Chapter 12

Resource Allocation in Local Government with Facilitated Portfolio Decision Analysis

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Abstract Resource allocation in local government imposes several challenges for public managers, such as: substantial pressures for more efficiency in public spending, frequent changes in levels of income for public organisations, steady growing demand for public services, and higher public expectations and increased scrutiny. In order to tackle these challenges effectively public managers and policy makers are focusing on changing old ways of working, with a view to creating and delivering public value in an ever increasingly ‘wicked’ context. One area of concern relates to improving decision making processes and the accountability of decisions, particularly within the context of resource allocation in local government. In this chapter, we review our experience of using *facilitated portfolio decision analysis* to help local government teams assess the value of a range of public services or projects. Our discussion is focused primarily on the British local government context, and illustrated with several case studies drawn from our own research and practical interventions. The approach and experience discussed here, however, can be easily translated to similar contexts in other countries.

12.1 Introduction

The environment within which public managers operate is typically complex, uncertain and contested. It is complex due to the high number of interconnected areas they have to tackle as part of their everyday work. Uncertain because the local, regional and national agendas that provide direction to their work will be

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influenced, in varying and unpredictable degrees, by political dynamics, environmental changes, and technological developments. Finally, it is a contested environment due to the existence of multiple and conflicting views and interests about the extent and shape of public issues needed attention. and the different ways to address them.

Working under the conditions described above is indeed a common feature in the life of most public managers. In the UK, these conditions are currently being exacerbated by a number of recent trends. These include: substantial pressures for more efficiency in public spending, frequent changes in levels of income for public organisations, steady growing demand for public services, and higher public expectations and increased scrutiny. Consequently, public managers are currently faced by unparalleled challenges which they are expected to deal with effectively.

In order to meet these challenges, policy makers and public managers are focusing on changing old ways of working in order to create and deliver public value in an ever increasingly 'wicked' context. For example, it is now widely recognised that in order to provide services that meet the needs and aspirations of the public a joined-up approach to service delivery is required. This has taken the form of different partnerships and collaborations such as Local Strategic Partnerships, Crime and Disorder Reduction Partnerships, Local and Multi-Area Agreements, among others.

Another current concern of policy makers and public managers relates to improving decision making processes and the accountability of decisions. Within the context of resource allocation in local government, for example, budgetary decisions tend to be highly political, often complicated by the sheer volume of options available, all requiring a rationale accountable to the public. It seems quite likely that there will be a growing clamour to ensure that budgetary decisions are sound and legitimate for those affected.

It is not uncommon for managers in the local government budgetary process to adopt a narrow view of the budget, one that is guided by the perspective provided from their own budget area. Managers are expected to try to increase their budgets and, when asked to find savings, to seek 'making the best use possible of the resource that is available to them'. Thus budgetary decisions are looked at in departmental silos rather than as a portfolio. Furthermore, when global budget cuts or increases are required, the tendency has been to decide on across the board percentage decreases/increases with little attempt to develop a system of priorities. This approach to budgeting typically leads to inefficiencies, as value is infrequently measured across different service areas.

The other type of resource allocation decision that is frequent in local government is the funding of new initiatives such as a new service or project. In many ways this is similar to the budgetary process, with similar challenges. Two main differences are noticeable, however. First, the budgetary decision is whether to fund (or not) a new initiative, rather than whether to increase, maintain or decrease expenditure associated with an ongoing service or project. The second distinction is the nature of the criteria set employed to assess the value of the new initiative, which may be distinct from the one used when assessing ongoing services or activities.

This chapter will present an alternative approach to resource allocation in local government for both budgetary decisions and funding of new activities or projects. Specifically, the chapter reviews our experience of using facilitated portfolio decision analysis, to help local government teams assess the value of a range of public services. Our discussion below will be focused on the British local government context, as it is the domain in which we have undertaken most of our practical interventions. We believe, however, that many of the issues discussed here are relevant for resource allocation in a local government context in general, and that the use of portfolio decision analysis can be easily translated to similar contexts in other countries (see, for example, Bana e Costa and Carvalho Oliveira, 2002)

The remainder of the chapter is structured in the following way. The next section introduces the British local government context and the issues associated with resource allocation, particularly those related to budgetary decisions. Our discussion will identify ‘incrementalism’ as the traditional approach to budgeting in local government as well as the wider public sector in the UK and Ireland. Next, we present a resource allocation framework intended to counter incrementalism, and serve as an effective and efficient facilitative mechanism for budgetary and investment decisions about public services. The framework will be illustrated with case studies drawn from our own research and practical interventions. In the final section, we discuss how to implement the proposed framework, and outline directions for further research.

12.2 Resource Allocation in Local Government

With local expenditure comprising 25% of total public expenditure and 10% of national income, the UK local government is an economically important sector. In local government the annual budget cycle has historically, not only determined the policies, plans and objectives, but also acted as the principal method by which the sector implemented organisational and structural accountability (Goddard, 2004).

Having a major role to play in the delivery of public services in areas such as education, social services and environmental well-being, the setting of the budget is perhaps the single most significant process and decision made by a local authority during the course of the year. It implies formulating and making key choices between different possibilities for expenditure: from creating new ones to cutting, freezing, or increasing current expenditure. As resources are always limited, the budget process forces a local authority to prioritize from the various projects and activities it wishes to initiate, continue, reduce or close down.

With few exceptions (e.g. Boyne et al, 2000), research has consistently shown that the traditional approach to budgeting in local government as well as the wider public sector in the UK and Ireland has been incremental (McCarthy and Lane, 2009; Midwinter, 2005; Seal, 2003). Although the notion of incrementalism has been defined in many ways (Berry, 1990), here we conceptualise incrementalism

from two perspectives: as an output and as a process. The former considers a budget as incremental when departures from the expenditure base in the previous year represent small or regular changes (Davis et al, 1966; Wildavsky, 1964; Wildavsky and Caiden, 2003); the latter views the process of setting the budget as incremental if little systematic analysis is employed, few alternative options are evaluated, and the alternatives that are considered do not differ significantly from the status quo (Braybrook and Lindblom, 1963; Lindblom, 1959).

It is argued that such behaviour is the result of a number of conservative influences including habit, history and tradition (Seal, 2003). These, combined with a lack of resources, leads policy makers and public managers to adopt simple 'rules of thumb' in order to reduce the technical and political complexity of budgetary decisions (Boyne et al, 2000). Examples of such rules are 'protect the base' (the continued funding of existing services) and 'follow central guidelines' (follow central government's prescription of how to allocate money). Overall, these rules avoid radical changes and lead to stability of budget decisions.

The problems caused by the inherent continuity and stability of incremental budgeting became particularly salient as the economic environment of British local authorities has been turbulent since the mid-1970's onwards. This made reform of the budget process a political priority, and led to a search for new modes of organisational control in the public sector (Hoggett, 1996), and a shift in focus from the concentration on inputs, to one which linked inputs with outputs and outcomes.

During the period 1979-1997, policy reforms under the umbrella term of 'New Public Management' resulted in some changes in local government through mechanisms such as competitive tendering for public services, centrally imposed 'caps' on local expenditure, and the creation of quasi-markets in education, social services and housing. Compulsory tendering and the capping of local government expenditure were later abolished in the period 1997-2009 by the New Labour government. Yet, the government still retained reserve powers to control local expenditure and required local authorities to deliver services based on the new principles of Best Value, the promotion of public-private partnerships, and the scrutiny of performance through nationally-set performance indicators and audits (Hood, 1995; Seal, 2003).

Research indicates that the intended reforms have been successfully implemented in some cases, and incrementalism is beginning to be challenged. For example, Seal and Ball (2004) report on the adoption, in two British local authorities, of budgetary processes that disrupted the application of incremental routines. Similarly, the work of Pinch (1995) and that of Bolton and Leach (2002) identify particular interventions designed to counter the influence of incremental practices in British local authorities.

Incrementalism has, however, survived. Hood (1995) found that the reforms had not created a complete collapse of previous models of public administration (1995, p106). Within British local authorities, Seal and Ball (2004) found that incrementalism has continued despite the intended reforms. Some authors argue that

the apparent tenacity of such approach is due to the lack of alignment between the intended reforms, and the embedded cultural norms, rules, and routines within the organisation (see, for example, Ter Bogt, 2008a, 2008b). When this occurs, countermeasures to avoid incremental budgeting are likely to be confronted by organisational inertia (Seal, 2003). In other words, effective change will require more complex interventions than simply changing 'old' rules for 'new' ones.

From a decision analytic perspective, it follows that any form of support designed to move away from incremental budgeting practices must take close account of both cultural aspects and other institutionalised patterns of organisational thinking and action. Within the local government context, at the very least, it means acknowledging that resource allocation is both a technical and socio-political process (Wildavsky, 1964). Furthermore, it should be recognised that public managers, together with the citizens they serve and the politicians they report to, are not only interested in the economic efficiency and effectiveness of public agencies, but also focus on non-economic aspects such as, for example, equality, accountability, responsiveness and equity (Wilson, 1989). Consequently, support to resource allocation must be in the form of embedding a new set of decision rules and routines that enables public managers to consider both economic *and* socio-political aspects. That is, a decision support framework that provides a form of 'social rationality' (Ter Bogt, 2008a) comprising both economic and socio-political concerns, and one that signifies a departure from incrementalism. In the following sections we introduce and discuss one such framework.

12.3 A Decision Framework for Resource Allocation

As the previous section highlighted, the process of resource allocation in local government is challenging, both from a technical and a social perspective. It is technically difficult because it comprises the assessment of a large number of services or projects that need to be funded, the pursuing of multiple and often conflicting objectives in delivering such services or projects, and the definition of difficult trade-offs that need to be made in allocating limited budgets.

The other facet of this type of decision has received less attention in the decision analytic literature. As also highlighted in the previous section, the process of resource allocation in local governments is socially complex because of the multiple stakeholders involved in the decision; the pressures for service delivery from active stakeholder groups representing different segments of the local community; and the complex participation patterns in the decision that require interactions with and mandate from elected members. Therefore, any form of decision support intended to promote a better allocation of resources must be designed to address both the technical challenges *and* the social challenges just discussed (Cherns, 1987; Phillips, 2007).

In terms of supporting the technical side of such decision problem, the right tools are the ones researched in Portfolio Decision Analysis. In particular, given the omnipresence of multiple objectives and intangibles in this context, multi-criteria portfolio analysis models have been often used for prioritising projects or services. The use of Decision Analysis provides a clear framework for thinking about resource allocation decisions and a common language (Howard, 2004) which is both precise and helpful in allowing public managers expressing preferences and trade-offs.

For supporting the social side of resource allocation model building, the most adequate mode of working seems to be facilitated modelling (Franco and Montibeller, 2010a) such as decision conferencing, where portfolio decision analytic models are built by and analysed with the group of decision makers (see Phillips, 2007; Phillips and Bana e Costa, 2007; Phillips, this volume). The notion of facilitated decision modelling is not new in the UK local government context. Friend and colleagues developed an interactive decision approach to the analysis of interconnectedness in options and the management (rather than modelling) of different types of uncertainty back in the 1970s. The approach, known as Strategic Choice (Friend and Hickling, 2005), is firmly rooted in the British soft operational research tradition and has influenced the development of the intervention framework discussed below. We will refer to this type of intervention as *facilitated portfolio decision analysis*.

Given the socio-technical nature of these decision problems, thus, a first step of any intervention is to help public managers in defining the decision problem they are dealing with, identifying which type of resource allocation is needed (i.e. funding new initiatives or prioritising services or projects when budgets are reduced), and then designing the process of engagement with key stakeholders. These steps are then followed by an assessment of value and costs of each service or project, and a portfolio decision analysis. We discuss below each of these steps in turn.

12.3.1 Defining the Decision Problem

In many instances, managers in local government have a compartmentalised view of the organisation, with a focus on their own department/division. This may lead to a failure to understand the repercussion of actions, or the impacts that running (or not running) services or projects may cause.

A powerful tool for understanding different perspectives about resource allocation decisions is the use of causal maps (Eden, 2004). These maps are networks of ideas or concepts, with links denoting either perceived causality (a cause at the beginning of an arrow which leads to an effect at the end of the arrow) or perceived influence (a means at the beginning of an arrow which influence an end at the end of the arrow). For further details about the structural aspects maps see

Montibeller and Belton (2006); for a review of these tools in a decision analytic context see Franco and Montibeller (2010c).

For example, Fig. 12.1 shows a causal map built for a group of managers from Coventry City Council, a group responsible for the internal auditing and planning department which was underperforming at that time. (The number associated with every concept just indicates the order in which it was entered into the map.) Our task was to help them to clarify the areas that needed improvement in the department and identify possible actions for improvement in every area, as well as prioritise such options. The map was created using facilitated modelling, with participants entering concepts and arrows into the *Group Explorer* networked workstation system (www.phrontis.com) running along the *Decision Explorer* mapping software (www.banxia.com). This allows entered concepts to be projected 'on-the-spot' onto a large public screen, thus helping to inform the discussion and enabling the sharing of different perspectives. The process was guided by the two authors, who were working as decision analysts and group facilitators. The map, which has a means-end structure, displays the means available to group members at the bottom and the ends they wish to pursue on the top. Understanding the complex interrelationship between means and ends, the group then agreed on the areas for improvement that they wanted to tackle, four of which are shown in Fig.12.1 (concepts 27, 33, 36 and 43).

This type of representation can also be used for identifying objectives (Bana e Costa et al, 1999; Belton et al, 1997; Montibeller and Belton, 2006), as well as options in a portfolio model (Montibeller et al, 2009). In this case study, for instance, we used the map to brainstorm actions that could be implemented to improve every area. For example, one of the areas identified in the causal map (but not shown in Fig.12.1) is that the group itself should be more effectively used by the other divisions of the council. Several ideas were suggested for improving this area, as shown in Fig.12.2, which were then grouped and labelled by the group members, with our support. Those concepts with a square border became options to be evaluated in a portfolio decision model.

Fig. 12.1 A causal map for discovering fundamental objectives

Fig. 12.2 Ideas for the team to be used more effectively by the organisation

12.3.2 Defining the Type of Resource Allocation Evaluation

From a portfolio decision analytic point of view, two main resource allocation problems are dealt with by managers in a local government context. The first one relates to the allocation of resources to fund new initiatives such as new projects or services; the second one is linked to the prioritisation of strategic budgets entailing decisions on which, or to which extent, ongoing services will be funded. These two decision problems are formally represented next.

12.3.2.1 Allocation of Resources to New Initiatives

The first type of problem is the allocation of resources to new projects or services that a local authority wishes to fund. It can be easily formulated as a traditional portfolio problem. Let A be the set of N new projects or services to be funded, with $A = \{a_1, a_2, \dots, a_n\}$. Every i -th project is assessed by an additive multi-criteria model, which provides its overall value $V(a_i)$, as a weighted sum of K partial performances $v_j(a_i)$ and their respective weight w_j , i.e.:

$$V(a_i) = \sum_{j=1}^K w_j v_j(a_i).$$

To every project or service an implementation cost, c_i ,

is also estimated – see Keeney and Gregory (2005) for guidelines on how to define attributes to assess partial performances; Keeney (2002) for a discussion about value trade-offs and weights in multi-criteria models; and Kirkwood (1997) for details on how to elicit value functions.

Of course, properties such as essentiality, non-redundancy and preferential independence, have to be checked and guaranteed for the criteria (Belton and Stewart, 2002; Keeney, 1992; Keeney and Raiffa, 1993) in order to use a simple-weighted sum. We are also assuming that the overall value of a set of projects can be simply added, thus disregarding any synergy among different projects or services.

The optimal portfolio of projects, given the total amount of resources R , can then be found by defining a binary variable x_i associated with every i -th project and solving the binary knapsack problem (Kleinmuntz, 2007):

$$\max \sum_{i=1}^N V(a_i)x_i \quad (1)$$

$$\text{s.t.} \\ \sum_{i=1}^N x_i c_i \leq R$$

Where $x_i = 1$ if the project should be executed, and 0 if it should not be executed.

In cases where there are no interdependencies among projects, a simpler decision rule is to use the value/cost ratio of each project, i.e., $\frac{V(a_i)}{c_i}$ and then rank the project according to this ratio, from the highest to the lowest. As exemplified in Fig. 12.3, if projects are ranked in decreasing order, and thus showing decreasing value-for-money, the cut point is established once the amount of resources R is spent.

Fig. 12.3 Ratios of value-for-money and the optimal solution

Notice that this rule does not guarantee an optimal allocation of resources if there is a given r project with a cost $c_r \leq \Delta r$ but with a value-for-money ratio $\frac{V(a_r)}{c_r}$ smaller than the ratio of the last project funded $\frac{V(a_l)}{c_l}$, i.e., the *critical project*, located just on the left of line R – see Martello and Toth (1990). In this case, the solution to (1) would include such a r project, but a value/cost ratio analysis would not. The analyst then needs to inspect manually the solution and check if this project (or a combination of small projects whose cost is smaller or equal to Δr) can be funded by the available resources.

Projects or services can also be grouped into Z areas $A_1, A_2, \dots, A_Z$ (with $A = A_1 \cup A_2 \cup \dots \cup A_Z$) which can be, for example, departments of a local authority. The advantage of such *a priori* categorisation of projects is to compartmentalise the assessment of options, enabling every department to estimate the performance of projects or services. Another way of grouping projects is by creating new areas that put together these new services, thus avoiding each department ‘to fight for its own corner’ – see Montibeller, Franco *et al* (2009) for a discussion on structuring portfolio models with areas.

For example, for the Coventry City Council project described above, we built up a portfolio model as shown in Fig. 12.4, using the *Equity* software (www.catalyze.co.uk) where at the bottom of every column there is the name of the area and the blocks represent the possible actions for improvement.

7				Improve profile PPT	
6	Imprv. understand PMF	Share best practices		Visit other councils	
5	Support req. divisions	Agree & Priorit tasks	Test mngrs skill&knl	Locate PPT same ofce	Reports stand formt
4	Mng procs. lack resp	Anal. use of time	Onus on serv. mngrs	Conduct debriefs	Quality check of doc
3	Def & Com Responsiblt	Anal. PPT skills set	Feedback to mngrs	Team Bldg activities	Provide outline repo
2	Reviv team performanc	Audit data gathered	Plans as Mng Tools	Set meetgs with HoS	Dev qual protocols
1	PPT Now	PPT Now	PPT Now	PPT Now	PPT Now
	PPT Used Effectively	Performance PPT	Ensure Mngs. Ownrshp	Improve team spirit	Quality outputs

Fig. 12.4 An area-grouped portfolio decision problem

In another project, we helped a team drawn from the Library Learning and Culture division of Warwickshire County Council to explore new sources of income generation. The division was divided into six areas (libraries, museum service, county record office, adult and community learning, heritage education service

and county arts service), and its aims are to inspire learning and imagination for people of all ages living in the region. Although the majority of the services provided by the division are free of charge, there is a small range of services for which there is a small fee (e.g. renting CDs and DVDs from the library). The challenge was to explore new ideas for generating extra income without increasing the current level of charges for this small range of services. The assumption was that specific sources of funding would be targeted to finance the best ideas.

As in the case of the Coventry City Council project, we made use of the *Decision Explorer* and *Group Explorer* software packages. This time however, we did not use them to support the definition of the decision problem. Rather, we used them to support the structuring and derivation of evaluation criteria. Following Keeney's (1992) value-focused thinking approach, we constructed a means-ends network map with members of the division team in a workshop format, and employed it to guide the brainstorming of new ideas for income generation. Using *Group Explorer*'s anonymous input tool, workshop participants were able to produce 203 potential ideas to generate additional income to the division. Given such large number of ideas, they were subsequently clustered and further developed after the workshop and in several meetings with the team. The ideas were grouped in a bottom-up fashion by splitting them into twelve broad income generation 'themes' and then, initially, an analysis was conducted to identify the particular division area where an idea could be implemented. Finally, a manageable set, containing the most interesting ideas, was chosen at a subsequent meeting with the division head and the finance manager.

It is worth noting that in this case (Warwickshire County Council) we opted for identifying income generation themes emerging from the option set, instead of taking the division's six areas as a basis for clustering the ideas. The rationale for this was to reduce the potential for tension among the heads and staff of the different division areas, who otherwise could have ended up fighting for their new ideas to be placed in their own areas. We built the portfolio model similarly to the one built for Coventry City Council, using the *Equity* software to support the evaluation.

12.3.2.2 Strategic Budgeting

Another type of decision problem, which is currently very pressing in local government, relates to budget cutbacks and thus the prioritisation of strategic budgets. We use the term 'strategic budget' here to differentiate it from the budgeting exercise that is typically conducted within this context. We see this as a top-down yet participatory decision process, with a focus on assessing individual ongoing services or projects, where the budget is centrally analysed and the portfolio of services is optimised given the budget available.

The formulation is similar to the one we presented in the previous section, but now we suggest modelling it as a continuous knapsack problem (for details, see

Martello and Toth, 1990), with a variable y_i associated with each i -th service, which indicates the proportion of the service that should be kept within the new budget B :

$$\max \sum_{i=1}^N V(a_i) y_i \quad (1)$$

s.t.

$$\sum_{i=1}^N y_i c_i \leq R$$

With $0 \leq y_i \leq 1$

$i = 1, 2, \dots, N$

For dealing with this type of evaluation, analysts usually employ optimisation, as these are large decision problems, many times with dependencies between services.

An illustration of this type of approach is the analysis we conducted for a local authority in the English Midlands, which was concerned with the prospect of a cut of up to 40% for their £14.2 million budget (its name cannot be disclosed and some of the data has been disguised, due to confidentiality issues). There were seven areas of direct expenditure, as shown in Table 12.1 (column a shows the base budget for each area), and their initial approach was to cut proportionally across all the areas. Instead, we build a model as formulated in (2) to support their decision and reduce the value losses.

Notice that strategic budgeting problems could also be formulated as (1). There are some advantages, in our view, in formulating the problem as (2). Firstly, it allows the analyst to include a lower bound on each y_i , if required for political or social reasons, such as concerns about implementation or fairness, respectively. Second, if the options being considered are relatively large, i.e., organisational units that perform a large number of services, then turning-off one of them could prove to be impossible in practice. By formulating it as a continuous knapsack problem, it will just reduce the budget of the least efficient one.

There are also some disadvantages in using (2). One is that it is not always possible to reduce a budget of a service without destroying it. We have assumed that there is a linear relationship between value and cost of a service, but this may not always occur (a cut of 20% may generate a fall of 50% in its value for example). In this case, a more realistic mapping between cost and value would be required as well as a cut-off point for the service. Regarding the issue about large options, discussed in the previous paragraph, using (2) will not always alleviate it, if the budget cut is severe enough and thus a whole option is turned off. An alternative

solution to this issue is to use (1) but decompose the large options into much smaller services.

Table 12.1 Initial budget and optimised budget (20% overall cut) for a local authority in the English Midlands

	(a)	(b)	(c)	(d)	(e)	(f)
Areas:	Base Budget 2010/11 [£]	Overall Value Full budget	Cost New Budget [£]	Overall Value New Budget	% Original Budget	% Original Value
Local Business & Enterprise	304,500	535	274,000	521	90.0%	97.4%
Corporate & Customer Services	4,357,800	5,607	2,991,320	4,745	68.6%	84.6%
Finance	1,880,200	3,065	1,880,200	3,065	100.0%	100.0%
Housing Infrastructure & Planning	720,000	1,097	720,000	1,097	100.0%	100.0%
Environmental Service Delivery	4,252,000	5,264	3,400,800	4,879	80.0%	92.7%
Community Engagement, Cohesion & Wellbeing	1,195,000	1,677	880,900	1,485	73.7%	88.5%
Community Safety & Enforcement	1,490,900	2,391	1,213,100	2,265	81.4%	94.8%
Totals	14,200,400	19,634	11,360,320	18,056	80.0%	92.0%

12.3.3 Designing the Engagement with Key Stakeholders

Within the context of resource allocation in local government, attention to stakeholders is needed to assess and enhance political feasibility of budgetary decisions. Consideration of stakeholders is also important to satisfy those involved in, or affected by the decision, that the intervention has followed rational, fair and legitimate procedures. This does not imply that all possible stakeholders should be satisfied by or involved in the resource allocation process – only that the key stakeholders must be. Of course the choice of which stakeholders are ‘key’ and what level of participation is appropriate should be the result of careful consideration by the analysts and their sponsors, and is likely to include a sample of public managers, citizens and politicians.

For example, in an intervention with the Teenage Pregnancy Strategy Group from the London Borough of Newham (Franco and Lord, 2011), we worked closely with a multi-stakeholder group comprising senior managers from the borough, as well as representatives from the National Health Service, the children’s

rights and sex education group; faith groups, and the young parents forum, among others. For useful examples of engagement with stakeholder groups in decision analytic interventions, see Gregory and Keeney (1994) and Gregory and Wellman (2001).

In the case of complex organisational settings it may be useful to consider formal means to identify and manage stakeholders. Several problem structuring tools for stakeholder analysis are available in the literature (e.g. Bryson, 2004; Parnell et al, 2008; Rosenhead and Mingers, 2001). The most widely used techniques include the power-interest grid, star diagram, and stakeholder influence map (Eden and Ackermann, 1998); and stakeholder-issue interrelation diagram and problem-frame stakeholder maps (Bryson, 2004). Stakeholder analyses should be designed to gain needed information, build political acceptance and address some important questions about legitimacy, representation and credibility (Bryson, 2004). Once the required engagement with stakeholders is scoped, the next stage in the intervention process is to articulate value-for-money concerns and conduct the portfolio decision analysis, which we discuss in the following sections.

12.3.4 Assessing Public Value

The concept of ‘public value’ is critical for managers working in the public sector (Benington and Moore, 2010). Yet, paradoxically, what is meant by ‘public value’ is usually unclear. This is not surprising, as ‘value’ is a concept to which multiple meanings can be attached (Rohan, 2000). Furthermore, the notion of ‘public value’ extends beyond economic considerations, and also encompass social, political, cultural and environmental dimensions of value (Benington, 2010). Therefore public managers would benefit immensely from using a value-focused thinking framework (Keeney, 1992) and being able to clearly define and agree on a set of public value dimensions to assess the services they provide or the initiatives they wish to support.

The definition of public value criteria $v_j(\bullet)$ must reflect the mission, strategic objectives and priorities of the local government agency (which, in our experience, are specified in the current strategic plan) and, at the same time, must allow the evaluation of possible benefits in running every service (see, for example, Barcus and Montibeller, 2008; Gregory and Keeney, 1994; Keeney, 1992). Such a value framework is shown in Fig.12.5. While we believe this public value criteria have to be tailor-made for every organisation, to reflect both the specific decision context and the nature of the services being considered (Barcus and Montibeller, 2008; Keeney, 1992), the process of defining them should be more standardised.

For problems concerning the funding of new initiatives (see Section 12.3.2.1), the other key parameter is the estimation of the implementation cost for each i -th service or project: c_i . This traditionally is calculated as the discounted future implementation cost of the investment. Care should be taken in setting up the dis-

count rate, to avoid punishing excessively projects with heavy set up costs but that may provide high public value. In a similar way, it is also possible to discount value, albeit not common in practice (see Montibeller and Franco, 2010).

Fig. 12.5 A value framework for local government (each z -th area is composed by n_z services).

In some cases, less precise estimates are sufficient to build a requisite model (Phillips, 1984). For example, in the Coventry City Council project described earlier, we asked participants to assess options on 0-100 scales of overall value and 'effort' (the latter comprising cost, time and hassle), with the best option receiving 100 and the other options being assessed relative to this best one.

On the other hand, for the English Midland local authority mentioned in Section 12.3.2.2, given the link between cost and value they wanted reflected in the evaluation, we identified a value multiplier (from 1 to 5) to calculate the value. The cost of each service was then multiplied by this factor to find the partial value of the service. The latter scale was then normalised between 0 (no value) and 1000 (the service with the maximum value in the portfolio, i.e., £2,214,500). These parameters are shown for one area in Table 12.2 (columns a to d). The total value for this area was then 2,391 (last cell in column d), which is then reproduced in the respective cell of Table 12.1 column b.

In other cases, the benefits were clearly multi-dimensional and we used a multi-attribute value function to assess public value. For example, in the London Borough of Newham project, six benefit criteria were agreed and validated in a decision modelling workshop: two criteria related to core objectives of the Teenage Pregnancy Strategy Group (minimise number of conceptions among teenagers aged 15 to 17; and, maximise number of young parents back into education); one criterion representing the group's range of extra benefits (other than those included in the previous two); two temporal criteria (speed of impact and sustainability of

impact), and one related to uncertainty (i.e. confidence in achieving the intended benefits).

Table 12.2 Calculating value and the optimal portfolio for a local authority in the English Midlands (20% overall budget cut)

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
Area:	Base Budget 2009/10 £	Value (£)multiplier	Value Service	Normal- ised Value	Run ser- vice?	Value Services Running	Cost Ser- vice Run- ning
<u>Direct Expenditure:</u>							
Enforcement	92,600	3.00	277,800	125	1.00	125	92,600
Car Parks Administra- tion	99,600	1.00	99,600	45	0.00	0	0
SaferCommunities LAA Fund	1,900	4.00	7,600	3	1.00	3	1,900
Environmental Health	442,900	5.00	2,214,500	1,000	1.00	1,000	442,900
Planning Enforcement	133,100	5.00	665,500	301	1.00	301	133,100
CCTV	37,300	5.00	186,500	84	1.00	84	37,300
Community Safety	74,300	5.00	371,500	168	1.00	168	74,300
Licensing Team	94,300	1.00	94,300	43	0.00	0	0
Improvement Grants	421,000	3.00	1,263,000	570	1.00	570	421,000
Home Improvement Agency	10,000	3.00	30,000	14	1.00	14	10,000
Control Centre	83,900	1.00	83,900	38	0.00	0	0
Totals	1,490,900			2,391		2,265	1,213,100

12.3.5 Conducting a Portfolio Decision Analysis

Once a decision model is developed, either for the funding to new initiatives (model (1) above) or for strategic budgeting (model (2) above), it is possible to conduct a portfolio decision analysis solving the model and providing recommendations. Such portfolio models can help in identifying the options which provide the highest value-for-money, as well as a portfolio of options that is Pareto efficient in the use of public resources.

As we mentioned at the beginning of this section, while the technical aspects of a portfolio decision analysis are critical for the success of an intervention, equally crucial is the management of the resource allocation process, including dealing with the group dynamics and negotiation involved in the decision. Goddard (1997), for example, has empirically shown that the relationship between groups

has a significant impact on the budget planning process. Furthermore, Jacobsen's (2006) study of over 1,000 local politicians and managers identified that individuals act to defend the budget for their area of responsibility, thus decreasing the economic rationality of the budgetary process. An effective management of the resource allocation process is required to secure that the economic and social-political dimensions of rationality are not overlooked, thus challenging the influence of incrementalist routines.

The need to manage process have led us to use extensively *facilitated* portfolio decision analysis as an intervention approach, which we locate within a broader family of facilitated decision modelling methods (Franco and Montibeller, 2010a). This requires a process by which portfolio decision models are jointly developed with a group of stakeholders, with the assistance of computer support, and in which insights about the decision situation being modelled is the result from model-based analysis produced "on-the-spot" (Franco and Montibeller, 2010b).

For example, in the Coventry City Council project, once the effort and benefits were assessed by the group (via a discussion about the scores and agreement on a joint score), the *Equity* software then prioritised the actions in terms of value for money, using value/cost ratios, as shown in Fig.12.6. These outputs were then used by the group to discuss how the high value-for-money options could be implemented (the highest one was to set up regular meetings with the Head of Service, as shown in the fifth row of Fig.12.6, with a ratio of 2.62).

Order Of Priority

Order Of Priority										
Area				Level		Costs		Benefits		Ratio
						Inc	Cum	Inc	Cum	
0	1	PPT Used Effectively	1	PPT Now	0	0	0	0	-	
0	2	Performance PPT	1	PPT Now	0	0	0	0	-	
0	3	Ensure Mngs. Ownrshp	1	PPT Now	0	0	0	0	-	
0	4	Improve team spirit	1	PPT Now	0	0	0	0	-	
0	5	Quality outputs	1	PPT Now	0	0	0	0	-	
1	4	Improve team spirit	2	Set meetgs with HoS	10	10	26	26	2.62	
2	2	Performance PPT	2	Audit data gathered	25	35	39	65	1.56	
3	5	Quality outputs	2	Dev qual protocols	30	65	41	106	1.36	
4	3	Ensure Mngs. Ownrshp	2	Plans as Mng Tools	70	135	84	190	1.20	
5	3	Ensure Mngs. Ownrshp	3	Feedback to mngrs	60	195	70	260	1.17	
6	2	Performance PPT	3	Anal. PPT skills set	25	220	26	286	1.04	
7	2	Performance PPT	4	Anal. use of time	50	270	49	335	0.98	
8	3	Ensure Mngs. Ownrshp	4	Onus on serv. mngrs	100	370	93	428	0.93	
9	1	PPT Used Effectively	2	Revw team performanc	50	420	41	469	0.82	
10	1	PPT Used Effectively	3	Def & Com Responsibt	60	480	47	515	0.78	

Fig. 12.6 A prioritisation of new project using facilitated portfolio decision analysis

A similar approach was used for the London Borough of Newham project. The resulting model was used to help the group identify the highest-value portfolio at various budgets. Participants were immediately surprised to see some of their flagship projects replaced by more, smaller projects. In particular, projects within the

‘clinical services’ area appeared to be very expensive and not being picked up as efficient by the portfolio model. These results were counterintuitive to many of the participants, as some of these projects were considered to be at the core of the group’s strategy. The political consequences of actually adopting the more efficient portfolios were then raised, and the *Equity* was used to explore possible adjustments which would make certain portfolios more politically feasible. Furthermore, post-intervention interviews with participants indicated that our intervention approach was able to implement a participatory yet efficient resource allocation process. We interpreted this outcome as the ability of the process to meet the participants’ needs for social rationality (for details, see Franco and Lord, 2011).

For the case of the English Midlands council budgetary decision, we built a large Excel spreadsheet and optimised its value (model (2)) using the Premium Solver add-in (www.solver.com). For example, for the budget area *Community Safety & Enforcement*, Table 12.2, column (e) shows which services should run (1.00) and which ones should be discontinued (0.00) for an overall budget reduction of 20%. The impact of these cuts in every expenditure area is shown in Table 12.1, in terms of their new budget (column c) new value (column d) and the % reductions in the budget (column e) and value (column f). Notice that this optimal portfolio would represent a loss of only 8% in value (100% minus the total loss shown in the last cell of column f), against a 20% loss for across-the-board cuts (colloquially known as ‘salami-slicing’ or taking a ‘haircut’ – see Keisler, this volume), assuming that value loss is a linear function. Playing with the model, decision makers could see the impact of budget cuts on the % value loss when using Portfolio Decision Analysis (PDA) versus a linear cut, as shown in Fig.12.7 (the value losses for a 20% budget cut are highlighted in the graph).

Fig. 12.7 Value loss in linear cuts versus Portfolio Decision Analysis (PDA) for a local authority in the English Midlands.

12.4 Conclusions and directions for future work

In this chapter we argued that resource allocation in local governments is both an important field of application for Portfolio Decision Analysis, and a decision environment that has its own characteristics and challenges. In this context, we suggested an intervention framework for conducting portfolio decision analyses. Such a framework is intended to provide a new set of decision rules and routines intended to assist managers in deciding what services to provide or what initiatives to support, and thus contributing to the generation of public value. Drawing on the British problem structuring tradition (Rosenhead and Mingers, 2001), the framework emphasises the importance of ensuring the legitimacy and political feasibility of budgetary decisions through problem structuring and the involvement of key stakeholders in building portfolio decision analytic models. It also stresses the need to identify the type of decision problem, and recognises value measurement as a critical element in developing sound decision value-based models, as well as the effective management of decision processes, thus our use of a facilitated version of portfolio decision analysis.

How could the intervention framework presented here be effectively implemented? Introducing change into any organisation can be difficult, but particularly

so when dealing with budgetary processes in local government. As we noted in Section 2, incremental budgeting practices are difficult to let go, and thus we posit that significant ‘decision analytic capability’ needs to be developed in local government through appropriate training, apprenticeship or knowledge transfer partnerships between academia and the public sector. Otherwise a shift to a portfolio decision analysis approach is likely to be fraught with difficulties.

We believe there are several areas of further development in the field of portfolio decision analysis. First, the issue on how to deploy facilitated portfolio analysis for optimisation models has to be investigated, which is linked with the availability of software. Decision conferencing has traditionally deployed user-friendly software for benefit/cost ratio analysis (Phillips, 2007; Phillips and Bana e Costa, 2007) and there are recent developments of specialised software for portfolio optimisation (e.g. Lourenço and Bana e Costa, 2009). Our view is that the creation of tailor-made spreadsheets with optimisation models embedded in it, with graphical and interactive-modelling interfaces may be the way forward, given the low implementation cost they represent for public (and also private) sector organisations.

The second area for further work is in developing process protocols to define public criteria. This calls for developments in stakeholder analysis techniques, including processes to identify who provides which information in these decision contexts. In our experience, discerning public value dimensions is especially difficult, and thus any agreed public value criteria will have to measure unambiguously the performances of services, both to avoid favouritism and also allow the justification of decisions. In this sense, the use of direct ratings, where assessments of performance and judgements are combined, should be avoided. The distinction between facts and values, for example via value functions, is also beneficial in defining who will provide the inputs for which part of the model.

The third area of research is extending portfolio decision analysis for the support of strategic budgeting. We have suggested that this may require a change in the formulation of a binary knapsack problem, making the decision variables continuous in the range $[0,1]$ and reducing the value loss when budget cuts are imposed. Of course using this model will provide quite different results than an across-the-board cut, which may create concerns about fairness. On the other hand, it provides a benchmark where other (non Pareto efficient) solutions may be tried and compared. We have argued that, in this context, a continuous knapsack formulation has some advantages against the traditional binary variables employed in most portfolio decision analysis models (which were typically developed for new projects). But this is still an open issue for debate and empirical validation. There are, therefore, several technical and social issues associated with this type of analysis remaining.

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