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Pre-press manuscript. Citation of the published Work:

Thomson, D.S., Pronk, L., Alalouch, C., & Kaka, A. (2010). Quantifying the Benefits of Healthcare Infrastructure Investment. In *Proceedings of HaCIRIC10 International Conference*. Edinburgh, Scotland, pp.57-74.

Quantifying the Benefits of Healthcare Infrastructure Investment

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Abstract

UK government seeks the use of Benefits Realisation Management Processes (BRMPs) to direct capital investments that are technically complex and must satisfy a diverse range of stakeholder needs. Although BRMP frameworks are available, methods to inform them with reliable quantifications of stakeholders' judgements of benefits realisation are currently absent.

The articulation of benefits in current practice is reviewed to establish the context of benefits realisation. Benefit-related healthcare policy is reviewed by desktop survey of government publications and NHSScotland business cases. A conceptual framework for benefits quantification which characterises benefits realisation using stakeholders' judgements and perceptions of benefit worth is contributed.

Translation of stakeholder judgements of benefit provision magnitude into indications of benefit worth by means of benefit functions is explored and related to BRMP operation. The use of utility functions to translate judgements of magnitude into representations of 'worth' is found to be an appropriate premise for benefit quantification.

Keywords:

Benefits; Investment; Judgement; Stakeholders; Utility.

1. Introduction

The notion of "benefits realisation" is prominent in public sector capital investment policy and guidance. Investment approval requires a defensible prediction that stakeholders will receive sought benefits. Investment performance is evaluated by stakeholders' views of the extent to which these benefits have been realised.

With the understanding that a 'benefit' is a desired change, a broad view of benefits has emerged which embraces their often intangible nature. Investors are increasingly expected to implement a "Benefits Realisation Management Process" (BRMP) which, alongside quantitative measurement of tangible benefits, gathers stakeholder judgements of intangible benefit delivery. A BRMP requires a structured and reliable way of eliciting and documenting stakeholders' evaluations to characterise investment success. In the healthcare sector, a method of

characterising stakeholders' views must accommodate the evaluation of benefits defined variously, from:

"The creation of a short stay assessment unit, an approach which has been pioneered widely in UK hospitals, will facilitate children to be assessed, observed and treated and discharged normally within 24 hours." (NHS Ayrshire & Arran, undated)

to

"Flexibility and adaptability" (Mitchell et al., 2006).

Benefit diversity is partly caused by differences between the needs of the healthcare providers investing in health services and those creating and operating the buildings housing those services. Further diversity arises among innumerable stakeholder subgroups. Stakeholders have unique bodies of knowledge, yet must express their views of performance using a common set of project benefits. A BRMP must accommodate diverse definitions and judgements of benefits gathered across multiple stakeholder groups to evaluate benefits realisation performance throughout project delivery.

This paper proposes a Benefits Quantification Method (BQM) to reliably engage stakeholders in the quantification of healthcare investment benefits when faced with: diversity in the nature of the benefits sought; diversity in the communities of evaluating stakeholders; and the need to evaluate intangible benefits using judgement, opinion and preference. The problem is explored with reference to UK government policy and the projects of NHS Boards in NHSScotland.

2. The Nature of Healthcare Benefits in Policy and Practices

Benefits can be tangible (such as design metrics and budgetary outcomes) or intangible (such as perceptions of attractiveness and feelings of safety). Patients are particularly affected by the intangible aspects of buildings and services. Patients are often weak, stressed, and unable to control their environment, amplifying the impact of intangible benefits on their well-being. Alongside service improvements, healthcare investments are expected to produce buildings that promote a desire to get well (DCMS, 2000; van den Berg, 2005), stimulate emotional responses (Baker and Lamb, 1992), or improve health outcomes (NHS Estates, 2003; Ulrich et al., 2004). Proving the realisation of such intangible benefits is problematic. Despite this, the realisation of both benefit types is increasingly considered indicative of project success.

2.1 The Role of Benefits and Benefit Realisation in Charactering Project Success

Our understanding of project success is evolving. Jugdev and Muller (2005) suggest that "success" has broadened to acknowledge the importance of stakeholders' views. In construction, stakeholders have been positioned as arbiters of project success by the Commission for Architecture and the Built Environment (Macmillan, 2006), the Design Quality Indicator (Gann et al., 2003) and VALiD (Austin and Thomson, 2005).

Project success has latterly been related to benefits (Cooke-Davies, 2007). Reiss et al. (2006) suggest that projects perceived as unsuccessful often fail to acknowledge or articulate their role

in providing the benefits stakeholders seek. BRMPs address this problem. The Office of Government Commerce (OGC, 2003) recommended BRMP use to guide the "realisation" (i.e. provision to the stakeholders that seek them) of benefits.

Several BRMP models have been developed including OGC (2003), Bradley (2006), Reiss et al. (2006) and Sapountzis et al. (2009). BRMPs define activities in which benefits delivery performance (actual or predicted) is periodically evaluated to gauge project performance and inform decisions. As of writing, however, no means of quantifying benefit provision exists.

BRMPs require a Benefits Quantification Method (BQM) to characterise benefits realisation at any stage in the investment process, from the perspective of the stakeholders to whom those benefits will accrue. A BQM must respond to current understanding of benefits. To this end, articulations of "benefits" were studied in government policy and the practice of recent NHSScotland projects. Required BQM functionality was inferred from these insights and is discussed below.

2.2 Benefits in Government Policy

Policy definitions of project success are provided by the HM Treasury "Green Book" which distinguishes "outcomes" from "outputs." Outcomes are "the eventual benefits to society that proposals are intended to achieve." Outcomes can "sometimes cannot be directly measured" (HM Treasury, 2003, p. 13), requiring outputs (such as buildings) to indicate their delivery. HM Treasury (ibid.) defines four benefit types: financial quantitative; non-financial quantitative; non-financial qualitative; and outcomes. "Improved standards of healthcare" are cited as an example of outcomes (ibid., p. 44). Guidance thus establishes that investments can realise intangible benefits that are evidenced by outputs such as buildings. The Scottish Capital Investment Manual (SCIM) Business Case Guide (Scottish Government, 2009a, p. 25) associates programmes with outcomes and, specifically, benefits, while associating projects with outputs such as "buildings." Thus, Scottish Government policy contradicts the Treasury's association of benefits with projects.

2.3 Benefits in Healthcare Infrastructure Investment Policy

Realisation of "benefits" from infrastructure investments is treated variously by the guidance of HM Treasury; the Office of Government Commerce; the Department of Health; and, in Scotland, Scottish Government. Governing mid-value projects, ProCure21 makes little mention of benefits, only requiring a "benefits realisation plan" in Full Business Case (FBC) submissions (Department of Health, 2007). Frameworks Scotland guidance also requires FBCs to include such a plan (Health Facilities Scotland, 2008) but no other consideration of benefits. Negligible healthcare-specific benefit realisation guidance is available to healthcare providers. Instead, the need to realise benefits is inherited by from central government guidance and policy. This may be problematic as generic central government requirements do not always translate into healthcare.

2.4 Benefits in Healthcare Providers' Infrastructure Investment Practice

Desktop survey reviewed the application of benefit-related guidance to healthcare projects. The study reviewed current practice; the role of guidance in shaping it; and practices that require improvement. The survey sought to determine if components of a BRMP are present in current

practice and if benefits are quantified appropriately. The study reviewed submissions to each stage of the SCIM gateway process (Fig. 1) to determine how benefits are articulated at all formal stages of investment progression. The nomenclature identifying each case below is presented in the Appendix.

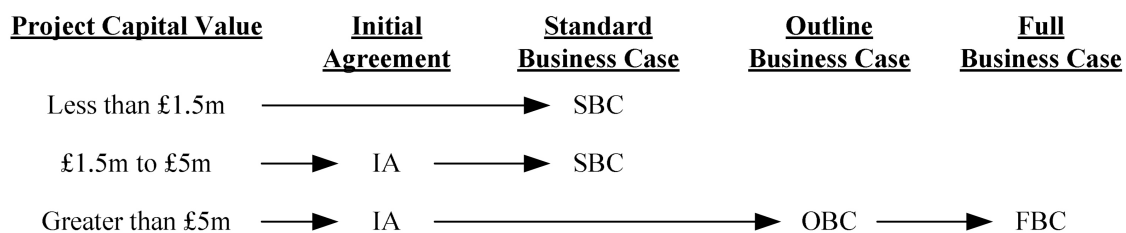


Fig. 1. Relationship of Business Case Submission to Capital Value and Gateway Review, adapted from Scottish Government (2009a)

2.4.1 Treatment of Benefits in Initial Agreements

Initial Agreements (IAs) bridge the healthcare provider's investment programme with the projects that advance programme strategy. The purpose of an IA is "firstly to establish the case for change and the need for investment; and secondly, to provide a suggested way forward for the scheme for the early approval of management" (Scottish Government, 2009b). An IA is typically the healthcare provider's first formalisation of a project and, as such, those reviewed were found to place notional importance on benefits.

Benefits were observed to be mentioned in passing; related contextually to the programme outcomes of which the project's outputs will provide evidence. Several NHS Boards exhibited awareness of the need to provide "proposed outcomes" but, by the terminology used, perceived these as related to the investment programme rather than the project that the IA justifies. These observations suggest that current practice does not provide sufficiently well-developed understanding of benefits to guide investment management at this embryonic project stage.

IA.5 and IA.7 included a "benefits realisation plan." These re-stated benefits along with 'indicators' (e.g. "Increase in number of referrals" to indicate the benefit of "To provide a choice of birth centre for women at low risk" (IA.5)), timescales for delivery and responsible individuals. These plans were accordingly interpreted as an attempt to construct the "benefits profiles" required by OGC (undated, a).

2.4.2 Treatment of Benefits in Standard Business Cases

As Standard Business Cases "do not have to be submitted to SGHD for approval but may be requested for information purposes" (SGHD, undated), guidance on their content is lacking. The SBCs studied exhibited moderate awareness of the need to provide benefits, which were described as "proposed outcomes - benefits to patients" (SBC.1) or "proposed outcomes and benefits to clients" (SBC.2), again suggesting conceptual links to their originating programme and sought investment outcomes.

Two extremes of benefits articulation were observed: a verbose form without the specificity required by a BRMP; and a terse form too ambiguous for BRMP application. SBC.1 verbosely described its sought outcomes (e.g. "Dedicated facilities for teenagers will be provided with separate rooms for teenagers, and a separate relaxation area, which will help bridge the gap with the inappropriate placement of teenagers in adult or children's wards."), while SBC.2 provided terse descriptions (i.e. "clinical effectiveness; access; flexibility; comprehensiveness; impact; appropriateness").

2.4.3 Treatment of Benefits in Outline Business Cases

Projects of capital value above £5m prepare an Outline Business Case (OBC). All observed OBCs complied with the SCIM Business Case Guide (Scottish Government, 2009b) required for "benefits appraisal" to select a preferred option by comparing potential benefits with capital costs. In recognising that "some benefits are not amenable to monetary values" the SCIM requires "non-financial benefits" to be weighted and scored (see Scottish Government, 2009c, pp. 119-120 for an illustration). However, the observed OBCs treated all benefits in this way. Further, and more significantly, rather than further understanding benefits established by the IA, most OBCs introduced a new set of benefits described as "benefit criteria." OBC.4 defined these criteria as "non-financial benefits that could be gained from redesign of current services."

	SBC.1	OBC.1	OBC.2 / OBC.3	OBC.4 / OBC.5	OBC.6	OBC.7 / OBC.8	OBC.9	FBC.1
Integration and improvement of service provision		Quality of service provision	Modernise the way services are delivered to best meet patients' needs	Comprehensive range of integrated services	Improvement in quality of service and effectiveness of service			Improved integration of services
Accessibility of service to users	Access	Location / Ease of access	Improve access to an appropriate range of services in NHS Forth Valley	Accessibility	Enhanced accessibility	Accessibility	Accessibility for patients, relatives and staff	Improved accessibility to services
Flexibility of the service provision	Flexibility	Flexibility		Flexibility and adaptability		Quality of environment / flexibility	Ability to implement options	Improved flexibility for future change
Quality of the physical environment		Quality of environment	Deliver improved healthcare facilities that meet users expectations			Quality of environment / flexibility	Quality of physical environment	Improved facilities
Strategic fit	Impact	Strategic fit			Strategic context	Deliverability		
Clinical effectiveness	Clinical Effectiveness			Quality improvement		Quality of care / Clinical effectiveness	Clinical effectiveness, integration of services and meeting national guidance	Improved clinical effectiveness
Acceptability of the service to user	Appropriateness					Acceptability to service users and providers		Improved acceptability from patients, staff and the public
Sustainable service provision			Ensure safe sustainable working across NHS Forth Valley			Sustainability	Sustainability	
Interaction of services				Responsiveness	Capacity to provide additional services	Disruption to other services		
Unallocated	Comprehensiveness		Improve recruitment and retention of adequate numbers of appropriately skilled staff	Culture change Therapeutic relationships			Research and education	

Table 1: Classification of Observed Benefit Criteria

Benefit criteria were typically introduced by a "project board" comprising patient, manager, and clinician stakeholder representatives (OBC.1); stakeholders themselves (OBC.4); or an undefined "project group" (OBC.6). This practice created the potential for the selected option to address a set of benefits distinct from those justifying the project in its IA. Given the relationship of project outputs to programme outcomes and the need for alignment between them, continuity of

understanding of project-specific benefits should be sustained through the programme strategy, its implementation via projects, and the progression of those projects. The introduction of newly-defined benefit criteria potentially disrupts this continuity. It creates the risk of considering benefits that are not aligned with programme strategy.

The observed benefit criteria were remarkably similar in all OBCs (Table 1). The generic nature of benefit criteria inserted at OBC stage suggests that option appraisal must represent a value system common to all healthcare investments. Whether these values are the result of overarching government policy, the professional values of healthcare providers, or an innate societal understanding of what is 'appropriate' for healthcare provision is beyond the scope of this study. This observation does, however, establish investment option viability is being evaluated against generic benefits, rather than the project-specific benefits required by policy. This practice is potentially harmful as it divorces programme intent from project action.

2.4.4 Treatment of Benefits in Full Business Cases

Full Business Cases (FBCs) are required for all projects requiring a capital investment over £5m. The FBCs reviewed both contained benefits realisation plans, as required by guidance. These plans translated the objectives of the instigating investment programme into project level benefits (albeit expressed with varying terminology) to provide alignment. As above, the progressive definition of benefits through project delivery was not observed, creating the potential for interpretation of programme objectives to define benefits at FBC that contradict those defined in preceding IA and OBC gateways.

The benefits defined were somewhat generic in nature, although this is arguably a consequence of the scale of the FBC investments (FBC.3 and FBC.4, for example, address a c. £300m acute hospital). The practice of disaggregating benefits into a series of more-specific benefits to provide clarity was observed. FBC.1 disaggregated six benefits (termed "objectives") into an average of four or five sub-benefits each. FBC.3 split four benefits (termed "services") into c. five sub-benefits each. This disaggregation activity has significant consequence for the development of a BQM, as discussed below.

2.5 Implications of Observations for Benefits Realisation Practice

The desktop survey concluded that benefits, in practice, are treated variously. Understanding and practice varies between NHS Boards due to multiple guidance sources, each of which articulates 'benefits' differently. A tendency towards overly-operationalised treatment of benefits was observed. A focus on implementing a process rather than ensuring the process was appropriate was noted. Such approaches were typified by the use of proxy metrics (such as assessing patient satisfaction by the number of complaints received, cf. OBC.7) to implement a standard process, without questioning the ability of that process to realise benefits effectively.

Practice generally made a fair attempt at following guidance, aside for the introduction of benefit criteria in OBCs. While the procedures used to generate benefit criteria can be construed to comply with current guidance, the question of why the elicitation processes always yield a similar set of effectively-generic criteria from project-specific stakeholder groups must be raised. Facilitator and non-response bias are issues of concern.

Current benefits delivery practice can be characterised as confused and conflicted. Some traits of a BRMP were observed, namely: the provision of Benefits Realisation Plans (albeit limited in scope) in FBCs; and the inclusion of functional-equivalents of Benefits Profiles in some cases. In the absence of an explicit and coherent BRMP, however, bespoke practice often failed to define benefits in ways that allow their realisation to be clearly demonstrated. Indeed, there is no evidence that anticipations of benefits realisation supporting gateway approvals are revisited later to confirm their accuracy. There is a clear need for a healthcare-specific BRMP to define best practice and for an associated BQM to characterise benefits realisation at key stages in the investment process.

2.6 The Need to Disaggregate Benefits

An observation of particular note is the emergent practice in some cases (OBC.2; OBC.9; FBC.1; FBC.2) of 'disaggregating' otherwise amorphous or ambiguous definitions of benefits to provide clarity. As this practice is emergent, it is not yet codified by guidance and, as such, is performed variously. OBC.2, for example disaggregated the amorphous "inpatient and ambulatory care services" benefit into nine sub-benefits, two of which related to the provision of buildings, four to healthcare service provision, and three to NHS Board operation. FBC.1, in contrast, disaggregated a generic benefit of "improved clinical effectiveness" into five sub-benefits each of which was described verbosely (e.g. "Development of more GPs with Special Interest to deliver services more locally") and none of which could be clearly associated with buildings, services, or board operation.

As it has emerged independently in different NHS Boards and in different forms of business case, it is concluded that the practice of disaggregating benefits into a series of sub-benefit components, albeit in part caused by the absence of BRMP-derived benefits definition guidance, is proving useful. Engaging stakeholders in benefits definition would build common understanding and increase consistency of subsequent evaluations. Further, the disaggregation process would provide an opportunity to associate qualities of the emerging service or asset with the benefit whose provision they represent. As these qualities could be experienced or observed by stakeholders, judgements of their magnitude could usefully indicate the extent of realisation and perceived worth of their associated benefit. This emergent practice was clearly helpful.

3. Foundations of a Benefits Quantification Method

The above has established the nature of benefits as currently conceived by Scottish investors in healthcare services and infrastructure. This section suggests four functions that a Benefits Quantification Method (BQM) must perform in light of current understanding of the need to inform a BRMP.

3.1 Principle 1: Articulation of benefits

Because stakeholders embark on projects to improve their situation, the benefits sought are 'desired outcomes.' A BQM must adopt stakeholders' perceptions of benefit as the most meaningful measure of their realisation.

3.2 Principle 2: Representing tangible and intangible benefits in measurable terms

Benefits must be broken down into the benefit generating qualities that stakeholders collectively associate with them and would accept as evidence of their realisation. Benefit disaggregation methods must establish the evidence that demonstrates benefits realisation.

3.3 Principle 3: Translating benefit provision magnitude into benefit realisation worth

The diminishing marginal utility associated with increasing magnitudes of good or service provision must be acknowledged. An intermediate step is required to elicit the utility function that translates stakeholders' judgement of benefit generating qualities provided by investment outputs into the perception of its benefit. These perceptions of worth (rather than magnitude) must indicate benefit realisation.

3.4 Principle 4: Reliably ascribing worth to benefit provision

A BQM must elicit stakeholder perceptions of benefit worth using carefully designed elicitation processes to overcome the many biases in stakeholder judgements. Anchoring bias, in particular, must be controlled by using project-specific comparator projects to frame judgement.

4. Characterising the Magnitude of Benefit Realisation

The observation of benefit realisation requires a concept to parallel consumption so that the magnitude of each benefit's realisation can be expressed. The provision of benefits from healthcare service provision is related to, and constrained by, properties of supporting infrastructure (such as buildings).

Reflective design and learning processes make stakeholders' understanding of the relationships between services and supporting infrastructure explicit, allowing it to be formalised and captured. This stimulates the double loop learning (Schön, 1983) by which initial conceptions of what a benefit would 'look like' when realised can be challenged by cycles of monitoring, mapping and observation (Fried, 2010). Evaluating the magnitude of benefit realisation among a group of stakeholders can, in itself, socially construct the common understanding required for a satisficing (Simon, 1969) investment output. The BQM will provide a two-stage process, wherein the physical or functional (note: not financial) qualities of infrastructure – defined as 'Benefit Generating Qualities' (BGQs) – are elicited from stakeholders during project initialisation and then judged by them during project delivery.

The desktop survey confirmed the appropriateness of disaggregating benefits into their constituent BGQs. This emergent practice was observed in FBC.1 wherein each of the "benefits to patients" required from the chosen option was disaggregated into several desired qualities of the investment output (Table 2). Such qualities can be interpreted as benefit generating qualities. Disaggregation of the benefit into a series of BGQs unpacks the understanding assigned to that benefit by a group of stakeholders in a specific situation. The BGQs associated with a benefit on one project could not be transposed to another project as a benefit that superficially appears the same (i.e. has the same description) would be ascribed a different meaning by different stakeholders.

<i>Benefit to Patients</i>	<i>Disaggregated Components</i>
Improved facilities	<ul style="list-style-type: none"> • Easier physical access to the building and to the range of services within. • An energy efficient building should reduce energy costs and thus the impact on the environment. • Backlog maintenance costs for Davidson Community Hospital and Girvan Health Centre will be reduced to nil. • Risk of harm or damage from building failure is significantly reduced. • The functional relationship of departments and rooms will be patient centred and therefore offer substantial improvement in effective service delivery. • There will be sufficient space to be able to offer an enhanced range of healthcare services. • Improved functionality and internal environment should improve staff morale and enhance recruitment and retention of staff increasingly wanting to work at the facility.
Improved acceptability from patients, staff and the public.	<ul style="list-style-type: none"> • Patients and public have a positive impression of health and social care services in Girvan. • Increased patient and staff satisfaction created from a positive ambient environment. • Successful staff recruitment and retention to posts needing to be filled and others retained in the new hospital. • Inpatients are afforded a greater degree of privacy and dignity, if they desire it.

Table 2. Example Disaggregation of an Example “Benefit to Patients” into

The BGQ process is justified by two conceptual links to existing practice. First, it reflects HM Treasury Green Book policy which states that investment outputs can be considered evidence of the benefits sought as investment outcomes. Second, it considers qualities as attributes of the artefact resulting from the investment. It is access to these qualities that stakeholders seek rather than, beyond symbolism, the artefact itself. Some BGQs will be qualities of the artefact (i.e. building features) and others of the healthcare service it accommodates.

5. Characterising the Worth of Benefit Realisation

5.1 Selecting an Appropriate Benefit Valuation Technique

Goods and tangible services can be traded. This allows their value to be derived from stakeholders' 'revealed preferences' (Pearce and Özdemiroglu, 2002) in open market function: the benefits of these goods or services are worth the price that individuals will pay for them. HM Treasury (2003) also requires all the “non-market impacts” of investment programmes to be valued. The healthcare service public good, and the buildings facilitating same, typify such impacts. As the intangible benefits associated with same cannot be readily traded, 'stated preference' valuation methods must ask stakeholders about the value of such commodities.

The Green Book (HM Treasury, 2003, p. 57) recommends Willingness to Pay (WTP) as the “preferred method of valuation to simulate the market” when valuing non-market goods and services. WTP and the related Contingent Valuation (CV) can elicit stakeholder judgements of all types of healthcare investment benefit using carefully designed methods to accurately determine what stakeholders would pay for these public goods if they could be traded. However, despite their endorsement by the Treasury, stated preference valuation methods remain inherently weak because, as van Exel et al. (2006) note, “‘saying’ and ‘doing’ may differ.”

5.2 Translation Principles

Benefits realisation in practice requires the benefit 'worth' (i.e. the amount that stakeholders would pay for it) to be determined. This worth can be expressed in monetary terms, although any other notional unit of consistent scale over time can be used. By relating this unit to levels of benefit magnitude by means of 'comparator' project outputs, the BQM will assist stakeholders in socially constructing a common understanding of benefit worth. Provided that the worth unit is commonly understood, it can translate an observed magnitude of BGQ provision into a common understanding of the worth of the benefit they generate. Integrating worth and magnitude into a function permits assessment of marginal changes in worth. This is achieved by an adaptation of a utility function that the BQM calls a benefit function.

Utility theory models the relationship between the amount of a good or service consumed or experienced and the resulting perception of utility. When applied to benefits quantification, utility theory allows the observed magnitude of BGQs to be related to the benefit arising from them, as judged by each stakeholder. The utility function that performs this translation of infrastructure qualities into benefit worth allows the many inputs to the function (and broader influences on the positioning judgement) to be taken into account. This is illustrated by Fig. 2. Assume that points a, b and c are equidistant. An increase in the magnitude of provided infrastructure or service qualities (i.e. an increase in quality) generates a larger increase in stakeholders' perceptions of benefit worth when moving from point a to b than from point b to c. At a certain point, additional increases in BGQ provision would not be worthwhile due to diminishing marginal increases in perceived benefit worth. Monotonic benefit functions such as this can inform the selection of an optimum provision of each benefit.

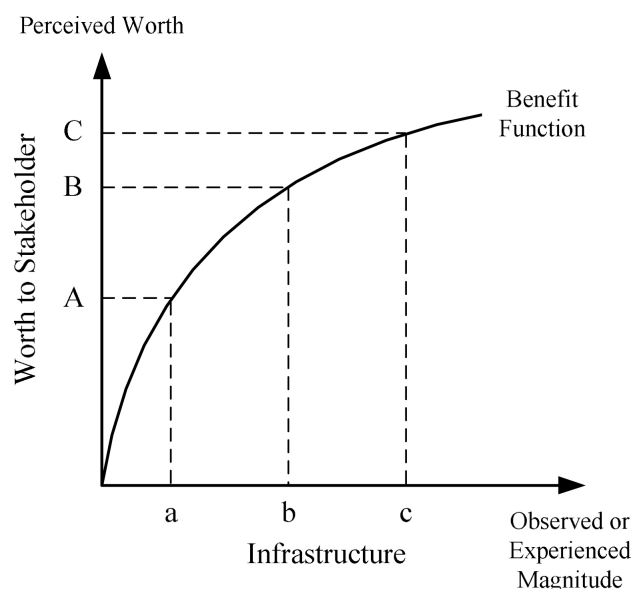


Fig. 2. Example of a Monotonic Benefit Function Exhibiting Typical Stakeholder Perceptions of Diminishing Marginal Benefit Worth with Increases in BGQ Magnitude

The eliciting of benefit functions is difficult. As the UK National Health Service is a public good, the majority of UK residents do not directly pay for its services. This can cause consumers to consider that healthcare and, therefore, healthcare benefits have no intrinsic 'worth.' This problem is also faced when valuing environmental goods and services. There are generally no means of ascertaining exactly who benefits from such assets, or the manner or degree to which they benefit (Smith et al., 1999). Environmental non-market goods have a value to society, but their worth is unknown (Cookson, 1998). 'Willingness to Pay' is a stated valuation technique that has proven particularly effective at evaluating the worth of these intangible goods. Evidence of its insightfulness in the healthcare sector is also present.

5.3 Willingness to Pay

Willingness to Pay (WTP) is a stated preference valuation technique ideally suited to eliciting stakeholders' judgements of benefits worth. The technique is applicable to intangible benefits and public goods; is proven in healthcare; and is reasonably reliable, provided certain biases are controlled. It can be readily operationalised to inform gateway reviews, design reviews, and so forth.

WTP is a representation of "total economic value" (Samuelson, 1954). That is, a stakeholder's statement of their willingness to pay captures their perceptions of their change in their human wellbeing that will arise as a consequence of a variation in benefit magnitude (ibid.). The expressions of benefit worth elicited by WTP as operationalised in the BQM arise as a consequence of stakeholders' perceptions of the change in their wellbeing arising from the project.

The BQM uses WTP to ask individual stakeholders the amount of a notional 'currency of worth' that they would sacrifice to preserve or gain a level of (tangible or intangible) good or service or, alternatively, how much they would accept as compensation for its loss or reduction. WTP techniques thus create a proxy market in which varying magnitudes of benefit provision are evaluated, assuming that an individual's stated shadow prices (Pearce, Özdemiroglu, et al., 2002) are related to their preferences (Mourato, 1998).

The ability of WTP to evaluate intangible benefits is proven by widespread use of its techniques to value environmental public goods (e.g. Ahlheim, 1998; Hanley et al., 2003), where it is often implemented using contingent valuation (DEFRA, 2007; Schläpfer, 2008), and infrastructure improvements (McFadden, 1997; Pearce, Özdemiroglu, et al., 2002; Andersson et al., 2009). Further, precedent for using WTP to evaluate immaterial healthcare goods and services exists, including: short term outcomes in heart surgery patients (Greenberg et al., 2004); the non-health benefits of health programmes (Borghgi and Jan, 2008); pain reduction and pain-related disability (Anderson et al., 2007); and demand for healthcare (Gyldmark and Morrison, 2001). In healthcare, WTP helps stakeholders consider "the entire range of attributes [read: benefit generating qualities] (both benefits and non-benefits)" of the good or service (Blumenschien and Johannesson, 1999). In group settings, WTP can specifically stimulate the "stakeholder dialogue" (Cass, 2006) required to deliberate and negotiate group valuations.

WTP is not without problems, however. WTP is vulnerable to hypothetical bias, as stakeholders find it difficult to reliably evaluate unfamiliar goods unless the choice context provides reliable cues to help the stakeholder create heuristics for their valuation (Schlöpfer, 2008). Pearce, Özdemiroglu, et al. (2002) consider all stated preference valuation techniques "costly and time consuming." "Benefits transfer," where the results of prior WTP evaluations are transferred directly into later ones or averaged over several evaluations to provide a "meta-analysis," can overcome this. Its appropriateness to healthcare infrastructure investments, where sought benefits are project-specific and stakeholder composition differs between projects is unlikely.

WTP biases have been detected in some studies, and disproven in others, indicating that WTP design critically influences results validity. The choice of payment vehicle, evaluation question framing, payment vector, and mode of delivery all require careful consideration. WTP applications control for inherent judgement biases. Comparator projects or benefit delivery scenarios must be defined to frame stakeholders' evaluations by providing implied value cues (Blumenschein and Johannesson, 1999) that control for anchoring bias which, along with availability and representativeness biases, is implicit in all cognitive judgement (Browne and Ramesh, 2002). Although the single-choice WTP technique can be readily operationalised into the workshop settings of a BRMP, WTP remains particularly sensitive to anchoring bias in such "referendum" settings (Green et al., 1998). The BQM will control this bias using comparator projects to provide dimension and units to the judgement scale on which the magnitude of BGQ presence is perceived.

6. Discussion and Future Direction

By identifying diversity of benefits and inconsistencies in their definition methods the desktop study has demonstrated the need for a unified approach to benefits management. A BQM associated with a BRMP has been outlined to characterise investment performance in realising sought benefits. Linking the concepts of infrastructure provision, resulting benefits, and stakeholder perceptions of worth through the use of benefits functions, the BQM will tackle a range of management issues: stakeholder engagement and consultation; improved communication of benefits in the business case; and ongoing monitoring of benefit realisation throughout project life. A BQM and BRMP developed to achieve this will inform the management of technically complex projects which lack financial (or otherwise directly measurable) success criteria and involve a diversity of stakeholders with varying and often conflicting expectations.

Having characterised the benefits realisation problem, the underlying study is now establishing the BQM processes. Stated preference methodologies are being adapted to determine stakeholder perceptions of worth and, at the time of writing, workshop sessions are testing elicitation, anchoring and framing techniques to implement BQM stages (Table 3). Possible methods are being tested with several NHSScotland Boards and professional consultants to establish their insight and ability to be operationalised into a workable tool.

<i>Initialisation stages</i>	<i>Possible method</i>
1. Identify benefits	Adopt directly from business cases; Elicit from stakeholders; Adopt from business cases; with validation; Pick from generic list; Align with prior benefit maps; Translate strategic goals from programme; Pick from generic list; with addition of specific
2. Reduce benefits	Card sorting / affinity diagramming; Rank by priority with cut off point; Management decision; Impact assessment
3. Validate benefits	Validate against programme strategy; Validate against required properties; Agree among stakeholders
4a. Identify comparators, per benefit	Adopt sector exemplars; Identify from stakeholders' experience; Agree good, bad, indifferent; Compose using PCT; Adopt preferred options from other projects; Construct artificial comparators from benefit generating qualities; Construct artificial comparators from exemplar benefit generating qualities
4b. Elicit benefit generating qualities, per benefit	Freelist by user stakeholders; Function analysis; Nominal group technique applications; Freelisting by wider stakeholders
4c. Position comparators, per benefit	Score using NGT; Score using NGT with stakeholder weightings; Score synthesising stakeholders' individual evaluations; Allocate "beans"
4d. Elicit stakeholder benefit functions, per benefit	High / low bidding workshop; Individual bidding; Group bidding; Individual bidding with tolerance; Market stall; Framing and open ended; Budget allocation
4e. Synthesise aggregate benefit function, per benefit	Derive single partial function; Regress individual functions; Synthesise single using stakeholder weightings
<i>Delivery stages</i>	<i>Possible methods</i>
A. Observe benefit provision magnitude	Iterative performance evaluation cycle to be defined.
B. Translate benefit worth	
C. Update dashboard(s)	
D. Target benefits for address	

Table 3. Preliminary Definition of BQM Stages

In addition to informing a BRMP, the BQM can inform specific investment decisions, most notably option appraisal conducted at Outline Business Case. Irrespective of whether health service provision (Scottish Health Council, 2010) or capital investment (Scottish Government, 2009c) options are being evaluated, 'non-monetary costs and benefits' must be "weighted and scored." The review of the OBCs presented determined that this policy is seldom implemented. When attempts to comply with policy are made, superficial judgements (e.g. marks out of ten, or percentages) are arbitrarily assigned to benefits. Rigour, auditability and defensible stakeholder engagement are not present. Using the BQM to quantify benefit realisation will address this significant shortcoming.

Appendix: Index of Business Cases Informing Desktop Survey

<i>Initial Agreements:</i>	
IA.1	Mitchell, H. (2004). <i>Initial Agreement: Re-provision of General Adult Psychiatry in Tayside, Final Version</i> . Dundee: NHS Tayside.
IA.2	Connelly, P.J and Charles, D. (2005). <i>Initial Agreement: Re-provision of NHS accommodation for Older People with Mental Health Problems in Tayside</i> . Dundee: NHS Tayside.
IA.3	NHS Forth Valley (2005). <i>Forth Valley Healthcare Strategy: Primary Care and Community Services: Programme Initial Agreement</i> . Falkirk: NHS Forth Valley, March.
IA.4	NHS Dumfries & Galloway (2007). <i>Delivering... Better Health, Better Healthcare: Dumfries and Galloway Royal Infirmary Redevelopment: Initial Agreement</i> . Dumfries: NHS Dumfries & Galloway, November.
IA.5	Wiggin, L. and McConnell, A. (2008). <i>Initial Agreement: Re-provision Community Maternity Unit North Angus, v. 4.0</i> . Dundee: NHS Tayside.
IA.6	NHS Tayside (2008). <i>Initial Agreement for Re-provision of Substance Misuse In-patient Beds across Tayside (TAPS), v 1.8</i> . Dundee: NHS Tayside, May.
IA.7	NHS Tayside (2008). <i>Initial Agreement for Re-provision of Substance Misuse In-patient Beds across Tayside (TAPS): Benefits Realisation Plan</i> . Dundee: NHS Tayside, May.
IA.8	Smith, G. (2008). <i>Health Campus Programme: Initial Agreement: Draft</i> . Aberdeen: NHS Grampian, 23 January.
<i>Outline Business Cases:</i>	
OBC.1	NHS Forth Valley and Clackmannanshire Council (2003). <i>An Investment Plan to Modernise Health Services in Clackmannanshire: Outline Business Case</i> . NHS Forth Valley and Clackmannanshire Council.
OBC.2	NHS Forth Valley (2003). <i>Forth Valley Healthcare Strategy: Outline Business Case II</i> . Stirling: NHS Forth Valley, July.
OBC.3	NHS Forth Valley (2003). <i>Forth Valley Healthcare Strategy: Outline Business Case II: Appendices</i> , Stirling: NHS Forth Valley, July.
OBC.4	Mitchell, H. et al. (2006). <i>Outline Business Case: Redesign of General Adult Psychiatry Services across Tayside including the re-provision of new inpatient facilities, Final Version, Version 2.3</i> . Dundee: NHS Tayside, February.
OBC.5	Mitchell, H. et al. (2006). <i>Outline Business Case: Redesign of General Adult Psychiatry Services across Tayside including the re-provision of new inpatient facilities, Final Version, Version 2.4</i> . Dundee: NHS Tayside, August.
OBC.6	Nicol et al. (2007). <i>Outline Business Case: Re-provision of Lock Leven Health Centre, Kinross</i> . Dundee: NHS Tayside, September.
OBC.7	NHS Lothian (2008). <i>Re-provision of Royal Victoria Hospital Services: Outline Business Case</i> . Edinburgh: NHS Lothian, April.
OBC.8	NHS Lothian (2008). <i>Re-provision of Royal Victoria Hospital Services: Outline Business Case: Appendix 2: Benefits Realisation Plan</i> . Edinburgh: NHS Lothian, April.
OBC.9	NHS Lothian (2008). <i>Royal Hospital for Sick Children: Outline Business Case (Public Version)</i> . Edinburgh: NHS Lothian, December.
<i>Standard Business Cases:</i>	
SBC.1	NHS Ayrshire & Arran (undated). <i>Standard Business Case: Centralisation of Paediatric In-Patient Services Crosshouse Hospital</i> . Ayr: Ayrshire & Arran NHS Board.
SBC.2	NHS Dumfries & Galloway (2007). <i>Family Planning and Sexual Health Service: Standard Business Case</i> . Dumfries: NHS Dumfries & Galloway, February.
<i>Full Business Cases:</i>	
FBC.1	NHS Ayrshire & Arran (2006). <i>Full Business Case for Girvan Community Hospital (Final (Published) Version)</i> . Ayr: NHS Ayrshire & Arran, November.
FBC.2	NHS Forth Valley (2007). <i>Healthcare Strategy: New Acute Hospital: Full Business Case</i> . Falkirk: NHS Forth Valley, January.
FBC.3	NHS Forth Valley (2007). <i>Healthcare Strategy: New Acute Hospital: Full Business Case Addendum (Published Version)</i> . Falkirk: NHS Forth Valley, November.

References

- Anderson, S. et al. (2007). Valuation using multiple price formats. *Applied Economics*, 29, 675-682.
- Andersson, H. et al. (2009) Willingness to Pay for Car Safety: Sensitivity to Time Framing. *European Transport Conference 2009*, Leeuwenhorst Conference Centre, The Netherland, 5-7 October, Association for European Transport.
- Ahlheim, M. (1998). Contingent valuation and the budget constraint. *Ecological Economics*, 27(2), 205-211.
- Austin, S. and Thomson, D. (2005). Delivering Value in Construction and Design: A New Approach. *Proceedings of the Institution of Civil Engineers, Civil Engineering*, 158(4), 148.
- Baker, J. and Lamb, W. C. J. (1992). Physical environment as a hospital marketing tool. *Journal of Hospital Marketing*, 6(2), 25-35.
- Blumenschien, K. and Johannesson, M. (1999) Use of Contingent Valuation to Place a Monetary Value on Pharmacy Services: An Overview and Review of the Literature. *Clinical Therapeutics*, 21(8), 1402-1417.
- Bradley, G. (2006). *Benefits Realisation Management: A practical guide for achieving benefit through change*. Gower.
- Borghini, J. and S. Jan (2008). Measuring the benefits of health promotion programmes: Application of the contingent valuation method. *Health Policy*, 87, 235-248.
- Browne, G.J. and Ramesh, V. (2002). Improving information requirements determination: a cognitive perspective. *Information & Management*, 39, 625-645.
- Cass, N. (2006). *Participatory-Deliberative Engagement: a literature review (Working paper 1.2)*. Department of Geography, Lancaster University.
- Cooke-Davies, T. (2007). Managing Benefit. in Turner, R. (ed.) *Gower Handbook of Project Management (Fourth Edition)*. Hampshire: Gower Publishing.
- Cookson, R. (1998). *An alternative approach to valuing non-market goods. Environmental Valuation, Economic Policy and Sustainability: Recent Advances in Environmental Economics*. M. Acutt and P. Mason. Cheltenham, Edward Elgar Publishing, 51-61.
- DCMS (2000). *Better Public Buildings: A proud legacy for the future*. London: Department for Culture, Media and Sport.
- DEFRA (2007). *An introductory guide to valuing ecosystem services*. Department for Environment Food and Rural Affairs.
- Department of Health (2007). *The ProCure21 Guide, Version 5.0*. Leeds: Department of Health, January.
- Fried, A. (2010). Performance measurement systems and their relationship to strategic learning: A case study in a software-developing organization. *Critical Perspectives on Accounting*, 21(2), 118-133.

- Gann, D.M., et al. (2003). Design Quality Indicator as a tool for thinking. *Building Research & Information*, 31(5), 318-333.
- Gyldmark, M. and G. Morrison, C (2001). Demand for health care in Denmark: results of a national sample survey using contingent valuation. *Social Science and Medicine*, 53, 1023-1036.
- Greenberg, D. et al. (2004). Willingness to pay for avoiding coronary restenosis and repeat revascularization: results from a contingent valuation study. *Health Policy*, 70, 207–216.
- Green, D. et al. (1998). Referendum contingent valuation, anchoring, and willingness to pay for goods. *Resource and Energy Economics*, 20, 85-116.
- Hanley, N. et al. (2003). Aggregating the benefits of environmental improvements: distance-decay functions for use and non-use values. *Journal of Environmental Management*, 68, 297-304.
- Health Facilities Scotland (2008). *Frameworks Scotland: The Guide, Issue 1.0*. Glasgow: Health Facilities Scotland Property and Capital Planning, December.
- HM Treasury (2003). *The Green Book: Appraisal and Evaluation in Central Government*. London: TSO.
- Judgev, K. and Muller, R. (2005). A retrospective look at our evolving understanding of project success. *Project Management Journal*, 36(4), 19-31.
- Macmillan, S. (2006). *The Value Handbook: Getting the most from your buildings and spaces*. London: CABE.
- McFadden, D. (1997). Measuring Willingness-to-Pay for Transportation Improvements. in Gärling, T. et al. (eds.) *Theoretical Foundations of Travel Choice Modeling*.
- Mitchell, H. et al. (2006). *Outline Business Case: Redesign of General Adult Psychiatry Services across Tayside including the reprovision of new inpatient facilities, Final Version, Version 2.4*. Dundee: NHS Tayside, February.
- Mourato, S. (1998). Economic valuation in transition economies: an application of contingent valuation to Lake Balaton in Hungary. In *Environmental Valuation, Economic Policy and Sustainability: Recent Advances in Environmental Economics*. M. Acutt and P. Mason. Cheltenham, Edward Elgar Publishing: 15-33.
- NHS Ayrshire & Arran (undated). *Standard Business Case: Centralisation of Paediatric In-Patient Services Crosshouse Hospital*. Ayr: Ayrshire & Arran.
- NHS Ayrshire & Arran (2006). *Full Business Case for Girvan Community Hospital (Final (Published) Version)*. Ayr: NHS Ayrshire & Arran, November.
- NHS Estates (2003). *Exploring the patient environment - An NHS Estates workshop*. London: TSO.
- OGC (2003). *Managing Successful Programmes*. London: The Stationary Office.
- OGC (undated, a). *Benefits Profile*. http://www.ogc.gov.uk/documentation_and_templates/benefits_profile.asp [Last accessed: 4 April 2010]

- Pearce, D., Özdemiroglu et al. (2002). *Economic Valuation with Stated Preference Techniques: Summary Guide*. London: Department for Transport, Local Government and the Regions.
- Reiss, G. et al. (2006). *Gower Handbook of Project Management*. Aldershot: Gower Publishing.
- Samuelson, P.A. (1954). The Pure Theory of Public Expenditure. *Review of Economics and Statistics*, 36(4), 387-389.
- Sapountzis, S. et al. (2009). Realising benefits in primary healthcare infrastructures. *Facilities*, 27 (3/4), 74-87.
- Schön, D. (1983). *The Reflective Practitioner. How professionals think in action*, London: Temple Smith.
- Schläpfer, F. (2008). Contingent valuation: A new perspective. *Ecological Economics*, 64(4), 729-740.
- Scottish Government (2009a). *Scottish Capital Investment Manual: Programme and Project Organisation Guide*. Edinburgh: The Scottish Government, 7 December.
- Scottish Government (2009b). *Scottish Capital Investment Manual: Business Case Guide*. Edinburgh: The Scottish Government, 7 December.
- Scottish Government (2009c). *Scottish Capital Investment Manual: Option Appraisal Guide: A practical guide to the Appraisal, Evaluation, Approval and Management of Policies, Programmes and Projects*. Edinburgh: The Scottish Government, 21 March.
- Scottish Health Council (2010). *Involving Patients, Carers and the Public in Option Appraisal for Major Health Service Changes*. Glasgow: Scottish Health Council.
- SGHD (undated). *SCIM: Approvals Process: Delegated Limits*. <http://www.scim.scot.nhs.uk/Approvals/Delegated.htm> [Last accessed: 4 April 2010]
- Simon, H.A. (1969). *The Sciences of the Artificial*. Cambridge: MA: MIT Press.
- Ulrich, R. et al. (2004). *The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity*. Texas, TX: Center for Health Systems and Design, College of Architecture, Texas A&M University.
- Smith, K. et al. (1999). Does nature limit environmental federalism? In *Environmental and Public Economics*. A. Panagariya, P. R. Portney and R. M. Schwab. Cheltenham, Edward Elgar Publishing Ltd., 126-150.
- van Exel, N.J.A. et al. (2006). With a little help from an anchor. Discussion and evidence of anchoring effects in contingent valuation. *The Journal of Socio-Economics*, 35, 836-853.
- van den Berg, A. E. (2005). *Health Impacts of Healing Environments: A review of evidence for benefits of nature, daylight, fresh air, and quiet in healthcare settings*. Groningen, University Hospital Groningen.