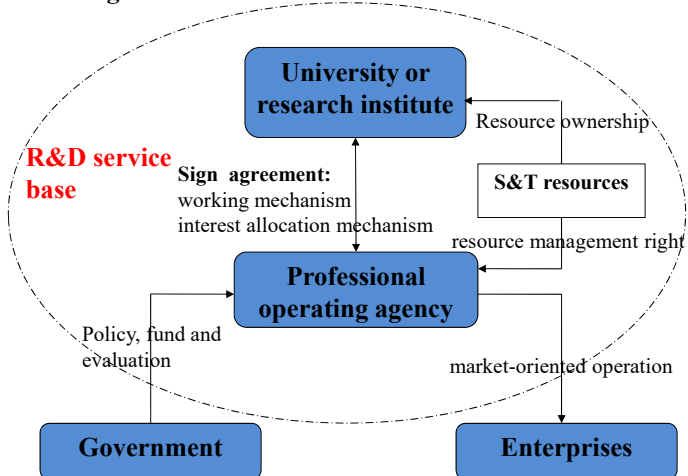
Beijing Science and Technology Committee started to construct R&D service bases in 2009. Professional operating agencies are introduced as the third party to marketing the S&T resources in universities and research institutes. Under the guidance from the government, working mechanism , benefit distribution mechanism between S&T resource owners, marketing operators and other related actors is created .

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Research and development (R&D) Service Base

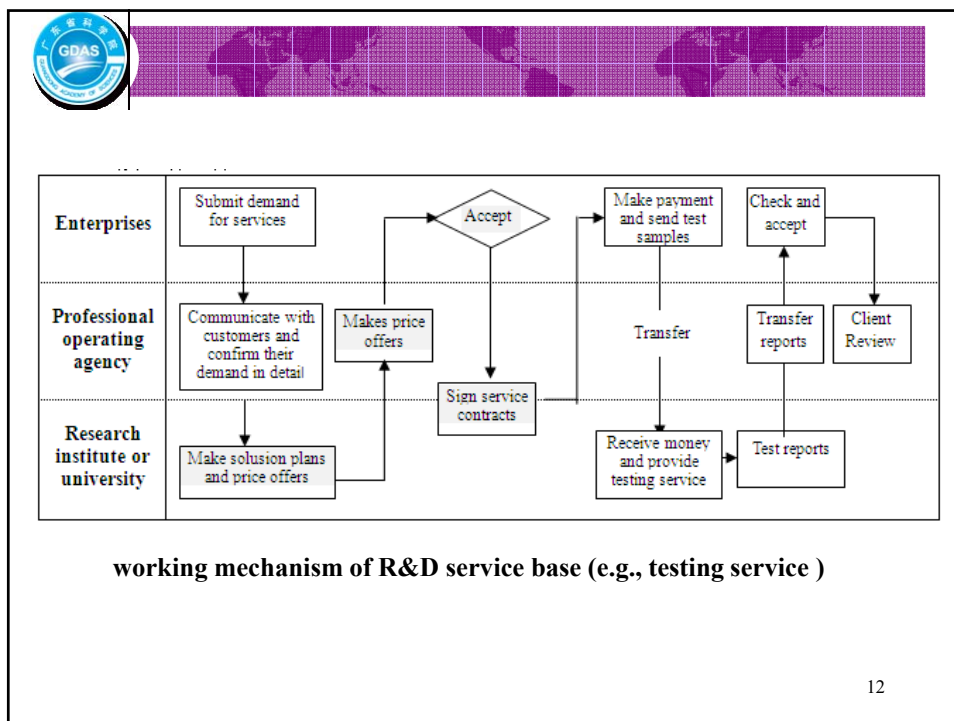
Organizational structure of R&D service base

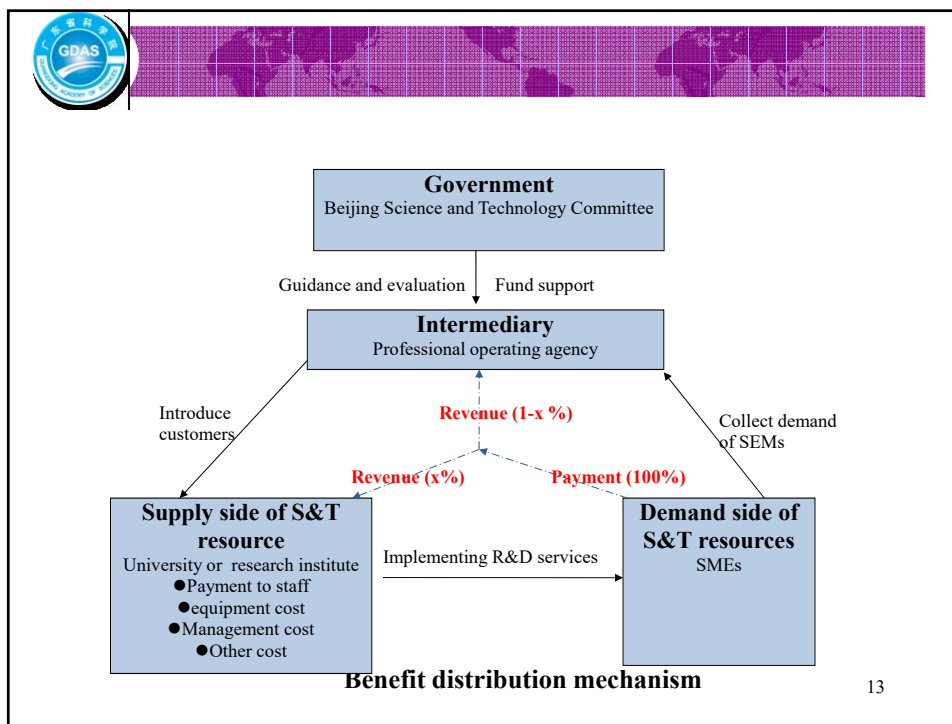


The diagram illustrates the organizational structure of an R&D service base. It features a central dashed oval labeled "R&D service base" containing three main entities: "University or research institute", "S&T resources", and "Professional operating agency".

- University or research institute** (top blue box) has "Resource ownership" over "S&T resources" (white box).
- Professional operating agency** (middle blue box) has "resource management right" over "S&T resources".
- A "Sign agreement: working mechanism interest allocation mechanism" (text) connects the "University or research institute" and the "Professional operating agency".
- Government** (bottom left blue box) provides "Policy, fund and evaluation" to the "Professional operating agency".
- Enterprises** (bottom right blue box) engage in "market-oriented operation" with the "Professional operating agency".

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More than 20 R&D Service bases:

No.	R&D Service bases	Equipments opened to society
1	Chinese Academy of Sciences	1,400 sets, original value of 2.6 billion yuan
2	Peking University	2,319 sets, original value of 2.16 billion yuan
3	Tsinghua University	2,375 sets, original value of 1.3 billion yuan
4	Beijing Normal University	490 sets, original value of 0.3 billion yuan
5	North China University of Technology	1200 sets, original value of 0.23 billion yuan
6	Beijing Academy of Science and Technology	1000 sets, original value of 0.4 billion yuan
7	Beijing University of Technology	1947 sets, original value of 0.83 billion yuan
8	Academy of military medical sciences	677 sets, original value of 0.45 billion yuan
9	Chinese Academy of Medical Sciences	700 sets, original value of 0.4 billion yuan
10	China Academy of Traditional Chinese Medicine	952 sets, original value of 0.34 billion yuan
11	University of Science and Technology Beijing	510 sets, original value of 0.31 billion yuan
12	China Building Materials Academy	1590 sets, original value of 0.21 billion yuan

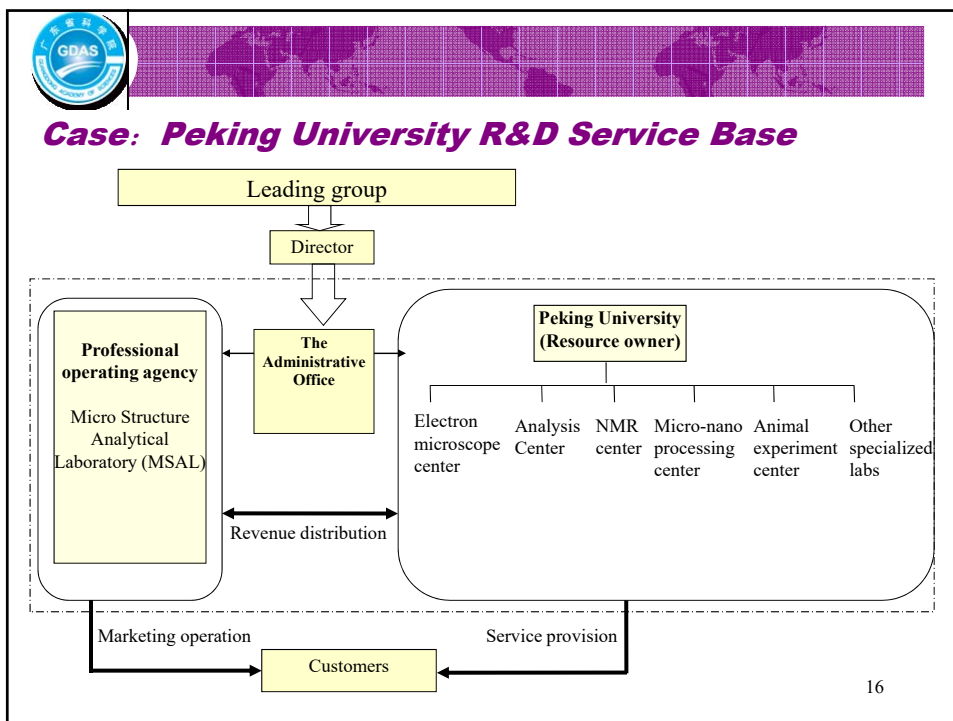
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More than 20 R&D Service bases:

No.	R&D Service bases	Equipments opened to society
13	Beijing University of Posts and Telecommunications	1297 sets, original value of 0.4 billion yuan
14	Beijing Institute Of Graphic Communication	322 sets, original value of 0.1 billion yuan
15	Beijing Institute of Technology	119 sets
16	North China Electric Power University	2000 sets, original value of 0.27 billion yuan
17	Beijing Academy of Agriculture and Forestry Science	258 sets, original value of 0.14 billion yuan
18	China Agricultural University	18 sets, original value of 6.4 million yuan
19	China Electric Power Research Institute	102 sets, original value of 0.32 billion yuan
20	Beijing Jiaotong University	388 sets, original value of 0.21 billion yuan

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Case: Peking University R&D Service Base

- ✦ Peking University owned equipments for teaching and researching totally valued at more than 1.6 billion RMB in 2009. Among them, equipments valued at 800 million RMB could be opened for providing R&D services to SEMs.
- ✦ Peking University Micro Structure Analytical Laboratory (MSAL) is an independent legal entity providing testing service of X-ray diffraction (XRD) and X-ray fluorescence (XRF). In order to promote the openness of S&T resources, Peking University appointed MSAL as professional operating agency and together set up Peking University R&D service Base in 2009.

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Case: Peking University R&D Service Base

- ✦ The leading group was formed, with the university vice-principle in charge, to make major decisions about the overall construction under the guidance of Beijing Science and Technology Committee. The administrative office was set up with 6 full-time staffs and 15 part-time staffs, including people from MSAL, equipment management division and different laboratories of Peking University. Deputy General Manager of MSAL is appointed director of administrative office.
- ✦ MSAL is fully responsible for attracting customers, coordinating laboratories scattering in different faculties to provide qualified R&D service, as well as conducting industrial service demand surveys and getting feedbacks from SEMs periodically. The equipment management division takes charge of selecting suitable equipment open to society based on their function and application status, supervising the service quality according to the feedbacks from the customers and the professional operating agency. With equipments in hand, the laboratories implement R&D services according to customers demand.

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Case: Peking University R&D Service Base

- ✦ To ensure an appropriate benefit distribution mechanism, Peking University R&D Service Base introduced the revenue allocation rule to stimulate the motivation of related stakeholders to sharing S&T resources. Accordingly, from the total service revenue, MSAL takes 10% to cover its marketing cost. The rest of revenue subtracting maintenance cost is allocated among university, faculty and lab staffs.

Revenue Allocation of Peking R&D Service Base

	Allocation of revenue
Management fee paid to University	10%
Management fee paid to Faculty	10%
Intermediary fee paid to professional operating agency	10%
Service fee paid to lab staffs	15-25%
Maintenance cost of equipments	45-55%

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Case: Peking University R&D Service Base

- ✦ **Remarkable effect:** according to Beijing Municipal Science and Technology Commission, by September 2010 (less than one year after the R&D service base was initiated), Peking University R&D Service Base had provided technical service to nearly 400 enterprises, which were 258 more than the total amount of previous year, reaching 29,643,800 yuan service contract, at least reducing R&D costs of 60 million yuan for the enterprises, generating economic benefits of 300 million yuan for the enterprises.

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Highlights of R&D Service Base

- ✦ **Separate the owner and operator of R&D resources by introducing market-oriented professional operating agencies.**
 - ❑ Most of professional operating agencies already provided technological service (such as testing, technology transfer etc) to SEMs and had certain kind of business relationships with the resource owners before they joined R&D service bases. Therefore, they have information about both the available S&T resources and the existing need from the SMEs, and act as bridge between supply side and demand side of S&T resources.

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Highlights of R&D Service Base

- ✦ **Get win-win situation among stakeholders.**
 - ❑ S&T resource owners can be aware of the latest market information and find research topics through direct and indirect interaction with SEMs, can apply for government joint research projects with their customers, can share part of the service revenue with professional operating agencies. Professional operating agencies can get government subsidy, enter new business area which is complementary to their current businesses and earn promising benefit, e.g., MSAL with testing service as main business begins to participate in technology transfer from Peking university to industry. SEMs can enjoy R&D services with guaranteed quality provided by S&T resource owners.

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Highlights of R&D Service Base

- ✦ **Focus on mechanism design and explore a new funding way**
 - ❖ Most innovation platforms in China get fund from government including investment on equipments and facilities during the construction period and subsidy related to quantity and quality of technical service during the operation period.
 - ❖ However, R&D service bases in Beijing created a new way of government funding. 58 million RMB that Beijing Science and Technology Committee put in R&D service bases in 2009 were mainly used for devising feasible mechanism that is accepted by all stakeholders including universities, research institutes, professional operating agencies, and the government.
 - ❖ The working mechanism and benefit distribution mechanism fully demonstrate the principles that those who contribute to provide services are the ones who benefit, and that those who make greater contribution are the ones who benefit more. Therefore, **huge S&T resources used to be asleep were waken up!**

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Results of R&D Service Bases

- ✦ **Up till late 2011:**
 - ❖ 27 R&D service bases were constructed, equipments valued at **12.1 billion yuan** scattered in more than 400 national and/or municipal key laboratories and engineering center were open to society. Enterprises could use the equipment in R&D service bases operated and guided by professionals at affordable price rather than cost huge money to buy one.
 - ❖ **397** mature technological achievements generated by universities and research institutes are chosen and published for technology transfer. Among them, **110** technological achievements were transferred to industry.
 - ❖ More than **7000** SMEs received R&D services provided by R&D service bases, and the service contracts could be worth **1.3 billion yuan**.
- ✦ **Up till 2014:**
 - ❖ More than **600** national and/or municipal key laboratories and engineering center were open to society with equipments valued at **19.2 billion yuan**, more than **10000** enterprises obtained service in 2014.


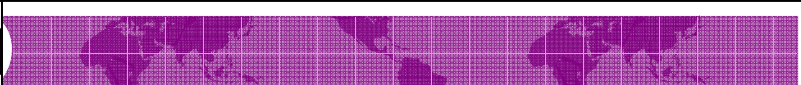
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Results of R&D Service Bases

- ✦ **Cause attention from top level of government policy makers**
 - ❖ Minister of China's Ministry of Science and Technology made instructions and comments twice respectively in the year 2009 and 2010, spoke highly of the new business model.
 - ❖ The R&D service bases were visited by the main leaders of Beijing municipal government.

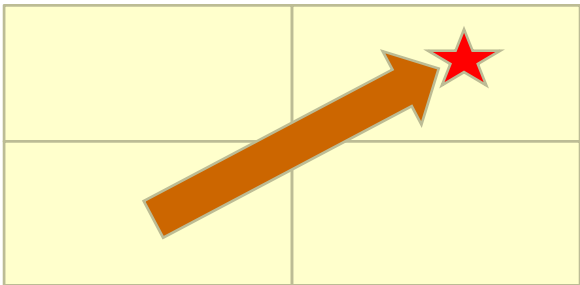


Discussion: Future development of R&D service base

- ✦ **Achieve self-sustainable development**

Ability of professional operating agencies

Value-add service provider	
Information Intermediary	
	Administrative order Profit earning and benefit sharing

Binding force in R&D service base

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Discussion: Future development of R&D service base

✦ **Achieve self-sustainable development**

- ❖ Enhance R&D capability of professional operating agencies. Transform those professional operating agencies only act as information intermediaries between resources suppliers and demanders to **participants and contributors** in R&D service process.

- ❖ Transform the R&D service bases from a system combined by administrative orders to a system based on profit earning and benefit-sharing

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Discussion: Future development of R&D service base

✦ **Extend the boundary**

- ❖ Open S&T resource from equipments to technological achievements (e.g., patents) and R&D personnel in the system of R&D service bases.

- ❖ Build official or unofficial cooperation with industrial alliance and other regional governments to integrate more S&T resource as well as to deliver R&D services to more enterprises.

✦ **Build image and brand**

- ❖ Carry out standardized service procedure and standardized management.

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Discussion: Future development of R&D service base

✦ Adopt Internet plus

- ✦ Use internet to enhance resource information sharing and to improve service efficiency. It is feasible to construct four major databases, i.e., the equipment database, the technology achievement database, the personnel database and the service demand database.

✦ Support entrepreneurship

- ✦ Nowadays in China, more and more people are enthusiastic about starting up their own business but facing shortage of S&T resources. R&D service bases can provide these entrepreneurs with S&T resources and related R&D services to create not only large economic value but also great social value.

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Discussion: Potential for future applications

✦ A new business model can well-leveraged the utilization of S&T resource

✦ A good business model relies on:

- ✦ Market-oriented operation
- ✦ Mechanism design to achieve win-win situation among related actors
- ✦ Proper funding way by the government
- ✦ Sustainable development in terms of “connotation” and “extension”

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Discussion: *Potential for future applications*

- ✦ **Requirements and conditions for applying this business model innovation**
 - ❖ **Supply side:** Plenty of resource owners (large universities, research institutes, big firms) and qualified resource operators.
 - ❖ **Demand side:** Technology-intensive industries and large number of innovative enterprises.
 - ❖ **Policy:** Powerful government to boost and coordinate in the beginning.

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Discussion: *Potential for future applications*

- ✦ **Whether the lessons learned can be generalized to other countries/districts? It depends!**
 - ❖ In this case, the business model is operated in the level of city or province.
 - ❖ Beijing Municipal Science and Technology Commission guided, supported, supervised and coordinated all the R&D service bases. Different R&D service bases can jointly provide R&D services when it is necessary. If it is applied in regional or national level, an authority in charge of coordination is needed.
 - ❖ Central cities of economic and S&T, e.g., Beijing, Shanghai, Guangzhou in China, are possible to copy the business model.
 - ❖ General cities that lack S&T resource should establish connections with such kind of R&D service bases in other regions. Government should give extra subsidy for cross-regional S&T resource sharing and related service.

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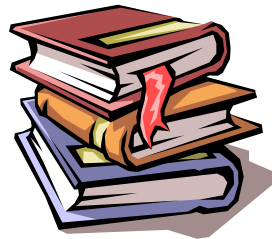


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Thank you for your attention!



Questions & Comments

