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Is Country-system-based Aid Really Better than Project-based Aid?

Evidence from Rural Water Supply Management in Uganda

Mitsuaki Furukawa[*] and Satoru Mikami[†]

Abstract

The adoption by donors of the recipient country's system, rather than a parallel donor system, in implementing aid projects has been highly recommended within the aid community in recent years. However, the assumption behind this policy that using a country's own system would enhance the recipient's bureaucratic capability and result in improved public service delivery has yet to be verified. We show in this paper that this expectation does not necessarily fit with the reality, taking the Ugandan rural water supply sector as an example. When bureaucracy itself is in flux in the name of "decentralization," the unconditional adoption of a country-system approach could underperform when compared to the conventional donor-project approach.

Keywords: Uganda, rural water supply, country system

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Introduction

At the DAC High Level Forum in Paris in March 2005, the participating partner countries and donors reconfirmed the need collectively to tackle aid fragmentation as one of the major challenges in development (OECD 2008b; Knack and Nichole 2009). Aid fragmentation is widely seen as a breeding ground for transaction costs in development aid, imposing unnecessary burdens on partner countries and harming their governance (Morss 1984; Roodman 2006a; Kharas 2007). Recognizing this, the use of recipient country systems by donors was unanimously agreed in the "Paris Aid Effectiveness Declaration." Five years later at the Busan High Level Forum, aid fragmentation continued to be the central problem that had to be addressed (OECD 2010).

While active debate on donor coordination continues, the relationship between aid modalities and development outcomes such as economic growth and poverty reduction in partner countries has been neglected in the literature (Bourguignon and Sundberg 2007). Most empirical studies on aid do not explicitly distinguish between aid delivery systems (Rajan and Subramanina 2008, Easterly et al. 2004; Clemens et al. 2005); exceptions are Kimura et al. (2007), who took into account the heterogeneity of aid quality, and Furukawa and Takahata (2013), who focused on the effectiveness of General Budget Support (GBS).[1]

The aim of this paper is to examine empirically the effectiveness of country-system usage as against the conventional project-based method, which relies on donors' own separate management systems, in the specific case of the maintenance of water-supply infrastructures and the organizations that manage them. This is intended to lead to a reconsideration of future aid architecture, since the desirability of country-system usage has been taken for granted in recent debate without a systematic examination of its real impact on development outcomes. GBS, which by definition should increase country-system usage, has been preferred in several

1. GBS refers to donor funds that are disbursed through the recipient government's own financial management system rather than being earmarked for specific uses.

countries. Yet no one knows for sure whether it really paves the way for aid-effectiveness. As the first country to adopt GBS in 1998, Uganda is an appropriate case for the study of the possible utility of the country-based system. We focus on the rural water supply sector in particular, in which the adoption of a country-based system has been streamlined since the early 1990s, although a certain amount of project-based aid remains.

This paper is structured as follows: after a review of earlier studies, we trace the history of Ugandan development aid since independence and explain the current rural water supply system in Uganda. The third section presents a hypothesis based on the dominant discourse in aid modality debates as well as sketchy macro-level evidence. The fourth section describes the data and method we used in verifying the hypothesis. The results are presented in the fifth section, before a final discussion of their implications.

1. Previous studies

The aid effectiveness commitments, which were agreed upon in Rome, Paris, and Accra, call for increased use of partner country systems, in particular the national budget and public financial management systems (OECD 2008a). This call stemmed from the perceived adverse effects of aid fragmentation, one of the longstanding issues for the aid community (Pearson 1969; Morss 1984; Cassen et al. 1994), with examples witnessed in Kenya, Zambia, Tanzania, Vietnam, Cambodia, and so forth (van de Walle and Johnston 1996; Roodman 2006). As Acharya et al. (2006) point out, the immediate consequences of aid fragmentation are increased transaction costs for recipient governments in absorbing foreign aid. Despite a substantial amount of aid as a whole, increasingly differentiated projects become a burden rather than a benefit for partner countries, as the number of donors per recipient country increases (Frot and Santiso 2010). According to Kharas (2007), the average scale of projects has become smaller in recent years, while the average number of donors per recipient country has increased, producing inefficiency and high costs in information sharing, coordination, planning, and aid administration. In short, aid fragmentation has produced inefficiencies in development assistance and a burden for partner countries, undermining rather than underpinning their administrative capacity. The negative influence of aid fragmentation has been empirically verified (Acharya et al. 2006; Knack and Rahman 2007; Roodman 2006a, 2006b; Kimura et al. 2007; Kihara 2012). Knack and Rahman (2007), for instance, have revealed the impact of donor fragmentation on the quality of government bureaucracy in partner countries.

The adoption of a country-based system, which is expected not only to enhance the public financial management capacity of partner countries but also to improve ownership and further alignment, has yet to be scrutinized. As already noted, Kimura et al. (2007) have examined whether aid fragmentation hinders aid effectiveness in promoting economic growth and Furukawa and Takahata (2013) have examined whether GBS, which promotes the usage of country-based systems, has any impact on health outcomes. However, to the best of our knowledge there is no study which has explicitly investigated the effect of country-based systems on the development performance of a recipient country. Although Knack and Eubank (2009) focus on the country-based system, what they explain is how to create incentives for donors to utilize the country system of partner countries rather than the consequences of the adoption of a country-based system.

There are a number of project evaluations by practitioners as well as some academic research on rural water supply projects (Isham and Kähkönen 2002; UNESCO–WWAP 2003; Gleitsmann et al. 2007). However, they too fail to compare the results of country-system-based projects and those of donor-based projects.

In this paper, we try to fill the gap that has been left to wishful thinking—the use of a country-based system in partner countries would eventually lead to better outcomes (OECD 2008a)—by directly comparing the performance of country-system-based projects and donor-based projects. Before coming to our empirical test, however, we will establish the context in which our case is embedded.

2. Historical background

After gaining its independence from the UK in 1962, Uganda began its state-building with two consecutive five-year national development plans: the first for 1962–1967 and the second for 1967–1972. However, continual political turmoil, beginning with the coup by Idi Amin, has interrupted planned development efforts since 1971. Donors and NGOs have implemented projects based on their own interests, resulting in uncoordinated and often fragmented projects with tremendous transaction costs instead of expected benefits.[2]

However, this trend changed in the mid-1990s, when sector-wide approaches as well as the Poverty Reduction Strategy (PRS) approach were adopted with a view to bringing a more collaborative approach to development. This new approach has restructured aid relationships between donors and the partner country: the Ministry of Finance, Planning and Economic Development on the recipient side and GBS donors have become the central players in the arena of development. Specific measures adopted to strengthen the PRS approach include the first Poverty Reduction Action Plan (PEAP1) and the Mid-term Expenditure Framework formulated in 1997, the introduction of GBS in 1998, the poverty action fund established in 1998, the partnership principle concluded in 2003, the poverty reduction action plan matrix formulated in 2004, and the Uganda joint assistance strategy agreed in 2005. Currently, GBS is the preferred aid modality, and the aid structure for policy dialogue has been gradually institutionalized around this. The Joint Budget Support Framework, which was established in 2009, was the additional confirmation of this aid structure. Along with GBS, the use of a country-based system is now widely encouraged in many sectors in Uganda.

2. Interview with the National Planning Authority, conducted on August 29, 2012.

Against this backdrop, the preferred aid modality in Uganda has shifted from project-based assistance to pooled funds, and eventually to GBS. Even where project-based assistance persists, most donors provide financial support either to the government or to NGOs, allowing them to implement projects and programs through the country system.[3] The donors that provide the greatest proportion of assistance through the public financial management of Uganda are "GBS donors" such as the UK, the World Bank, AfDB, the Global Fund, Ireland, Denmark, and the Netherlands. On the other hand, the UN, Japan, the US and the EU institutions tend to avoid the system. With respect to the procurement system, the rate of usage by the UK, EU institutions and Denmark is high, whereas the rates for AfDB and the Global Fund are very low, and the rates for Japan and the World Bank are somewhere in between (OECD 2010). Of course, adoption rates for the country-based system differ from sector to sector, depending on the major donors in that particular sector.

The water and sanitation sector is regarded as an important for improving of quality of life for the poor. Water is one of the prioritized sectors in the PEAP which adopted in 1997 four pillars of development: 1) the establishment of a system tuned to economic growth and structural reform; 2) securing good governance and security; 3) income improvement for the poorer classes; and 4) the improvement of the quality of life of the poorer classes. Rural water supply is especially crucial to achieving PEAP aims related to the poor in rural areas.

Rural water supply projects in Uganda were initiated on a large scale around 1990. DANIDA started the Rural Water and Sanitation Eastern Uganda Project (RUWASA), targeting the eastern part of Uganda, while UNICEF implemented the Water and Environmental Sanitation (WES) program with financial support from SIDA for the rest of the country. Both projects shifted to the use of the Ugandan country system in their early stages. In the meantime,

3. Interviews with staff of government, donor and NGOs, conducted in August 2012.

projects sponsored by Japanese grant aid, which started in 1997 and mainly targeted the central region, adopted the conventional aid modality (JICA 2003).

Such contrasting approaches by major donors in the rural water supply sector in Uganda precisely fit the predictions of Knack and Eubank (2009). According to their theory three main factors govern whether or not donors will utilize the recipient country's system: 1) the trustworthiness or quality of governance; 2) the donor country's public tolerance of development aid; and 3) the donor's ability to internalize more of the benefits of investing in country-based systems. Based on the results of the regression analysis, Knack and Eubank (2009) point out that international organizations such as UNICEF are more likely to use country-based systems than bilateral donors, and that among bilateral donors, Nordic Plus, which includes Denmark and Sweden, tends to utilize country-based systems more than other donors. On the other hand, Japan has persisted with project-based assistance in the rural water sector, mainly as a result of a strong domestic consensus on the superiority of the project-based approach. The experience of Asian development in which projects aligned with partner country development plans have been successful in bringing prosperity to this region has had a powerful effect on Japan's behavior.

From our interviews with the Ugandan government, donors, and NGOs in 2012, we found that in the area of rural water supply, there is a clear demarcation between users and non-users of the country-based system: Japan is the only donor that continues project-type assistance, whereas others, namely Denmark and Sweden, provide assistance through the country-based system.

3. The logic of adopting country-based systems

Only a few researchers have tried to explain the chain of causality from inputs to outcomes of development. One example is the International Development Department and Associates

(2006),[4] which theorizes to what extent and under what circumstances GBS is relevant, efficient, and effective for achieving sustainable impacts on poverty reduction and growth in its "causality map for the enhanced evaluation framework." It claims that GBS prompts policy dialogue between donors and recipients, thereby improving coordination and harmonization among donors, decreasing transaction costs, and enhancing the predictability of external funding. At the same time, through the use of the recipient country's system for a project's execution, GBS develops the budget management capacity of bureaucrats in recipient countries and improves their efficiency in public expenditure allocation, while enhancing the recipient's sense of ownership. These effects, in the medium or long term, promote development and lead to poverty reduction.

Since GBS is the aid modality that fully utilizes the country system of the partner country, this "causality map" is tantamount to the assumed outcome of country-based system usage. That is, the country-based system is expected to enhance the administrative capacity or bureaucratic quality of partner country governments. However, advocates of the country-based system rely primarily on intuition and accumulated anecdotal evidence (Knack and Rahman 2007). Therefore, we must first examine the correlation between the country-based system and the bureaucratic quality of partner country governments at the macro-level.

To measure the level of country-based system usage, we relied on the 2006, 2008, and 2010 Survey on Monitoring the Paris Declaration conducted by OECD DAC.[5]

– the proportion of use of national budget execution procedures in the total aid disbursed at country level

– the proportion of use of national procurement systems in total aid disbursed at country level

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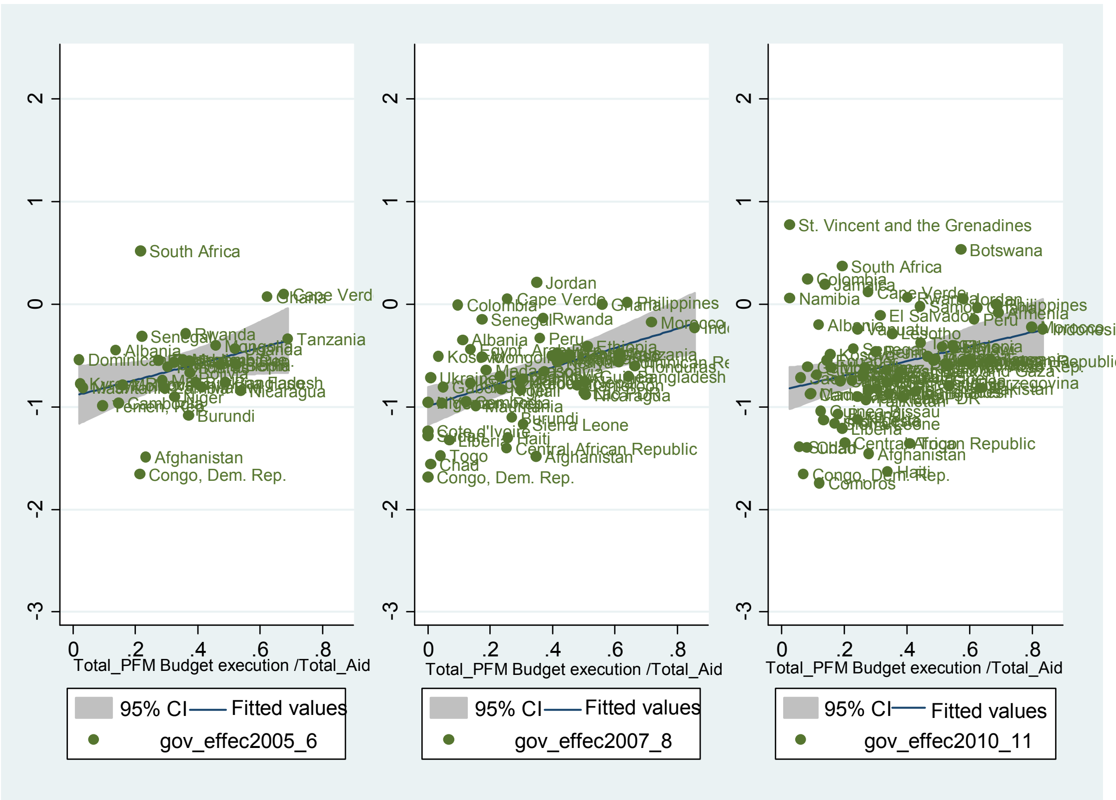
4. International Development Department (IDD) and Associates (2006), Evaluation of General Budget Support: Synthesis Report (referred to as the "DAC seven country studies"), which was published by the British Department for International Development on behalf of the Steering Group of the Joint Evaluation of General Budget Support of OECD-DAC. This studies were commissioned jointly by bilateral and multilateral donors.

5. Data source: OECD Survey on Monitoring the Paris Declaration http://stats.oecd.org/Index.aspx?lang=en&DataSetCode=SURVEYDATA (accessed December 15, 2013).

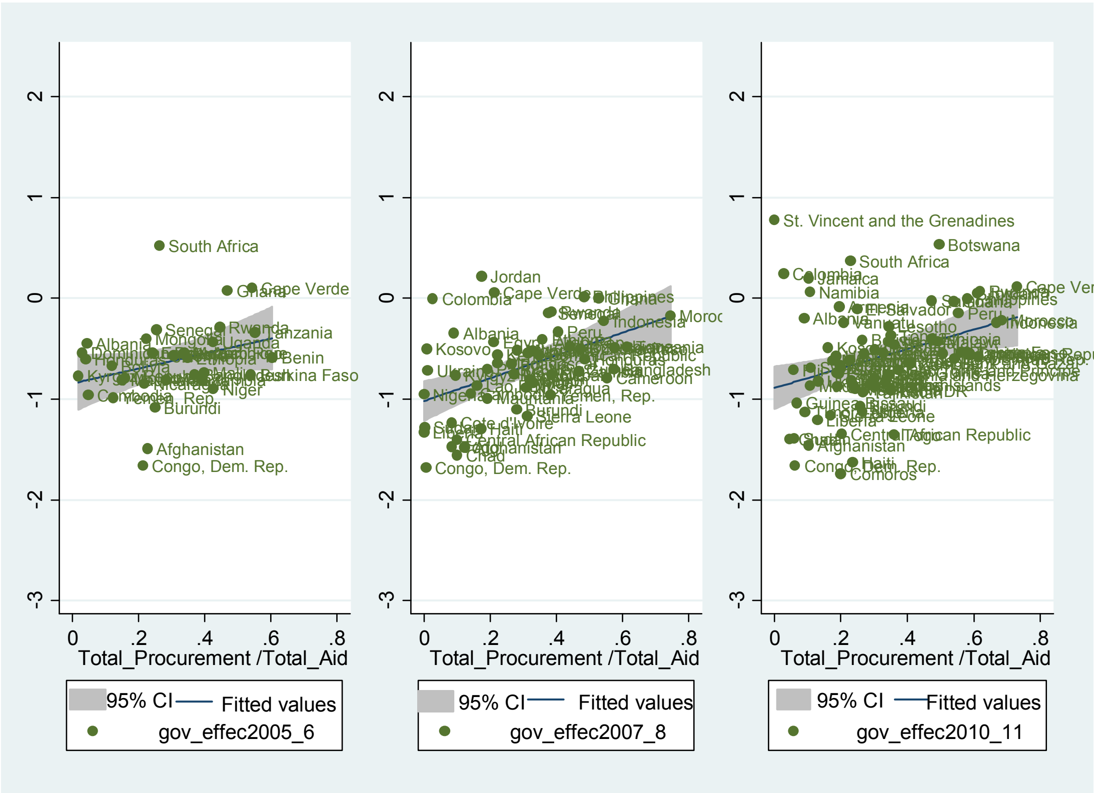
As a proxy of bureaucratic quality, we used the Government Effectiveness Index in "Aggregate Governance Indicators" (Kaufmann et al. 2010). Bearing in mind the expected time lag before the use of a country-based system crystalizes into enhanced bureaucratic quality, we examined the correlations between government effectiveness (GE) in 2006 and the use of the country-based system (CS) in 2005, GE in 2008 and CS in 2007, and GE in 2011 and CS in 2010. Figures 1 and 2 are the simple scatter plots with fitted linear relationships between the two variables. As expected, the figures show that the use of the country-based system has a positive effect on government effectiveness; All correlations are statistically significant at 10 percent level.

Figure 1. Correlations between government effectiveness and the use of a country-based system (use of national budget execution procedures)



Note: Use of country-based system in 2005 and government effectiveness in 2006: n=33, r=.3426*; use of country-based system in 2007 and government effectiveness in 2008: n=54, r=.4634***; use of country-based system in 2010 and government effectiveness in 2011: n=76, r=.2818**.
$*p<.10$; $**p<.05$; $***p<.01$

Figure 2. Correlations between government effectiveness and the use of a country-based system (use of national procurement systems)



Note: Use of country-based system in 2005 and government effectiveness in 2006: n=33, r=.2989*; use of country-based system in 2007 and government effectiveness in 2008: n=54, r=.4721***; use of country-based system in 2010 and government effectiveness in 2011: n=76, r=.3461***.
*p<.10; **p<.05; ***p<.01

Together with the causal impacts of government effectiveness on development outcomes reported, for instance, by Kimura et al. (2007), these results do not conflict, at least at the macro-level, with the hypothesized causal chain from the usage of a country-based system to government effectiveness and development outcomes, as described in the “causality map.”[6]

Having roughly confirmed the general expected causality, we now try to translate this into the context of the rural water supply sector. We will first examine the Ugandan rural water administration system in more detail. The management systems for water and sanitation in urban and rural Uganda can be classified into one of the following three types:

6. The result is a mere correlation. Neither reverse causality nor superficial correlation is ruled out. However, we do not discuss the problem further because it is not our main concern here.

1) water supply and sewerage for large-scale cities managed by the National Water and Sewerage Company,

2) water supply facilities for small towns and rural growth centers managed by the Water Sanitation Development Facility,[7] and

3) the remaining rural water supply other than that above, managed by the district.

Rural water supply under the jurisdiction of each district is divided further into two sub-categories: management by private operators in localities with populations of 5000 or more, and community-based management systems in smaller villages. In the latter, residents are in principle obliged to set up water sanitation committees (WSCs), which are usually composed of seven members including at least three women. WSCs impose and collect maintenance fees from users while the district water offices or NGOs carry out education and training for maintenance.

Hence, the typical pattern of adoption of a country-based system in the context of rural water supply is as follows. Donors disburse funds to DWD (the Directorate of Water Development) and DWD transfers the funds to RUWASA, which in turn makes a contract with drilling companies to construct wells and implement soft components such as hygiene awareness training. Alternatively, NGOs which receive funds directly from donors or governments take responsibility for the construction of water points as well as soft components.

The content of projects is essentially the same when the donor manages projects through its own separate system. Along with the construction of wells, WSCs are set up for each water point and training is given to ensure community-level operation and maintenance using common materials. On top of this, water quality testing kits are given to the districts to ensure that water quality meets consumption standards and, as a backup measure, hand-pump mechanics are

7. The “Water Board” is the body responsible for water supply facilities in each city, and is composed of representatives of the organizations in the district. The Water Board for each facility may entrust the operation of the facility to private companies.

trained and equipped with repair tool kits. However, these mechanics, as well as the water officers of districts, oversee all wells within the district whether or not they are constructed via the country-based system. Hence, the only difference between water points established by the country-based system and those established through the donor-based system is their construction history.

After the disbursement of the donor's financial contribution into the partner government treasury, the funding is utilized through the country-based system in accordance with the sector program which was formulated in the policy dialogue between the Ministry of Water and Environment and water supply related donors. This process is intended to promote harmonization and alignment, to increase public financial management capacity, to improve the fiscal discipline of operational resource allocation, and to enhance the ownership of the Ministry of Water and Environment as well as the district level public servants, which in turn contributes to a more efficient management of water services.

Therefore, even though the process in each case is the same superficially, the sustainability of water points would be expected to differ between facilities established by donor projects and those established through country-based systems, because of government effectiveness. For sustainability, two aspects are crucial: functional sustainability of the facility itself, and the organizational persistence of the WSC. In what follows we test the hypothesis that projects established through country-based systems perform better in terms of sustainability than those established through donor projects.

4. Empirical strategy

We focus here on deep boreholes for two reasons. First, water supply systems such as shallow wells and rainwater tanks do not demand high technical skills for their construction, and therefore the recipient government can construct them through its local system. In contrast, the construction of deep boreholes requires a considerable level of technology as well as experience; therefore, this offers analytically meaningful variations between the country-based system and the donor project.

The second reason is more substantial. In developing countries like Uganda, boreholes can be the most efficient source of clean water, since underground water from deep boreholes is bacteriologically much safer than water from other sources like protected springs or ponds. Therefore, the maintenance of deep boreholes is by far the most critical factor in the improvement of people's health conditions.

To assess the potential impact of the adoption of the country-based system, we compared the sustainability of deep boreholes and their WSCs using monitoring data from the Ministry of Water and Environment, which is called "WATSUP."[8] WATSUP includes various items of information such as types of water source, funders of well construction, year of construction, current status of functionality, and the activities of respective WSCs.

What is good about this dataset is that it comprises records that are generated independently of this specific study. In that sense, we can safely rule out the possibility of bias caused by respondents' adaptation to our research purposes, which is sometimes detrimental in field surveys customized for specific research. The adoption of WATSUP, however, does impose certain limitations. The dataset is mainly concerned with the current status of facilities and contains no information about the geographical and social environment of the facilities. Therefore, the use of the propensity score matching method is impossible.

8. http://www.watsup.ug/

Our dependent variables are the following records about the boreholes themselves and about their management committees:

– whether the borehole is in operation or out of order

– whether the WSC collects user-fees

– whether the WSC holds periodic meetings

– whether the WSC keeps the environment clean

– whether the WSC offers services

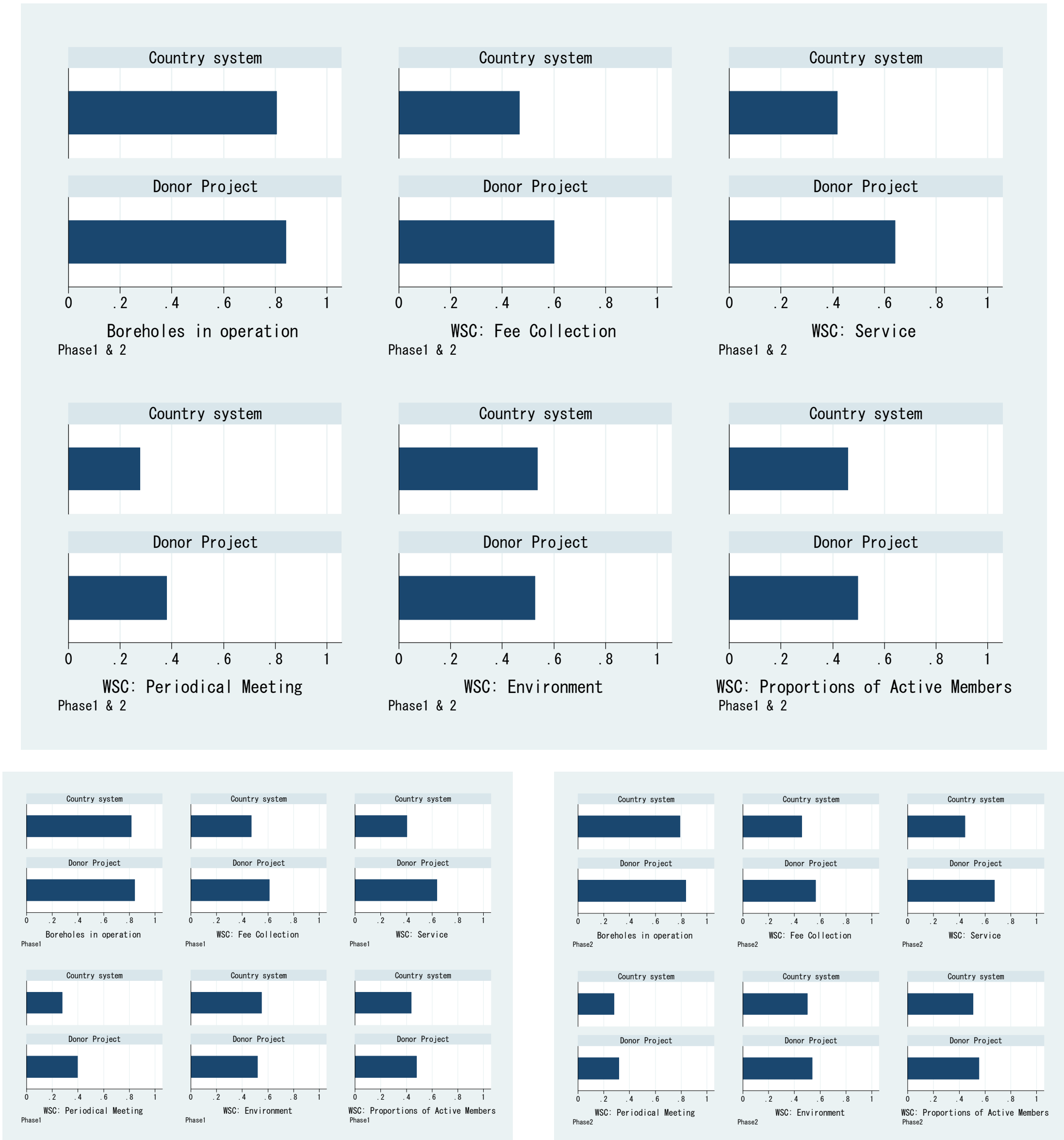
– how many members are active in the WSC

Only the last variable has a continuum scale, because we measured it as a proportion of active members. The rest are binary variables taking a value of 0 or 1. We compared proportions and means between country-system-based boreholes and project-based ones in the districts where JICA constructed deep boreholes during the periods of JICA phase 1 (1998–2002) and JICA phase 2 (2004–2006) (see Table 1 and Figure 3).

Table 1. Variations of dependent variables across districts (top) and elapsed years since construction (bottom)

		functionality	fee collection	service	meeting	environment	active member ratio
Total		0.819	0.511	0.493	0.310	0.532	0.473
phase1 area		0.826	0.523	0.492	0.321	0.542	0.453
phase2 area		0.802	0.483	0.496	0.287	0.511	0.517
district	BUIKWE	0.791	0.374	0.352	0.308	0.440	0.414
	BUKOMANSIMBI	0.833	0.417	0.583	0.250	0.333	0.396
	BUTAMBALA	0.698	0.488	0.442	0.349	0.535	0.587
	GOMBA	0.806	0.391	0.682	0.291	0.645	0.559
	KALUNGU	0.500	0.182	0.227	0.182	0.136	0.183
	KAYUNGA	0.858	0.697	0.748	0.387	0.761	0.758
	KIBOGA	0.839	0.586	0.402	0.345	0.299	0.537
	KYANKWANZI	0.956	0.699	0.529	0.338	0.456	0.532
	LWENGO	0.816	0.316	0.395	0.263	0.342	0.339
	MASAKA	0.286	0.143	0.286	0.286	0.286	0.490
	MITYANA	0.761	0.413	0.222	0.209	0.461	0.492
	MPIGI	0.700	0.296	0.282	0.296	0.563	0.402
	MUBENDE	0.917	0.659	0.712	0.371	0.492	0.357
	MUKONO	0.815	0.430	0.378	0.185	0.407	0.421
	WAKISO	0.830	0.571	0.639	0.406	0.749	0.315
elapsed years	0	0.949	0.608	0.430	0.481	0.696	0.631
	1	0.965	0.616	0.453	0.395	0.628	0.636
	2	0.915	0.581	0.316	0.239	0.735	0.608
	3	0.791	0.408	0.392	0.254	0.577	0.477
	4	0.809	0.489	0.436	0.266	0.500	0.514
	5	0.769	0.442	0.452	0.221	0.481	0.362
	6	0.798	0.482	0.518	0.307	0.500	0.484
	7	0.786	0.439	0.508	0.250	0.470	0.455
	8	0.705	0.318	0.372	0.209	0.380	0.328
	9	0.786	0.517	0.621	0.379	0.586	0.400
	10	0.694	0.486	0.405	0.189	0.514	0.446
	11	0.817	0.615	0.673	0.317	0.394	0.438
	12	0.860	0.699	0.625	0.471	0.441	0.437
	13	0.798	0.445	0.630	0.311	0.630	0.479
	14	0.808	0.603	0.615	0.436	0.577	0.369

Figure 3. Comparison between country-system-based and donor-project-based boreholes (top: pooled; left: phase 1; right: phase 2)



We show in Table 1 district affiliations and the number of years that have elapsed since the construction of the borehole in order to control for regional variation and time effects. One caveat is in order: district names are different from the time of the initiation of the project as a result of the rapid proliferation of districts (as discussed later). Elapsed years are calculated based on the year of construction, which may not be precise given the fact that JICA boreholes themselves are wrongly recorded in WATSUP (the date must be between 1998 and 2002 for phase 1 and between 2004 and 2006 for phase 2). We have no choice but to leave them as they are because we do not have alternative information regarding country-system-based boreholes.

Two more methodological considerations need to be mentioned. One is that the construction modalities (country-system-based or project-based) were not randomly assigned. There is a possibility that JICA selected locations that would be suitable for operations after borehole construction. However, according to consultants from the Japanese contractor that oversaw the construction of the boreholes, the areas selected were ones in which the mobilization of residents for water exploration and sanitation improvement had been largely unsuccessful and which had been left unserviced by the government (interview at Kampala on August 25, 2012).

Another problem is the possible spatial autocorrelation, which violates usual OLS assumptions. To address this problem we applied a series of spatial autoregressive models after conducting simple bivariate analysis and multiple regressions. For this purpose, we first used autoregression models with weights (A) assigned to neighboring points in three ways: "uniform" gave equal weight to all data points in the neighborhood; "inverse" weights by inverse distance; and "inverse squared" weights by the square of "inverse." Non-zero coefficient (ρ) would indicate spatial correlations and validate the necessity of this approach. We tried all three schemes and chose the most efficient result based on AIC in case results disagreed with each other.

$$\log\left(\frac{\mathrm{p}}{1-\mathrm{p}}\right) = X\beta + \rho A$$

$$\mathrm{y} = X\beta + \rho A + \varepsilon$$

Particularly for the last dependent variable, which is a continuum, we conducted additional analyses. First we applied ordinary least squares and then tested spatial dependence with a Lagrange Multiplier. After confirming spatial dependence, we proceeded to a series of spatial autoregressive models, namely, spatial lag model without explanatory variables, spatial lag model, spatial autoregressive error model, and spatial mixed autoregressive model (or spatial Durbin model):

– spatial lag model without explanatory variables: $y = \rho W y + \varepsilon$

– spatial lag model: $y = \rho W y + X\beta + \varepsilon$

– spatial autoregressive error model: $y = X\beta + (\lambda W u + \varepsilon)$

– spatial mixed autoregressive model: $y = \rho W y + X\beta_1 + W X\beta_2 + \varepsilon$

where W refers to a binary matrix that defines neighborhoods whereas ρ as well as λ are its coefficients and would control for spatial correlations if needed. Again, we relied on AIC in selecting the most plausible model.

5. Results

From 1998 to 2002 JICA project (Phase 1) constructed 435 deep boreholes in Butambala, Gomba, Kiboga, Kyankwanzi, Mityana, Mpigi, Mubende, and Wakiso districts. Of these, data on 383 are found in WATSUP. The database also contains information on 645 boreholes constructed after 1998 on the country-based system (excluding cases without a record of construction year). Districts in which JICA constructed 190 boreholes during phase 2 are

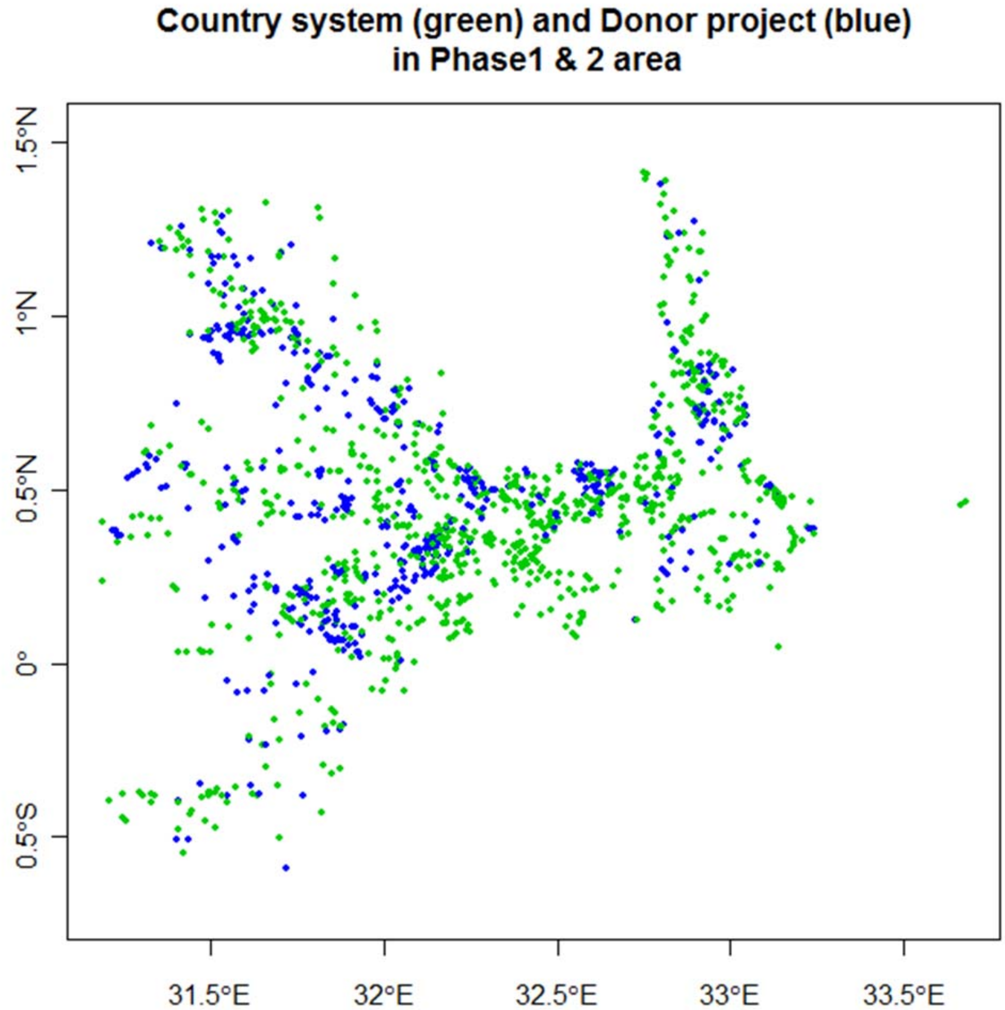
Buikwe, Bukomansimbi, Kalungu, Kayunga, Lwengo, Masaka, and Mukono; of these 104 were included in WATSUP. Corresponding boreholes constructed under the country-based system amount to 356 (excluding cases without records of construction year). The number of boreholes by districts and construction modalities are shown in Table 2.

Table 2. List of district project areas

District	Phase	Country system	Donor project	Total
BUIKWE	2	76	15	91
BUKOMANSIMBI	2	5	7	12
BUTAMBALA	1	27	16	43
GOMBA	1	47	63	110
KALUNGU	2	16	6	22
KAYUNGA	2	113	42	155
KIBOGA	1	45	42	87
KYANKWANZI	1	75	61	136
LWENGO	2	31	7	38
MASAKA	2	5	2	7
MITYANA	1	155	75	230
MPIGI	1	68	3	71
MUBENDE	1	73	59	132
MUKONO	2	110	25	135
WAKISO	1	155	64	219
Total		1,001	487	1,488

Some boreholes lacked geographical positioning data, which caused further deletions. We ended up with 379 project-based and 622 country-system-based cases in the phase 1 area, and 104 project-based and 352 country-system-based in the phase 2 area. Figure 3 displays the locations of the two types of boreholes (green for country-system-based and blue for donor-project-based).

Figure 4. Geographical distribution of country-system-based and donor-project-based boreholes



Overall the figures for the dependent variables are as follows: boreholes in operation: .819; WSCs collecting fees: .511; WSCs offering services: .493; WSCs holding meetings: .310; WSCs keeping environment clean: .532; average active member ratio .473. Naturally, these figures differ from district to district and also depend on the time that has elapsed since construction of the boreholes (Table 1). It is important to note that the figures do not necessarily decrease proportionally as time elapses since construction.

Before taking these variations into consideration, however, we can first simply compare country-system-based boreholes and project-based ones, which reveals that the latter outperform the former in every aspect except environmental maintenance (Figure 3): 84.3 percent of project-based boreholes are in operation as against 80.7 percent of country-system-based ones ($p = .09$); 60.2 percent of WSCs of project-based boreholes collect user fees as against 46.7 percent of country-system-based WSCs ($p < .00$); 64.5 percent of WSCs of project-based boreholes offer services as against 42 percent of country-system-based WSCs ($p < .00$); 38 percent of WSCs of project-based boreholes hold meetings as against 26.7 percent of country-system-based WSCs ($p < .00$). On average, the proportion for active membership of WSCs of project-based boreholes is 3.5 points higher than that for country-system-based boreholes, a figure whose statistical significance level reaches .06 according to the parametric *t*-test as well as the non-parametric rank sum test. Only in terms of environmental maintenance do we find no difference between project-based and country-system-based WSCs (52.6 vs. 53.6 percent; $p = .38$). These findings do not change substantially even if we divide the samples between the two phases (not reported).

Having demonstrated the better performance of project-based boreholes and their WSCs by simple bivariate analysis, we now move on to multivariate analysis in order to control for individual district effects (with Mityana district as the reference category) as well as elapsed time effects (in quadratic form). Table 3 reports the results. Partial coefficients for project-based construction are consistently positive at highly significant levels including environmental maintenance by WSCs, for which we could not find any statistically significant difference in bivariate analysis.

Table 3. Multivariate regression results controlled for elapsed years, district, and phase

Dependent variable	functionality		fee collection		service		meeting		environment		activemember ratio	
method	probit		probit		probit		probit		probit		OLS	
	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value
Donor project	0.429	**.000**	0.418	**.000**	0.516	**.000**	0.371	**.000**	0.325	**.001**	0.122	**.000**
	(0.113)		(0.097)		(0.100)		(0.101)		(0.099)		(0.029)	
elapsed years	−0.234	**.000**	−0.124	**.000**	−0.012	.723	−0.159	**.000**	−0.199	**.000**	−0.046	**.000**
	(0.044)		(0.033)		(0.034)		(0.034)		(0.034)		(0.010)	
elapsed years^2	0.011	**.000**	0.007	**.002**	0.001	.551	0.010	**.000**	0.009	**.000**	0.002	**.007**
	(0.003)		(0.002)		(0.002)		(0.002)		(0.002)		(0.001)	
BUTAMBALA	−0.060	.793	0.219	.305	0.603	**.005**	0.427	**.055**	0.312	.145	0.130	**.039**
	(0.227)		(0.214)		(0.217)		(0.223)		(0.214)		(0.063)	
GOMBA	0.362	**.040**	−0.066	.667	1.117	**.000**	0.218	.185	0.672	**.000**	0.123	**.008**
	(0.176)		(0.154)		(0.162)		(0.164)		(0.156)		(0.047)	
KIBOGA	0.384	**.046**	0.411	**.011**	0.432	**.010**	0.361	**.034**	−0.376	**.025**	0.066	.173
	(0.193)		(0.162)		(0.168)		(0.170)		(0.168)		(0.048)	
KYANKWANZI	1.087	**.000**	0.707	**.000**	0.798	**.000**	0.351	**.016**	0.000	.998	0.043	.296
	(0.220)		(0.141)		(0.144)		(0.146)		(0.139)		(0.041)	
MPIGI	0.063	.739	−0.114	.531	0.374	**.047**	0.503	**.007**	0.480	**.007**	−0.037	.499
	(0.191)		(0.182)		(0.189)		(0.188)		(0.177)		(0.055)	
MUBENDE	0.918	**.000**	0.694	**.000**	1.292	**.000**	0.550	**.000**	0.278	**.049**	−0.080	**.071**
	(0.189)		(0.143)		(0.152)		(0.148)		(0.141)		(0.044)	
WAKISO	0.446	**.002**	0.480	**.000**	1.168	**.000**	0.633	**.000**	0.955	**.000**	−0.128	**.001**
	(0.143)		(0.124)		(0.132)		(0.132)		(0.130)		(0.037)	
BUIKWE	−0.202	.307	−0.796	**.000**	−1.018	**.000**	−0.164	.339	−0.835	**.000**	−0.325	**.000**
	(0.198)		(0.171)		(0.175)		(0.172)		(0.174)		(0.051)	
BUKOMANSIMBI	0.006	.989	−0.747	**.053**	−0.626	.113	−0.367	.373	−1.033	**.009**	−0.335	**.003**
	(0.448)		(0.387)		(0.395)		(0.412)		(0.395)		(0.113)	
KALUNGU	−0.829	**.005**	−1.348	**.000**	−1.484	**.000**	−0.508	.133	−1.610	**.000**	−0.508	**.000**
	(0.298)		(0.340)		(0.329)		(0.338)		(0.358)		(0.088)	
LWENGO	0.084	.760	−0.873	**.000**	−0.915	**.000**	−0.209	.395	−0.924	**.000**	−0.362	**.000**
	(0.274)		(0.239)		(0.237)		(0.245)		(0.239)		(0.071)	
MASAKA	−1.466	**.006**	−1.530	**.013**	−1.306	**.016**	−0.166	.754	−1.110	**.035**	−0.213	.145
	(0.535)		(0.618)		(0.541)		(0.529)		(0.527)		(0.146)	
MUKONO	0.004	.981	−0.599	**.000**	−0.956	**.000**	−0.506	**.002**	−0.819	**.000**	−0.295	**.000**
	(0.182)		(0.154)		(0.157)		(0.164)		(0.158)		(0.045)	
phase2	0.316	**.051**	0.780	**.000**	1.536	**.000**	0.596	**.000**	0.801	**.000**	0.247	**.000**
	(0.162)		(0.138)		(0.148)		(0.143)		(0.143)		(0.040)	
intercept	1.413	**.000**	−0.017	.880	−0.973	**.000**	−0.559	**.000**	0.453	**.000**	0.625	**.000**
	(0.154)		(0.115)		(0.127)		(0.124)		(0.118)		(0.034)	
n	1479		1488		1488		1488		1488		1419	
LR chi2(17)	124.960	**.000**	152.020	**.000**	272.360	**.000**	80.130	**.000**	204.830	**.000**		
Pseudo R2	0.089		0.074		0.132		0.044		0.100			
F(17, 1401)											13.180	**.000**
Adj R-squared											0.127	

Finally, we control for spatial autocorrelations, defining boreholes within an area of 5 km^2 as neighbors. Figure 5 visualizes neighborhood connections with red lines. Tables 4 and 5 report the multivariate regression with spatial weights. Again, the results do not change: every approach, regardless of weighing schemes or model assumptions, shows consistently that project-based boreholes outperform country-based ones in every aspect even after we control for possible spatial autocorrelations as well as district heterogeneity and elapsed time effects.

Figure 5. Neighbor relations among boreholes

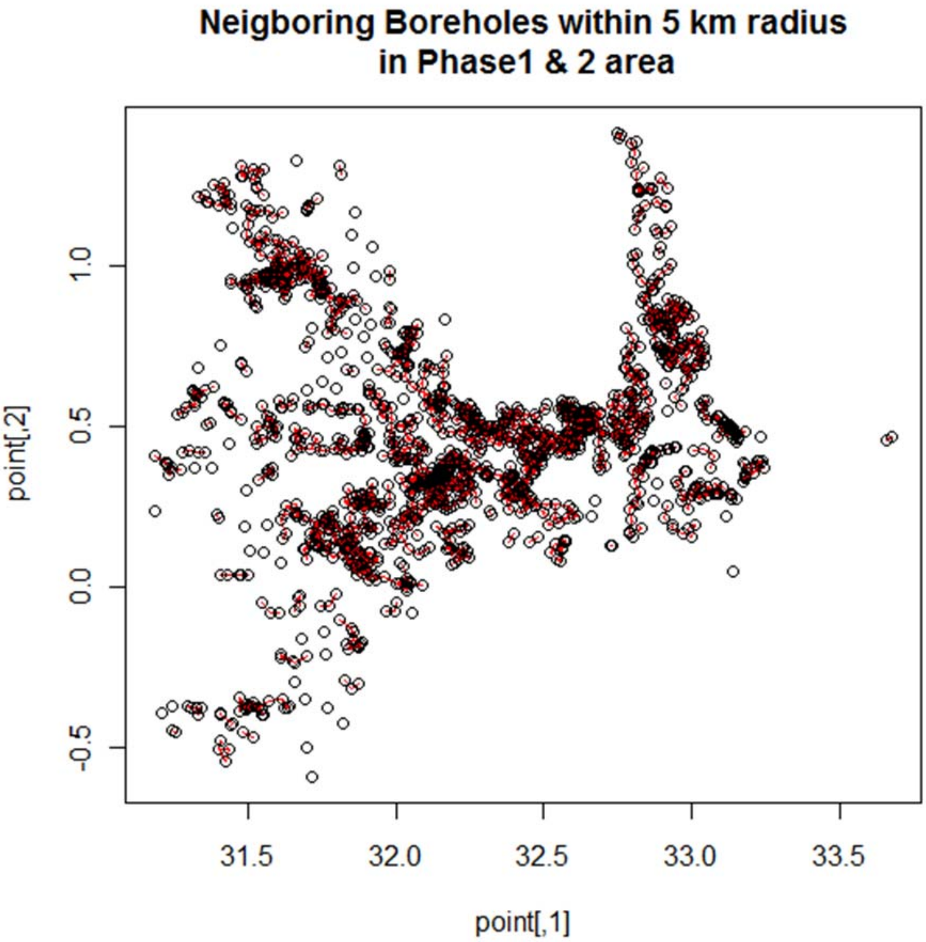


Table 4. Results of multivariate regression with spatial weights

Dependent variable	Whether borehole is in operation or out of order					
method			logit			
weighing schemes	uniform		inverse		inverse^2	
	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value
Donor project	0.756	.000	0.739	.000	0.733	.000
	(0.203)		(0.203)		(0.202)	
Spacial weight	1.420	.000	1.311	.000	1.151	.000
	(0.290)		(0.263)		(0.229)	
AIC	1268.7		1267.9		**1267.3**	

Dependent variable	Whether WSC collects user-fee					
method			logit			
weighing schemes	uniform		inverse		inverse^2	
	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value
Donor project	0.728	.000	0.733	.000	0.734	.000
	(0.165)		(0.166)		(0.166)	
Spacial weight	1.704	.000	1.623	.000	1.405	.000
	(0.214)		(0.184)		(0.160)	
AIC	1827.9		**1813.3**		1814.6	

Dependent variable	Whether WSC offer serves					
method			logit			
weighing schemes	uniform		inverse		inverse^2	
	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value
Donor project	0.945	.000	0.926	.000	0.909	.000
	(0.173)		(0.175)		(0.175)	
Spacial weight	1.887	.000	1.822	.000	1.594	.000
	(0.217)		(0.191)		(0.167)	
AIC	1710.7		**1695.4**		1696.4	

Dependent variable	Whether WSC keeps environment clean					
method			logit			
weighing schemes	uniform		inverse		inverse^2	
	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value
Donor project	0.538	.001	0.520	.002	0.513	.002
	(0.167)		(0.167)		(0.166)	
Spacial weight	1.583	.000	1.201	.000	0.959	.000
	(0.225)		(0.191)		(0.166)	
AIC	**1783.2**		1794.4		1800.7	

Dependent variable	Whether WSC holds periodical meeting					
method			logit			
weighing schemes	uniform		inverse		inverse^2	
	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value
Donor project	0.655	.000	0.632	.000	0.609	.001
	(0.176)		(0.176)		(0.175)	
Spacial weight	2.404	.000	2.185	.000	1.797	.000
	(0.238)		(0.210)		(0.179)	
AIC	1654.2		**1649.6**		1660.4	

Dependent variable	Proportion of active members in WSC					
method			OLS			
weighing schemes	uniform		inverse		inverse^2	
	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value	Coef. (Std. Err.)	*p*-value
Donor project	0.121	.000	0.121	.000	0.120	.000
	(0.029)		(0.029)		(0.029)	
Spacial weight	0.318	.000	0.273	.000	0.242	.000
	(0.047)		(0.041)		(0.036)	
AIC	1191.1		1192.2		**1191.0**	

Note: Omitted are estimates of coefficients of control variables, which include district dummies, phase dummy, elapsed years since construction and its square.

Table 5. Results of multivariate regression with spatial correlations

method	OLS		spatial lag model without explanatory variables		spatial lag model		spatial autoregressive error model		spatial mixed autoregressive model	
	Coef. (Std. Err.)	p-value	Coef. (Std. Err.)	p-value	Coef. (Std. Err.)	p-value	Coef. (Std. Err.)	p-value	Coef. (Std. Err.)	p-value
Donor project	0.125 (0.029)	.000			0.122 (0.029)	.000	0.122 (0.029)	.000	0.115 (0.029)	.000
Lag.Donor project									−0.012 (0.056)	.829
Rho			0.327	.000	0.202	.000			0.207	.000
Lambda							0.235	.000		
AIC	1234.6		1320.5		1207.5		**1201.9**		1208.7	
Lagrange Multiplier test										
for Rho	33.699	.000								
for Lambda	40.996	.000	0.927	.336	1.584	.208			0.232	.630

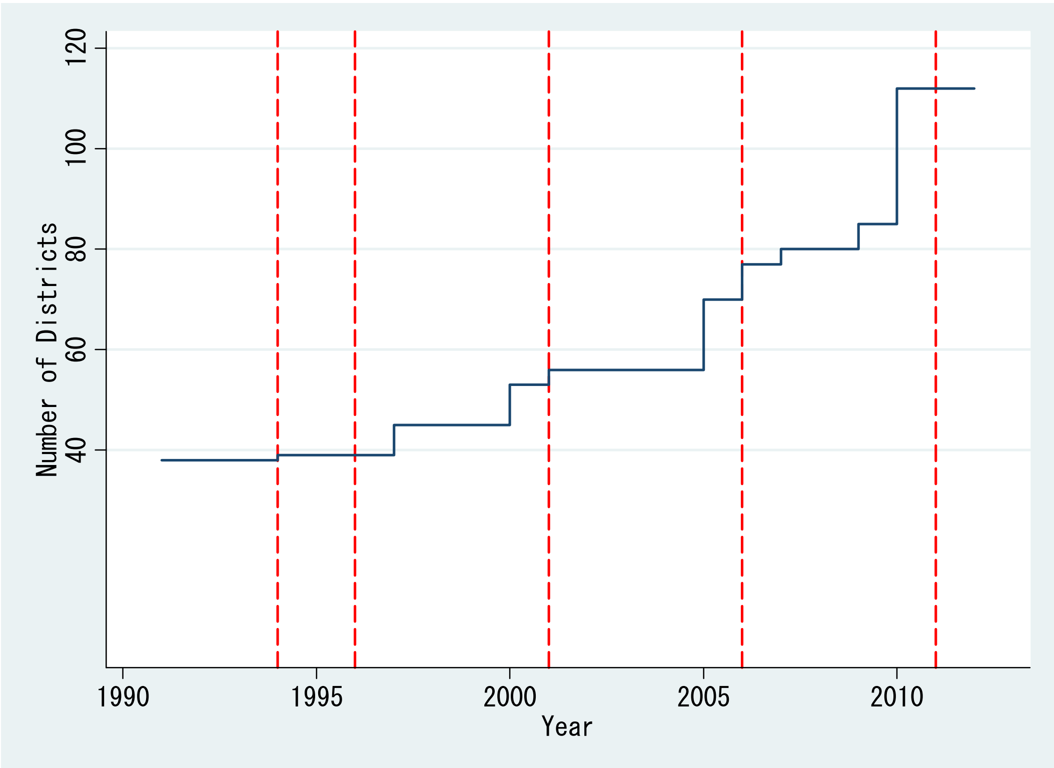
Note: Dependent variable: proportion of active members in WSC. Estimates of coefficients of control variables, namely, district dummies, phase dummy, elapsed years since construction and its square, are not shown.

Concluding remarks

This paper has examined empirically the possible advantage generated by the use of country systems, based on monitoring data regarding rural water supply points in Uganda, one of the leading GBS recipient countries in sub-Saharan Africa. Against our expectations, there was no sign of added value; rather, we found that project-based assistance outperformed country-system-based projects in terms of the sustainability of the boreholes as well as of the WSCs which are responsible for maintaining the facilities. However, we should not rush to the conclusion that there is no benefit to be derived from using country-based systems. First, estimation itself is not without problems: natural experiment is by no means the ideal method for impact evaluation; control of possible confounders is far from sufficient; the monitoring data in developing countries often lacks accuracy; and the evidence from deep boreholes in the rural water supply sector may not necessarily be generalizable for other contexts.

In addition to these potential problems, there is another non-negligible process under way in the case of Uganda: rapid decentralization and the resultant proliferation of districts. This trend began in the 1990s and the number of districts has roughly tripled from 38 to 112 within the last two decades. The 15 districts included in this study comprised only five districts (Mukono, Masaka, Mpigi, Mubende, and Kiboga) before 1991. Many scholars and practitioners have complained about the adverse effect of this rapid decentralization, which is driven chiefly by the political motivation of the incumbents rather than administrative necessity (Green 2010).

Figure 6. Rapid proliferation of districts since 1990



Note: Dashed lines refer to election years (presidential or legislative)

We also witnessed, during our field survey, adverse working environments for the conducting of the appropriate oversight of rural water points. For instance, Mukono district office owns only one personal computer, one water quality test kit, one old car with more than 500,000 km on the clock, which was purchased with a conditional block grant in 2005, one working motorcycle and six dysfunctional ones, and one bicycle each for the community development officer and the hand-pump mechanics, which JICA donated in 2005. The situation is similar in Kayunga district.

Furthermore, chronic shortages of human resources may have marred the district-level administration. According to the report of the Ministry of Local Government for the financial year 2012/13, the average rate of filled posts in districts excluding Kampala was only 48 percent (Ministry of Local Government 2012). It is highly likely that the overwhelming workload per officer could have resulted in compromised public bidding and construction control. There is no doubt that these difficulties caused mainly by the excessive decentralization could have nullified any potential benefit of country-system usage, especially since local administrative staff are chiefly responsible for rural water supply management. In such a context, conventional project-based assistance may well be more effective. In fact, the officers of Kayunga district, for example, greatly valued the frequent and intensive visits by JICA staff to facilitate the setting up of WSCs, which usually requires a long time. Capacity-building through physical communication between donor and recipient might have been indispensable for this particular case.

In any case, the use of a country-based system is neither an unconditional nor universal gurantee of aid-effectiveness. There are many factors that should be taken into account in adopting the country-based system. What is important is that a project, whether country-based or donor-based, should be aligned with the sector policy and plan of the recipient government. A complementary approach using both frameworks seems to be realistic and essential for the time being, rather than a premature standardization into a single modality.

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Abstract (in Japanese)

要約

援助を実施する際に、その資金管理も相手国のシステムを通じて行うことが、近年推奨されている。しかしながら、カントリー・システムを使用すれば、その官僚の能力が強化され、さらに公共サービス提供の改善につながるとする、このポリシーの背後にある前提は、まだ経験的には確認されていない。我々は、ウガンダ地方給水分野を例として、この期待が現実に適合するのか検証する。分析結果は、とりわけ、地方分権化の名の下に官僚システムが流動的であるような場合、カントリー・システム·アプローチの無条件の採用は、従来のドナーによる資金管理による援助に比べて、むしろ非効果的になる可能性があることを示唆する。

JICA Research Institute

Working Papers from the same research project

“Role of Budget support in the Development Aid Regime”

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Is GBS Still a Preferable Aid Modality?

Mitsuaki Furukawa and Junichiro Takahata