A Year in the Philippines: Improving Governance through Operations Research

Elizabeth Warnes[a]

Abstract

A year spent teaching Operations Reasearch (OR) in the Philippines has convinced me that such efforts can genuinely improve the quality of governance in the developing world. Working with city-planning staff in a local government unit, a number of experiences demonstrated to me the potential OR presents for improving decision-making. This article relates some of my observations and will hopefully generate some interest in the use of OR to promote better governance in the developing world.

This promising suggestion presents a practical means for building more capable governance in weak and fragile states, a current endeavour of the aid program and national security efforts.

Introduction

Bacolod, City of Smiles and home of the famous *lechon manok* (barbequed chicken), is a highly urbanised city on the Filipino island of Negros. Arriving in mid-October 2005, I found myself in the middle of the annual Masskara Festival, a masked fiesta to celebrate civic life and culture.

Despite appearances, locals are well aware that the infectious *Bacoleño* optimism is up against a number of serious challenges posed by rapid urbanisation in the last thirty years. Massive rural-to-urban migration has seen the population sky-rocket (from 260,000 residents in 1980 to 430,000 in 2000), placing considerable strain on infrastructure and government services in the city. The provision of public housing, severe poverty, the maintenance of a sprawling road network, disaster management, the disposal of municipal waste and public health are all pressing community issues.

My host organisation was the City Planning and Development Office (CPDO), which is responsible for overseeing the development, implementation and observance of strategic city plans. The office compiles and updates the comprehensive land use plan, the socio-economic profile, the solid waste management plan and a geographical information system. Employees of the office regularly advise the city's legislative body on development and planning issues, often undertaking short term studies to inform executive decision-making. The officer in charge is Architect Lemuel Reynaldo, who supervises around twenty staff and was my counterpart for the year.

The office was far from high-tech. Computers were still operating on Windows '98, while Microsoft Office and Arcview were pretty much the only commercial applications available. In fact, typewriters and carbon paper were still used for many administrative duties and my counterpart did not use a computer at all, preferring to organise his schedule by text message and draft all official documents with pen and paper.

Architect Reynaldo's duties were incredibly taxing, spanning ten-hour days making strategic decisions and planning for the city's future. In these activities he had to take into account a number of factors, attempting to not only comply with pre-existing city plans, but also address community concerns and a body of national and local laws that were often conflicting or unclear. His deliberations had to involve a range of stakeholders, with diverse viewpoints and motivations, while always striving to satisfy his own conviction that governors should act for the greatest good of the greatest number.

OR provided him with a basis for decisions and advice, while also managing some of the nepotism, corruption and inertia endemic in the political environment. It was extremely rewarding to see his role, and those of his advisors and support staff, made a great deal easier throughout the year.

[a] Planning and Guidance Branch, Defence Systems Analysis Division, DSTO, Canberra, Australia (Email: elizabeth.warnes@defence.gov.au)

My Experiences Assisting Decision-Making in Bacolod's Local Government Unit (LGU)

I will now describe some applications of OR that significantly improved the planning activities of Bacolod's LGU. In these experiences some guidance can hopefully be found for other practitioners engaged in the field.

The Integrated, Community-Based Information System (ICBIS)

The ICBIS project involved the creation of an information system containing important community information to be used for government planning purposes. Information from 20,000 household was successfully collected, digitised and reported upon in an effort that required significant planning and analysis throughout.

The scale of the ICBIS was ambitious and unique, with considerable planning and problem-solving efforts in the formative stages to ensure the ultimate success of the enterprise. Over a series of meetings, officials from city government and the community worked together to establish information requirements and design the questionnaires, following which the CPDO created a series of spreadsheet templates for data management. Spreadsheet modelling and analysis was employed by officials extensively throughout the project, representing the main technology transfer of OR for this activity.

The ICBIS was a unique success. A number of other local agencies had previously failed in information-gathering efforts of more modest sizes, owing to a lack of planning and analysis beforehand. Bacolod's LGU used spreadsheet calculations to define a feasible scope for the survey, providing hard numerical evidence that stationery, time constraints and staff availability would only permit a 20% sample of the population. At planning meetings, these basic calculations informed passionate debate regarding the pros and cons of undertaking a full census, which was the first impulse of many stakeholders. The analysis provided indisputable proof that a census would take years to complete, while canvassing of a sufficiently large sample could provide desired outcomes with the resources we had. This ensured that the LGU's investment in the project was ultimately rewarded.

The LGU also developed a simple paper template, in Excel, for data collection. The template was completed with crosses and numbers and used by over 500 interviewers, with varying levels of literacy, to expediently amass the raw results of the survey. This approach reduced stationary expenses whilst minimising the physical burden on interviewers, many of whom had to walk long distances in difficult terrain.

Designing a system to evenly canvas 20% of the city's 100,000 households, without repetition, was the next problem. The city consisted of sixty-one barangays, the Filipino equivalent of a suburb and the next tier of local government beneath city-level. It was decided that each barangay would be responsible for managing their own information, following simple protocols carefully defined by the CPDO.

After considering various approaches, it was decided that interviewers would be pre-assigned routes by a local coordinator and survey every fifth house. City maps, generated by the Geographical Information System (GIS) in my office, were provided to each barangay for daily update to record canvassed areas, thereby ensuring that households were not surveyed twice. At the end of surveying, the CPDO collected these 61 maps and entered them to the GIS, so a map of survey coverage was produced.

One worker per barangay was specially trained to enter hand-tallied results from the interviewers into a custom-designed spreadsheet. At the completion of surveying, 61 of these spreadsheets (one from each barangay) were forwarded to the CPDO for compilation in a database. Thus, in the space of three months, information from 20 000 households was amassed and processed, presenting a unique success story inarguably due to planning activities supported by the transfer of basic analysis skills.

The project also yielded long-term benefits to government operations, since it provided hundreds of workers with the opportunity to acquire expertise in the use of spreadsheets. These individuals can now maintain electronic records at the community level and perform simple calculations and modelling in Excel.

The exercise also presented the opportunity to teach staff in the Research and Statistics division about statistical concepts, such as sampling and significant difference. It was encouraging to see the consequent application of these skills to the city's socio-economic profile (hitherto a brick of tables with minimal analysis or explanation). The staff also used their understanding of significant differences to map the survey results using the geographical information system. The latter proved a great way to share the outcomes with the general community, and generated considerable further interest at the city council and local university's economics department.

It is envisaged that the information system will be further developed this year, using the methods and expertise established in 2006.

Finding a Site for the New Government Centre

The next example illustrates a case where simple OR both structured a group decision-making process and created ownership for the outcomes.

The LGU wanted to choose a site for the new government centre, housing all the agencies and offices of city government, from around ten available alternatives. The decision involved a number of competing criteria, and was also contingent upon the inescapable politics that arise when personal interests and affiliations come into play.

The CPDO had already put together a number of lengthy verbal reports evaluating the sites on a range of issues. Each report that was presented to the city council would invariably provoke hours of debate and deliberation, with no decision having been reached in six months. One afternoon, as a colleague was despairing at the prospect of compiling her third report in almost as many weeks, we decided another approach was required to progress the issue at the council chambers.

We decided instead to present a basic spreadsheet outlining the basis for my office's recommendations at the next council meeting. Councillors could use this tool to engage in the analysis process, which we suspected would create greater confidence in the assessment and create greater ownership in the advocated courses of action. Taking our structure for the decision problem from the criteria and qualitative assessments already established in a previous report, we put together a spreadsheet using the Simple Multi-Attribute Rating Technique (SMART). My colleagues were then able to test the sensitivity of the result to the assessments that had been made, and show the councillors the basis for their findings.

My colleagues were excited about this new approach. No doubt another selling-point for this tactic was that it reduced the amount of written and spoken English required in reporting to the council, as the majority of my colleagues were more comfortable speaking and dealing in their local dialect. A spreadsheet of numbers allowed them to present their case to the council without having to spend hours prior to the session despairing over the absurdities of English grammar, as required for all official reports.

The following week, the spreadsheet was presented to the council and used to make a final decision. The use of SMART to structure the problem helped to focus council proceedings on the criteria of interest, in this case the readiness of the site and development costs. After examining the impact of scoring against these criteria on the final result, a site was selected and approved by the body.

The use of this simple technique had helped to focus debate on the real issues and effectively expedited the decision-making process. It also gave some of my colleagues the opportunity to numerically articulate their reasoning, where the task of representing their arguments in English might have proved more challenging. Moreover, the spreadsheet made the decision-making process transparent, leaving a trail of logic to the final result. The spreadsheet had assisted the council by providing a structured and mutually agreed framework for debate, managing competing viewpoints whilst not allowing them to derail proceedings.

The LGU used SMART again during the year to revisit this problem and others. An additional benefit was that spreadsheet modelling skills were also enhanced, and gradually developed and applied to other problems.

Messy Problems: Solid Waste Management

Solid Waste Management (SWM) has been a major concern for Filipino LGUs in recent years, following the Payatas disaster in 2001, in which 200 waste pickers were killed in a landslide at a Manila garbage dump. In response to the disaster, the national government passed Republic Act 9003 (R.A. 9003), setting out the obligations of LGUs to manage the social, environmental and economic aspects of this issue to minimise adverse impacts on the community. These obligations include the operation of an accredited sanitary landfill, recycling and composting of municipal waste as well as public education campaigns to encourage responsible waste generation and management at the household level.

Although a number of success stories have been reported in various LGUs, the majority have struggled to keep pace with government regulations. Prescriptive solutions to the problem simply do not exist, since responses have to be appropriate to the local context, particularly taking into account the individuals who are involved in the waste management stream (including workers and waste-pickers). The response of the LGU also must be appropriate to the resources and expertise of the local community and government, population size, local industries, infrastructure (such as roads, dumpsites and trucks) and environmental features of each locality, to name but a few relevant factors. The mere scale of the problem in Bacolod, which produces around 250 T of garbage for daily collection by 21 trucks with a combined daily capacity of 220 T, conveys the urgency and scale of the problem.

R.A. 9003 calls for each LGU to establish a SWM committee to strategically manage and plan for all aspects waste management. Membership of the committee spans both public and private sectors, with the participation of senior government decision-makers, ideally the mayor, as well as members of commercial enterprises with vested interests in waste management, government planners, school teachers, workers' unions, livelihood project representatives, environmentalists and other community groups as appropriate. In Bacolod, membership of the committee was approximately thirty people, with a considerable diversity of views represented.

While this variety could have strengthened decision-making within the body, often it created inertia owning to a lack of individual ownership of issues and a sense of hopelessness about the enormity of the task at hand. There was no clear place to start, or any kind of strategic vision for where activities might lead.

Committee members also complained of a lack of support from higher levels of government, or the "political will" required for change. Certainly, top-level attendance at meetings was often minimal. However, there was also a deficiency of coordinated initiatives coming from the body itself, with a clear need for a structured approach to formulate a strategic plan that would accommodate the diverse positions of stakeholders. This could also have explained the disinterest of senior government decision-makers, who were often pressed for time and had to rely on subordinates to show initiative.

In any case, the problem certainly wasn't a lack of money or resources. A number of small grant schemes – from New Zealand, Japan, the United Nations Development Program and Australia – were available for well-planned initiatives and proposals. However, without ideas from the committee itself, all the money in the world was of little use. The inertia displayed by the committee was exacerbated by a reliance on outside solutions. Numerous plans and proposals written by consultants and development agencies invariably floundered at the implementation stage because locals had not been involved. The capacity to create locally appropriate plans, with real ownership and the potential for action, was clearly needed.

This dependency has been re-enforced in LGUs throughout the Philippines by the growth of a consultancy industry in SWM, which has created a public sector skills gap to manage the problem organically. Industry representatives roam the country, marketing expensive waste management advice, services and technology that often falters at the implementation stages because it is simply not appropriate to local

conditions. Other groups, some funded by international aid, sell complicated decision support to LGUs, often using “black-box” methods such as the Analytical Hierarchy Process. While the logic chain remains impossibly obscure, the findings are met with limited support in government circles.

In my office, a number of reports had already been produced by consultants that were never even read, representing many thousands of dollars of international aid money wasted. There was low ownership of the studies, since the LGU had neither participated in the studies, nor understood the methodologies employed. As has been noted previously, any study that is not sufficiently simple and transparent to be easily explained will be distrusted by decision-makers [5]. Bacolod’s failure to implement these many studies was classic proof.

Hoping to not replicate the mistakes of the past, I was involved with key government planners from the committee in adopting a participatory methodological approach to develop a strategic framework for SWM. We initially gathered information and performed estimates to characterise the current baseline situation. The group then began with the basic flowchart shown in Figure 1, representing a generic waste management system. We then developed a more specific representation of Bacolod’s system by entering our own numbers in a colourful flowchart (Figure 2) that decision-makers and their staff could interpret with relative ease.

Using this picture, the group then agreed on specific improvements to the system that should occur over the following decade, before formulating feasible strategies to realise these goals. We also began to consider more diverse issues, like population growth, landfill capacity and increasing waste generation, and could calculate the implications for landfill given current trends. Alternatively, we considered the impact of waste reduction initiatives and assessed these strategies against the hard, numerical baseline we had established. Based on the pictorial model shown in Figure 2, a framework for solid waste management was proposed, which broke the problem into smaller concerns such as recycling, landfill, composting, livelihoods and public information and education campaigns. Most importantly, each part of the problem now had its own strategies and goals, which could be assigned to appropriate government departments for more basic planning and implementation.

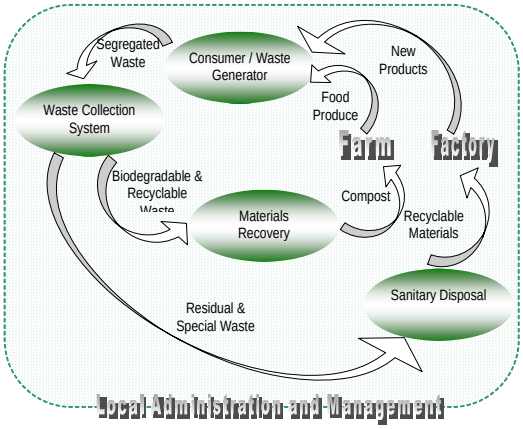

Figure 1: A generic representation of an Ecological Waste Management System that government planners used to construct the flowchart in Figure 2.

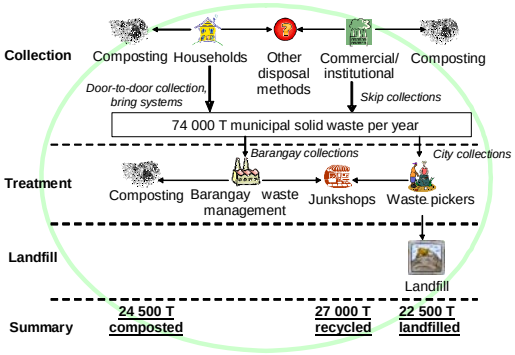

Figure 2: Flowchart showing the current volumes of waste generated in Bacolod, and the ideal system for its management.

As previously noted, technical, socio-cultural and institutional factors all contribute to the difficulty of planning for solid waste management [8]. Possibly the largest challenge, however, lies in managing the sheer number of stakeholders in the process. In this context, it is enough for acceptable, rather than optimal, responses. The kind of decision-support it is appropriate to employ in this territory should ensure that, while solutions don’t necessarily have to be “right”, they shouldn’t turn out to be seriously wrong at a later stage.

In my experience, decision-support approaches that encouraged participation, ownership of issues and prevented outright failure were successful to inspire action in this challenging community issue.

Analysis Paralysis: A Word of Warning for Number Crunchers

As an adjunct to these positive experiences, a word of warning should be issued about the collection of development statistics in general. The ultimate value presented by information should always be weighed against the investment in time and resources that data collection and interpretation requires. The following tale cautions all would-be number crunchers caught up in spreadsheets of raw data and tantalised by the secrets that detailed investigations might yield.

The LGU was given national, provincial and local Department of Education data for the previous year, containing thousands of test scores and drop-out rates from public schools throughout the country. As might be expected, I fell upon the figures with analytical enthusiasm, finding correlations between such obscure factors as school furniture availability and year six truancy levels.

While my own enthusiasm for deep analysis revealed a number of current issues in the education system, these were all previously known to the LGU. Already, my colleagues were aware of significantly higher drop-out rates in the south eastern areas of the city, a poorer agricultural area which was badly serviced by infrastructure. They were also previously aware of other findings, such as the conclusion that high-schools close to the city-centre showed significantly poorer attendance rates, most likely due to the distractions offered by nearby pin-ball parlours, shops and cinemas. In the end, my deep analysis provided few answers to improve education, merely characterising deficiencies, which were already accepted as givens.

From scanning the wealth of data on development that is available from the UN, World Bank , Asian Development Bank and a host of Non-Government Organisations and aid programs, it cannot be said that the problems presented by poverty are uncharacterised. While there is no doubt that the collection of socio-economic data can serve to raise awareness and establish a baseline for social progress, it is also an expensive and time-consuming activity. Too often, it seems that information-gathering is carried out in lieu of developing strategies for tackling the tough problems. Unfortunately “something is better than nothing” doesn’t always ring true here, since censuses and surveys cost time and money, and serve to delay more meaningful action.

I strongly believe that aid resources could be employed more effectively in teaching decision-makers how to use statistics in shaping activities and making progress towards challenging goals.

Strong Governance: Why It Makes All the Difference

Equipping a public sector that can manage its own progress towards key goals is an explicit objective of many international aid efforts. For example, the UNDP notes that in the majority of cases, governance is weak not because of the ill-will of leaders, but because the state lacks the financial resources and technical capacity to manage an efficient public administration [15]. The report proposes that the most efficient response is to invest in measures to train and equip an accountable and efficient public sector.

Similarly, the Australian aid program aims to build capable and transparent governance as a strategy to intervene before the collapse of weak states. A recent report on fragile states explicitly notes that the quality of leadership, and how decision-makers manage vested interests, has considerable bearing on state stability. The same report proposes that inclusive consultation processes and effective group decision-making is central to the reform of fragile states, and acknowledges that

“[T]here is growing recognition that investing in and training a capable/accountable elite – both inside and outside of government – to drive reform from within the country itself is a ‘public good’ with significant positive externalities.” [1]

These “significant positive externalities” extend as much to better quality of life for locals as a controlled security environment resistant to organised crime, terrorism and other transnational threats, all of which have impacts beyond state borders. As a 2003 World Bank report notes, the “third ripple” effect of a collapsed state has global implications, namely that it

"generates territory outside the control of any recognized government, and such territories have become the epicentres of crime and disease" [4].

A number of Australian government agencies are currently engaged in the provision of practical, in-country advice to build government administrative skills in our region. However, there is no specific agency or department currently involved in the transfer of scientific analysis skills to support government planning and decision processes. I would argue, based on my own observations last year, that the transfer of OR skills presents a new area in which appropriate government departments could become involved.

The History of OR in Community Development and the Public Sector

This being the case, it is important to note that a number of obstacles have limited the application and skills transfer of OR in the developing world previously. Various OR studies have been conducted in underdeveloped countries since the 1950s. A comprehensive overview is given by Bornstein and Rosenhead [3], who note that early efforts were predominantly focussed on national economic planning, while it seems that the uptake of OR at the lower levels of municipal and provincial government was more limited. Still indicative of the high national-level involvement in the developing world is the statistic that of 44 national member organisations of International Federation of Operations Research Societies (IFORS), 17 are from the developing world[2].

Since the 1970s, however, commentators have noted that OR is a field that has not lived up to its potential or been seriously studied in development contexts [11]. This criticism persisted into the early eighties, when Kemball-Cook and Wright criticised a lack of work on significant development problems, and a lack of work for indigenous clients [6].

Numerous papers have proposed reasons for the limited success of OR in development. Among them is the complaint that the practice has not understood the political environment, (admittedly, a criticism also levelled at practitioners in the developed world). Others have proposed that techniques have not been tailored to fit the types of problems, culture, or cognitive processes of decision-makers in developing societies. It has been argued that the identification of appropriate techniques for resource-poor, non-hierarchical organisations challenges traditional OR, which typically operates within highly-structured, first world organisations and governments [9]. It was certainly true in my organisation that informal, resource-starved networks dominated government and community decision-making. Improvised, ad-hoc procedures, based very much on social networks and informal gatherings, were devised to manage a diverse body of problems.

The growth of unique OR cultures in the developing world is a necessary step, which can only grow from local involvement. Bornstein argues that underdevelopment is about dependency, which is characterised by relationships with the developed world: cultural, technical, political and economic [3]. For true development to take place, governments need to become self-sufficient and so there is a need to encourage self-confident, multi-faceted, indigenous OR communities in the ranks of public administrators. Ineffective cycles of dependency arise when technical skills are exogenous and do not suit local needs and logic. Within my government unit, interest in OR derived from engagement in local problems which were formulated from community needs and concerns.

These failures in the developing world may reflect the larger crisis in OR to find applicability to strategic government problems, even in the developed world. While OR has been a presence in government since the 1970s, with aspirations to tackle the major strategic issues that face society as a whole, Rosenhead notes that its practice has nevertheless been dominated by fairly routine applications [10]. The development of government OR in the 70s and 80s was hindered by the belief that relevant factors and constraints could always be consensually established in advance, and that there was a single, legitimate decision-maker. While this might prompt the lazy analyst to wish for more dictatorships, in

[2] Four are Asian, seven are European, four are from Central or South America and two are African.

democratic political processes there is inevitably a range of stake-holders and competing concerns to keep practitioners busy.

In fact, traditional OR operates under a very different set of assumptions to what might be more appropriate for governments. Mingers and Rosenhead have noted drivers for these disparities, namely that effective governance isn't always measured by efficiency or profits, concepts more suitable in the private sector and economic theory [9]. In serving public and individual welfare, government considerations must extend to long-term as well as short term benefits, to social relationships as well as environmental concerns. For example, in my experience community participation was an important measure of effectiveness in government decision-making. In the private sector, the number of views that require accommodation in a particular decision process is invariably far fewer and of less importance.

This often leads the practitioner of public sector OR into unpredictable territory, or "The Swamp", where competing views can make even problem definition difficult [10]. To these murky depths, soft OR techniques can bring some illumination. For example, Problem Structuring Methodologies (PSMs) developed out of a sense that OR practice had strayed from important areas of social decision-making. Rosenhead argues that PSMs can provide analytic assistance where there are multiple actors, differing perspectives, partially conflicting interests, significant intangibles and perplexing uncertainties [10]. While these characteristics pervade all democratic decision-making, the need to identify novel, inclusive solutions under considerable resource constraints, make these methodologies particularly relevant to developing world governance.

Participatory PSMs use rules and methods to guide group debate as a means to understanding messy problems. These techniques have proved effective in the management of problems that have previously inspired only inertia and a lack of ownership within government and community groups. It has been argued that structured dialogue processes can also assist to establish shared meaning, values, understanding and acknowledgment of problem solving processes. Supporters argue that PSMs promote "systems intelligence" over "group think" [10]. Essentially, the process of humans interacting, creating ideas and coming to conclusions becomes a science in itself – one to be understood, leveraged and assisted however possible.

Towards Culturally Appropriate OR

Within Asia, the main stumbling block has been resistance to the development of local forms of the discipline that are suited to Asian cognitive processes and values. However, there has been a movement in the last fifteen years towards developing more culturally appropriate OR methodologies in Asia, that are adaptable to context and replace more Western approaches. In China, in particular, there has been acknowledgement that there is a need for OR practitioners to engage in projects in ways, languages, styles and logic that are compatible with that of the day-to-day management activities of users.

One particularly interesting paper, proposing a path towards more user friendly OR, develops a methodology that facilitates learning and problem-solving skills among Chinese workers by taking conceptual guidance from traditional philosophy [16]. Noting that Eastern and Western cognitive processes are different, the author proposes a move away from formal Western methodologies, which can alienate the Eastern mindset, to processes that are more familiar.

Over the course of my own assignment, I more or less came to similar conclusions. Rigorous frameworks and mathematics on paper were invariably met with extreme disinterest by decision-makers. However, there was greater interest in visual representations, reflecting the ubiquity of visual stimulation in Filipino society, where adornments are bright and ubiquitous. Art and craft is a popular form of expression in all social fora. Murals adorn city walls, schools, prisons and spare urban spaces, while office space is embellished with fake flowers, bright posters, Styrofoam displays and elaborate paper crafts. It is hardly surprising that the use of graphs, flowcharts, maps and pictures to interactively explore problems met with greater success than words and maths. These approaches visually engaged

workers in ways that were compatible with daily experience.

There is a trend that is starting to acknowledge a very human side to community and government OR, which presents challenging but not unmanageable opportunities to develop the discipline. Human behaviour and politics are important components of problem-solving situations and processes, and as much controversy as the label “philosopher politician” might generate among purists, it is also clear that complete detachment can be perilous. Government OR is a part of the political process, as an art that gives decisions credibility and reason, and is not an activity that stands above or beyond the institution it supports. Practitioners must carefully craft their work to appeal to decision-makers if their outputs are to influence decision-making in any way at all.

General Guidelines for the OR Practitioner Working Across Cultures

I would now propose some broad strategies for capacity-building local governments in OR, important given the clear role it played in strengthening decision-making and planning in my experience. Nine pointers for other practitioners therefore follow, based on my own observations throughout the year.

1. Break dependencies on external decision support

First and foremost, skills transfer in OR should aim to break government dependencies on external decision support. This can be realised by fostering an indigenous expertise in OR, in both government and local academic institutions, that is appropriate to local cognitive processes, culture and social structures.

Bornstein and Rosenhead also argue that minimal training for local students, to transfer basic OR skills, is more appropriate than advanced mathematical training [3]. This being the case, there is a noted shortage of teaching materials, particularly case studies highlighting successful OR applications to developing world problems. Western courses are out of context and often too theoretical. Personally, I found that materials for community-based OR were of most assistance, particularly Slocum’s practical web-based resource detailing a number of participatory problem-solving techniques [13].

The flow-on effect from a local capacity to problem-solve will be a higher rate of implementation for projects and plans. When locals find their own solutions, ownership of those solutions logically follows.

2. Tailor the techniques to the decision-making culture

At several times throughout the year, I found that my own suggestions had a distinctly Australian bias. For example, during survey design when I proposed a question relating to annual household income, several colleagues noted that this would not accurately reflect the situation of the household in many cases. Firstly, household income was often received in-kind, particularly in poorer areas. Furthermore, within the community there was a deep mistrust of government interest in earnings, particularly since tax evasion is endemic. As a result, survey results would inevitably under-estimate the true household resource base.

However, my suggestions could also present interesting new perspectives even if occasionally overlooking relevant local factors. From this observation I would suggest that technique transfer should encourage local inputs to allow the exploration of progress from angles appropriate to the community [16]. Operating in a different society to my own, it was necessary to be aware of societal, cultural and institutional differences that determined the viability of the OR we practiced.

The development of locally adapted problem-solving techniques emerged through everyday interaction and dialogue with my colleagues. From this interaction a number a methods presented useful starting points to inspire further engagement with problems: decision analysis techniques (eg. SMART, decision trees), flow charting, spreadsheet modelling and participatory problem solving methods met with the most success. From there we embarked upon the development of locally-adapted variants, which were suited to cognitive processes, understandings and preferences.

Unfortunately, this means it is difficult to suggest universally appropriate forms of OR for development contexts, since communities are different everywhere and a myriad of possibilities arise from collaboration. However, a preparedness to stray from the path of Western OR is strongly advised. In particular, it was important to adopt a collectivist understanding of objective functions which meant, for example, that community involvement and group welfare invariably assumed higher priorities than expediency, efficiency and profit.

It is crucial to build organic skills in OR so that the right problems are solved. No outsider will ever understand the intricacies of a culture and community as a local does. After all, you can't make someone else's decisions for them, but you can help someone else make better decisions.

3. Remember that humans make decisions

The human side of OR was something that was apparent time and again during the year. The techniques that I shared with my colleagues had to be compatible with the social and cognitive processes of decision-makers and institutions.

It was important to remember that politics both determined how my office would be tasked, while affecting the behaviour of people in political processes. This feedback loop operated at all times, and working within the boundaries and interests of those processes, our analysis could have positive effect on decision processes. For example, one positive effect OR on the political environment was that analytical support provided leaders with the confidence to advocate and instigate decisive action, thereby overcoming the inertia that otherwise bounded legislative processes. Participatory OR also focused group debate on the important issues, rendering impotent some of the dirty politics of decision-making.

4. Stop collecting statistics and start using them

Building an indigenous capacity to analyse and use statistics in weak local governments can enhance the quality of decisions, actions and planning for the future. The development of this capacity should proceed, if necessary, at the expense of more information gathering exercises. Collecting socio-economic data is a resource-intensive exercise, and a particularly wasteful one when the results progress little. Creating local capabilities to frame problems and find solutions offers a far greater return on investment.

5. Dismantle the technocracy of government planning and decision-making

There was a general belief in my LGU that complicated analysis was a technocracy to be performed by outside contractors and professionals, often from the developed world. This perception was gradually replaced by the realisation that local planners and decision-makers could undertake their own analysis, using a number of low-tech techniques.

Tools didn't have to be complicated. Working within IT limitations and local skills was always possible with a little creative thought. There was simply no scope for complicated pieces of analytical wizardry. Any computer-based models I did develop were also suitable for training purposes, with simple, intuitive designs that could be adapted to other problems.

Past experiences in my LGU, largely forgotten but for the piles of dusty studies, untouched manuals and computer print-outs stamped indelibly with aid program slogans, pointed to the folly and wastefulness of anything more elaborate. Beyond the contracting fees for such support (often sourced from international aid), there were several cases in my experience where contracted assistance actually detracted from progress, as it created dependencies on unfeasible solutions that were paraded as "answers" whenever certain topics were raised. Without an indigenous understanding of the analysis, it was frustrating to see minimal progress in these areas as a result.

Effective and long term investments in governance build local capacity to critically evaluate issues using low-tech, available methods (namely Microsoft Excel, a pad of paper and whatever cranial capacity you might possess).

6. Retain a practical focus

When the techniques transferred were appropriate to skill levels and had demonstrated relevancy, my colleagues were enthusiastic to learn and experiment with new ideas. We tried to use existing, everyday problems to maintain a practical focus at all times, which served to maintain staff interest. As staff saw how their new skills could influence, support and improve higher decision-making processes, morale certainly improved. Enthusiasm to acquire the skills to support other important areas of local governance spread as colleagues saw the positive results of past efforts.

This was particularly the case with spreadsheet modelling, following the successful application of SMART to the government centre selection process. As confidence in spreadsheet modelling grew, colleagues began to apply this analysis to new problems. For example, later in the year, when a business tried to sell the LGU technologies that could transform all of Bacolod's garbage into building blocks, a colleague did some basic spreadsheet modelling and realized that in a week Bacolod's waste stream would produce more bricks than the city could annually use.

In brief, spend some time looking for appropriate problems to demonstrate the practical applications of OR before you rush into teaching the more abstract points of theory. Six months of my assignment passed before the use of SMART for the government centre decision managed to convince many of my colleagues of the practical benefits of OR.

7. Advocate the benefits of OR in government operations

OR has to be marketed to the power brokers in local government as a tool that presents obvious opportunities to improve everyday operations. This is necessary to secure the investment of time, effort and resources required to transfer and practice these skills.

The participation of higher levels of government in OR processes is essential, since implementation of findings will only proceed if those invested with the authority to act have confidence in the process. As Rosenhead also notes, a commonly encountered sticking point with problem solving methodologies is that organisational actors at the appropriate level of responsibility have minimal involvement, due to considerable time pressures, and as a result outcomes are often surprising and dismissed [10].

Decision-makers must be convinced that OR offers a return on investment before they will champion its use. Compiling some successful case studies from the literature and presenting these to in-country gatherings of local planners would be an effective strategy to secure support.

8. Assist group decision-making

In my local government unit, the decision-making environment was characterised by numerous viewpoints and polarised views, which made for a general failure to reach consensus and act. Middle ground was obscure and disputed, as is the nature of political processes the world over, not in itself a bad thing but made so when this diversity was not leveraged to reach more robust understandings.

Development is about participation, even if this also makes issues and problems particularly messy. As viewpoints diverge and polarise, a murky problem space emerges where systems methodologies, decision-structuring dialogues and other participatory problem-solving methods from the "soft-side" of OR come into their own. These are effective ways to engage a number of stakeholders in decision processes, ultimately brokering viable, comprehensive and long-term solutions.

I would also propose that some types of hard OR would be appropriate for skills transfer, taking into account computing limitations and access to customised optimisation and decision support software. A local capacity for spreadsheet modelling does take time to build, but would find applications to planning for well-defined systems such as transport networks, solid waste management systems, simple forecasting and the identification of socio-economic trends.

9. Accept diversity and that difficult problems require multiple approaches

To state the obvious, where a problem has existed for years, there is inevitably a reason: difficult problems take time to solve.

With new eyes, the development worker can bring different perspectives to problems that have otherwise stagnated. This is an exciting outcome, however it pays to be realistic. Human society is a richly nuanced and messy space. To believe we can understand community concerns from a single viewpoint is simply unrealistic. Accepting that often the resources or time for a complete solution are simply unavailable is a healthier philosophy. Change is slow and progress comes one step at a time.

Nevertheless, understanding as much as possible to inform progress should be the perpetual aim. This requires the accommodation of a spectrum of human experiences. Soft OR can herd these into something workable, and present some viable courses of action. Hard OR can provide more definition, digging deeper into the problem space while forfeiting a degree of real world nuance. Undoubtedly, both play an important role in comprehensively defining and understanding societal challenges.

Kotiadis and Mingers discuss a robust approach to decision-making through the application of soft and hard OR methods [7]. They note that significant benefits are derived from employing multi-methodologies, although a number of factors impede their wide application, spanning philosophical, cultural, cognitive and practical domains.

As a deployed volunteer, an awareness of the diversity of tools presented by OR supplemented by considerable reach back to appropriate expertise, presented a means for putting a variety of techniques into use. The internet provided another valuable resource. It was also important to accept that there would be many false starts, and sustainable change is slow and difficult to measure from day-to-day.

Conclusion

One might ask if the approaches described here really fall in the domain of OR, and not in the purviews of management science, political science, cultural studies or psychology. Certainly, there is overlap. However, given that the aim of OR is to ensure that "decision-makers can make better informed decisions" [5], I would argue that this convergence is necessary for the discipline to position itself within the social context in which it sits, and positively influence human decision-making. The application of OR needs to fit the institution within which it operates, particularly the culture of decision-makers and ways in which group understanding is created.

I am a strong supporter of OR. It teaches people to think laterally, creatively, strategically and analytically about important societal problems. The nexus between humans, environment, infrastructure and institutions is a nuanced problem space. Nevertheless, through inclusive problem solving and analysis we find ways to evolve community understandings towards more robust solutions. In any society, progress is about getting the most out of humans. With a little flexibility, a little thought and some patience, OR can present a lever to improve the management of communities everywhere.

[1] Anderson, Ian "Fragile states: What is international experience telling us?" AusAID report, June 2005, accessed at http://www.ausaid.gov.au/publications/pdf/fragile_states.pdf (30/12/06)

[2] Australian Government "Pacific 2020: Challenges and opportunities for growth" AusAID report, 2005, accessed at http://www.ausaid.gov.au/publications/pdf/pacific2020.pdf (30/12/06)

[3] C.T. Bornstein & J. Rosenhead "The role of OR in less developed countries: A critical approach" European Journal of Operations Research, Vol. 49, pp 156-178, 1990.

[4] P. Collier et al. "Breaking the conflict trap. Civil war and development policy", copublished by the World Bank and Oxford University Press, Washington D.C., 2003

[5] DSTO "Operations research code of best practice", Defence Science and Technology Organisation OR Hub, Accessed 31/12/06

[6] D. Kemball-Cook, D. J. Wright "The search for appropriate O.R.: A review of operational research in developing countries" The Journal of the Operational Research Society, Vol. 32, No. 11, pp. 1021-1037, 1981.

[7] K. Kotiadis and J. Mingers “Combining PSMs with hard OR methods: The philosophical and practical challenges” Journal of the Operational Research Society, Vol. 57, No. 7, pp. 856-867

[8] T. Loetscher and J. Keller. “A decision support system for selecting sanitation systems in developing countries” Socio-Economic Planning Sciences, Vol. 36, No. 4, pp. 267-290

[9] J. Mingers and Rosenhead “Problem structuring methods in action” European Journal of Operations Research, Vol. 152, No. 3, pp. 530-554

[10] J. Rosenhead “Past, present and future of problem structuring methods” Journal of the Operations Research Society, Vol. 57, pp 759-765, 2006.

[11] R.V.V. Vidal “The role of operations research in underdeveloped countries - An appraisal” IMSOR, Technical University of Denmark, Lyngby, 1973.

[12] M. Shakun, “Operations research and developing countries: Focus on India” Opsearch, Vol. 7, No. 2, 1970 p.91

[13] N. Slocum “Participatory methods toolkit: A practitioner’s manual” Joint Publication of the King Baudouin Foundation, Flemish Institute for Science and Technology Assessment and the UN University – Comparative Regional Integration Studies, Belgium 2003. (available at http://www.kbs-frb.be/code/page.cfm?id_page=153&ID=361)

[14] S. Slotte and R.P. Hamalainen “Decision structuring dialogue”, Working Draft, Helsinki University of Technology, Systems Analysis Research Laboratory Reports, E13, April 2003, accessed at http://www.sal.hut.fi/Publications/pdf-files/E13.pdf

[15] UNDP “Investing in development: A practical plan to achieve the millennium development goals”, Report to the UN Secretary General, UN Millennium Project, Earthscan, UK, 2005

[16] Z Zhu “Towards user-friendly OR: A Chinese experience” Journal of the Operational Research Society, Vol. 53, No. 2, 2002, pp. 137-148