

From knowledge and capacity development to performance improvement in water supply: the importance of competence integration and use

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Abstract

Knowledge and capacity development (KCD) is increasingly acknowledged as critical for water supply development. Since KCD aims to improve institutional performance, it is often measured using technical performance targets. This paper cautions about the misleading nature of this measurement. The authors argue that technical performance improvement should be separated from competence development because the latter does not always directly translate into the former in a short time period. Drawing on empirical evidence about the management contract between Aqua Vitens Rand Limited and Ghana Water Company Limited, the paper demonstrates how the process of integrating and using competences is a necessary condition before KCD interventions can result in performance improvement. As this process often takes time, KCD providers and beneficiaries should set realistic performance targets. Not doing so creates unrealistic expectations and often leads to underestimation of the actual impact. This paper finds that knowledge management concepts common in the private sector are equally applicable in the public sector but that the latter may be constrained by short term goals and lack of insight in management processes. It is concluded that technical performance-based assessments should be complemented by capacity-based assessments in order to show fairly the contribution of KCD interventions.

Keywords: Capacity; Competence; Effectiveness of KCD; Institutional Analysis and Development Framework; Knowledge and capacity development (KCD); Performance improvement; Performance indicators

1. Introduction

As knowledge and capacity development (KCD) intervention in water supply and budgets allocated to them continue to increase, pressure is growing to assess their effectiveness. However, evidence of the development impact of such interventions is often not compelling despite the current level of resources spent on KCD. The pressure is even more urgent for KCD interventions such as water operator

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partnerships or public–private arrangements where performance contracts are signed with clear quantitative performance targets to attain within relatively short periods. In practice, however, there is no consensus about how KCD should be assessed and there are many challenges associated with KCD assessment. These include, among others, the difficulty of defining the concept of capacity and thus assessing something we do not know (Morgan, 1997), the complex nature of capacity and capacity development (CD) which makes it difficult to operationalize and to cover all relevant aspects (Zinke, 2006; Alaerts & Kaspersma, 2009) and the existence of competing capacity evaluation approaches (Hospes, 2008). Instead of addressing these difficulties, KCD practitioners use traditional technical (physical) measurements of performance, mostly key performance indicators (KPIs), as a proxy measure of their interventions. They usually do this because performance on technical parameters seems to be easier to measure compared to capacity (Morgan, 1997; Alaerts & Kaspersma, 2009; Alaerts, 2009).

This paper discusses the disconnection caused by the approach that assesses KCD effectiveness by an assessment by proxy measures. The analysis is done at organizational scale (case of a water utility). By taking performance indicators such as non-revenue water, service coverage, compliance with water quality standards, and so on, as proxy measures of KCD in water supply, practitioners associate improved performance with the development and use of organizational competences. However, experience from the corporate sector shows that competence application by an organization typically lags behind competence development (Nonaka & Takeuchi, 1995). Prior to their use, competences need to be accepted and integrated into the existing knowledge base, rules, and so on. Knowledge integration and operationalization is a process that takes time but which is often taken for granted. As a result, good programmes may be built but with unrealistic targets. This may generate unnecessary frustration when expectations are not met and it can result in ‘throwing out the baby with the bath water’. An example is when a good KCD programme is terminated because unrealistic technical performance targets are not met. The objective of the paper is to show that capacity-based assessments can complement technical performance-based assessments to inform about the real contribution of KCD interventions despite their *prima facie* failure to meet short-term performance targets. In the second section of this paper, we present the conceptual framework. Section 3 elaborates the methodology, whereas Section 4 presents the results and discusses the conditions that have affected the processes of knowledge integration and use in the context of the case study. Section 5 concludes the analysis.

2. Conceptual framework

2.1. KCD in the water sector

The history of KCD in the water sector relates to that of CD in international development assistance work. The 1991 Delft Declaration (Alaerts *et al.*, 1991) defined CD as consisting of three main elements, namely: (a) creating an enabling environment with appropriate policy and legal frameworks; (b) institutional development, including community participation; and (c) human resources development and strengthening of managerial systems. Since then, consensus has been growing among academics and practitioners about three nested levels at which KCD takes place: that of the individual, of the organization and of the enabling environment (Lusthaus *et al.*, 1995; Alaerts *et al.*, 1999; Mizrahi, 2004; OECD, 2006; UNDP, 2006; Alaerts & Kaspersma, 2009). The recent interest in knowledge management in the water sector is associated with the emergence of what is today known as the knowledge-based

economy (OECD, 1996) whereby knowledge has become (or is becoming) the main asset of companies. The process of knowledge production and diffusion has been increasingly accelerated through the widespread and rapid diffusion of information and communication technologies (ICTs) from the 1990s onwards, further adding to the importance of knowledge for development (Mansell & Wehn, 1998). In this context, water utilities, ministries and other related institutions are increasingly being encouraged to reap the advantages from applying knowledge management principles. Traditionally, KCD has relied on such mechanisms as formal education, training programmes and technical assistance. But recent years have seen the introduction of innovative KCD mechanisms, often accelerated by ICTs. Networks, e-learning, water operator partnerships, and so on, are becoming powerful mechanisms of KCD.

KCD is characterized by two models, that is, the positivist and the complex systems approach. The positivist model posits that there is a direct, linear and causal relationship between different parts of a KCD initiative. Under this perspective, KCD providers deliver inputs (e.g. training, technology, financial resources) in the hope of seeing them transformed into outputs, leading to change in cognition, attitudes and processes and development impact. Assessment tools associated with this paradigm rely on the identification of indicators which are then tracked over time to see changes that result from KCD implementation (Lusthaus *et al.*, 1995; Otoo *et al.*, 2009; UNDP, 2010). The positivist model is, however, criticized for being an oversimplification of a much more complicated set of processes which involves the reinterpretation or transformation of policy and of the environment in which KCD takes place (Long, 2001). The criticism also challenges the assumption that the multitude of forward and backward loops of interaction can be simplified by an outside observer into a causal linear relationship. The complex systems approach, which draws on systems thinking theory, is adaptive and focuses on processes, patterns and relationships. By doing so, it tries to understand the effects of the interactions, as opposed to detailed efforts to predict (and manage for) outcomes. This approach also assumes randomness of institutional development and, therefore, unanticipated consequences (Morgan, 2005). KCD interventions under this perspective are believed to be complex and intrinsically uncertain processes (Baser, 2009). Assessment tools associated with the complex system approach focus more on capturing change in the behaviour and relationships between the direct participants in the KCD process, than on specified outcomes. With regard to impact measurement, the two models have different implications. In the positivist model, the outside observer (say, the financier of the KCD intervention or the civil society which is supposed to benefit) is assumed to articulate and identify the desired impact. From there, he or she derives the target. However, in the complex-system model, the desired impact is assumed to be not discoverable precisely and the endogenous creation of competence (which is considered as a process which cannot be really guided) is the real output of the intervention.

2.2. *The institutional analysis and development framework*

The Institutional Analysis and Development (IAD) Framework is used in this research as an organizing tool for information gathering and reflection. The framework was selected because of its potential to frame research at multiple levels of analysis and to combine structural and actor-oriented approaches. These are two major perspectives for investigating issues such as policies, programmes and their implementation (Ostrom, 2005). The central level of analysis is the action arena which comprises actors interacting within action situations (particular activities under investigation) and affected by a set of external variables. An action arena is defined as ‘a social space where individuals interact,

exchange goods and services, solve problems, dominate one another, feel guilty, fight, etc.’ (Ostrom, 2005). The interactions between actors lead to outcomes which feed back into the external variables and the action arena. The framework posits that actors consider the costs (such as transaction cost, see North, 1990) and benefits of various behaviours and act according to their perceived incentives. These incentives are based on their underlying values and preferences, the information they have about the state of the world and the intentions of other actors (which may be incomplete and/or imperfect) and the threat of material or social sanctions. Three levels of decision-making are distinguished at which the IAD analysis can be carried out, namely the operational level, where decisions directly affect the resource/good/service access and use, the collective-choice (policy making) level where the rules that govern resource access and use are designed and the constitutional level, where decisions affect the rules that govern how decisions are taken at the collective-choice level. Note that the term ‘constitutional’ refers to the process of articulating and aggregating the preferences of various members or sectors of society, not to the ‘constitutions’ of various jurisdictions *per se* (Rudd, 2003).

2.3. Knowledge integration and use

Whether it involves one or many actors, KCD implies the transfer of new knowledge and capacity into a social system or the action arena(s). The knowledge can be explicit or tacit (Polanyi, 1966; Tsoukas, 2003). Polanyi (1966) expresses the difference between the two by arguing that explicit knowledge refers to what we know and can tell, whereas tacit knowledge is what we know but we cannot easily tell. Because every social system already has its reservoir of competences (existing knowledge, rules, practices, collective memory, and so on.), any new knowledge must logically be operationalised and integrated before it can be used and add value to that system. This integration occurs through actor-interactive processes in and/or across the action arena(s). Nonaka & Takeuchi (1995) were the first to develop a knowledge conversion model that helps to understand this process, applying it to corporations. This model illustrates the different successive and parallel knowledge activities that are likely to take place within a social system before new knowledge can really be fully exploited. In their model, Nonaka & Takeuchi (1995) identified four modes of knowledge conversion, namely: (1) socialization (from tacit knowledge to tacit knowledge); (2) externalization (from tacit knowledge to explicit knowledge); (3) combination (from explicit knowledge to explicit knowledge); and (4) internalization (from explicit knowledge to tacit knowledge).

In the context of KCD in the water supply sector, these activities must take place before new knowledge can be used and affect organizational or sector performance. Socialization takes place when KCD beneficiaries (such as participants in training) share their different experiences with new tacit knowledge. Through exchange, organizational members take the opportunity to figure out the advantages and disadvantages of the newly acquired knowledge (compared to what they already know or do) or to experience its complexity. The end result is either the adoption or rejection of that knowledge. Beneficiaries may also be indifferent *vis-à-vis* the new knowledge. Externalization is also a necessary step before knowledge can create value for the organization. In fact, when tacit knowledge is transferred, say to heads of departments, these must in turn articulate it into explicit concepts so that their employees can understand and use it. Combination occurs when new knowledge and existing knowledge are combined to bring about a new product or procedure. An example could be when a new water connection procedure is proposed but is combined with the existing one to create a more efficient and faster procedure. This could be through elimination of unnecessary steps in the existing procedure and the

inclusion of new steps drawn from the procedure being proposed. Through internalization, the emerging new explicit knowledge is shared throughout an organization and converted into tacit knowledge by individuals. Internalization is closely related to ‘learning by doing’ (Nonaka & Takeuchi, 1995, p. 69). To use the above example of a water connection procedure, as the new procedure is approved, those in charge of connecting customers to the network will start using it. During the first few days, they will have to read their manual to ensure that they go through all the steps but as they get acquainted with it, the procedure will be standardized and become internalized.

3. Research focus and methodology

3.1. Research focus

It emerges from the above discussion that knowledge integration and use, as illustrated by Nonaka & Takeuchi (1995) knowledge conversion modes, is a complex process. Thus, the authors hypothesize that many KCD interventions often fail to recognize the importance of the knowledge processes involved and that it takes time for new knowledge to be standardized and internalized. KCD practitioners seem to assume that once water professionals have been trained (or a new technology introduced), the new knowledge will be used automatically and translated almost immediately into improved performance. The authors, on the other hand, anticipate that new knowledge will hardly impact on performance at organizational level until it is mobilized and crystallized into different groups, departments and divisions (Nonaka & Takeuchi, 1995; Tissen *et al.*, 2000). This research focuses on the question whether and to what extent, the organizational capacity has improved as a result of KCD, compared to the achievement of the performance standards (outcomes). Our objective is to show that the assessment of KCD may need also to focus on the changes that occur in capacity to complement the conventional technical performance measurements and, as such, establish the actual contribution of KCD interventions.

3.2. Methodology

The approach selected for this research is a case study, because we wanted to investigate the aforementioned question in its real life context (Yin, 2009). KCD also involves many variables of interest and is shaped by contextual conditions (Yin, 2009; Kaspersma, 2013). The approach helped closely to approach actors involved at different relevant levels and to gather evidence of how they perceive and actually deal with KCD. The management contract between Aqua Vitens Rand Limited (AVRL) and Ghana Water Company Limited (GWCL) in Ghana was chosen as a case. The 5-year contract (2006–11) was part of the Ghana Urban Water Project which comprised the following four components: (1) system expansion and rehabilitation; (2) public–private partnership development; (3) capacity building and project management; and (4) a severance programme (World Bank, 2004). Under the management contract, GWCL, the grantor, seconded about 3,200 staff members to AVRL, the operator, who became responsible for the operation of all the systems and reported to a director in GWCL headquarters. The operator brought in expatriates who served either as trainers or partnered one-to-one with the local top management staff. The grantor remained the asset owner and monitored the implementation of the management contract, assisted by independent technical and financial specialists. The contract set

service standards and provided incentives for the operator to achieve them, but it also included penalties. Four main reasons motivated the selection of this case. First, it is a very recent intervention, so beneficiaries and other stakeholders could easily recall their experiences with the knowledge processes involved in the project. Second, the management contract is well documented because it has ended and technical audits were conducted. Third, the transparent government in Ghana allowed actors at all levels to discuss issues openly and freely. Lastly, the management contract is a representative case for sub-Saharan Africa (SSA) as it involved most of KCD activities found here. These include training (locally and externally), coaching and organizational reforms (changing the organizational structure, delegation of autonomy to district staff, introduction of new procedures and policies, and so on). As a low income country, with a diverse culture, Ghana is also comparable to many countries in the SSA and other continents.

To ensure the credibility of results, direct empirical evidence was collected and complemented by data from secondary sources. Thirty six interviews (structured and open) were conducted with staff members of GWCL at headquarters, regional and district levels; one interview was held with a former managing director of AVRL and a focus group discussion was organized with a group of consumers. Outside the utility, 13 interviews were conducted with relevant individuals from a variety of organizations (actors) including ministries (the Ministry of Water Resources, Works and Housing and the Ministry of Finance and Economic Planning), Universities (Nkwame Nkhruma University of Science and Technology), consultants and contractors, financiers (World Bank) and civil society organizations (CONIWAS, Ghana Anti Corruption Coalition and Ghana Integrity initiative). First hand accounts from these actors allowed us to understand their perception of (and or actual participation in) the management contract, their incentives and the impact of their behaviour on the effectiveness of the contract. In addition, relevant publications including formal studies, evaluation reports, audit reports and archival records, were consulted to complement the information gathered by means of interviews. Especially, the authors compared the results from the assessment of the management contract by the independent technical auditors with their own systematic investigation of the changes that occurred in the competences of GWCL caused by the implementation of the management contract. This double assessment helps to decide what KCD does do to the organization. The technical audits were performance based, that is they consisted of measuring the performance of the operations of the operator against the service standards established in the management contract. The audits were jointly conducted by three consulting groups, namely Fichtner, Hytisa and Watertech.

4. Results

4.1. Performance indicator-based assessment by the auditors¹

Throughout the life of the management contract, technical audits were conducted by independent consultants on behalf of GWCL to establish the performance of the operator. The contract included 10 service standards that the operator was contractually bound to achieve within 5 years. As most of

¹ The results presented in this section were obtained from the Final report on management audit of GWCL/AVRL management contract by the [State Enterprise Commission \(2011\)](#) and the management contract Technical Audit Reports by [Fichtner, Hytisa and Watertech \(2009, 2010\)](#).

these targets related to the technical aspects² of water supply, the authors have chosen to display the evaluation results related to some of them (Table 1).

As mentioned earlier, projects that include KCD support often assess KCD through the use of easily monitored proxy measures in the form of technical performance indicators such as non-revenue water, water resources availability, treatment plant utilization, pressure of supply adequacy and quality of supplied water. The conclusion of the assessment here was that AVRL has not been able to meet the targets set in the management contract. The *State Enterprise Commission (2011)* gave an average score of 3.5 (on a five point scale) to AVRL's overall performance, whereas for the performance in the technical services, AVRL was given a poor score of 2. The targets specified in the management contract did not include anything related to the necessary competences that had to be developed in order to produce the desired level of performance. Those who developed the management contract were aware of the following:

- AVRL would develop the capacity of the utility (that is why a portion of the project money was allocated to capacity building activities) in order to improve its performance. However, they seemingly assumed that the developed capacity would translate directly into performance improvement.
- However, the knowledge acquired through in-house and external training of staff, the changes in organizational structure and the new systems and working behaviour introduced required time to be accepted and integrated in the utility before affecting its performance. This is demonstrated by the fact that in many cases, as reported by the technical auditors, many of the new competences proposed by the operator started being operational during the third year of the management contract because the grantor had taken time to appreciate them (for example, the operator submitted the plans for optimization of chemical usage in 2007 but the grantor approved them in 2009).

While it is true that the targets set in the contract were not met within 5 years, it can also be argued that they were not realistic if one takes into account that the developed competences took considerable time to nurture before resulting in expected organizational performance. In this regard, some respondents claimed that by committing to achieve ambitious targets such as reducing non-revenue water (NRW) by 5% every year, AVRL had underestimated the task it had taken on.

4.2. The capacity-based assessment

4.2.1. Essence of the assessment. The authors independently assessed the effectiveness of the management contract. The assessment hypothesized that the conventional (technical) performance indicators need to be complemented by measures of the difference in institutional capacity of the organization prior to and after the project. Thus, it investigated the extent of improvement in (and actual use of) GWCL's competences from the management contract. The capacity of a water service provider here is operationalized at two levels, individual and organizational. Then, building on the work of *Alaerts &*

² According to the *State Enterprise Commission (2011)* final report, the performance of AVRL in the technical services area on the whole is ranked 2 on a five-point scoring scale (where 1 = unacceptable; 2 = poor; 3 = average; 4 = good; 5 = outstanding).

Table 1. Summary of the performance assessment of the management contract.

Service standard	Assessment
Raw water quality: Raw water abstracted should meet the relevant standards of the water resource commission	<ul style="list-style-type: none"> • The operator only started the programme for monitoring raw water quality after 3 years. • During the early years of the monitoring programme some important parameters were not measured. • Reliable raw water quality reference values were only defined during the 4th contract year. <p><i>The Auditors concluded that the operator failed to meet fully the service standard.</i></p>
Treated water quality and pressure: Treated water quality and pressure to meet standards set by Ghana Standards Board	<ul style="list-style-type: none"> • Tracking treated water quality started from the 3rd year of the management contract. • There were consistent incidences of distributed water quality not complying with Ghana standards. • Pressure could not permanently be maintained in most distribution systems. <p><i>The Auditors concluded that quality and pressure did not meet the service standards.</i></p>
Reduction in non-revenue water: Reduction in non-revenue water by at least 5% per annum	<p>For 35 systems investigated in the 4th year:</p> <ul style="list-style-type: none"> • Total NRW was about 51% (against 50% before management contract). • 21 systems did not comply with the management contract's target; however, two of them showed an improvement, but less than 5%. • Four systems complied with the target. • 10 systems could not be assessed because a complete data set was not submitted. <p><i>The Auditors concluded that the operator was unable to achieve the at least 5% reduction annually in global NRW as stipulated in the management contract.</i></p>
Treatment plant operations: Treatment plant operations to maintain average daily production for at least 10 months in a year	<p>In the 4th contract year:</p> <ul style="list-style-type: none"> • Of 94 plants, 53 have increased the production (compared to 50 plants in year 3). • 24 plants were complying with the management contract criteria. • 45 plants did not comply. • For the 25 plants, no conclusion could be drawn since no data on water demand were available. • Nearly all the electromechanical and hydraulic equipment was in a poor state. Spare parts availability is very restricted and repair works were often characterized by improvisation. • The standard operating and maintenance procedures are often not found in place or are not executed (where available). <p><i>The Auditors concluded that the operator did not only fail to meet fully the service standards in respect of treatment plant operations, but also allowed the conditions of the plants to deteriorate through poor maintenance practices.</i></p>

Kaspersma (2009), four clusters of competences³ are identified: (a) technical competences, (b) managerial competences, (c) competences in governance and (d) competences in continual learning and innovation. These aggregate competences make up the overall capacity of a water provider and are essential determinants for the long-term success and sustainability of water management strategies. For consistency reasons, we deliberately decided to display the results related to technical competences. A complete list of the organizational and individual technical competences is provided in Boxes 1 and 2 in the Annex (available online at <http://www.iwaponline.com/wp/015/023.pdf>). The results outlined below all are derived from interviews and documentation as described before.

4.2.2. Assessment at organizational level. At the organizational level, AVRL is reported to have created a major impact on GWCL in terms of the key technical competences. First, in the target area of raw water quality, the operator was instrumental in attracting the attention of staff and management to the importance of the water quality issues which were neglected before. Respondents highlighted that before the management contract, many systems lacked raw water quality data and most water abstraction facilities (such as reservoirs) were not properly maintained. Algae routinely blocked raw water intakes as no regular assessment was conducted. No plans existed to assess the quality and quantity of water sources systematically nor was there a protection strategy for water source areas. Similarly, there were no schedules to deal with raw water quality systematically. Where they existed, they were not complied with. The operator, on the other hand, developed and introduced a raw-water quality monitoring programme including a reporting tool and clear procedures; they also improved the capacity of several laboratories and developed drinking water safety plans. This is reported to have very much improved the culture of record keeping on water quality, which is an important competence for a modern utility. The operator also established a raw water quality baseline.

Second, in the target area of treated water quality, the operator's initial review (AVRL, 2006) stated the following which was also confirmed during interviews with GWCL technical staff members: the water from wells was generally fed into the water supply system directly or via a storage reservoir, often not chlorinated or only in a very rudimentary manner; some of the treatment steps were simplified or bypassed in the water treatment plants. Obtaining reliable data was problematic and what existed was only recorded in hard copy files. To turn around the situation, the operator introduced a new reporting and monitoring system based on electronic files. The system included schedules for water sampling and testing, reporting templates and so on. This enhanced GWCL's basic capacity to start recording treated water quality data and allowed data sharing between districts and headquarters. The operator also developed the emergency procedures including periodic review of emergency procedures. All this is broadly recognized as having improved the recording and reporting capacity of the utility.

Third, with regard to NRW, at least from the technical perspective (physical losses), the operator developed a NRW plan for a systematic measurement and reduction of NRW. The road map detailed the potential activities and policies that needed to be implemented in order to reduce NRW rates. AVRL also improved the existing metering programme and the reporting tool on NRW. The metering programme included the replacement and installation of domestic meters, refurbishing and reopening

³ (1) Technical competences are required to analyse and solve the problems that have a technical nature. It can be said that this is traditionally the main competence; (2) Management competences (traditionally embodied in senior staff) refer to the competence to manage personnel, organization and the water resource itself; (3) Governance competences foster dialogue and communication with stakeholders, resource allocation, transparency, accountability, and so on; (4) Competences on learning and innovation foster knowledge generation and sharing.

meter workshops in Accra and Kumasi, with trained staff. The operator also opened a Geographical Information System (GIS) office. GIS, a fundamental tool, allowed systematic measurement and reduction of NRW in service areas, mapping of water infrastructure and organization of data concerned with commercial issues. These include customer data, locations, mapping of unmapped areas, investigation of meter readings and customer categories, and so on. AVRL installed and equipped loss control teams in all the regions to check cases of water theft and other abuses; it also introduced policy on new service connections and leakage monitoring. Another important element introduced by AVRL was the concept of district metered areas (DMA), that is, controlled discreet hydraulic areas or zones provided with meters to enhance water auditing of those areas with the view to managing NRW. Respondents generally recognized these improvements as very important capacity improvements. However, they indicated that after the termination of the management contract some of these competences were kept up while others faded away for lack of management attention.

4.2.3. Assessment at individual level. The results of interviews revealed that AVRL has also improved the individual competences of technical staff members. For example, competences have considerably improved in the areas of network mapping and techniques for meter management. Improvement in the former can be associated with the introduction of the GIS which was deployed in 2009 in six regions. One of its purposes was to map operational areas and organize data relating to commercial issues. The latter improved owing to the metering programme initiated by AVRL which helped the technical staff to internalize new knowledge. In the meter workshops that were established in Accra and Kumasi, experts shared their skills with locals which also brought tacit knowledge. Respondents noted that they learned that meter management goes beyond fixing faulty meters, to embrace a comprehensive philosophy that goes from purchasing meters of good quality, installing them in a way that they cannot be easily tampered with, maintaining them, calibrating them, and so on.

Another group of competences is reported to have improved significantly. These are teamwork, networking, communication, problem solving and ICT. These ‘knowledge competences’ facilitate professionals to work with knowledge, especially to learn from others, to mentor others and to think critically. There is no doubt that improvement in terms of communication has been fostered by the introduction of ICT. The use of the internet made it possible for people not only to network more with technical staff members in other regions but also between regions and the headquarters. Reporting is now done online, whereas before the management contract district and regional managers had to travel long distances to submit their monthly and annual reports. On teamwork, respondents argued that it has improved drastically under the AVRL regime, mostly because engineers have started understanding the importance of professionals in other departments such as customer care staff. The knowledge competences have the potential to accelerate knowledge integration and use. However, the lack of facilities such as IT equipment and software has slowed down their effect, especially after contract termination.

Therefore, strong and broad evidence exists showing significant changes in competences. These results complement those by the technical auditors to give a more in-depth and comprehensive picture of the effect of the management contract. Although AVRL did not meet the technical performance targets specified in the management contract, the intervention did however enhance the fundamental capacity of the utility. It can be assumed that if the above competences were further expanded, consolidated and mobilized throughout the whole organization, this would create a large impact, first in capacity and then, after a few years, in technical performance.

The results from these two assessments are comparable to the findings of the study conducted by Pascual *et al.* (2013) in the context of water operator partnerships (WOPs) in Malawi. Using a five path approach⁴, the study assessed the performance of two projects where Vitens Evides International, a Dutch water company, partnered with Lilongwe and Blantyre Water Boards, respectively. In the two cases, it was established that over a period of 2 and a half years, the KPIs changes path failed to inform about the progress and the contribution made by the two partnerships. Conversely, the empirical evidence gathered from the other four evaluation paths demonstrated that substantial progress had been achieved in both projects. For example, positive changes were identified in the capacity to reduce NRW (e.g. capacity to reduce leakages, illegal connections, and so on), although the fixed targets for this specific KPI were not reached. In addition, Pascual *et al.* (2013) found that after 2 and a half years, the new knowledge had not yet been converted into working routines in the Lilongwe Water Board, although some progress was observed in Blantyre. This finding is in line with our results and, indeed, corroborates our thesis that knowledge integration and operationalization is a process of successive phases that requires time.

4.3. Competence integration and use during the management contract

4.3.1. Inside the arenas: the actors and their interactions. First, the organizational structure and associated culture slowed down the process of competence integration and use. When the contract started, GWCL had a hierarchical layout which could not easily accommodate the principles and practices of knowledge management that AVRL wanted to introduce. For example, AVRL wanted to promote staff based on their merit but the corporate culture emphasized seniority; also, teamwork was being promoted in a utility that historically had favoured engineers to the detriment of other disciplines. This choice resulted in the former often assuming positions of superiority (i.e. prior to the contract, only engineers were sent abroad for training, fresh graduate engineers always started as assistant managers, all managerial positions were held by engineers, and so on). Likewise, the operator tried to promote an open culture that would enhance knowledge sharing, but major distance existed between staff members and the hierarchical structures were much accentuated. Indeed, in several instances, new knowledge appeared to be ambiguous for many staff owing to a lack of congruence between their mental models and those of AVRL partners. A flat structure was piloted to facilitate quick integration and use of new competences. This change was resisted initially and it took time to develop a structure that combined elements of hierarchical and matrix organizations. Thus, in the beginning of the management contract at the organizational level, employees were reluctant to assimilate the new attitudes to work and change behaviour accordingly.

Second, both the GWCL and AVRL leaderships were lacking continuity during the period of the management contract. Four managing directors (or acting) led GWCL and four reconstituted boards were established during the period of 5 years. At AVRL, three successive managing directors handled affairs during the contract period. Six ministers were appointed successively in the Ministry of Water Resources, Works and Housing. These discontinuities and uncertainties hindered the integration and use of new competences because relationships between the parties had to restart each time and different

⁴ The five paths are as follows: KPIs changes, capacity changes, project inputs consolidation into change, quality of inter-organizational dynamics, and degree of satisfaction (partners and external stakeholders).

approaches to knowledge transfer had to be introduced. Under these circumstances, leaders spent much of their time struggling with how to secure their short term interests instead of reflecting on the strategic actions.

Third, the two contract parties had different interpretations of the purpose of the management contract. An analysis of the two parties' behaviour revealed that AVRL viewed the contract as a coaching and mentoring relationship, emphasizing flexibility and learning approaches. GWCL, on the other hand, took a purely legalistic position, sticking to the performance indicators which they recognized to have been merely estimated because of the absence of baseline data. The interviews strongly suggested that they left the operator struggling to reach unrealistic targets, to see the contract period end and take over the utility again. This climate could not foster learning processes. However, many respondents argued that towards the end of the contract, the two parties had realised that they would both benefit by working together, but it was late in the process to achieve significant results.

Fourth, the competences of AVRL experts were questioned by local staff. Although the perception of respondents was mixed about the competences of the expatriates, a large number believe that the calibre of the experts did not meet their expectations. The operator lost credibility in the eye of the grantor from the very beginning as it failed to mobilize the people whose curriculum vitae had been included in the bidding documents. The fact that AVRL failed to recruit experts from its mother companies also contributed to their disqualification. This affected the transfer of knowledge in several ways: staff members could hardly integrate knowledge from people they perceived were not qualified enough to teach them and the grantor was not ready to allocate funds for many proposals by the operator because it did not believe in their robustness.

Fifth, the interpretation of the terminology in the management contract created conflicting relationships between GWCL and AVRL, which slowed down learning processes. On several occasions, words and phrases such as 'consultation', 'reasonable and necessary cost' were interpreted differently and a third party had to arbitrate (Aquanet, 2009). A number of meetings and retreats were organized to reconcile the positions. All this affected negatively the integration and use of the competences that were being proposed.

4.3.2. Outside the arenas: the role of the context. On one hand, patronage and political influence obstructed knowledge transfer and use. Historically, GWCL has had a problem of lack of autonomy and of interference by the Government or the State House. Traditionally, the utility managing directors (MDs) and board members have been appointed by the President and, as such, their positions have always been political. The situation did not change during the management contract period; so, neither the MDs nor the board members were independent, especially since many of the MDs were acting management directors. To many of the respondents, such leaders could not drive the changes proposed by AVRL or the contract, let alone to serve as role models for new knowledge assimilation and use.

On the other hand, procurement problems delayed operations. Both the operator and the grantor were supposed to follow the World Bank as well as national procurement procedures. In both cases, procurement processes took a long time, which affected the mobilization of resources and materials (ICT equipment, water meters, bulk meters, chemicals, and so on) necessary for water professionals to translate their competences into physical outputs. For example, the national procedure required four steps involving successive clearance by the Evaluation Committee, the Board of Directors, the Entity Tender Committee of GWCL and finally the Ministerial Tender Review Board or the Central Tender

Review Board. In practice, requests for explanation or dissatisfaction by one of the above entities immediately led to long delays because of the time required to convene new meetings.

Furthermore, the expectations of the Ghanaian community impacted negatively on knowledge processes. Prior to the management contract, many things were not clear to staff members or the public about the actual status of the operator. People had different perceptions of the contract, not all realistic. For example, some staff members thought that AVRL would be a new employer, independent from the grantor, but they were discouraged when they were only seconded to AVRL. In addition, the public was also not fully informed of what was going on in the water sector, especially the roles of the new water service provider. People were eager to see the level of service improve. However, they were disappointed when they saw that the presence of AVRL did not produce visible outcomes in the first few years, especially regarding the availability of water. Some organizations in the civil society, including workers' unions, took advantage of the situation to voice their position against AVRL and were reluctant to cooperate. The public, like the project supervisors, ignored the fact that many of the changes introduced by AVRL would need time to mature before they could make a visible impact on the lives of citizens.

Finally, power relations slowed down knowledge integration. In fact, prior to signing the management contract, GWCL and the World Bank disagreed on the nature of the problems and how they should be solved. While the former believed that its problems were technical (old infrastructure, and so on), the latter argued that the main issue was poor management and believed that an external operator would help turn around the situation. Therefore, during the contract period each party used its powers to make things happen the way it wished, which affected the learning processes negatively. The World Bank laid the management contract as a condition for the Government to get the necessary investment funds for the water supply sector which put the Government in a weak bargaining position. On its side, GWCL had to accept the direction of its mother ministry. Still the management contract put GWCL in a powerful position as it kept the responsibility to plan and execute infrastructure projects and had to monitor AVRL work. The grantor used this particular position to influence the contract in its favour, to demonstrate that the World Bank and the Government had given a wrong prescription to the urban water supply problem.

5. Conclusions

Theoretically, four main conclusions emerge from this study. First, the three conceptual frameworks used by the authors namely the IAD Framework (Ostrom, 2005), the knowledge conversion modes (Nonaka & Takeuchi, 1995) and the aggregate competences (Alaerts & Kaspersma, 2009) have proved useful for understanding the dynamics of KCD under the management contract between GWCL and AVRL. These tools are also relevant for the analysis of other forms of KCD interventions. Second, the public sector (and development community) is right in stressing the role of capacity and knowledge. However, it can learn a lot from the private sector on how to manage processes inside organizations. Nonaka & Takeuchi (1995) theory about how organizations create knowledge is one good guidance in this regard. In general, the critical decisions taken by the public sector in water supply often reflect short-term interests (such as budget constraints, staff appointments, managing political interference, and so on) where corporations may seem to have stronger incentives to develop a realistic strategic vision. Third, the organization has a critical role as an 'independent' entity between inputs and outputs and KCD practitioners must understand how it behaves (it has its own life and dynamics). The processes of knowledge integration and use that take place in that entity determine the success of KCD

intervention, as they determine the health of the organization; however, they are too often neglected. Fourth, the organizational leadership and management procedures are critically important to help develop and maintain new competences and capacity. This paper showed that some new competences were introduced and integrated but faded away as the operator pulled out owing to lack of GWCL top management attention.

With regard to the use of proxy measures, the study has the following implications. First, the paper cautions practitioners about the misleading nature of technical performance improvement targets as a proxy measure of KCD effectiveness. This approach is flawed as it assumes two different, although related, concepts to be synonymous. Instead, it makes sense to differentiate technical performance improvement from competence development because the latter does not always directly and instantly translate into the former. When competences are developed, they must be accepted and integrated into the existing organizational knowledge base, culture and rules before they can be used and add value to what actors do, that is, improvement in their performance. Therefore, during the design phase of KCD interventions, targets should be set that are realistic enough to take into account the time that competences take to translate into performance. In many cases, this time is much longer than the project period, which explains the frequent difficulties of KCD service providers to achieve set performance targets within the project period. This implies that KCD practitioners, beneficiaries and financiers should take the lead in making KCD more effective and efficient by acknowledging more explicitly that KCD is a long term learning process. It is therefore crucial to work on development protocols that allow knowledge and capacity to develop in the face of organizational and institutional constraints.

Second, while recognizing the importance of technical performance indicators to indicate the level of attainment of the objectives of the interventions, it is true that such measurements have limitations. They do not inform about the real capacity of a water operator and the extent to which it improves as a result of KCD. Whether the observed performance improvement results from an increase in capacity (and not from a temporary external assistance, for example) and whether it is likely to be sustained (after the intervention has been phased out) are all issues which the current KCD evaluation approach does not say anything about. Thus, there is a need to develop complementary methodologies to assess the effectiveness of KCD interventions. A starting point would be to characterize the concept of capacity for particular water sub-sectors and then develop indicators that take the above concerns into consideration. This would allow practitioners to conduct fair and realistic assessments, focusing not only on the set technical targets but also the capacity changes that result from KCD interventions.

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