Sustaining the Benefits of Action Research in Decision Support Tools Development: Lessons from an Urban Water Utility in Africa

Frank Kizito[*]

National Water and Sewerage Corporation
Kampala, Uganda

Extended Abstract

1.   Introduction

Research leading to the development of decision support tools is often carried out within the context and framework of an academic research project with a finite time frame and limited budget. All too often, the results of such a research undertaking do not find their way into practical application within real-life organizations, or, if they do, there is insufficient continuation of the research and development effort within the organization for which such tools have been developed and deployed. This, unfortunately, leads to disuse, redundancy and failure of such tools to evolve with changing requirements within the organization over time.

In general, it has been noted (Rasmussen, 2004; Brugher & Bowen, 2005; Styhre & Sundgren, 2005) that there are shortfalls in the traditional approaches to research in the technological sciences with respect to their failure to effectively impact on practice and to support joint learning between academicians and practitioners. Action Research (AR), which involves partnership between academicians and practitioners for the purpose of resolving real-life problem situations within the practitioners' social context, has been advocated as a suitable way of bridging this gap. In AR, research takes place in real-world situations, and aims to solve real-world problems. What separates this type of research from general professional practice, consultancy, or daily problem-solving is the emphasis on "scientific study"; the researcher studies the problem systematically and ensures that the action or intervention is informed by theoretical considerations.

There are two types of learning in organizations (Bhatt & Zavery, 2002): single-loop learning (problem-solving), and double-loop learning (critical reflection leading to further learning).

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[*]*Corresponding Author: frank.kizito@nwsc.co.ug*

While the former maintains an organization, it is the latter that redefines an organization and enables it to adapt and thrive in a dynamic environment. By its nature, AR is an iterative process, with action and critical reflection taking place in turn; this makes it suitable for application in situations where sustainable organizational development is the principle goal.

Sustainability is thus guaranteed through a complementary process of AR and Action Learning (AL). The latter is described as a process in which a group of people come together regularly to help each other learn from their experiences. Both AR and AL are intended to improve practice; AR intends to introduce some change, while AL uses some intended change as a vehicle for learning through reflection.

This paper describes a study in which an AR approach was applied in developing decision support tools for enhanced management of an urban water utility in Uganda. The focus of the study was not on the development of decision support tools *per se*, within an academic setting, but rather on the promotion of participatory problem-structuring and decision-making processes within a real-life organization, and the provision of support for these processes through the development of appropriate computerized tools.

2.   Objectives

Being an AR undertaking, the overall objective of the study was to achieve improvement in decision-making within a real-life organization through the development and application of decision support tools. The specific objectives were to elicit first-hand the causes for the perceived low rate of adoption of decision support tools in practice, and to propose practical ways in which the identified shortfalls could be overcome. The study sought to understand the challenges of embedding decision support tools within existing work systems in organizations, and to identify how best to provide formal decision support as an enabling framework for organizational development.

3.   Methods

The study was carried out within the National Water and Sewerage Corporation (NWSC), a public utility owned by the Government of Uganda. NWSC is mandated to provide piped water and sewerage services in 22 urban centers in Uganda. In particular, the study was conducted within Kampala, the capital city and the largest of the 22 urban centres.

In the study, four real-life problem situations were used as case studies to develop prototype decision support tools designed to assist in tackling the following needs respectively: (i) participatory problem-structuring in the face of water distribution bottlenecks; (ii) formulation and implementation of action plans for non-revenue water management; (iii) facilitation of decentralized customer account management using a "territorial management" approach; and (iv) budget implementation monitoring and control.

During the study, a number of prototype decision support tools were developed. GIS-based spatial analysis and visualization tools were extensively used to inform the processes of participatory problem analysis and structuring, while a number of modeling tools were applied in the generation and evaluation of alternative solutions. Activities undertaken included participatory problem-structuring; development of prototype data management tools;

development and application of geovisualisation tools; hydraulic modeling and scenario analysis; performance of spatial and geostatistical analyses; development of web-mapping applications.

To facilitate participation, and as a way of fostering action learning, a think-tank was established within the organization. The think tank was introduced as "a new forum for supporting the formal structuring and analysis of technical problems, by making use of all available data, tools and techniques, and promoting decision-making characterized by participation and dialogue". The think-tank held regular meetings at which issues were collectively identified, actions formulated, and tasks allocated for implementation. Other participatory activities included brainstorming workshops that involved the participation of a wider range of stakeholders within the organization.

4. Results

As a direct outcome of practical activities carried out within the four case studies, three categories of decision support tools emerged as being required for effective enhancement of decision-making processes within the organization, namely: (i) geovisualisation tools to support problem identification and structuring; (ii) data management tools for continuous collection, analysis and presentation of data required to inform various stages of the decision-making process; and (iii) modeling tools, useful in the generation and evaluation of alternative solutions to problems as well as in informing the problem-structuring phase.

Two other categories of decision support tools were identified as necessary within the decision-making train: (i) Choice models, useful for facilitating the process of ranking and selection amongst alternative solutions; and (ii) Task management tools, addressing difficulties in making the transition from planning and decision-making to effective implementation of selected courses of action.

5. Discussion and Conclusion

Using the four case studies, a number of insights were gained into how best to ensure successful development and implementation of decision support tools within an organization. Through reflection on the case studies, three aspects of interest were highlighted: (i) the need for proper problem identification prior to formulation of actions; (ii) the challenges of moving from planning to action; and (iii) the importance of embedding formal decision support processes within existing work systems in organizations. The necessity of a holistic outlook, going beyond a focus on technological artifacts, was also underscored.

The AR approach was found to be useful in the development of appropriate and sustainable tools and technological practices within real-life organizations, and in bridging the gap between academic research and technological practice. The establishment of a discussion forum for participatory problem analysis was found to be beneficial in promoting structured decision-making processes within the organization, thereby creating awareness on the need for a more rigorous approach to decision-making, going beyond the "firefighting" that had hitherto characterized network operations management.

Furthermore, apart from ensuring the inclusion of participatory processes at all stages of the decision-making processes, one benefit from the establishment of a think-tank was to provide an opportunity for enactment of a mutual learning process. Participation within the think-tank thus included aspects of training, benchmarking, peer review and knowledge transfer, with proper documentation of activities and outputs at each stage acting as an audit trail and enriching the knowledge base of the organization.

The study also recognized that a gap existed between the outcomes of planning and decision-making processes and the effective implementation of proposed actions. Among other things, it emphasized the need for strengthened supervision, monitoring and evaluation activities, as well as a commitment on the part of all players to support and systematically see planned actions through to their logical conclusion.

As an outcome of the study, a prototype decision support framework was proposed, structured on a generic procedure and process flow chart for provision of support for problem-solving. The prototype framework was developed based both on a review of the existing theory on the subject and on reflections on the actions undertaken within the study and their outcomes. The purpose of the framework was to act as a basis for identification of the nature and mode of delivery of formal decision support tools and processes to be availed to various levels of decision-makers at various stages of a decision-making process.

The prototype decision support framework was considered to be emergent, based as it was on the outcome of reflection on the actions carried out during the study, together with attempts to relate the results of these actions with the theory that informed and prompted them. It is hoped that the framework will be subjected to further research, development and refinement as subsequent iterations of action research within the organization unfold.

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