A Study on Application Strategies of the National Science & Technology Information Service (NTIS) Designed to Support Research Activities of the Business

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Abstract—As Korean government emphasizes the incubation of small and mid-sized enterprises (SMSEs) with creative technology innovation competency; the percentage of R&D investments has gradually increased. However, SMSEs and venture businesses have found it hard to use related research data even though they are aware of the importance of R&D activities. Even though the National Science & Technology Information Service (hereinafter referred to as the 'NTIS') of Korea provides the projects carried out with national R&D budget, research personnel, research outcome (ex: R&D paper, etc.), facilities & equipment and science & technology statistics, there should be a service strategy which can be easily used by business researchers. This study analyzed the use of R&D information by business researchers, performed a demand survey to establish a system in which businesses are able to make good use of national R&D information and grouped the characteristics and requirements of conventional business support services. Then, it derived a plan and assignments designed to promote the use of business R&D information using the results and ultimately suggested service strategies to support business R&D activities.

Index Terms— NTIS, R&D information, data package, research activity of the business, NTIS application

I. INTRODUCTION

Under the government 3.0 initiative, Korean government has emphasized the incubation of SMSEs and venture businesses with creative technology innovation competency. Thanks to the expansion of government grants to government-funded research institutes and increase in R&D support for SMSEs, the percentage of R&D investments has been on the rise[1]. Among the NTIS users, the percentage of business users gradually increases[2]. In addition, there has been a rising demand for the establishment of an information support system to provide business-wanted information more effectively. Under these environmental changes and the government's SMSE incubation policy, the NTIS needs to develop an NTIS utilization service strategy for the purpose

of making a contribution to the development of an ecosystem for creative economy by providing national R&D information and knowledge information for SMSEs[3][4]. This study aims to propose a service system and strategies which meet business researchers' needs and demand for the active utilization of national R&D information provided by the NTIS. In chapter 2, current information and services used by businesses for R&D activities and their problems and business researchers' demand for information are discussed. In chapter 3, NTIS-based business R&D support service strategies are mentioned. In chapter 4, conclusion is given.

II. CURRENT UTILIZATION OF BUSINESS R&D INFORMATION AND ITS DEMAND

To derive a plan designed to provide business researcher-wanted information and services needed for R&D activities in an effective manner, this study investigated the collection and utilization of the information needed for business R&D. After performing a demand survey needed for business R&D, science technology policies and corporate experts' opinions were sought. In the process, problems were detected, and an improvement plan was developed by grouping the characteristics of business support services and user requirements. Then, the national R&D information service strategies were developed to support business users after deriving specific plans and assignments for the current problems. Each bureau has provided diverse support services for SMSEs. Even though there are a variety of public and private support services for SMSEs, many business researchers don't know exactly where and what information they would find. In particular, 40% said that SMSEs are lack of professional personnel needed to utilize R&D information.

We looked at the demands of national R&D services and functions from about four hundreds business users. The business users subject to a demand survey requested the specialization, expansion and connection of information from the aspect of information supply and business-customized services and participatory functions in terms of services. From the system perspective, in addition, they demanded the improvement of convenience. Especially, they wanted to get customized information, and more than 65% responded that push services such as e-mail are needed. From a type of information, furthermore, business researchers preferred the announcement of national R&D programs, promising program induction & certain technology sector-related

analysis information and technology transfer & commercialization support information. Against the NTIS, they requested the improvement of education and PR, pointing out the fact that many SMSEs don't get access to the information they want even though there is a lot of useful information in the NTIS. Table 1 below states the results of analysis on the use of information by business researchers.

TABLE I
USE OF R&D INFORMATION BY BUSINESS RESEARCHERS

Category	Demand Survey Results
Necessity of R&D information	R&D information needed: 96.2%
R&D information use stage	Planning stage (43.2%), development / implementation stage (22.5%), idea-finding (16.8%)
Utilization information by stage	- Idea-finding & planning, initiation stage: Personnel information - Development/implementation, technology transfer/commercialization, release/marketing: Science & technology statistics, research outcome
Major difficulties on R&D activity	Lack of professional personnel (41.7%), non-awareness of information source (28.7%), budget shortage (23.4%)
Website use frequency	Small & Medium Business Administration>patent information>NDSL>NTIS>KOTRA>standard information>statistical information>etc.
Access frequency rankings	NDSL>foreign information agency>MIRIAN>BIZ Madang>RISS>etc.
Satisfaction rankings	NDSL>foreign information agency>MIRIAN>BIZ Madang>RISS>etc.
Preference rankings	NTIS>patent information network>NDSL>Korea Evaluation Institute of Industrial Technology (KEIT) >BIZ Madang>RISS>etc.

NDSL is the National Digital Science Library, KOTRA is the Korea Trade-Investment Promotion Agency, MIRIAN is the Monitor Information of R&D and Insightful Knowledge Alerting Network, BIZ Madang is an information service of Small and Medium Business Administration for SMSEs, and RISS is the scholar information service of the Korea Education and Research Information Service.

Business users have a high demand for R&D information analysis data and want to use the information provided by other services through the NTIS. In particular, there was a high demand for active push services through which needed information is automatically provided.

III. NATIONAL R&D INFORMATION SERVICE STRATEGIES FOR BUSINESSES

There should be service strategies for the easy access to national R&D information by business users. To establish an R&D information support system specially designed for SMSEs & startup businesses, in particular, an information analysis support system and an external information linkage system is needed[5]. For the advancement of information services for business users, this study suggests the implementation of active R&D information services and establishment of a user-participatory environment. To improve convenience for SMSEs and startup businesses, in addition, it is essential to have a service channel for business users only and operate an information usage support system such as education and PR. Table 2 above states the programs and specific strategies designed to improve NTIS-centered national R&D information services for the purpose of supporting business R&D.

TABLE II
NTIS-CENTERED NATIONAL R&D INFORMATION SERVICE IMPROVEMENT PROJECTS

Project	Detail Plans and Strategies
Establishment of R&D information system support system	National R&D information mapping services
	Development of an online platform for information analysis support
Linkage with external business support services	Directory services for SMSE support-related websites
	Integrated search of related website information to allow users to get access to the information through a single channel
Active R&D information services	Improvement of smart push services
	National R&D information packaging services for businesses
Development of user-participatory environment	Establishment and operation of a prosumer unit for the self-innovation of NTIS business services
	Community support for inter-business cooperation and promotion of convergence R&D
Establishment of a special channel for SMSEs and startup businesses	Improvement of search convenience
	Development of menus and brands for SMSEs and startup businesses
Operation of information usage support system	Operation of NTIS Business Service Help Desk
	Strengthening education and PR to promote business usage

The information most preferred by businesses is the analysis information which provides the latest technology trends and market data along with R&D information. This information can also be analyzed through private experts or a platform linked with R&D service businesses. The analysis experts include business support information analyzers from Korea Institute of Science and Technology Information (KISTI) and Creative Economy Town. It is also able to utilize the Global Network of Korean Scientists & Engineers (KOSEN) to provide global technology transfer information and make good use of an expert pool for small & mid-sized businesses and business startup linked with 'Voucher System' of SMBA and 'Consulting Support Program' of Small Enterprise Development Agency. In terms of private firms, it can also be linked with Korean Professional Engineer Association, R&D Service Business Association, Korea Government Certified Consultant Association (KGCCA), and Commercialization Promotion Agency for R&D Outcomes and Korea Technology Transfer Agent Association (KTTAA). To promote external business support service linkage projects, a business support directory service system which offers business support services by type depending on the business growth stage, R&D stage and industrial sector should be developed. It is also necessary to provide business-specialized search services to make the business-needed information from the business support-related websites searchable in the NTIS in an integrated manner. Figure 1 below reveals a conceptual diagram for linkage with external services in order for the NTIS to play a curator's role as a gateway to business support services.

Businesses prefer getting useful information automatically to searching the information they want in person. To provide active R&D information services, therefore, it is needed to
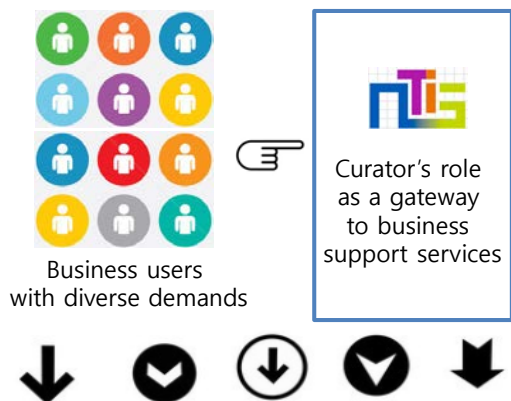
- Creative Economy Town
- KEIT
- Industrial Technology R&D Service System
- Future Technology Madang, Commercializations Promotion Agency for R&D Outcomes
- SMSE Support Center, Ministry of Science, ICT and Future Planning
- Korea Technology & Information Promotion Agency for SMEs (TIPA)
- Technological Innovation Association for Small & Medium Business
- INNO-BIZ Net's Technical Exchange Convergence Search System
- MIRIAN, Technology Information Analysis Center of Korea Institute of Science and Technology Information (KISTI)
- R&D Help Center, Ministry of Science, ICT and Future Planning
- Technology Development Program Management System, SMBA
- Regional Techno Park, etc.

Fig. 1.   Conceptual Diagram for Linkage with External Business Support Services.

develop smart push services which provide the user-wanted information regularly by predicting business users' interests and launch an R&D information packaging service system which provides customized information only. To provide customized information, there should be search personalization through the collection of users' interested sectors and keywords. In addition, an R&D information packaging plan designed through the establishment of users' profile data could be another solution. Here, business profile data refer to keywords and classification information (ex: business users' interested research sectors, flagship products, technology, etc.) and their NTIS usage pattern information. Figure 2 shows a plan to provide useful information to business users by packaging the information (ex: National R&D programs, research outcome, research facilities & equipment, technical industry, etc.) based on their interests.

There should be a feedback system which allows business users to be able to improve the NTIS business services and information on their own. Furthermore, it is needed to establish an online/offline prosumer unit to support online community environment which makes inter-business cooperation and convergence possible. In addition, it is required to provide a sphere of communication among the same/ related business sectors or between convergence research sectors and support online community environment to promote inter-business collaboration and convergence R&D. It is also necessary to operate Help Desk to establish a

channel for SMSEs only and solve their problems in using the information through the improvement of UI and search convenience to help business users get access the information they want and use functions more easily. Furthermore, there should be decent education and PR to promote the utilization of NTIS. It is needed to establish and provide menus for SMSEs only and develop national R&D information-centered brand and services for them. After all, all these measures would help business researchers use the NTIS easily and improve R&D efficiency by sorting out and upgrading the conventional diverse and complicated functions provided to government bureaus, researchers and general public.

These plans include i) promotion of national R&D information usage by opening special curriculum providing education data and videos for SMSEs, ii) operation of customized courses for academia-industry cooperation unit an SMSEs and iii) detection and advertisement of success stories through the development of NTIS guide for SMSEs and SMSE-customized services.

IV. CONCLUSION

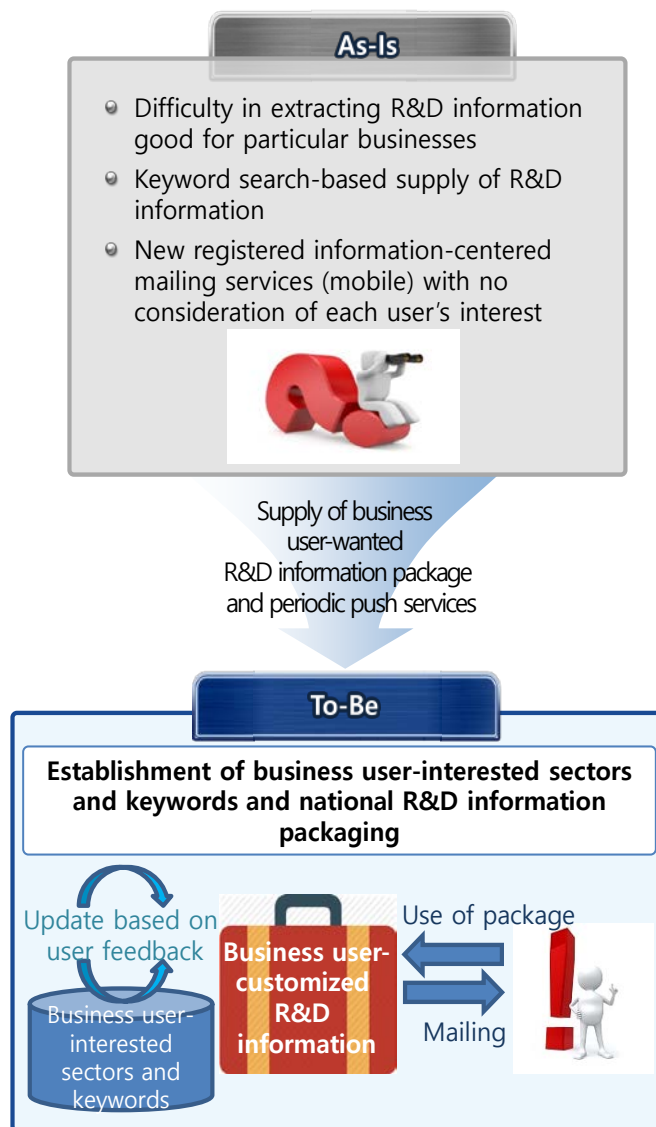Korean   government   has   strengthened   technology

Fig. 2.   Magnetization as a function of applied field. Note that "Fig." is abbreviated. There is a period after the figure number, followed by two spaces. It is good practice to explain the significance of the figure in the caption.

innovation and development support for SMSEs and venture businesses such as increase in R&D budget, focusing on INNO-BIZ. The NTIS which provides R&D information in an integrated manner needs to develop service improvement strategies for SMSEs. For this, it investigated the use of information by business users and carried out a demand survey. As a result, this study suggested the strategies to establish the environment in which business users can efficiently utilize national R&D information.

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