Aid Effectiveness in Practice:

A Case Study on the National Data Center in Mongolia

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Content

Abstract

The main purpose of this paper is to examine the aid effectiveness of ODA projects through a case of an e-Government ODA. The case at hand is the Mongolian National Data Center project, which was supported by Korea International Cooperation Agency in 2007~2009. In this paper, we analyze aid effectiveness through a case instead of a long-term macroeconomic analysis. By using OECD DAC guideline for performance evaluation of ODA project combined with PRM (Performance Reference Model) for evaluating e-Government, authors undertakes a post-implementation evaluation on the Mongolian NDC project.

The result shows that the NDC project has been relevant and implemented effectively and efficiently given the political instability incurred by the election fraud in 2008. However, there have been problems as well. Provision of defected monitors was a critical problem while disagreement on the safety of the building was lasted for two more years to be settled. Some comments on the training program are also worth to hear to ameliorate similar projects. But more fundamental problems are found in impacts and sustainability areas. Low political status of ICTPA as a coordinating organization for ICT ODA and unstable job security of NDC are serious hurdles to increase effectiveness and efficiency of NDC. ICTPA has played very limited roles in coordinating government-wide ICT ODA projects because it lacks actual power and control over them. Other government organizations do not fully trust NDC as a reliable government data center due to low political status and lack of job security. Thus critical factors to affect the effectiveness and efficiency of e-Government ODA projects are political and organizational instead of economic.

Keywords: *ODA, Mongolian National Data Center, aid effectiveness, KOICA*

1. Introduction

The main purpose of this paper is to examine the aid effectiveness of ODA projects through a case of an e-Government ODA. The case we are going to examine is the National Data Center (NDC) of Mongolia, which was provided by the Korea International Cooperation Agency (KOICA) in 2007 ~2009.

One of the key problems in ODA is the lack of aid effectiveness, *i.e.*, what and how much development aid has contributed to achieve development goals such as poverty reduction, public education, public health, economic growth, and/or political democratization in the recipient countries. Aid to developing countries has been increased over time significantly since the World War II without seeing much progress in reducing poverty and/or reforming governments.[1] In fact, "after 40 years of development aid, the evidence indicates that aid has not been effective." (Doucouliagos and Paldam, 2010; Rajan and Subramanian, 2008). Since the beginning of the 21st century, improving the quality rather than quantity of aid has been emphasized through evaluating the impacts of aid toward economic growth, poverty reduction, and/or advancing democratic governance. As a consequence, both the Paris Declaration in 2005 and the Accra Agenda for Action in 2008 emphasized five principles and four agendas to increase aid effectiveness.[2] The subsequent 4th High Level Forum on Aid Effectiveness held in Busan in 2011 followed the same track, and most delegations from various countries and organizations agreed upon the document titled, "Busan Partnership for Effective Development Cooperation."[3]

As one way of increasing aid effectiveness, post-implementation evaluation might be useful. Post-implementation evaluation means evaluating aid projects and/or programs after several years of their completion. It evaluates the whole process of aid projects from the very beginning to the end. Thus it covers initial discussion, feasibility study, planning/implementation/completion phases, outcomes, sustainability, and even long-term potential effectiveness. It not only evaluates the projects/programs at hand, but also draws lessons and implications for other ODA projects/programs as well. In this respect, post-implementation evaluation can provide a crucial guide line for the effectiveness of current and future ODA projects.

As an effort to increase effectiveness and efficiency of ODA projects, KOICA undertakes various evaluations such as a preliminary survey, interim evaluation, and closing evaluation. Yet the questions of whether the expected outcomes were actually occurred and the benefits can be maintained in the long run have been in controversy. Post-implementation evaluation is supposed to fill this gap and thus contribute to long-term effectiveness of ODA project. In this sense, post-implementation evaluation of KOICA contributes to the effective and efficient usage of limited ODA grants and maximizes the benefits of the ODA projects by systematically examining the processes and outcomes of ODA projects that are already implemented.

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[1] Perhaps Korea is a noteworthy exception in this regard. Korea's outstanding economic development is surely an outcome of effective ODAs from many advanced countries. This is why the existence of Korea itself is a sign of hope for many developing countries as mentioned by Paul Wolfowitz, the former President of the World Bank.

[2] Five principles include recipients' ownership, alignment between donors and recipients, harmonization among donors, results-orientation, and mutual accountability among donors and recipients. Four agendas are ownership, inclusive partnership, delivering results, and capacity development. For the details, see http://www.oecd.org/dac/effectiveness/

parisdeclarationandaccraagendaforaction.htm(visited on June 2, 2013).

[3] For the details of this document, see http://www.oecd.org/dac/effectiveness/49650173.pdf.

The case we are going to examine in this paper is the NDC to Mongolia that was provided by KOICA in 2007~2009. As shown in Table 1, the NDC project included the following: constructing a new building for NDC, supporting equipment and facilities, providing training program for those who would work at the center, and dispatching

Tab. 1. Overview of the Mongolian NDC Project

Classifications		Details
Project Purpose		Building a national data center as an infrastructure for e-Government Government-wide integrated management of computational resources
Burden of the two sides	Korea	Constructing a new building for NDC ($ 1,548,000) Providing facilities and equipment ($ 3,265,000) Inviting trainees ($ 102,000) Dispatching specialist ($ 150,000) Project management ($ 135,000)
	Mongolia	Providing building site and infra-structures for construction, etc. ($ 700,000)
Project Area		Ulaanbaatar area
Scale/Term		$ 5,200,000 / for 3 years (2007~2009)
Beneficiaries		Government of Mongolia and the people
Expected Effects	Korea	Sharing advanced experience and technology in building integrated data center to enhance national image as an IT powerhouse, and increasing effectiveness and efficiency of government services
	Mongolia	Increased efficiency through integrated resource management Improve the reliability and transparency of government through the establishment of e-government system
Implementation Agency	Korea	Korea International Cooperation Agency (KOICA) / PMC : KT
	Mongolia	ICTA (Later ICTPA)

experts to help the center launch smoothly with the budget of US$520 million. Because KOICA have additional plans to support the Mongolian e-Government by providing "State-owned Property Management Information System Project" (2013 ~2014), the "Congressional Legislative Activities Supporting System Project" (2013~2015), the "Immigration Control System Modernization Project" (2013 ~2015), and others which are totaled to be nine by the end of 2015, the post-implementation evaluation of the very first project has very important implications for the upcoming projects.

2. Studies on Aid Effectiveness

As pointed out earlier, a key concern to international community on ODA is how to increase aid effectiveness. Since early 21st century, many studies were undertaken to analyze whether development aid really made progresses as it originally intended. Much of previous studies examines whether development aid make any significant improvements in macroeconomic indicators of recipient countries such as economic growth, savings, investments, income inequality, and poverty reduction. The results of these empirical studies are, however, overall very disappointed. Doucouliagos and Paldam (2009), for example, undertakes a meta-analysis of 97 previous studies on the effects of aid on growth, savings, and investment, which found no evidence of aid effectiveness. By using cross-sectional data and panel data, Rajan and Subramanian (2008) examines the effects of aid inflows upon the growth of recipient countries. They also found no evidence of aid effectiveness of any type. Yet Chong, Gradstein, and Calderon (2009) examines the effects of foreign aid on income inequality and poverty reduction for the period 1971~2002 using dynamic panel data technique. The outcome shows no sound evidence of aid effectiveness although there is some weak evidence that foreign aid is conducive to the im-

provement of the distribution of income when the quality of institutions is taken into account. Overall, however, their findings are consistent with other empirical researches which show no empirical evidence of aid effectiveness. But some studies find positive relationship between aid and economic performance. For example, Bearce and Tirone (2010) finds that foreign aid may be effective when donor governments have small strategic benefits out of aid provision, and/or economic reforms of the recipient countries are effectively demanded by donors.

Yet another type of research on aid effectiveness goes one step further. Accepting high volatility of aid inflows to developing countries, Buliř and Hamann (2008) examines how aid money affects macroeconomic conditions of recipient countries. They found that especially in very poor, aid-dependent countries, high volatility of aid inflows makes its macroeconomic management hard, and the impacts of aid has been pro-cyclical rather than counter-cyclical. Thus overall, aid has failed to serve either as a stabilizing force or as an insurance mechanism for the recipient economies. Based upon this analysis, authors argue that donors should react more speedily and effectively against adverse shocks, and their conditionalities should be more flexible in order to counteract the adverse impacts of aid upon the economies of recipient countries.

A group of studies pay more attention to political aspects of aid effectiveness. Knack (2004), for instance, examines whether foreign aid have positive impacts on promoting democracy in recipient countries. Although aid have strong potential to promote democracy, a large sample of recipient countries between 1975 and 2000 period shows no statistically meaningful evidence that aid promotes democracy. In their study of examining the effects of short-term geostrategic motivations on aid effectiveness, Dreher, Eichenauer, and Cehring (2013) conclude that the effects of aid on growth is significantly lower when aid has been granted for political reasons. Yet in another study which examines how the size of a leader's support coalition and government revenues affects trades between policy concessions and aid, de Mesquita and Smith (2009) finds that aid benefits donor and recipient leaders, while harming the recipient's, but not the donor's, citizenry.

While most of these studies provide meaningful results about aid effectiveness over long period of time through elaborated statistical analyses, measuring aid effectiveness is something like "opening the black box," as argued by Bourguignon and Sundberg (2007: 316-317). As shown above, aid effectiveness is at best fragile and undetermined. This is so mainly because the causality chain among major actors and events inside the black box in aid processes is so complex and contingent. As Bourguignon and Sundberg (2007) admitted, however, this does not mean all aid is ineffective. Rather one has to analyze the complex causality of aid to its outcomes by tracing interplays of major actors and/or events under specific political and economic circumstances, both in domestic and international.

One way of doing this is an in-depth analysis of individual cases of aid project in greater detail. De Lange (2013), for example, recently evaluates Dutch aid program on capacity development. According to him, capacity development accounts for about 25% of all international aid, but there have been few studies on evaluating this program. By adopting several questions as analytical framework, de Lange (2013: 35) qualitatively examines the effectiveness and pitfalls of Dutch capacity development programs. The result of this study indicates that donors are primarily responsible for increasing aid effectiveness.[4] This suggests that

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[4] He argues, "it is crucial that donors reconsiders their policies and practices in such a way that they facilitate endogenous capacity development, local resourcefulness,

while aggregate quantitative data may have difficulties in finding out aid effectiveness due to the complexity of causal chains, qualitative research on individual cases may be a good alternative to examine the actual and perceived effectiveness of those who are actually benefitted most. In this regard, our study on evaluating the government data center projects supported by KOICA to Mongolia would be a good alternative way of measuring aid effectiveness.

3. Evaluation Framework and Methodology

3.1 Evaluation Criteria of OECD DAC

As a general guideline for measuring aid effectiveness, OECD DAC (Development Assistance Committee) provides six criteria according to the logical processes of implementing aid projects: relevance, efficiency, effectiveness, impact, sustainability, and cross-cutting issues as shown in Figure 1.
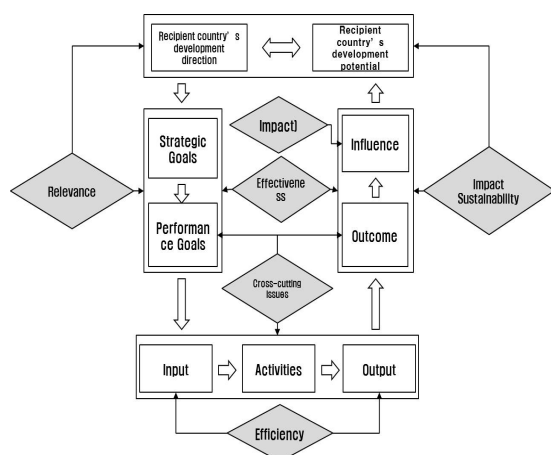
Note: ◇ : Evaluation Criteria, → : Flow of Project
Fig. 1. OECD DAC Evaluation Criteria

and downward accountability." (de Lange 2013: 43-45).

Relevance means that ODA project should serve Millennium Development Goals (MDGs) as well as the needs of donor and recipient countries. Efficiency means the input versus output ratio. Input may include budget, time, and manpower. Output can be tangible and intangible outcomes, time-required, and capacity of beneficiaries. In order to increase efficiency, efforts to minimize inputs and to maximizing output is needed.

Effectiveness means the extent that the intended goals are achieved. To measure effectiveness, the goals of the project need to be set up in measurable ways. The outcomes of a project also need to be measured fairly and objectively. Impacts mean the direct and indirect influence of the outcomes or project itself to their surrounding environment. Mostly impact is measured through performance goals and effects. However, there can be unintended consequences in the middle of implementation processes or the project itself. Impact should include both positive and negative sides as well.

Sustainability means evaluating the continuity of outcomes in the long run. Sustainability should be evaluated from the viewpoints of recipients. Independent self-sustain-ability, meaning good operation of aid project without further assistance from donors, is the final goal. Hence, evaluation should include the possibility of the independent operation of the project by the recipient.

Cross-cutting issues include gender equality, environmental protection, protection of minority, and so on. Hence, evaluation for cross-cutting issues should be carried out separately from other evaluation standards. Evaluation of legal cross-cutting issues should find each element (gender, environment, minority, etc.) in the project and should be carried on by experts, using objective data.

3.2 Performance Evaluation for e-Government

Although there is no standardized model for

evaluating the performance of e-Government, the Performance Reference Model (PRM) developed in the US is one of the most widely used reference model.
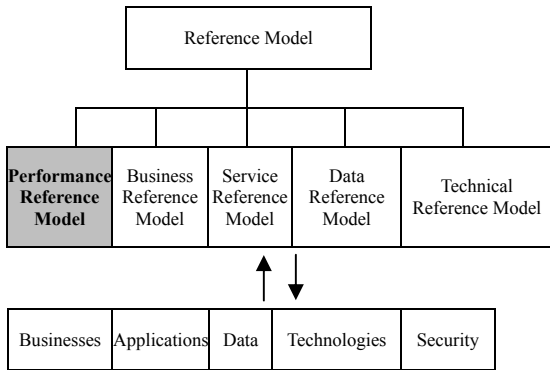

Fig. 2. Structure of Reference Model

PRM is a part of Reference Model (RM). RM is a common EA (Enterprise Architecture) standard for public organizations when governments construct and operate ICT systems. Its main objective is to maintain consistency and interoperability of multiple ICT systems used in public organizations. RM consists of five areas: performance, business, service, data, and technical reference models. PRM is a framework to measure the performance of major ICT investments and their contribution to program performance. It helps government and public agencies to evaluate direct and indirect outcomes and effects of e-Government system and services.

Details of the PRM measurement categories are as follows. Measurement area means e-Government itself. Measurement Categories include the following six areas such as mission and task, customer, process and activities, human resource, IT (Technology), and related resources. There can be 16 measurement items as shown in Figure 3. They are administrative service, customer satisfaction, service quality, service area, finance, productivity, work quality, security, user, support, system quality, standards, information and data, application, ICT policy, and legal system for e-Government.

3.3 Combining OECD DAC Criteria with e-Government PRM

3.3.1 Qualitative Analytical Framework for e-Government ODA

Since e-Government ODA has two aspects in one project, the project has to be evaluated in two viewpoints: one from ODA and the other from e-Government. Hence, the post-implementation evaluation for e-Government ODA project can use the evaluation criteria by OECD DAC standards combined with the evaluation model for e-Government, in our case the PRM. A conceptual framework for evaluating an ODA project in the field of e-Government, therefore, can be shown as follows. Since PRM specifically targets after the completion of e-Government projects, contents of PRM mostly focus on outcomes, impacts, and sustainability as shown in Figure 3.
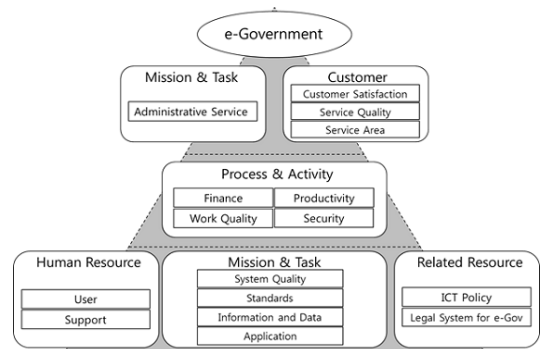

Source: National Information Society Agency (2011), *Performance Reference Model 2.1*, Ministry of Public Administration and Security, 4.

Fig. 3. PRM Measurement Categories and items for e-Government

In addition, given the characteristics of government internet data center as an infrastructure, we have adopted three more criteria for performance evaluation, that is, integration, economic efficiency, and security, in our field survey. Integration can be evaluated by whether various gov-

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ernment agencies located their data servers to the government integrated data center. It can be divided into physical integration, process integration, and integration of laws and systems. Economic efficiency evaluates economic effects caused by e-Government related projects. It can be divided into cost savings, transparency, and creation of added value. Security evaluates how equipment and data are secured to maintain stable and safe e-Government services. It can be divided into physical security, system security, and information security.
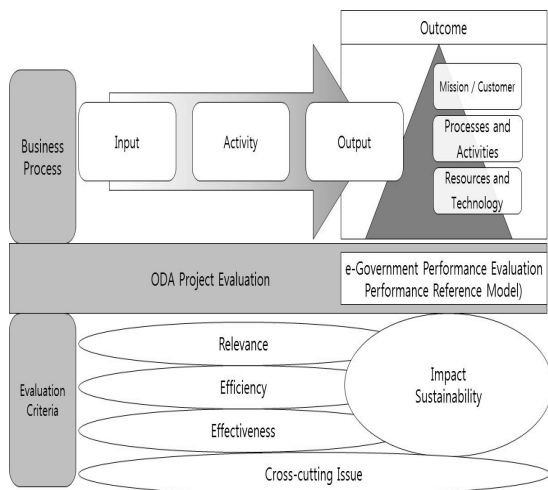
Source: Authors.
Fig. 4. Post-Implementation Evaluation Framework e-Government ODA
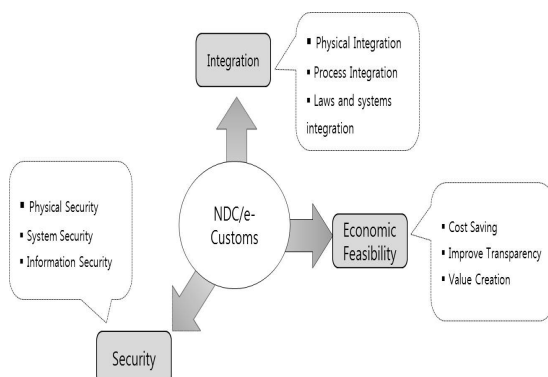
Source: Authors.
Fig. 5. NDC Survey Measurement Criteria

3.3.2 Evaluation Methods

This post-implementation evaluation was conducted through various methods like literature reviews, interviews, observation, and questionnaire. Literature review was started by making a list of necessary documents. Domestic documents were collected through donor agencies and implementing agencies. Collection of foreign documents was done by local experts through recipient agencies and related government organizations. To verify the truth of certain statements or arguments, all documents and materials were cross checked. In this study, literature review was undertaken by reviewing all the related output and reports of the project[5] and reviewing of various documents for ODA project evaluation.[6] In-depth interviews were conducted from August 5th to August 10th for the first round and from October 17th to October 20th for the second round in Mongolia.

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[5] List of ODA project related output and reports: Proposal Report; Project Feasibility Study and the Results Report; Project Consultation Report; Project Management Plan; Project Execution Plan; Interim Assessment Report; Project Completion Report; Exit Assessment Report; R/D (Record of Discussions); PDM (Project Design Matrix).

[6] List of related literature of ODA evaluation indicators and methods: 2011~2015 International Development Assistance Field Master Plan (2010); KOICA Development Assistance Project Evaluation Guidelines (2008); Project Planning, Monitoring, and Evaluation Methods (2009); Evaluation Report of The Paris Declaration on Aid Effectiveness (2009); Gender Impact Assessment of Korean ODA Project (2010); Evaluation and Performance-Based Management Glossary (2010); ODA Project Efficiency Measures in Human Resource Field (2008); Trainee Invitation Project Effectiveness Evaluation Report (2010); 2011 ODA Project Recipient Country Satisfaction Survey (2011); KOICA Environmental Mainstreaming Guidelines (2012).

4. Major Findings

4.1 Post-implementation Evaluation

4.1.1 Relevance

The need for NDC was highlighted in various parts of the Mongolian e-Government Master Plan (e-GMP). The Mongolian government showed keen interests in improving its governance through the establishment of e-Government. In 2005, KIPA (Korea Information and Communication Industry Promotion Agency, which merged into NIPA in 2009) had completed "e-Mongolia Master Plan (e-GMP) 2005~2010". The Mongolian government established 22 detailed projects using the e-GMP Roadmap and the NDC project was selected as one of top priorities.

The Mongolian government requested a total of US$590 million for NDC to Korea on October 4, 2005. After the pre-feasibility study in November 2006 and reflecting Mongolia's needs in July 2007, the construction began on May 22, 2008. On the Mongolian part, the Ministry of Finance was in charge of the project, under which the ICTA (Information & Communications Technology Authority at that time) was designated as a working organization for the project.

Source: e-Government Master Plan in Mongolia, 2005, IV-8, KIPA.

Fig. 6. Mongolian e-GMP

However, ICTA's roles and functions for policy coordination were not high enough to run the NDC project. For example, construction schedule had to be changed due to a claim of land ownership by local business, due to which the original site had to move nearby. In addition, protests against election fraud in the Mongolian parliamentary election in July 2008 and the resulting emergency decree also retarded the schedule. But after a short break, political situations were stabilized, and the NDC project could be back on the original track. Most data servers of the Mongolian government were scheduled to move to newly built NDC by 2012, which has not been realized as scheduled due to bureaucratic hassles and low status of ICTA as a responsible organization for the NDC project.

During the construction phase, a problem of non-compliance of local construction standards was in question. Later on NDC repeatedly argued that the NDC building itself was floating due to this non-compliance of local construction standards. NDC argued that due to the very cold winter season in Mongolia, the ground is frozen and melted repeatedly, and thus the building itself is floating up and down according to seasonal changes. On the other hand, KOICA and PMC argue that seasonal weather conditions affect the building, but it is within normal range. Later NDC, KOICA, and PMC agreed to hire an independent engineering company to investigate the safety of the building, according to which the NDC building itself turned out to be safe without having any mechanical problems.

4.1.2 Efficiency

The Mongolian NDC Project had a lot of hurdles that might incur potential inefficiency during implementation processes. But the project was implemented relatively efficient ways and completed with a marginal increase of budget. Especially at the beginning phase, domestic political

turmoil was taken place due to election fraud and the resulting declaration of the martial law. Abrupt increase in raw material prices because of the Beijing Olympic Games, sharp increase of the exchange rate due to the financial crisis, and the skyrocketing wage level were also problematic to implement the NDC project as planned. Despite these unexpected difficulties, the project was relatively well implemented mainly thanks to the unique Korean style flexible management of work processes. Finally, the project was completed with an increase of about 220 million won, which in fact incurred by the design changes and additional requests from the Mongolian counterpart.

Among budget items, however, we found that the item named 'working expenses' increased about 371.1% compared to the original amount.[7] We tried to figure out why this happened, but no one could say for sure why that happened. The actual use of working expenses and a severe deviation from the original budget meant that there might be a possibility of inefficiencies.[8] But given the fact that working in developing countries might incur unexpected expenses and working expenses itself was relatively small amount, this does not mean that the project itself was implemented inefficiently.

The actual construction of the NDC building was completed at the third quarter in 2009, but the legal inspection was postponed until November 2010. This was due to the disagreement about the safety of the building itself between PMC (donor) and NDC (recipient). As explained above, this disagreement was continued for about two more years until both parties agreed to hire an independent engineering company and confirmed the safety of the building. In the meantime, however, both PMC and NDC had different views on this issue from time to time.[9] This was a main reason why official permission for legal use of the building postponed until November 2010.

4.1.3 Effectiveness

Overall, the NDC project was effectively implemented by constructing the NDC building, and education and training programs along with dispatching experts to help NDC people to operate the center. Later on KOICA dispatched additional experts by using the senior expert dispatch program in order to increase sustainability of the project.

However, some leaks and cracks on the wall and rooftop of the NDC building were found in several places, and these also became major reasons for complaints from NDC. But most of these turned out to be minor problems, and PMC did provide appropriate A/S. Although there were unsatisfactory comments from those who are working at NDC arguing that PMC's A/S was not fundamental solutions for problems, wall cracks and other problems were taken care of within the normal service plan.[10]

A more serious problem that negatively affected the effectiveness of the NDC project was found in provision of equipment and facilities. Especially, among 32 PC monitors installed in NDC, more than half were not work properly from the begin-

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7) In original budget, working expenses were $135,000. This means that actual working expenses reached slightly over $500,000.

8) One possibility of using 'working expenses' might be express fees (or under the table money). The other possibility might be some expenses that official receipts were not available.

9) Even when our research team visited NDC in 2012, NDC people claimed this issue again. We have investigated this issue by having interviews with PMC, KOICA, and the Mongolian counterparts, and found out an official document issued in 2010, in which all related parties agreed to the safety of the building.

10) Again, NDC people argued these cracks were caused by the floating problem as mentioned earlier, which turned out to be no mechanical and/engineering defects at all. NDC should have their own maintenance program after the normal A/S period is over.

ning. Although the PMC replaced them quickly, still significant number of PC monitors did not work well and replaced by NDC. Since PC monitors are supposed to be lasted at least five years, this apparently means that defective products were provided to NDC. It was apparent that bad quality monitors were provided, which had long-lasting negative impacts on the credibility of PMC through the whole process of project implementation.

According to the expert dispatch program, two system experts and two security professionals were sent to Mongolia. Experts who were dispatched from Korea faithfully performed the duties and NDC people were generally satisfied with their works. NDC prepared thoroughly in advance before experts were dispatched, and NDC people confirmed that they fully satisfied with their activities.

There were some comments on the training program. Mongolian trainees who were invited to Korea to learn how to operate NDC were consisted of 10 people with different courses and periods as follows: 2 for management (2 weeks), 2 for security (2 weeks), 4 for systems (4 weeks), and 2 for infrastructure (4 weeks). Generally they argued that contents of the training program were introductory level and not high enough for those who actually run a data center, meaning that the training programs were not sophisticate enough to run the NDC. And some coursework were too theoretical to provide practical knowledge applicable to the field settings. Also, two or four weeks were simply too short to cover necessary contents to educate technical personnel.

One of the key indicators for effectiveness is how much percentage of government servers was integrated by NDC, and whether other government organizations trusted NDC as an ICT manager for government. As to the ratio of hosting government servers, NDC argued that significant portion of government servers would be transferred to NDC

by the end of 2012. But the Ministry of Finance, for instance, has its own server room, and plan to send only back-up servers to NDC. The Mongolian Stock Exchange already sent its back-up servers to NDC because NDC had the best quality facilities with high-speed internet and the highest level of security. But as shown in Table 2, many government organizations still did not fully trust NDC as a government internet data center. The actual percentage of central government organizations which put their servers (either main or back-up) to NDC was 18.2%, and the server space used in NDC was merely 35% when our field research was undertaken in October 2012. This implies that NDC is underutilized at the time of post-implementation evaluation, and systematic efforts have to be made to increase the utilization of NDC.

NDC did not undertake any customer satisfaction survey yet. During the post-evaluation period, analysis of NDC through the on-site interviews and surveys for government agencies found that their level of satisfaction is generally low. Our field research showed that low customer satisfaction was incurred by low status of NDC within government, low reliability on NDC, long distance from main government complex in downtown (more than 20 kilometers away), excessive access control, expensive costs, and so on.[11]

A survey result undertaken during our interviews with user organizations was given below. The collected surveys from one employee of the Ministry of Finance, one from National Registration Department, and four from Stock Exchange were analyzed. Because the number of respondents was too small to generalize the result of this survey, interpretation must be careful. But it suggests some important ideas on the effectiveness of NDC.

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[11] NDC workers are not public officials. They are all hired in contract bases, due to which public officials from other ministries and departments could not trust NDC.

The survey questions were about integration, security, efficiency, relevance, cooperation, and contribution. Each axis include as follows: integration (server, data, business processes, organization, budget, laws and institutions), security (physical security, system security, and information security), efficiency (budget savings, increased efficiency, and value creation), relevance (consideration of e-Government development, consideration of Mongolian development priority), cooperation (participation of Mongolian stakeholders, bilateral stakeholder participation), and contribution (e-Government, IT industry, economic development). A five-point Likert scale was used for a total of 19 questions, and the respondents were able to answer freely to semi-structured questions. The result shows that private institutions viewed NDC more positively than government agencies, except relevance. Public officials gave the lowest point in contribution while the highest in relevance, which indicates that they fully understand the importance of NDC as an infrastructure for e-Government, but the perceived contribution of NDC to the development of e-Government is low.
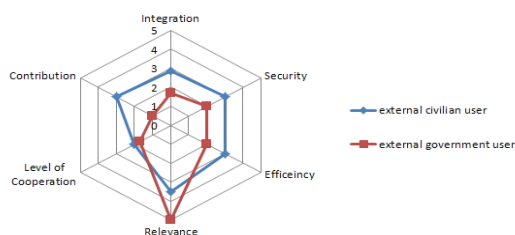

Fig. 7. Survey Results on NDC

4.1.4 Impact

As an infrastructure for the Mongolian e-Government, NDC gave positive impacts while it partially motivated e-Government ODA projects from other countries or international organizations such as ADB. For example, ADB and KOICA jointly agreed to provide a modernization project for the Mongolian Customs Clearance Service.

Awareness on the data center has been increased through promotional activities by NDC, which invited IT officials from other ministries and agencies in order to locate their data servers at NDC. Though there are somewhat reluctant atmosphere among government organizations due to the unstable status of NDC officials, NDC held various seminars, forums, and workshops, as well as provided periodic education opportunities to build up trust toward itself. Recently the first private data center in Mongolia was opened, which increased the awareness about the excellence of NDC.

There were growing concerns from government organizations about the possibilities of reducing ICT manpower and facilities if they decided to locate their servers to NDC. NDC, however, was not able to persuade them due to their lower status within government hierarchy and instability of its workers. ICTPA should play the role, but due to the lack of active participation of ICTPA in any e-Government ODA project, fear of losing jobs will continue for a while.

4.1.5 Sustainability

Mongolia has lots of e-Government projects ongoing, which would increase NDC's utilization. However, the relatively weak position of ICTPA within the Mongolian government still provides difficulty in systematic implementation of various e-Government programs. NDC as an organization under ICTPA and the instability of NDC people due mainly to their temporary labor contracts are still major problems in sustainable development of NDC. By the end of October 2012, NDC held and managed about 300 servers out of 3,500 government organizations (it is estimated that about 1,000 organizations have their servers). The Ministry of Finance and the Customs Clearance Service, for example, are operating a significant number of servers independently, but ICTPA does not have the strength and momentum that can inte-

grate these into NDC. Approximately 11 agencies with a high level of informatization which hold their own servers do not participate in integrated management by NDC. An e-Procurement system is currently being established with the support of KOICA. The Ministry of Finance is planning to maintain its own servers, having only backup servers be located to NDC. This indicates that major ministries do not trust NDC fully enough to allow its sustainable development.

Manpower training program, workshops, seminars, and forums held by NDC seem to increase sustainability of NDC as an e-Government infrastructure because they target central and local government officials. Once they have a chance to visit NDC, increasing number of government officials would realize the importance of integrated data center. These efforts, therefore, significantly increase the sustainability of NDC.

The Government of Mongolia, ICTPA, announced a new plan for e-Government in April 2012. According to this plan, the Mongolian government aims to be in top 10 among Asian countries by 2016, and NDC will be able to make itself genuine general data center. As a means of achieving this goal, a new law titled the National Registration Framework Act of 2010 was passed, which required all new government servers should be located in NDC. But this law was not kept by government organizations when this post-implementation evaluation was undertaken in October 2012.

4.1.6 Cross-cutting Issues

Interagency data exchange and integrated management of government data servers will be gradually increased as a result of the NDC project. But when the project was planned and implemented, no major efforts were made to increase gender equality, minorities, and/or handicapped. No major consideration for environmental protection other than general level of concern was made in most of the project implementation processes

4.2 PRM-based Performance Measurement on the Mongolian NDC

PRM-based performance measured by main indicators is given below. As shown in table 2, the Mongolian NDC is significantly underutilized in all three areas of objectives, integration, stability, and security. Regarding 'integration,' only 18.2% of central government is now using NDC, and only 35% of NDC's space is currently used. Due to this underutilization, the number of used facilities per capita remains 52.6.

In terms of 'stability,' we examine client satisfaction, rate of IT specialists, turnover rate of IT specialists and stability of average voltage regarding electricity. Client satisfaction measured by 5-point Likert scale shows 2.74 on average, which is slightly above the medium. IT specialists are 19 out of 45, meaning that less than half of NDC workers are IT specialists. In addition, 9 out of 19 IT specialists who worked at NDC went out to get jobs in other organizations. High turn-over rate means that job security in NDC is problematic because all of IT engineers are hired at contract bases. This might be one reason why other government organizations have low level of trust on NDC as a permanent public institution that is responsible for managing government's data.

Regarding 'security,' handling of security manual, security budget, and security training programs are examined. Security manual is developed and applied strictly, in fact, too strictly, so that users of NDC have strong complaints about too tight level of physical security. Though we visited NDC to evaluate the performance of the ODA project, we cannot get the actual ratio of security budget out of total budget. NDC even denied our access to server rooms and did not provide any information about data center even to our research team even though we got prior permission to go there. Security training programs consist of more than half of all training programs. This indicates that physical and network security of NDC is near perfect.

Tab. 2. Performance index and measurement of Mogolia NDC

objective	area	item	index	Method	unit	result	note
Integra-tion	Mission and task	Adminis-trative service	User among central gov-ernment	(number of central govern-ment using NDC ÷ total number of central govern-ment) × 100	%	18.2%	Using facility : 2 Total facility : 11
	Process and ac-tivity	Utilization	Rate of used space	(used space ÷ available space) × 100	%	35%	Result of post eval-uation interview
		Produc-tivity	Number of used facilities per capita	(number of using facilities) ÷ (number of IT specialist)	Number per person	52.6	(1000 / 19 person)
			Used facilities out of budgets	(number of using facilities) ÷ (budgets)	Num-ber/$	NA	Restricted document of MNDC (100% government's budgets)
	Human resources	User	Number of participants in user training program	Number of participants in user training program	Person	NA	-
	Asso-ciated resources	Manage-ment sys-tem	Obligation rules of using NDC	Condition on legislation about using NDC obligation in gov-ernment facilities	Yes/No	Legislation	But, each depart-ment rejects to use MNDC
Stability and/or Trust	Client	Client satisfac-tion	Client satis-faction	Research and interview of client satisfaction	Survey	Average 2.74	Integrity : 2.33 Security : 2.67 Economic efficien-cy : 2.78 Perceived contribu-tion : 3.19
	Human resources	Assistance manpower	Rate of IT specialists	(number of IT specialists ÷ total number of employee) × 100	%	42.2%	IT specialists : 19 Total employees: 45
	Asso-ciated resources	Organiza-tional culture	Turnover rate of IT special-ists	(turnover number of IT spe-cialists ÷ total number of IT specialists) × 100	%	47.4%	IT specialists turn over : 9 (in 2012)
	Informa-tion tech-nology	Quality of system	Stability of average vol-tage	(actual service voltage ÷ regulated voltage) × 100	%	NA	Maintain applied voltage (from interview)
security	Process and ac-tivity	security	Handling manual for information security acci-dent	Condition of development about information security accident handling manual	Yes/No	Development completion	From post evalua-tion interview
			Expense rate of budget related securi-ty	(budget of security program ÷ budgets) × 100	%	NA	Restricted document of MNDC (100% government's budget)
	Human resources	Assistance manpower	Rate of secu-rity training program	(time spending on security training program ÷ total training time)	%	53.8%	Security training program : 70Hr Total training Pro-gram : 130Hr

Note) ① central government: government organizations headed by Minister
② government facilities: all central government and local government (21 Aimag, 315 Sum)
③ user organization: all government organizations using NDC (but, simple tasks like issuance of domain and e-mail account are excluded).

5. Implication and Suggestions

Given political instability at the beginning and implementing phases of the NDC project, the Mongolian NDC project itself was well implemented. However, there are some problems that should not be repeated. Some implications and lessons to be learned from the NDC experience are summarized as follows.

Interest and commitment of the Government of Mongolia on e-Government are estimated to be very high. But the relative position of ICT and e-Government organizations and the resulting lack of political power and influence of ICT leadership within the structure of the central government have been critical to the effectiveness of ICT ODA project. In particular, the key agency to coordinate ICT-related ODA at the central government level, the ICTPA, does not have enough ICT leadership and political influence compared to other ministries and/or departments. This made it difficult for ICTPA to promote systematic e-Government and information policies. One possible solution for this would be transferring ICTPA to the Ministry of Finance, which is in charge of national budget and ODA project in general.

Another problem of the NDC project is significant underutilization of facilities. The main reasons for underutilization of NDC were diverse. Lack of power and influence of ICTPA and the resulting weakened ICT leadership is one. In addition, the NDC as a managing agency for the Mongolian government data center has not been fully trusted by other government organizations because the legal status of NDC is not a permanent part of government and its employees are not regular public officials. Physical environment is also an important factor for underutilization of NDC. Long distance from downtown to NDC, lack of exclusive lines instead of leased lines, and strict access control by security guards are also affects underutilization of NDC as well. Fear of client organizations about the potential loss of ICT manpower and strong wish to control over their own servers are also important reasons why they try to maintain their own servers independent from NDC. Thus when donor country decides e-Government ODA such as NDC, it has to consider the ways to maximize the utilization of the outcomes in the first place.

At the implementing phase, PMC should be extremely careful in providing appropriate equipment and facilities. Provision of defected monitors would not be justified for whatever reasons. In addition, equipment and facilities should be selected considering the availability of local A/S. e-Government projects must have various electric and electronic products, and there can be high possibility of malfunction. In developing countries, electricity provision is usually problematic, which may incur frequent malfunction in electric and electronic equipment and facilities. If local A/S were not available, broken equipment and facilities cannot be fixed on time, which would reduce the efficiency and effectiveness of the whole ODA project.

Another factor that may have negative impacts on e-Government ODA is the appropriateness of the manpower training program. Training program through inviting people from the recipient country must meet the demand of the recipient country, and the quality of contents should be sophisticate enough to run the provided facilities. The length of the training session should also be carefully designed to meet the actual demand from the recipient country. It is recommended to conduct a pre-training program to educate high level government officials about the importance of NDC by dispatching experts to the recipient. Inviting some upper (higher) politicians to the donor country and letting them visit the country's National Computing and Information Agency, and conduct training that relates to informatization along with e-

Government policies will also be necessary to maximize the utilization of NDC. Preparing legal systems (for instance, making it mandatory to locate main servers in the NDC when introducing the e-Government system in government institutions, etc.) as prerequisites for e-Government ODA such as NDC are needed in a timely manner before any e-Government projects are undertaken.

The NDC project may have contributed to the increased attention about the importance of e-Government and integrated management of government data servers. It may also have stimulated to develop local ICT industry and increased the informatization minds of public officials. Certainly, the NDC project has served as an information infrastructure for the Mongolian e-Government. However, medium and long-term effects of the Mongolian NDC upon the achievement of MDGs are not clear. As in other literature on aid effectiveness, we cannot exactly demonstrate the macroeconomic effect upon poverty reduction, economic development, and/or establishing democratic governance. But we can conclude that provision of NDC certainly increase the awareness of e-Government and would have potential for increasing transparency in public administration, which is important for social and economic development of the recipient country in the long run.

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고려대학교에서 행정학 학사, 석사학위, 미국 아이오와 주립대학교에서 정치학석사, 노스웨스턴 대학교에서 정치학 박사를 취득하였고, 국민대학교 행정정책학부 교수로 재직 중이다. 정치경제학과 산업정책을 전공으로 하면서 다수의 전자정부 ODA 평가 사업을 수행하였다.

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고려대학교에서 경영학 학사, KAIST 경영학석사, 러시아 IMEMO에서 경제학 박사를 취득하였고 국민대학교 국제학부 교수로 재직 중이다. 러시아 및 CIS 체제전환 경제와 국제경제를 전공으로 하면서 한러경제 협력, 한중앙아 경제협력에 관한 다수의 연구논문을 발표하였다.