Fundamental Study on Applying SIB to CPTED Projects

Jieun. Lee, Kabsung. Kim

***Abstract*—**This study proposes the possibility to apply SIB(Social Impact Bond) to CPTED(Crime Prevention through Environmental Design) projects as a precautionary strategy to decrease crime rate as well as increase the sense of financial efficiency and urban safety. Focusing on CPTED projects, u-security system in South Korea and Peterborough SIB projects in England, case studies are conducted to reveal the principles, results, and its usefulness of applying SIB to CPTED for the synergy effect according to the identical purpose. Moreover, the applicable SIB model of crime prevention with CPTED is designed and the expected benefits and social impacts are analyzed.

***Keywords*—** CPTED (Crime Prevention Through Environmental Design), Smart City, Social Impact Bond, U-city

I. Introduction

A. Research Background and Purpose

The importance of securing urban safety never should be underestimated. Therefore, many countries including South Korea are trying to establish u-city or smart city equipped with u-city infrastructures by utilizing ICT(Information and Communication Technology), to fulfill the increasing citizens' demand of quality of life including the urban security issue. In order to establish and operate the infrastructures of u-city, acquiring economic feasibility and the facilities' sustainable management plan should be carefully considered in advance (Son, 2010). In fact, although local government and public/private enterprises have hoped and tried to establish the infrastructures such as CPTED system in many urban areas, it has been hardly vitalized due to the lack of financial status of local government and its poor feasibility to operate the system consistently (Kim, 2012).

Therefore, appropriate u-city provision model which allows the effective financing and operation through the partnership between private sector and public sector is needed at the moment. Certainly, the financing the establishment cost is a one of the biggest challenges in constructing u-city infrastructure, and to make it more efficient, expansion of private participation, consumer-oriented service development have been asserted to be important and necessary (Lee, 2014).

Against this backdrop, this paper aims to reveal the possibility of introducing social impact bond model into the CPTED projects based on the well-fitting features of U-Security service and social impact bond. Moreover, offering the framework integrating u-security service provisions and social impact and SIB models which allow benefits to all participants of the partnership between public and private sectors.

B. Research Scope

This research starts with introduction of u-security system in South Korea. Then, the concept of social impact bond model is going to be defined and analyzed with its general structure and key features. Also, the Peterborough SIB case is introduced to show readers its typical structure and its inspirable results. Afterwards, the qualifications to be applied to other services are going to be reviewed, and the possibility of applying SIBs in CPTED projects is going to be clarified. Based on that, just like the other SIBs which have been applied to other social programs fulfilling the conditions to be applied, the combined u-security provision model with SIB contracts has been designed and suggested. Afterwards, the last section is going to offer the expectable outcomes of utilizing the SIB model in u-security system's provision process.

C. Research Methods

This study has reviewed literatures and document materials including legislature regarding ubiquitous city (u-city) in South Korea, blueprints provided from an expert working in the project of setting up the u-security CPTED system of Goyang city in Korea. The expert was Chang-hyeok, Lim, a director of Myung Shin System Co., Ltd. He provided blueprints and u-security system designs at the moment, which are core plans of CPTED system design in Goyang city where the u-security system is under construction at the moment. The author visited the u-security construction site, 'Samsong' district in Goyang city to get some implications and meet Mr. Lim.

II. CPTED System in South Korea

A. Concepts of CPTED

CPTED refers a precautionary approach lowering the crime rate and reducing fear of crime by deterring criminal behavior through environmental design and physical management based on preventive policing philosophy (Moffat, 1983). Since a structured environment design can hinder crime and save numerous potential victims, defensive environmental design

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from crime chances has been developed in many countries. CPTED strategies include 'target hardening' such as multiplying the difficulty required to commit crime, 'access control', and reinforcing 'surveillances' through increasing the possibility of detection of criminal behaviors (Clarke & Homel, 1997). In Korea, CPTED is applied to most of the u-city projects under the name of U-security system. It prevents crime by reinforcing public safety and anticrime measures through real time monitoring, and quickly response as soon as an accident occurs.

B. Ubiquitous City and U-security System

U-security system is a part of a 'Ubiquitous city (U-city)', which is a national strategic project under the new paradigm of urban development, which is commonly called as a 'smart city' in other countries. Under the aim of improving the quality of life of citizens and balanced national growth by providing the efficient construction and management of ubiquitous cities, South Korea enacted the 'Act on the Construction, etc. of Ubiquitous Cities' in 2008 and have amended the legislature several times making continuous improvements. Since the u-city comprehensive plan has been established in 2009, Korean government has supported the u-city related businesses of constructions in 50 cities.

'Ubiquitous city (U-city)' is a city which provides ubiquitous city services at any time in any place by establishing 'ubiquitous city infrastructure' through integrating the construction technology and new information communication technology (ICT). These u-city technologies are applied to transportation, environment, crime prevention, disaster prevention, energy and facility management, and administration service fields. These ubiquitous city services are categorized to 11 area, 70 services, 228 unit services. These include transportation management optimization, health care service, pollution management, public security and alarm service, road facility management, U-classroom (education) service, cultural facility management, U-distribution center, job information service, housing town management services, and so on.

Among those, this paper focuses on the crime-prevention issues and its improvement by studying 'Social Impact Bond', another new paradigm of financing and providing social services. Especially, the CPTED strategy is well reflected in the 'U-security' service system in Korean U-cities. Above all, the crime-prevention related issues are one of the most popularly introduced services in the current u-city projects in Korea due to its effectiveness and pervasive empathy for its necessity.

Many projects similar to U-cities are in progress in other countries, too. Advanced countries implement the smart city (u-city) type projects in both new and old cities focused on transportation, security, environment, and energy with 'old city redevelopment' type. In contrast, developing countries tend to introduce the u-city technologies in 'new city development' projects focusing on crime-prevention and transportation. Therefore, in both advanced countries and developing countries may utilize the U-Security Service system combined with SIB model in the future if appropriate model is well designed, developed, and finally delivered to the cities having U-security infrastructures.

C. U-security Services

U-security services monitor crime and disaster in real time by installing detection systems or CCTVs in high crime or high risk areas. If crime or disaster occurs, U-security service informs citizens its occurrence and countermeasures through smart phones, television set, media board, and so on. Also, the monitored video information is transferred to U-integrated control center (or 'U-integrate operate center') and saved, so that administrative agencies and centers can search, trace the moving routes and arrest criminals in a short time effectively.

U-security services are provided by U-security system. The U-security system consists of CCTV camera facilities, security communication network, and integrated control center. It provides intellectualized, geo-spatial services by grasping the current security situation and regarding factors needed to be considered.

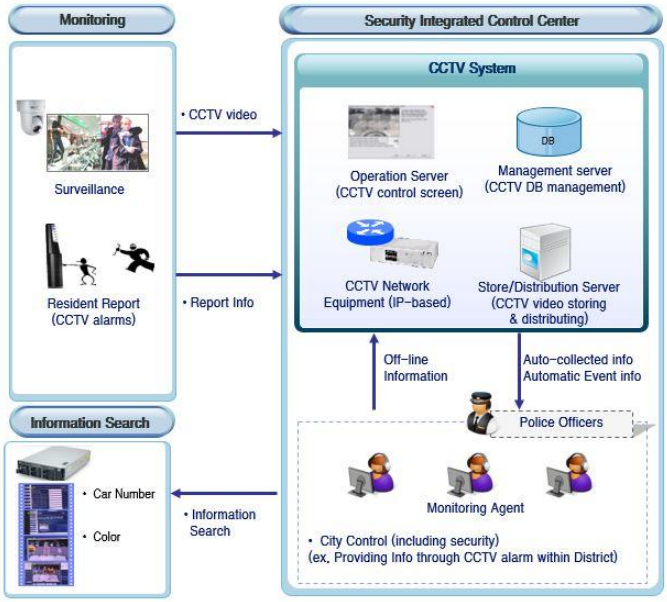

Fig. 1 U-Security Service System

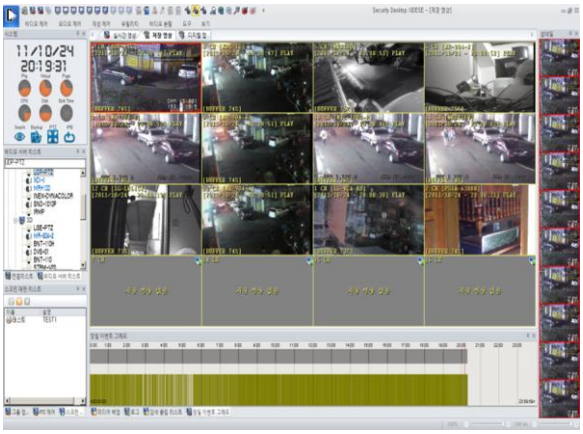

Fig. 2 U-Security crime monitoring with CCTVs

III. Social Impact Bond

A. Concept of SIBs

Social impact bonds (SIBs) are financial contracts designed to attract investors to fund social programs by providing them an incentive if the projects meets its predefined targets (Schinckus, 2015). Although normal bonds are obligated to pay back the principal and interest after the expiry of a fixed-term contract, social impact bonds are conditional contracts without the fixed interest rate, but ensure its payment of money depending on degree of the outcome achievements of the social goals had been aimed. SIBs are named in England but they are called differently in each country. 'Payment for Success' is more prevalent in United States, whereas 'Social Benefit Bond (SBB)' is official name in Australia, and 'Social Bond' in New Zealand.

B. Typical SIB Structure

SIBs involve multiple participants including government (or government agency), external organization as an intermediary, service provider, private investors, and an independent agency as an outcome evaluator. The multiple participants cooperate by arranging contracts between them as follows.

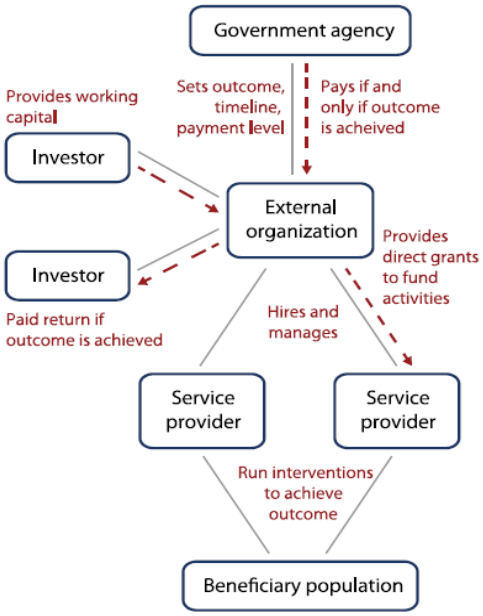

Fig. 3 Typical SIB Structure
Source: Kristina Costa, Sonal Shah, Sam Ungar and the Social Impact Bonds Working Group, "Frequently Asked Questions: Social Impact Bonds" (Washington, DC: Center for American Progress, 5 December 2012)

First, government and the intermediary make an agreement. Government ensures the budget supply, and intermediary organization finances business capital from investors by issuing social impact bonds. Intermediaries take a central role deciding and managing service providers. Service providers deliver the social services and receive pre-agreed payments. Also, the independent assessors review and evaluate the results of the social business and submit the results to government and intermediaries. Then, government executes the budget based on the outcome assessment results, only if the pre-agreed degree of outcome has been achieved. After that, intermediaries pay back to the principals and interests to private investors with the executed budget from government.

C. Key Features of SIBs

Social Impact Bonds have strengths compared to existing financing methods in several aspects as follows. First, social impact bonds tend to focus on preventive businesses. For instance, rather than punishing offenders afterwards, it creates social security and educational effect by offering social services and establishing social institutions in advance of crime occurrence.

Second, SIBs involve the assessment of the pre-defined outcome. Therefore, service providers are able to concentrate on achieving the core outcome that the social program pursues, and the government may use the results as foundations of improvement progress in the future.

Third, SIBs involve returns the capital and interest to investors contingent in whole or in part on performance-related payments. This is a differentiated feature from the general donations in the private perspective. Private investors may receive both capital and interest if the performance goal was achieved, and if not, they may report the investment money as donations so that they may get some donation tax credit, meaning that private investors may pursue profitability as well as the publicity.

Fourth, SIBs enable to share risks involved in social programs. The subject of solving social problems is government in most cases, and government takes all the risks involved in the failure of each policy. However, SIBs transfer the risks burdened on government to the private sector while offering the new types of opportunity expectable profits and social outcomes to investors. In sum, SIBs are cooperative process solving social problems through partnerships with government, investors, and service providers in private sectors.

IV. Case Study: Peterborough SIB

A. SIB Projects in the World

SIB projects are started in England in 2010 and it has been expanding to other countries, recording 26 SIBs are on operation in the world (Nicholls, 2013; Schinckus, 2015). England, United States, Australia, and Canada has already on the process of implementing several SIB programs. Especially, in June 2014, United States passed the Social Impact Bond Act, a bill aimed at fostering growth of SIB programs and allowing to spend 300 million dollars for SIB projects to fund feasibility studies and evaluations of SIB projects (Field, 2014). Now, many countries including United States are about to introduce or expand the SIB projects under an arrangement of institutions. Among the countries, the author has reviewed Peterborough SIB project for the case study since it is the foremost example of

SIBs showing the applicable example in U-security service according to the CPTED strategy as well as aiming the same issue, crime-prevention.

B. HMP Peterborough SIB in England

HMP Peterborough SIB contractual model is the very first SIB project in the world. It was started in September 2010 aiming at decreasing recidivism rate of short-sentenced prisoners in HMP Peterborough (Emma, 2011).

The program provides rehabilitation programs to three thousand offenders. If the second conviction rate is lowered by at least 7.5% overall, compared to other regions' comparison group, the Ministry of Justice pays capital and interest contingent in the amount of savings from the interventions. The investors in Peterborough SIB are 17 organizations including Rockfeller Foundation and other philanthropic organizations. The ministry of Justice guaranteed its payment and the upfront cost was financed from the Big Lottery Fund. Service providers are St. Giles Trust, Ormiston Trust, SOVA, MIND, and YMCA. Each of them delivers different kinds of services such as criminal's family care, psychological counseling, and reintegration assistances. Also, QinetiQ and University of Leicester are in charge of independent assessor of the outcomes, and already published several reports, including the recent output, 'final report on cohort 1 analysis' in 7th August 2014.

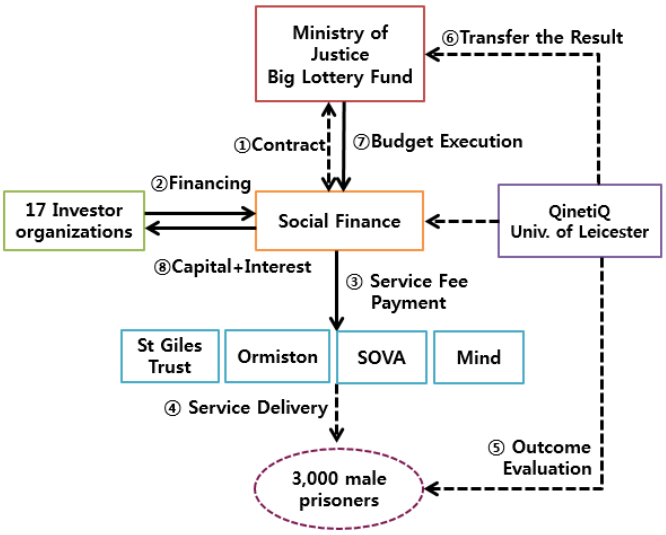

Fig. 4 Peterborough SIB Structure

C. Results HMP Peterborough SIB So Far

According to the interim report in 2013, the Peterborough SIB has shown an inspiring result, the second offense rate has reduced by 11% while the national average recidivism rate has increased by 10% in the same period, implying the significance of interventions. The recent final report on cohort 1 analysis concluded that the analysis showed that there was 8.39% reduction in reoffending rates within Cohort 1, showing somewhat insufficient outcome to make happen the payment for the first cohort.

D. Qualifications to be Applied to Other Programs

To apply SIB-type contractual model into other social programs, some requirements should be met. First, the aiming outcome should be well-defined and objectively measurable because SIB contracts pay back depending on the evaluation result concluded by the independent assessor. Second, private service providers should be able to deliver the social services with lower costs in achieving the defined outcomes than government agency. Third, there should be enough investors to fund the upfront cost of the social program while accepting the risk involved in the SIB projects, meaning that the social program needs to have some empathy about its necessity among the potential investors.

V. SIB Model with CPTED

A. Verification of Suitability

While CPTED approaches try to suppress the crime triggers through physical environment management, Peterborough SIB projects try to lower crime rate more in software (human) aspects by educating and helping people who are potential reoffenders not to become a criminal again. Both of them have a common goal, the crime prevention, and try to result the decrease of crime rate and securement of urban safety.

Based on the common goal, it is expected that U-security services may have synergy when or if the U-security services are provided in the form of SIB contractual model. Before concluding that introducing SIB model into CPTED projects is desirable, the qualifications stated above, should be reviewed and checked out.

The first matter, the possibility of defining a clarified and measurable objective outcome, is able to be satisfied since U-security services aim to prevent crime occurrence so that the measure of 'crime rate' of the target region may be utilized. Whereas Peterborough SIB projects took the recidivism rate as the measure of outcome evaluation, CPTED projects can be assessed with the measure of 'crime rate' where U-security infrastructure system is equipped. Both of the measures are obviously measurable and clear, having no doubt to be distorted in the middle of assessment process.

Second, the existence of service providers who can implement the outcome achievement with lower costs, is able to be met depending on the types of services. In most cases such as the supply and maintenance of the U-security infrastructure, the regarding corporations are certainly potential service providers since those services are currently provided by contracting-out. However, some part of the U-security services like arresting and monitoring, seems to be maintained in public part at least at some level. Regarding the public-private partnership model for the u-city management, Son (2010) has suggested division of roles and responsibilities between public sector and private sector. According to the study, u-city services such as construction, maintenance of the facilities, and data archiving can be transferred to the private sector whereas monitoring,

rendering, and overall operating seem to be remained in public sector.

Third, the existence of investors in the field of U-security system, may be the biggest challenge in pushing forward the SIB contractual model in providing U-security system due to the financial risk that investors should take and its big amount. However, considering the increasing demand of Corporate Social Responsibility (CSR) and interests in urban security, potential investors are expected to be companies hoping to promote its corporate images in relation to safety issues, individuals searching place to put dollars for profit or either for social influence, and the inhabitants worrying the safety issues. Also, in case of the other country's SIB model such as New York Riker's Island project, Bloomberg philanthropies guaranteed up to 7.2 million dollars to reduce the risk of capital loss for investors (Nichols, 2008). If a philanthropic organization or government agency can cut the burden of investors' risks at some degree, the challenge of gathering enough upfront cost from the investors is going to be much easier to overcome.

B. Designed Model

Then, the combined model can be suggested as Fig. 5. Yet, there is no case of providing infrastructure with a SIB contractual model form in the world. However, it may work out based on the implications from the other projects and institutional bases that we have. Based on those, I have designed the tentative SIB model as follows.

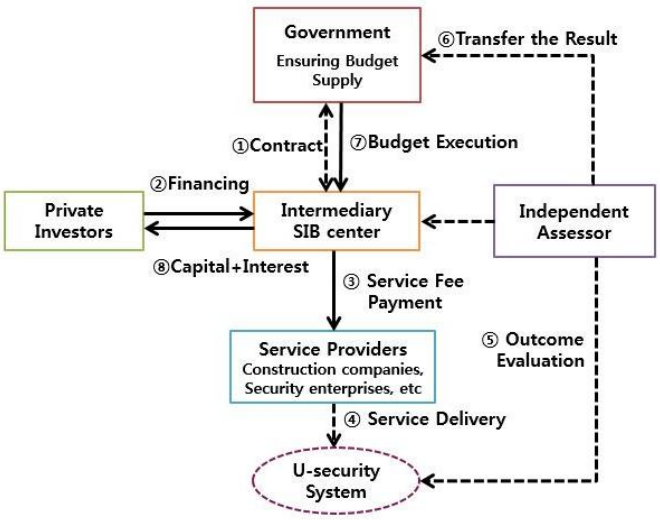

Fig. 5 U-security SIB Structure Model

A subject ensuring the budget supply if pre-defined crime rate reduction goal has achieved can be the region's local government who are currently in charge of operating the u-city infrastructure system. Also, the role of the intermediary is the key of success in any type of SIB projects since the intermediary organization should choose the service providers, issue the social impact bonds, and finance the upfront costs. For this role, there are several options. One is establishing or deciding an independent organization apart from the integrated control center. The candidates may be financial institutions such as 'Social Solidarity Bank', 'Korea Social Investment', and so on who can work as commissioner and financer of social impact bonds. Another option is utilizing existing integrated control center as an intermediary by establishing an independent division in the center, and this requires less costs. The independent assessors can be either university or police agency which has profession in estimating the degree of the statistical significance and its crime rates. Service providers can be many enterprises related to security system related industries.

C. Potential Social Impacts

If SIB model is applied in providing U-security services, several desirable objectives are expected to be acquired. First, government can lessen cost burden for u-city projects while increasing the outcome of the services. If infrastructure establishment is implemented with SIB contractual methods, government may reduce the financial charges and can finance capitals from the private companies, philanthropies, and individuals like residents in the cities. Moreover, if the agreed outcome was achieved, local government will spend the principal and interests but it will still be less costs. If the pre-defined outcome was not achieved, then local government does not need to pay back the principal, meaning that taxpayers' money is going to be used only for successful services. Therefore, local government will be able to save the budget and citizens will be happier with the positive impact on their cities.

Besides, private investors are going to have an attractive opportunity to contribute on urban security as well as to make a profit. In private enterprises' perspective, investing on stocks or real estate market always involves risk. Considering its social impact by achieving the crime-prevention, this type investment model is able to be attractive. The residents are also able to take a role as investors hoping to have a safer city environment and profits with the outcome achievement.

VI. Conclusion

This paper has offered fundamental studies on how social impact bonds (SIBs) and U-security system could potentially be merged and utilized to amplify its synergy effects for crime-prevention. To get some implications for the u-security infrastructure provisions, this study has reviewed the Peterborough SIB model which aimed at reducing the recidivism rate with the same crime issues. Although u-security system includes much broader targets, certainly it seems to be possible to vitalize its financing with SIB contractual model in the process of providing it. To attract more investors, introduction of crowdfunding is also needed to be considered, and other methods to reduce the financial risks for the investors will be applied as have seen in New York city's Pay for Success project. Although the first trial would require much more efforts than just maintaining current situation, considering its social impact and the possible savings of local governments, the taxpayers' benefits, and the opportunities which enabling to pursue both profits and public interests by investing on urban

environment, the u-security SIB structure model is enough to be carefully reviewed as an alternative supply method of CPTED facilities.

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REFERENCES

[1] Choi, Chang-Sun, "The effects of u-security service quality on end user's satisfaction," Department of Convergence Industry, Seoul Venture University of Seoul, Korea. Dissertation.
[2] Clark, R and Homel, R., "A Revised classification of situational crime prevention techniques", In S.P. Lab(ed) Crime Prevention at a Crossroads. Cincinnati: Anderson Publishing Co., pp.17-27, 1997.
[3] Emma Disley, Jennifer Rubin, Emily Scraggs, Nina Burrowes, Deirdre Culley, RAND Europe. "Lessons learned from the planning and early implementation of the social impact bond at HMP Peterborough . Ministry of Justice , 2011
[4] Field, Anne, Bipartisan bill would allocate $300M for social impact bonds. Forbes. June 26 2014
[5] Harder, Kelly, and Tina Walha, 2012. Paying for success: a model for the future, The 2012 Human Services Summit.
[6] Kim. Ki-Sung, A study on the provision and sharing of operating resources for u-city management center, 2010, Graduate School of Public Administration, KonKuk University.
[7] Lee, Jae-yong, Jang, Hwan-young, Kim, Kirl, "A study on the performance diagnosis and the future development direction of U-city", Journal of the Korean Urban Geographical Society, Vol. 17, No. 2, 2014.
[8] Lee, Jea-sun, Park, Hyeon-Ho, Oh, Se-Kyung. "A study on the crime prevention through environmental design (CPTED) strategy for the application in Korea: a preliminary inquiry, Vol. 20, Issue 2, pp.213-232, 2008.
[9] Maryland, Department of Legislative Services. "Evaluating social impact bond as a new reentry financing mechanism," 2013.
[10] Moffat, R. "Crime prevention through environmental design – a management perspective", Canadian Journal of Criminology, Vol. 25 No.4, pp.19-31, 1983.
[11] Nichols, Alex. The landscape of social investment: the history of opportunities and challenges, Skoll Center for Social Entrepreneurship, 2008.
[12] Nicholls, Tomkinson. "The Peterborough pilot social impact bond", University of Oxford, 2013.
[13] Olson, John and Phillips, Andrea. "Rikers island: the first social impact bond in the United States", 「Community Development Investment Review」, Vol. 9, Issue 1, Federal Reserve Bank of San Francisco, 2013
[14] Schinckus, C. "The valuation of social impact bonds: an introductory perspective with the Peterborough SIB", Research in International Business and Finance, 2015. http://dx.doi.org/10.1016/j.ribaf.2015.04.001
[15] Social Finance, Towards a new social economy, Social Finance, 2010.
[16] Son, Kweon-il. "A plan for an efficient u-operating model for the u-city-based integrate operate center(IOC)," 2010
[17] The Robertson Trust, "Social investment in Scotland: a funder's perspective on public social partnerships and social impact bond," The Robertson Trust, 2012.