

국내 공공정보시스템의 국제기술이전 사례연구 및 NTIS 제언

A Case Study on International Technology Transfer of Korean Public Information Systems and Recommendations for NTIS

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요약

국제기술이전은 이해관계 불일치, 기술수준, 문화 등 여러 거시적 환경여건의 차이로 국내기술이전보다 더 어려운 점이 많은 것으로 알려져 있다. 본 연구에서는 정보마케팅의 관점에서 국내 공공정보시스템의 국제기술이전 사례연구를 통해 미래창조과학부 NTIS의 해외진출에 관해 제언하고자 한다. 국내 공공정보시스템 국제기술이전의 대표적 성공사례로 평가되는 관세청, 특허청, 조달청의 국제기술이전을 성공시키기까지의 과정을 분석하여 국가과학기술지식정보서비스(NTIS)의 국제기술이전 촉진을 위한 정보마케팅 관점에서 사전준비전략을 제시한다.

■ 중심어 : | 국제기술이전 | 정보 마케팅 | NTIS | 해외진출 | 공공정보시스템 |

Abstract

It is well known that international technology transfer(ITT) is relatively more difficult than the domestic technology transfer because of the difference in interest, technology level, culture and other various macro-environmental conditions. This study aims to derive recommendations for ITT of National Science and Technology Information Service(NTIS) of Ministry of Science, ICT and Future Planning(MSIP) by conducting case study of ITT in domestic public information systems. The cases are the national agencies that performed successfully in ITT. The cases are Korea Customs Service(KCS)'s customs administration system(UNI-PASS), Public Procurement Service(PPS)'s Korea On-Line E-Procurement System(KONEPS), and Korean Intellectual Property Office(KIPO). After studying on how the cases proceeded ITT, this paper suggests proper preparation strategies in the view point of information marketing.

■ keyword : | International Technology Transfer | Information Marketing | NTIS | Overseas Expansion | Public Information System |

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I. Introduction

The demand for exporting various public information systems have been recently increasing since 2000 due to the strengthened status of e-government in the world. Korea is considered to administrate e-government most efficiently and is increasing the export of the systems. Korea exported \$150million in 2010, \$240million in 2011, and \$340million in 2012. Recently, Korea is also diversifying export products by exporting electronic resident registration certificates as well as ICT training center or electronic customs systems, which has been continuously exported from the past[1].

National Science and Technology Information Service(NTIS), providing public information system regarding national R&D information, is also trying to transfer its system overseas in order to meet increasing export demand of public information system. Therefore, this study aims to derive meaningful implications and suggestions for NTIS to promote international technology transfer(ITT) of the system by conducting case study on ITT of public information systems. From an information marketing perspective, this study examined three cases that succeeded in ITT of public information systems, and the cases are Korea Customs Service(KCS)'s customs administration system(UNI-PASS), Public Procurement Service(PPS)'s Korea On-Line E-Procurement System(KONEPS), and Korean Intellectual Property Office(KIPO)'s KIPOnet. Then, we derived and suggested recommendations for NTIS to secure foundation of success by properly proceeding from the preparation step.

II. Theoretical Backgrounds

1. International Technology Transfer

ITT is conducted when a nation or an enterprise transfers its technology to others with lower level of technology[2]. It is a trade of technology among two or more countries[3]. Therefore, a nation or an enterprise can be considered as a unit of analysis and it is categorized into providing country, receiving country, providing enterprise and receiving enterprise[2].

ITT is conducted in various ways, however, it is generally categorized as foreign direct investment(FDI), joint venture, and licensing[3]. In the view point of FDI, ITT occurs when implementing green field investment and transferring technology to subsidiaries. If a company possesses exclusive and high-tech technology, it generally prefers transferring technology directly. Joint venture determines technology transfer according to mutual consent among participants. Licensing defines technology transfer as a product, and a licensor determines which technology will be transferred or sold[3].

According to Davidson[4], in ITT, national factor is considered as environmental or situational factor, and enterprise is considered as the representative of internal factor. Thus, Lim[2] classified the influencing factors of ITT into situational factors and internal factors and then classified again into promoting factors and constricting factors. [Table 1] shows how ITT is classified and variables of each factor.

Many preceding researches seek to determine methods to foster technology transfer[5]; however, the researches are mainly about transferring tangible assets. To imply suggestions appropriate to NTIS, of which duty is mainly related to intangible assets such as software, this paper conducted case study from the view point of information marketing.

Table 1. Influencing Factor of International Technology Transfer by Lim[2] revised

| ITT | | Promoting factors | Constricting factors |
|---------------------|-----------------------------------|---|---|
| Situational Factors | Providing countries | <ul style="list-style-type: none"> · domestic competition increase · rising production factors cost · developing country support system · offering products and services to developing country | <ul style="list-style-type: none"> · potential competition with developing country · potential risk for national security |
| | Receiving countries | <ul style="list-style-type: none"> · FDI promotion · Controllability · geographic proximity · support system for foreign technology introduction · cooperation with other domestic subjects · high trade barriers · experience in international technology cooperation | <ul style="list-style-type: none"> · overseas technology introduction restriction policy · inadequate economic level · located at a long distance · unstable political, economic environment · cultural difference · inadequate institutional protection for intellectual property right · appearance of replacement |
| Internal Factors | Technology positioning (features) | <ul style="list-style-type: none"> · obsolete technology · a generalpurpose technology · past experience of technology transfer | <ul style="list-style-type: none"> · original technology · exclusive technology · high technology · core technology · excessive cost of technology transfer |
| | Technology absorptive capacity | <ul style="list-style-type: none"> · technology manpower · experience of technology introduction | <ul style="list-style-type: none"> · inadequate infrastructure · lack of manpower · lack of technology capacity |

2. Information Marketing

Rowley[6] defines information marketing as the marketing about the information based products and services which recognizes knowledge infrastructure such as technology and information as a product¹⁾. The information marketing focuses on consumer-oriented level such as establishing strategy of information commercialization, distribution, or promotion.

Table 2. Aspects of Values of Information System

| Aspects | Details |
|--------------|--|
| Variety | · each consumer values the system differently |
| Acceptance | · the system needs to be flexible enough to make an amendment according to the consumers' requests |
| Relationship | · values are dependent on relationship · familiar perception is required to gain support |

source: Soh et al.[7] and Robinson[8] revised

1) Because the goal of this study is to derive implications for NTIS to spur ITT of public information systems, we focused on marketing information systems.

Because information marketing is to promote trade of services based on information, the marketing needs to reflect the aspects of information systems to increase the value. [Table 2] implies what to consider when implementing information marketing in accordance with the aspects of information systems.

Likewise, information marketing has the following features in order to reflect the aspects of the systems they are trying to trade. First one is feedback. If suppliers of the information systems do not properly embrace feedback from the consumers, it is difficult to raise the market share.

The needs for information systems is changeable, and if the suppliers fail to improve their systems according to the feedback, consumers might not use the systems anymore, as shown in [Fig. 1].

Second one is differentiation. Different information system needs to be provided to satisfy different consumers with different level of participation[10]. Therefore, suppliers need to decide how to provide systems to whom[11].

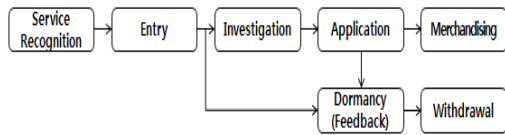


Fig. 1. Interaction between consumers and services by Seo et al.[9] revised

Third one is perception. As the value of information system is dependent on how consumers perceive, information marketing also needs to be aware to promote familiarity of the system[5][9].

3. Overview and Features of NTIS

NTIS of the Ministry of Science, ICT and Future Planning(MSIP) and Korea Institute of Science and Technology Information(KISTI) services the world's first national R&D information portal which compiles and provides comprehensive national R&D information such as the programs, researchers, research facilities & equipment and research outcome of 17 ministries or agencies. The primary purpose of NTIS is to avoid redundant investments which have been administered separately by the ministries and agencies and to maximize the utilization of national R&D program information.

After the NTIS 1.0(2006~2009) aimed to build the ground for the promotion of programs such as an inter-ministerial cooperation system, NTIS 2.0(2010~2012) secured the ground for information integration, and NTIS 3.0(2013~2015) targeted to improve the joint utilization of information. NTIS 4.0 has been promoted since 2016 for the following purposes: sharing & diffusing science & technology knowledge or research outcomes through the utilization; improvement of assistance to national R&D planning and management[12].

In addition, NTIS is performing Global Commercialization for the improvement of the

Korea's ICT reputation by supporting on foreign national R&D management systems and on the improvement of science & technology innovation competence in the corresponding country. However, since NTIS system is an intangible goods, it has characteristics which make it difference in features between intangible goods and tangible goods. Sim[13], said software has features of deformability, reproducibility, and uncertainty as being intangible goods and information goods and it has various risks at each level such as overseas marketing, contracting, or exporting since software is the typical electronic intangible assets.

III. Case Study on ITT of Public Information System

This study conducted case study on ITT of public information system in the view point of information marketing. Three cases were studied, KCS's UNI-PASS, PPS' KONEPS, and KIPO's KIPOnet. KCS is evaluated to perform ITT of public information systems most successfully among national agencies. PPS and KIPO conducted ITT of software systems, similar with NTIS.

1. International Technology Transfer of KCS

In 1990, KCS launched an electronic newspaper organization, 'information management office', which fostered the development of informatization of customs administration and resulted in the first governmental agencies to develop 'export customs systems without documents'.

As shown in [Table 3], KCS has succeeded in exporting 12 cases to 10 countries in \$335.6million since 2005. The agency made international trade with

Tanzania in 2012, Cameroon in 2015, Ecuador in 2010, Uzbekistan in 2014, and still, planning to expand customs administration system to other neighbor countries.

Table 3. Export Record of UNI-PASS

unit: million

| Nation | Program | Contract year | Expense | Finance |
|--------------------|---|---------------|---------|------------|
| Kazakhstan | UNIPASS Consulting | 2005 | \$0.42 | Kazakhstan |
| Kyrgyzstan | UNIPASS Consulting | 2008 | \$0.47 | Kyrgyzstan |
| Dominican Republic | UNIPASS Construction | 2008 | \$28.5 | EDCF |
| Mongolia | UNIPASS Construction | 2009 | \$5.54 | KOICA,ADB |
| Guatemala | Risk Management System Construction | 2009 | \$3.0 | KOICA |
| Ecuador | UNIPASS Construction | 2010 | \$21.63 | Ecuador |
| | Single Window Construction | 2011 | \$15.82 | Ecuador |
| Nepal | UNIPASS Construction | 2011 | \$3.83 | KOICA |
| Tanzania | RM and Cargo Management System Construction | 2011 | \$2.66 | KOICA |
| | New Customs System | 2012 | \$19.61 | ICF |
| Uzbekistan | Single Window Construction | 2012 | \$4.12 | KOICA |
| Cameroon | UNIPASS Construction | 2015 | \$230 | Cameroon |

source: KCS internal data

In the viewpoint of information marketing, ITT of KCS' UNI-PASS shows three features. First, KCS formed long-term relationship with Tanzania by promising additional support to improve the system in the country. As mentioned above, the suppliers need to improve or modify information systems continuously when the users ask for some changes or give feedback. Hence, KCS promoted follow-up projects by participating in Korea International Cooperation Agency(KOICA)'s programs. As part of KOICA program, KCS implemented invitational workshops and introduced how they have operated

the system. In addition, KCS built human networks which would be great advantage when practically preparing for projects. The establishment of human networks leads to preferable situation during preparation because it allows KCS to examine the situation in Tanzania more swiftly and accurately.

Moreover, to successfully conduct ITT, KCS constructed detailed plans to identify political or economical issues. KCS's ex-post evaluation report implies that verifying how it can support Tanzania was one factor to success ITT[14]. KCS had evaluated whether the contents of the projects would correspond with the political goals of the demanding countries, and whether the goals or performance of the projects coincide with the demands or requests from the countries. The agency also examined how economically Tanzania needed to reform its custom administration system. It examined trade ratio to GDP to evaluate how international trade influences national economic growth.²⁾ In addition to economical analysis, the main contents of feasibility study(F/S) contained analysis of political or administrative environment such as environment analysis, current situation analysis, technological planning or execution planning. As abovementioned, Tanzania government had been putting effort to modernize administrative performance including customs systems³⁾.

Lastly, KCS endeavored to raise the profile of the system. The process of raising the system's profile was necessary because African countries, including

2) In 2007 when the ITT began, international trade was increasing in Tanzania. While the value of export goods were \$752.65 and the one of import goods were \$1,336.69 in 1997, each value of export and import goods increased to \$1,735.76 and \$4,246.22. For the last 10 years, it has increased 8% and 12% a year on average[15].

3) There were request of improving government administration in Tanzania [16-18]. Also, from 2000, real GDP has increased 6.3% on average, and endeavored to increase the efficiency of public sectors[16]. In 2000, Tanzania emphasized "public service reform programme[17]", and 26 government ministries' websites were opened between 2000 and 2003[18].

Tanzania, were not familiar with the system. Considering that it takes time to actually implement the projects after identifying the intention to participate, KCS kept focusing on sustaining relationship with Tanzania and promoting the system for the country to get familiar with it before the implementation. Also, KCS invited government officials and experts or assigned specialists to help them understand clearly about the system. Moreover, KCS gave faith in the system to Tanzania by systematically operating workforce and allocating budget for customers management. Due to its professional ability and attitude, it was possible for KCS to support Tanzania to get familiar with the system.

2. International Technology Transfer of PPS and KIPO

In Korea, other national agencies also developed public information systems as to follow the global trend of reforming into e-government administration. PPS developed KONEPS while KIPO constructed KIPOnet.⁴⁾ Both public information systems proved the improvement of the efficiency of administration works or reduction of the cost and had successfully transferred to foreign countries.

To successfully perform ITT of public information systems, PPS kept close relationship for a long period to actively reflect the requirements from the demanding countries. The agency also maintained sustainable relationship with the countries that already has the system to identify whether the countries need improved or modified system. In addition, by investigating detailed sectors of foreign

4) In 2013, the framework of e-government was applied to the KOSEP, and it was opened to the public. KOSEP reduced the process of administrative documents and the cost of procurement trade[19]. KIPO saved more than ₩1.46trillion with KIPOnet by providing all fields of information including patent application or examinations[20].

countries, it tried to provide each country differentiated system to satisfy the demand of whether a country needs the system with basic functions or with advanced functions. Moreover, PPS cooperated with third parties such as foreign official institutes or private IT companies to make the system more familiar by enhancing the international marketing.

KIPO also constructed strategies based on information marketing to perform ITT of KIPOnet. First, with the cooperation with KOICA, the agency differentiated methods of transferring the system. For example, it transferred the system with the support of KOICA funding to countries that do not have enough budget. Moreover, KIPO invested on the system consulting programs to allow foreign countries to easily approach to the system and get familiar with it. [Table 4] and [Table 5] demonstrate how KONEPS and KIPOnet had succeeded in ITT. KPNEPS was transferred to 7 countries in \$35.3 million, while KIPOnet was transferred to 4 countries in \$17.85 million.

Table 4. Export Record of KONEPS

unit: million

| Nation | Program period | Expense | Finance |
|------------|----------------|---------|------------|
| Vietnam | 2008-2010 | \$2.3 | KOICA |
| Costa Rica | 2009-2010 | \$9.5 | Costa Rica |
| Mongolia | 2010-2012 | \$4.3 | KOICA |
| Tunisia | 2011-2013 | \$5.5 | KOICA |
| Cameroon | 2013-2014 | \$1.2 | KOICA |
| Jordan | 2015-2017 | \$7.5 | KOICA |
| Rwanda | 2015-2016 | \$5.0 | Rwanda |

source: PPS internal data

Table 5. Export Record of KIPOnet

unit: million

| item | Program period | Expense | Finance |
|------------|--|---------|---------|
| Mongolia | 2010-2011 | \$3.35 | KOICA |
| Azerbaijan | 2011-2013 | \$4.20 | KOICA |
| ARIPO | 2013-2015 | \$5.80 | KOICA |
| UAE | 1 year after contract(contract in Feb.,2016) | \$4.50 | UAE |

source: KIPO internal data

3. Research Findings

The implemented strategies of the three national agencies in Korea, KCS, PPS, and KIPO, imply how information marketing of public information systems should be conducted in preparation phase.

First, information marketing needs to continuously implement for long period. As abovementioned, the success of information systems is influenced by the relationship between suppliers and demanders. Because the demanders ask for modified or improved systems, suppliers need to form sustainable relationship with them by actively reflecting their requests. Successful ITT does not mean a successful case of trading. Rather it can be evaluated successful if the suppliers can continuously satisfy the consumers' needs.

Second, information marketing needs to prepare subdivided and detailed planning strategies as it assumes that each consumer has different preference of the public information systems. Therefore, differentiate performance is needed to attract or satisfy each one of them. For example, suppliers need to verify whether the functions of the systems can compile with policy paradigms or economical situation in demanding countries. Even if the system is highly advanced, it is worthless if it can not operate properly

because of technical or political issues.

Third, information marketing should attract consumers to feel familiar with the services. The value of information systems is closely related to the perception of the consumers. The value increases when they are more familiar with the systems. It's because the familiarity of an information system determines the capacity to utilize it more efficiently, which would gradually influence on the satisfaction.

[Table 6] categorized information marketing strategies in three features, continuity, subdivision, and familiarity and summarized how the national agencies performed information marketing.

IV. Recommendations for NTIS

This paper aims to imply recommendations for NTIS to promote success in ITT by conducting case study of ITT of the public information system in the view point of information marketing. Therefore, we examined how currently NTIS is preparing ITT and suggest recommendations to foster the transfer.

1. Preparation Phase of Exporting NTIS

NTIS has been preparing to export its public

Table 6. Summary of Information Marketing of the Three National Agencies.

| Information marketing strategies | KCS' UNI-PASS | PPS' KONEPS | KIPO's KIPOnet |
|----------------------------------|--|---|---|
| continuity | <ul style="list-style-type: none"> · promotion of follow-up projects with KOICA · implementation of invitational workshops · establishment of human network | <ul style="list-style-type: none"> · Active reflection of the requirements | - |
| subdivision planning | <ul style="list-style-type: none"> · examining political or economical issues · F/S | <ul style="list-style-type: none"> · providing different systems to each country | <ul style="list-style-type: none"> · Operating different methods of transferring with the support of KOICA |
| familiarity | <ul style="list-style-type: none"> · Keeping close relationship before signing for the contracts · inviting and assigning exports | <ul style="list-style-type: none"> · cooperation with third parties | <ul style="list-style-type: none"> · Investment on system consulting programs |

information systems abroad for three years. Until 2016, NTIS has put effort to export to Vietnam, Kazakhstan, and Costa Rica. NTIS constructed the process of preparation phases as shown in [Fig. 2]. First, environment analysis is required to examine political or economical situation. Then, F/S is conducted to identify the applying capacity. After F/S, to-be model is constructed to reflect the result of examinations conducted in previous steps. Lastly, specific plans for projects are developed. Yet, NTIS could not properly evaluated the appropriateness of the constructed process as there is few cases that NTIS has ITT.

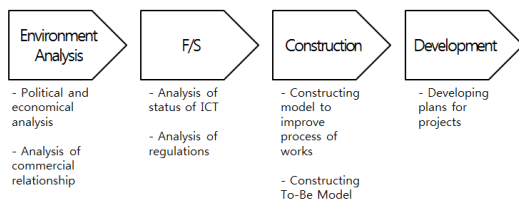


Fig. 2. Process of preparation phase

1.1 Vietnam

In 2013, as a follow-up action of the Korea-Vietnam Science & Technology High-level Meeting, an implementation plan designed to construct Vietnam National Science and Technology Information Service System (VTIS) was developed. In the same year, a preliminary F/S program for the integration of Vietnamese R&D program database and process standardization was implemented. Next year, Vietnamese Ministry Science and Technology(MOST) requested MSIP for support on the construction of VTIS at the Korea-Vietnam Vice-ministerial Science & Technology Joint Committee's Meeting. Then, government-led cooperation was launched, and there has been collaboration with MOST and local office of KOICA.

[Table 7] shows how NTIS first performed ITT with Vietnam. Based on the four phases in [Fig. 2], NTIS constructed 6 steps to prepare ITT.

Table 7. Plans for preparation in Vietnam

| Process | Details | Period (month) |
|----------------------|--------------------------|----------------|
| Environment Analysis | Preparation | 2 |
| | Environment Analysis | 1 |
| F/S | Domestic Study | 3 |
| Construction | Constructing To-Be Model | 3 |
| Development | Field Study | 2 |
| | Final Report | 0.5 |

1.2 Kazakhstan

In 2013, this program was launched after the Korea-Kazakhstan Technology Cooperation Center officially requested the technology transfer of NTIS' knowhow. Since the signing of the cooperation agreement between the KISTI and National Agency for Technological Development(NATD)/ National Center of Science and Technology Evaluation (NCSTE) in Kazakhstan.

In 2013, the agenda for the Korea-Kazakhstan Summit was adopted, and business agreement between the MSIP and Ministry of Education and Science (Kazakhstan) was signed in 2014. After performing international cooperation program titled 'A Study on Kazakhstan National R&D Information Management System Construction Plan' from 2015 to 2016, a direction for Kazakhstan NTIS information system was suggested, and major scenarios were visualized based on Kazakhstan national R&D survey and analysis. Then, NTIS' technology and knowhow were transferred to foster local staff.

[Table 8] is the steps that NTIS constructed when preparing for ITT with Kazakhstan. The steps are subdivided in details compared to [Table 7]. NTIS

increased the steps from 6 steps to 9 steps for preparation because NTIS identified the necessity of more detailed steps after the experience with Vietnam.

It summarizes how NTIS needs to perform IM according to the aspects of IM performed by the three national agencies. The agencies conducted ITT while concerning to keep continuous relationship, establish subdivided and detailed examination, and promote the partners to get familiar with the systems.

Table 8. Plans for preparation in Kazakhstan

| Process | Details | Period (month) |
|----------------------|---------------------------------|----------------|
| Environment Analysis | Preparation | 2 |
| | Analysis of Economic | 3 |
| | Onset Report | 0.5 |
| F/S | Analysis of Situation | 4 |
| | Joint Seminar with Participants | 1 |
| Construction | Constructing To-Be Model | 2.5 |
| | Visualizing Scenarios | 3 |
| Development | Practice Commission | 2 |
| | Final Briefing Session | 1.5 |

1.3 Costa Rica

In 2016, Embassy of Costa Rica in Seoul, Korea visited KISTI and requested for cooperation in

construction of NTIS Costa Rica. At a ministerial meeting of Costa Rican Minister of Science, Technology and Communication and MSIP, Costa Rica requested cooperation in the construction of Costa Rica NTIS. Currently, Costa Rica's current national R&D information management and cooperation plan are under review, and yet there is no official reports.

2. NTIS Information Marketing

KCS, PPS, and KIPO were able to succeed in transferring public information systems to foreign countries with the consideration of information marketing. Therefore, this research aims to derive how information marketing needs to be performed in preparation phase for NTIS to foster successful ITT. [Table 9] summarizes how NTIS needs to perform IM according to the aspects of IM performed by the three national agencies. The agencies conducted ITT while concerning to keep continuous relationship, establish subdivided and detailed examination, and promote the partners to get familiar with the systems.

First, it is important to sustain close relationship for the long period. For example, NTIS can promote long-term relationship by building human network or implementing invitational workshops in preparation phase. One example method of building human

Table 9. NTIS information Marketing

| Aspects of Information Marketing | NTIS Information Marketing |
|----------------------------------|---|
| Continuity | <ul style="list-style-type: none"> Establishing human network Cooperation with third parties |
| subdivision | <ul style="list-style-type: none"> Examining how much national R&D is funded Examining how national R&D is leaded Examining the capacity of operating the system Examining how national ministries operate with others Feasibility Study Ex-post evaluation |
| familiarity | <ul style="list-style-type: none"> Conducting research on economical benefit of NTIS Demonstrating detailed methods of how to apply Mutual exchange of work force |

network is allowing third parties such as private companies to participate in the ITT programs, which can support market entry. The long-term relationship can also be promised if NTIS and demanding countries keep preparing for follow-up projects.

Second, each phase needs to construct detailed and subdivided planning to accurately examine related sectors and proceed to next steps. To make it possible, it is important to precisely examine institutional regulations to reduce error when constructing national R&D information management system. Moreover, it can provide consumer-oriented consultation regarding ongoing projects. Therefore, it is important to identify what demanding countries can achieve by evaluating whether the performance satisfies their needs, or whether the projects coincide with political goals. To be more specific, it is important to examine on how much the national R&D funded for understanding how ministries administer the national R&D of each country. In addition, to have thorough examination on how national R&D is led and how national ministries operate with others is important because only thorough understanding on their current state of organization and regulation is able to lead the most adequate planning for each country.

Third, NTIS needs formal or informal ways to train or educate demanding countries to learn the advantages of NTIS system and to make the system more familiar. For example, Park[21] suggested that NTIS has 1.49 times of economic impact on effect on production inducement for the last 10 years since 2006. The result implies that NTIS performance had greater impact on value added inducements or employment inducements than any other industry[21]. It is difficult to conclude the impact based on one research. However, it can be used as a resource material to improve cognition of ITT to suggest that

it is possible for the demanding countries to improve enhancement of efficiency of national R&D and development of ICT by constructing comprehensive national R&D information system developed from Korea ICT. In addition, by introducing NTIS, they can realize that they can construct technology cooperation system, develop international collaboration items, and gain economic impact through cooperation among companies.

3. Recommendations

It is becoming global trend to construct and provide efficient public information systems, and Korea has been increasingly exporting the systems. NTIS also constructed the first comprehensive national R&D information system in the world. However, yet, there has been few studies on ITT of public information systems. Therefore, this research focused on deriving suggestions to provide information on how to operate in preparation phase during ITT by conducting case study on the national agencies that successfully transferred their public information systems to foreign countries. According to the result of the case study, three features of information marketing needs to be considered in priority.

First, building constant relationship to fulfill demanders changeable needs is required. It is because if the information systems do not satisfy instable demands from the consumers, they tend to use another one that services preferable functions.

Second, detailed examination should be conducted in subdivided process. NTIS needs to confirm whether it can provide services that compiles with current situation or the needs of demanding countries. For example, NTIS needs to identify the needs of country like which item or sub-item is adequate for the ideally customized system for each country.

Third, NTIS needs to provide ways to train or

educate the demanding countries to closer to the transferring service to make it more preferable.

V. Conclusion

Even though trade of ITT of public information systems is increasing, there are few studies focused on transferring intangible assets including information systems. Therefore, this study aimed to suggest recommendations for NTIS by and conducting the case study of the national agencies that succeeded in ITT of public information systems. The cases for the study were KCS's UNI-PASS, PPS' KONEPS, and KIPO's KIPOnet. This paper examined how the agencies could succeed in ITT in the view point of information marketing because NTIS is also trying to transfer information based systems.

According to the study, there were three primary information marketing strategies to consider. First, continuous relationship between NTIS and demanding countries needs to be formed to constantly apply the feedback or requirements from them. Second, detailed planning is necessary to reflect aspects of the countries in various view points. Third, NTIS needs to promote the countries to get familiar with the system to have reduce the error or risk.

As it takes long period to apply NTIS to the countries with poor R&D funding, it is important to spend time and keep close relationship with those countries until they show interest and have capability in investing national R&D. NTIS needs to imply the advantages they will be able to get in the future by applying NTIS. Also, by providing some part of the system to those countries' main facilities, NTIS needs to promote them to establish and manage comprehensive national R&D information system.

Further studies need to examine more cases on ITT

of products related to softwares for NTIS to analyze and benchmark as NTIS operates its function of managing information on national R&D based on softwares, intangible asset.

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