

This item was submitted to Loughborough's Institutional Repository (<https://dspace.lboro.ac.uk/>) by the author and is made available under the following Creative Commons Licence conditions.



CC creative commons
COMMONS DEED

Attribution-NonCommercial-NoDerivs 2.5

You are free:

- to copy, distribute, display, and perform the work

Under the following conditions:

BY: **Attribution.** You must attribute the work in the manner specified by the author or licensor.

Noncommercial. You may not use this work for commercial purposes.

No Derivative Works. You may not alter, transform, or build upon this work.

- For any reuse or distribution, you must make clear to others the license terms of this work.
- Any of these conditions can be waived if you get permission from the copyright holder.

Your fair use and other rights are in no way affected by the above.

This is a human-readable summary of the [Legal Code \(the full license\)](#).

[Disclaimer](#) 

For the full text of this licence, please go to:
<http://creativecommons.org/licenses/by-nc-nd/2.5/>

Pre-press manuscript. Citation of the published Work:

Thomson, D.S., Kaka, A., Pronk, L., & Alalouch, C. (2011). The Benefits Quantification Method: A practical approach to engaging stakeholders in the judgement of benefits realisation. In *4th Annual Conference of the Health and Care Infrastructure Research and Innovation Centre*. Manchester, 26 September, pp. 224-243.

The Benefits Quantification Method: A Practical Approach to Engaging Stakeholders in the Judgement of Benefits Realisation

D. Thomson, A. Kaka, L. Pronk, C. Alalouch

Abstract

The Benefits Quantification Method (BQM) is a practical approach to engaging stakeholders in the definition and judgement of benefits sought from investments in healthcare infrastructure; most notably buildings. As many of these benefits are intangible and cannot be directly measured, the extent of their realisation must be judged by the stakeholders to whom they will accrue. This requires a participatory approach to defining investment project intent and monitoring performance in realising same.

The BQM addresses this problem by operationalising utility theory to quantify the benefit realisation performance of an investment project. These quantifications, which represent stakeholders' perceptions of the worth of benefits realisation are intended to inform a Benefits Realisation Management Process (BRMP) such as HaCIRIC's BeReal.

This paper summarises the theoretical underpinnings of the BQM and presents a hypothetical example of its use derived from insights gained during its development. The role of a BQM Facilitator in engaging stakeholders in the translation of programme-level, strategic benefits into the project-level, tactical benefits they seek is explained. The practicalities of translating abstract definitions of benefits into practical explanations of what stakeholders expect benefits realisation to "look like" when achieved are addressed. The need for rigour in eliciting the judgements of benefit worth that underpin the BQM's ability to translate stakeholder observations of benefit-generating investment qualities into meaningful quantifications of benefit worth is identified.

Keywords

Benefits Realisation; Design Evaluation; Judgement; Stakeholder Engagement; Utility Theory

1. Introduction

This paper briefly illustrates the quantification of benefits realisation by the “Benefits Quantification Method.” Use of its insights to inform a Benefits Realisation Management Process (BRMP) is summarised. To be successful, investments in healthcare infrastructure must “realise” changes desired by stakeholders: “benefits” (Thomson et al., 2010). A BRMP requires an accurate definition of these benefits and accurate quantifications of project performance in their realisation. This paper summarises use of the BQM to balance analytical rigour with the need for a practical approach for use in projects settings to address these needs.

By structuring stakeholder engagement, the BQM informs the definition of investment intent, decision making, and through-life outcome appraisal. This paper briefly summarises selected BQM features and presents an abridged worked example.

2. The Need For Benefits Quantification

HM Treasury's 'Green Book' focuses public sector investments on demonstrably delivering stakeholders' sought benefits. Associated guidance (Office of Government Commerce, 2004), supported by 'Managing Successful Programmes' (MSP & Office of Government Commerce, 2007), introduces benefits realisation to investment governance. This policy is reflected in National Health Service (NHS) procurement practice (see, for example, Scottish Government Health Directorates, 2009).

Intangible benefits often result from investment (Office of Government Commerce, 2009; Office of the Third Sector, 2009), requiring their quantification to characterise investment success. Several non-monetary measurement techniques can be used (Pearce and Özdemiroglu, 2002), including stated preference valuation techniques such as willingness to pay and revealed preference valuation techniques such as hedonic pricing. To ensure workability in project contexts, the BQM informs quantification using sense-making and consensus building techniques with project stakeholders.

3. The Principles Of Benefits Quantification

The BQM addresses the intangible nature of many healthcare investment benefits by eliciting judgements of their realisation from those to whom they accrue. Stakeholders observe the investment outcome qualities they associate with benefits. When creating a healthcare building, for example, these “benefit generating qualities” are physical, functional, or financial building attributes. A “reduced infection risk” benefit might be evidenced by internal finishes, space cleanliness, and facilities available to staff and visitor to ensure their cleanliness. Stakeholders judge benefit realisation by observing the presence of these qualities. The BQM translated these observations into meaningful quantifications of benefit worth.

As benefits realisation is judged, perception of benefits and - specifically - the notion that “more is not necessarily better” must be acknowledged. The BQM distinguishes between the presence of benefit generating qualities and stakeholder perceptions of benefit magnitude. This distinction acknowledges that each unitary increase in benefit generating qualities provision adds a diminishing increase in benefit realisation. In short, acknowledging that benefit perception exhibits diminishing marginal utility allows realisation to be meaningfully quantified. Measuring

the evidence of benefit presence (i.e. benefit generating qualities) does not appropriately characterise benefits realisation.

4. The Valuation Of Benefit Worth

The valuation of benefit worth, as perceived by stakeholders, must inform the quantification of benefits realisation. The BQM adopts the 'willingness to pay' stated preference valuation method to ask stakeholders what varying magnitudes of benefit realisation (indicated by the presence of benefit generating qualities) are 'worth' to them. This approach is used to quantify intangible benefits in non-healthcare sectors (Johannesson, 1996; Smith and Richardson, 2005). To apply it to healthcare, the BQM distinguishes between benefit magnitude and benefit worth. Magnitude represents the presence of benefit generating qualities associated with a given benefit in the investment outcome. These are perceived by stakeholders through observation.

Informed by these observations, judgements are anchored to a prescribed benchmark (quantity and definition) definition of notional worth and elicited as multiples of this datum. Stakeholders interpret the investment outcome from documentation during delivery or experience once in use (Office of Government Commerce, 2007a; Sapountzis et al., 2007).

"Benefit functions" model the relationship of benefit realisation magnitude to benefit worth. These functions typically demonstrate diminishing marginal returns as discussed above and are illustrated by Fig. 1.

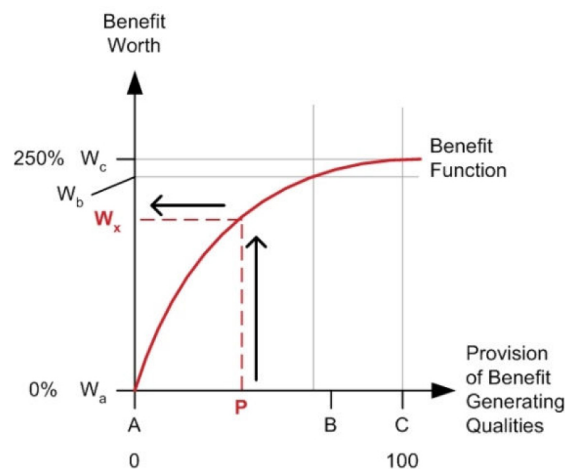


Fig. 1. Quantification of Benefit Worth using a Benefit Function

5. Operationalising The Evaluation Of Benefit Worth

5.1 Operationalisation Requirements

The BQM's distinction between benefit magnitude and benefit worth, together with its premise that stakeholder judgement must inform benefits quantification, require appropriate operationalisation to ensure its quantifications will appropriately inform a BRMP.

Operationalisation must also be appropriate to stakeholders' context. The BQM must be aligned with existing investment project processes. It must not introduce undue management overhead or impose additional participation burden beyond that currently experienced by stakeholders in

their roles as healthcare commissioners, healthcare providers, construction consultants (or other specialised consultants if the investment outcome sought is not a building), and lay-people.

The methods used to elicit stakeholders' perceptions must further be appropriate to stakeholders' expertise and experience of engaging in investment projects. They must be compatible with stakeholder engagement workshops pre-existing in investment delivery projects so that they can be inserted into same where possible. Issues of: stakeholder motivation and reward; workshop format and facilitator; and workshop fatigue during the life of the investment project all require address. Some compromises in analytical integrity must be accepted to satisfy these requirements.

5.2 Deployment Format

The salient features adopted by the BQM to facilitate its operationalisation, particularly within the construction projects enacted to realise benefits from the creation of buildings are as follows.

The BQM comprises initialisation and quantification activities. The former facilitate quantification by defining project benefits and eliciting perceptions of their worth so that benefit functions can be compiled. The latter capture stakeholder perceptions of benefit magnitude (evidenced by investment outcome qualities) and translate them into quantifications of benefit realisation.

These activities align with project inception, delivery and use (Fig. 2). Initialisation and quantification activities performed during investment delivery are informed by stakeholders' anticipation of investment outcome use. Quantification activities performed after the outcome is in use are informed by stakeholders' experiences.

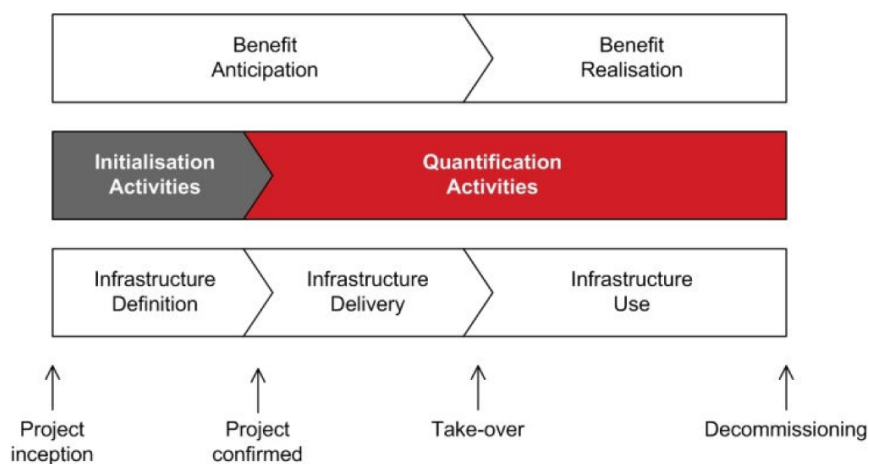


Fig. 2. BQM Application Contexts

Current investment guidance only acknowledges benefits realisation upon outcome use. The BQM differs in that it elicits anticipations of future benefits realisation during delivery so that investment project performance can be characterised while opportunities for correct action remain.

To minimise management burden the BQM links with existing workshops wherever possible. The BQM's focus on buildings causes these workshops to typically be associated with value

management or architectural briefing. In pre-project activity, the BQM integrates with the stakeholder engagement informing business case formation.

Despite this, a one-day workshop specific to the BQM is suggested for initialisation, whereas quantification activities are more opportunistic and much shorter. Eliciting stakeholder judgements typically requires around 20 minutes and can be performed collectively or by each stakeholder independently. The former can be implemented in design or performance review meetings. The latter can use email or telephone conversations.

Workshops require facilitation. The MSP Senior Responsible Owner (SRO) must carefully choose a BQM facilitator familiar with the activities, their principles and supporting tools. The value management practitioners often engaged in construction projects are ideally suited to this role. They are proficient in stakeholder engagement, possess construction expertise, and could rapidly learn the BQM itself. Alternatively, the Project Directors employed in the OGC Project Sponsor role (Office of Government Commerce, 2007b) could substitute their typical understanding of either clinical or nursing needs for construction expertise.

5.3 Initialisation Requirements

BQM initialisation activities must: be quick; minimise management burden; and engage stakeholders effectively. They must also synthesise reliable benefit functions to accurately inform BRMP use. Necessary compromises in analytical rigour are offset with the facilitation of socially-constructed understanding. Participation and negotiation complement the analytical derivation of insight. Individual (Thiry, 2001) and organisational (Maitlis, 2005) sense-making is essential. This requires cross-stakeholder dialogue, negotiation and the careful facilitation of both to form a participatory process.

5.4 Initialisation Activities

BQM initialisation activities synthesise the benefit functions that model stakeholder perceptions of benefit worth associated with varying magnitudes of benefit generating qualities present in the investment outcome. Performing these activities diligently ensures accurate benefit functions and, thus, meaningful quantifications of benefits realisation performance in following stages.

The synthesis of a benefit function is a multi-step process (Fig. 3). As a practical compromise, it is performed once on investment commencement even though stakeholder perception or composition might change over time. Indeed, stakeholder agreement of sought benefits may also change in a project of sufficient duration of unstable context.

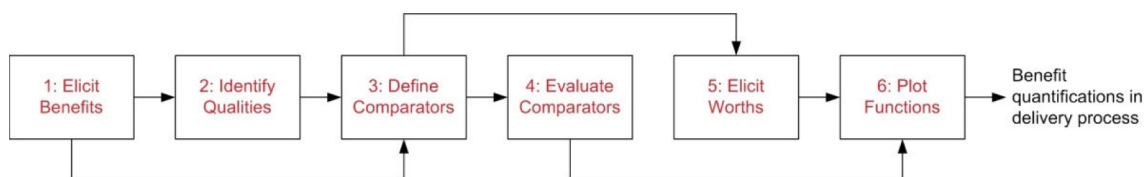


Fig. 3. BQM Initialisation Activities

The 'Elicit Benefits' activity captures stakeholder perceptions of project benefits. This group activity builds consensus regarding the benefits that all stakeholders collectively seek from the investment. The facilitator's ability to lead stakeholders through the negotiation and social construction of a common set of project benefits is pivotal to BQM effectiveness. If effective, a satisficing set of project benefits will result. Individual brainstorming elicits possible project benefits followed by facilitated collective card sorting and affinity diagramming to stimulate the sense-making from which stakeholder agreement regarding satisficing project benefits results.

The 'Identify Qualities' activity replicates the method of the previous activity although this time stakeholder perceptions of the benefit generating qualities they expect the investment outcome to exhibit as evidence of the realisation of each project benefit are gathered. The same facilitated approach to the social construction of common understanding ensures every stakeholder understands the perceptions of the others and any conflicts therein.

The 'Define Comparators' activity engages stakeholders in the definition of three 'comparator' scenarios for each project benefit to illustrate their collective understanding of how benefit generating qualities might become evident in practical situations. By representing stakeholders' collective perception of "loss of benefit," "general satisfaction," and "excellence," these comparators anchor stakeholders' quantification evaluations and define the three magnitudes of benefits realisation from which benefit functions are elicited.

The 'Evaluate Comparators' activity establishes, for each benefit in turn, the magnitude of benefits realisation that the stakeholders associate with each comparator. Note that these magnitudes are not quantifications. They define the scales on which subsequent stakeholder evaluations of benefits realisation will be made.

The 'Elicit Worths' activity uses 'willingness to pay' to determine the worth the stakeholders collectively place on each of the three magnitudes of benefits realisation represented by the three comparators describing each project benefit.

Finally, the 'Plot Functions' activity fits a single curve to each set of three data points provided by the preceding two activities. Each of these curves is a single benefit function, allowing any perceived magnitude of benefit generating qualities to be translated into a perception of benefit worth at any point by subsequent quantification activities.

5.5 Quantification Requirements

After initialisation, BQM quantification activities must elicit meaningful quantifications of benefits realisation performance from stakeholders. In addition to being simple and reliable, these quantification activities must, for each assessed benefit, use the corresponding benefit function to translate stakeholder observations of benefit generating qualities into quantifications of benefit realisation. Sufficient rigour is required to adequately inform a superordinate BRMP (such as BeReal) that will, in turn, direct project progression. Placing the benefits function at the core of ongoing benefits quantification during project progression embodies the principle that "more is not necessarily better." The quantifications resulting can help BRMP users and investors to understand when an optimal, rather than maximal, realisation of each project benefit has been

achieved. Quantification activities must, therefore, be sufficiently accurate. This is achieved by a combination of the proficiency with which initiation activities were formed as this determines the accuracy of each benefit function. It also depends on the rigour with which quantification activities are used.

5.6 Quantification Activities

To reliably assign meaningful quantifications to the current state of benefit realisation, BQM quantification activities must: elicit each stakeholder's judgements of the presence of benefit generating qualities in the investment outcome; combine these views through a weighting and scoring system; and translate the collective view into a single, overall characterisation of project performance in realising the benefit concerned.

The quantification of benefits realisation performance is an ad hoc sequential process intended to be performed as and when necessary. In addition to responding to spontaneous investor requirements during the project phase of investment, typical instances of benefits quantification would include: regular performance evaluations such as design reviews and site meetings; client change request review meetings; risk register review meetings; and so forth. During the operation of the investment, the quantification of ongoing benefits realisation would likely be more ad hoc, however periodic reviews may be linked to annual performance evaluations and condition surveys (wherein social obsolescence may be addressed).

Three quantification activities (Fig. 4) are performed in quick succession to provide each quantification of benefit realisation quickly. It is ideally performed in a workshop setting as this will afford stakeholders the opportunity to discuss emergent quantifications, thereby sustaining a common understanding of project performance and assisting in the management of insight into the causes of that performance. Evaluations can alternatively be gathered from stakeholders in isolation by telephone conversation, email, website form completion, and so forth. Each instance of the quantification process progresses as follows.

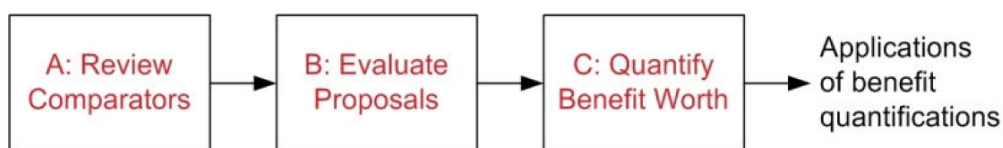


Fig. 4. BQM Quantification Activities

Stakeholders are first asked to 'Review [the] Comparators' defined for each project benefit to remind them of the illustrative scenarios painted of the possible realisation of each. This ensures consistency between quantifications by establishing consent anchors to stakeholders evaluations which may be performed some time apart (e.g. annually once the investment outcome is available and in use). After this, they 'Evaluate [the] Proposals' available to them by searching for evidence of the presence of the benefit generating qualities associated with each project benefit and potential embedded into the outcome in the manner described by the comparators. During initialisation and delivery, these observations may only be informed by available project documentation or design details. They are thus anticipations of future benefits

realisation. Once the outcome is in use, they are informed by stakeholders' experience of the investment outcome. Once stakeholders have been primed ('Review Comparators') and have observed the presence of project benefits via their benefit generating qualities ('Evaluate Proposals'), the BQM Facilitator then uses the benefit functions to translate observations into quantifications. This process is explained in the illustrative example below.

5.7 BRMP Facilitation

As discussed above, most benefits sought from buildings are intangible (Abdul-Samad and Macmillan, 2005). HM Treasury (2003) addresses this stating "... benefits for which there is no market price also need to be brought into any assessment. They will often be more difficult to assess but are often important and should not be ignored simply because they cannot be easily costed." The BQM therefore requires disciplined application of initialisation and quantification activities to reliably inform a BRMP.

The provision of such information to a BRMP largely follows an investment through the Gateway Review process (Fig. 5). Further spontaneous quantification can characterise tactical project performance (Gateways 3 to 5) and, once the investment outcome is in use, ongoing operational performance (up to and after Gateway 5).

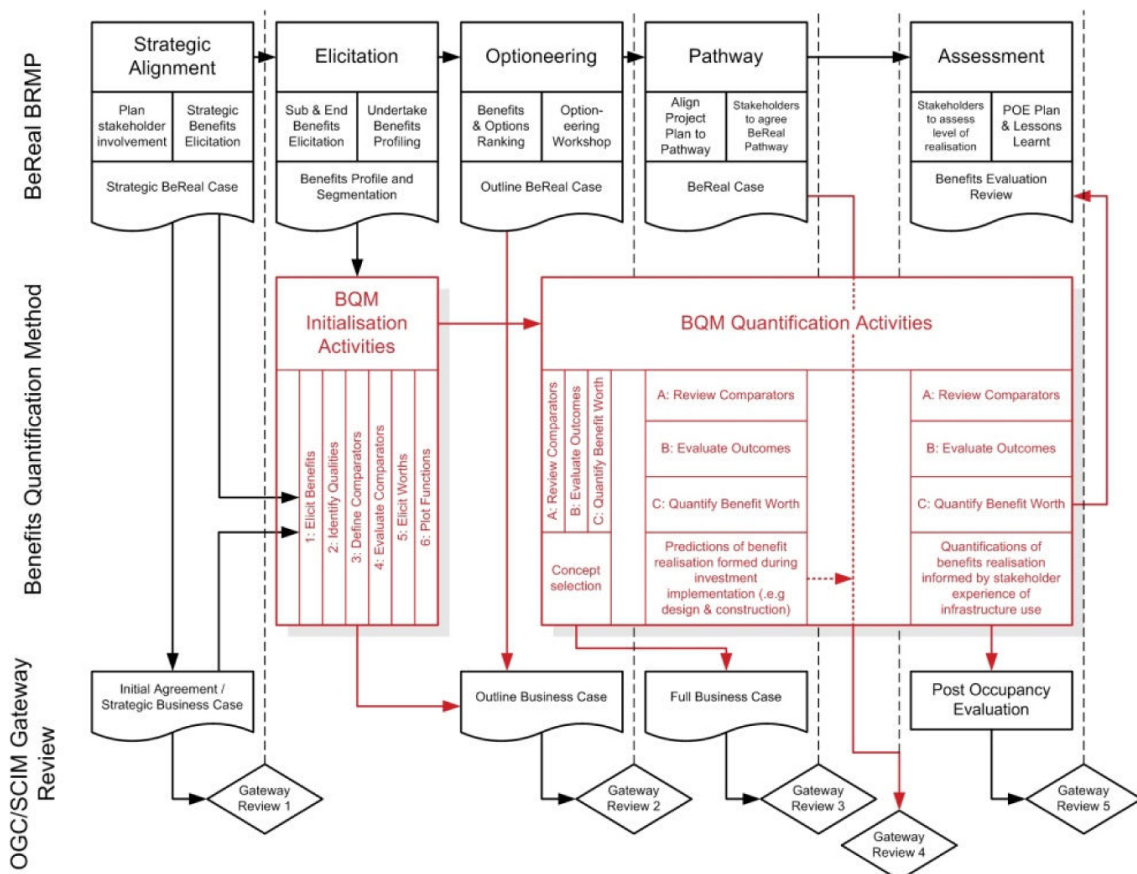


Fig. 5. Association of the BQM with the BeReal BRMP

6. Illustrative Example

The following presents vignettes of a hypothetical BQM application. They are drawn from experiences of developing and validating the BQM's activities with several NHSScottish Health Boards and stakeholders on 'live' investment projects at varying stages of business case approval, construction and early stages of use.

The stakeholder roles illustrated below are typical of those with whom the BQM will engage. Although stereotypes are presented, the attitudes and opinions summarised are similarly drawn from the authors' encounters during BQM development.

The BQM considers all stakeholders equally important and gives all equal voice. In 'live' applications this may not be the case. If so, the power, legitimacy and urgency (Mitchell et al., 1997) of each stakeholder can be reflected by weighting their engagement with the BQM. Although this can be achieved numerically for many initialisation activities, their participative elements (such as the piling and social negotiation used by the 'Elicit Benefits' and 'Identify Qualities' activities) cannot incorporate weightings and must engage all stakeholders fully.

6.1 Example Scenario

NHS Somewhere serves an ageing population. Demographic change is placing a strain on the existing Somewhere Acute Hospital, which is beginning to struggle to maintain service levels and to provide the range of services required by the changing populace.

NHS Somewhere identified their infrastructure as the main restraint on service quality at Somewhere Hospital, which consists of several buildings scattered over a large site. These buildings are in varying states of repair, physically incapable of housing the latest technologies and, as a whole, are too small to support required patient throughput.

A strategic plan was developed to promote the delivery of acute care through a single, rationalised campus housing all departments: the new Acme Acute Hospital. NHS Somewhere managed benefits realisation in addition to traditional project metrics, and used the BQM to monitor project performance in realising the benefits sought by stakeholders.

6.2 Example Stakeholders

Three healthcare stakeholder representatives were engaged in the Acme Acute Hospital investment. The BQM considered their views representative although some self-selection bias was noted. Around ten stakeholders would typically engage with the BQM. Only three stakeholders are presented below for clarity.

Dr. Reid, a House Doctor for NHS Somewhere, represented the oncology staff. She expected a notable improvement in the quality of the existing buildings. She required buildings that could accommodate the latest healthcare developments throughout their life. Although she appreciated the psychological influence of buildings on patients, she typified NHS Somewhere's medical staff in believing that buildings are less important than medical technologies and treatments.

Mrs. Reyes represented the patient body. Like most of NHS Somewhere's patients, Mrs. Reyes was satisfied with care quality but was generally disappointed with the age, state of repair, and general "atmosphere" of NHS Somewhere's buildings.

Mr. Turk, a Clinical Director, was typical of the clinical staff. Recently attracted to NHS Somewhere with the promise of the latest equipment, he found that the buildings could not support it. He had specific concerns about infection control and also considered the theatre space outdated in its arrangement and facilities. He considered healthcare buildings to be factories for delivering low-risk, repetitive care. He wanted to treat as many patients as possible on an outpatient basis.

Although not a stakeholder himself, 'Bob' worked alongside the above to apply the BQM itself. As Project Director for Acme Acute Hospital, he was the BQM facilitator. Bob sourced the 'BQM Manual' and 'BQM Spreadsheet' from www.benefitsquantification.com to let him do this. Bob also operated a BRMP informed by the BQM's quantifications of benefits realisation performance. The BRMP is not described here.

6.3 Illustrative Vignettes

The following vignettes illustrate application of the BQM to the hypothetical, yet realistic Acme Acute Hospital project.

6.3.1 Defining the Benefits

Bob used the 'Elicit Benefits,' 'Identify Qualities,' and 'Define Comparators' initialisation activities to engage stakeholders in the definition of project benefits. This was done in the first half of a single day BQM-specific workshop.

Bob performed the 'Elicit Benefits' activity as follows. Stakeholders were given cards and asked to note one possible project benefit on each. After exhausting their suggestions (Table 1), Bob led a group pilesorting activity to produce an affinity diagram that clustered 'like' benefits. When moving cards into clusters, Bob asked the stakeholders to verbalise their thinking. This group sense-making facilitated the social construction of consensus. Five clusters resulted (Fig. 6). Bob asked stakeholders to name each by its thematic content. The clusters were adopted as the project benefits, with each defined by its constituent suggestions and the discussion that ascribed meaning. Typically, between six and ten project benefits are found to balance the need to sufficiently inform a BRMP with the need for manageable stakeholder engagement.

<i>Stakeholder</i>	<i>Suggested Project Benefits</i>
<i>Dr. Reid (Oncologist)</i>	<i>adopting latest technologies - attract high-quality staff to the hospital - avoid an "institution" - avoid corridors - easy access to beneficial care - good working conditions - homely atmosphere - innovative delivery paths - provide artwork - put patients at ease - well-resources - lots of modern equipment</i>
<i>Mrs. Reyes (Patient Representative)</i>	<i>clean environment - easy to find your way around - easy to reach buildings - friendly staff - good quality care - low risk - individual care for each patient - nice, pleasant bedrooms - not left by yourself - socialisation - well-maintained buildings</i>
<i>Mr. Turk (Clinical Director)</i>	<i>effective theatre space with the latest equipment - high-throughput theatre space - space that reflects the esteem of the profession - excellent support staff - "cleanliness is next to Godliness" - high-quality consultancy rooms - accommodation of private practice</i>

Table 1: Suggested Project Benefits, by Stakeholder

Bob moved the workshop onto the 'Identify Qualities' activity which also used brainstorming and pilesorting to consider each benefit in turn, identifying the physical, functional, and/or financial investment outcome qualities that evidence its realisation. Typically, four or five of these "benefit generating qualities" were found for each project benefit. Stakeholders then considered the contribution made by each quality to the realisation of the associated project benefit and agreed an appropriate weighting. These allowed the importance of qualities to be considered when evaluating their presence (or otherwise) when quantifying benefits realisation in subsequent stages.



Fig. 6. Adopted Project Benefits

Bob next guided the negotiation of "comparators" that described stakeholders' collective understanding of examples of the realisation of each project benefit. For each benefit in turn, Bob asked the stakeholders to consider a hypothetical 'ideal' project, a current 'best of class' project, and a further project representing an undesired (i.e. 'loss of benefit') outcome. The agreed "comparators" and the way in which they illustrate the presence of benefit generating qualities (to varying extents) were recorded descriptively in a "comparator grid." These grids were used to anchor subsequent stakeholder judgements of benefit realisation against a common definition of what that realisation would 'look like.'

6.3.2 Modelling the Benefits

To implement the second aspect of initialisation, Bob directed the stakeholders to model their perceptions of benefit worth to structure the meaningful quantification of benefit realisation. He performed the 'Evaluate Comparators,' 'Elicit Worths,' and 'Plot Functions' activities in the afternoon of the day-long BQM initialisation workshop.

The 'Evaluate Comparators' activity defined scales for stakeholders' evaluation of benefit generating quality presence. Considering each project benefit in turn, Bob produced a continuous evaluation scale of 100 notional units for each benefit generating quality on which 0 units

represented “not present” and 100 units represented “fully present.” He asked the stakeholders to consider each comparator and agree its position each scale. The definitions of the three comparators associated with each benefit ('loss,' 'satisfaction,' and 'sector excellence') caused them to be distributed over their evaluation scale, assigning meaning. Bob recorded these scales in the BQM Spreadsheet (Fig. 7).

Comparator Evaluations:

Project Benefit	Benefit Generating Qualities	Weight (%)	"Loss of Benefit"	Comparators		Weighted Comparators		
				"General Satisfaction"	"Excellence"	"Loss of Benefit"	"General Satisfaction"	"Excellence"
1. Clinical Effectiveness	1.1 Adoption of Relevant Technologies	30%	0	50	90	0	15	27
	1.2 Control of Risk	50%	0	55	86	0	27.5	43
	1.3 Achievement of Throughput	20%	0	35	73	0	7	14.6
	1.4 Not defined	0%	0			0	0	0
Comparator Scores:						0	49.5	84.6
Normalised Comparator Scores:						0	58.51	100
2. Sustainability	2.1 Source of Energy	20%	0	50	95	0	10	19
	2.2 Recycling Facilities	40%	0	60	92	0	24	36.8
	2.3 Building Envelope	40%	0	35	82	0	14	32.8
	2.4 Not defined	0%	0			0	0	0
Comparator Scores:						0	48	88.6
Normalised Comparator Scores:						0	54.18	100
3. Patient and Staff Environment	3.1 Public Transport	50%	0	45	75	0	22.5	37.5
	3.2 Location	30%	0	55	89	0	16.5	26.7
	3.3 Public Access	20%	0	64	99	0	12.8	19.8
	3.4 Not defined	0%	0			0	0	0
Comparator Scores:						0	51.8	84
Normalised Comparator Scores:						0	61.67	100

Fig. 7. Definition of Evaluation Scales within the BQM Spreadsheet

Bob performed the 'Elicit Worths' initialisation activity by asking the stakeholders to consider each project benefit in turn. Following standard willingness to pay practice, he instructed the stakeholders with an appropriate version of the following prompt, asking each to respond individually:

“Assume that the realisation of “Clinical Effectiveness” offered by the “Loss of Benefit” Comparator is worth 100 tokens. How many tokens would you assign the realisation of this Benefit by the “General Satisfaction” Comparator; and how many would you assign to the “Excellence” Comparator?”

This elicited each stakeholder's judgement of the worth of varying magnitudes of benefits realisation anchored to a common datum. Although academic comprises associated with the meaning assigned to these datums exist, they were accepted in light of the need for a workable process that could aggregate individual stakeholder views into collective ones. The judgements were recorded by Bob in the BQM Spreadsheet.

Bob performed the last initialisation activity ('Plot Functions') in front of the stakeholders even though their input was not required. He did this show how benefit functions were produced and to explain their role in subsequent quantifications. The activity was automated by the BQM Spreadsheet. For each benefit, considering stakeholders individually and collectively, it fitted a degree 2 polynomial function to the data points using the scales from 'Evaluate Comparators' as

the independent variable and judgements of worth from 'Elicit Worths' as the dependent variable of each function (Fig. 8).

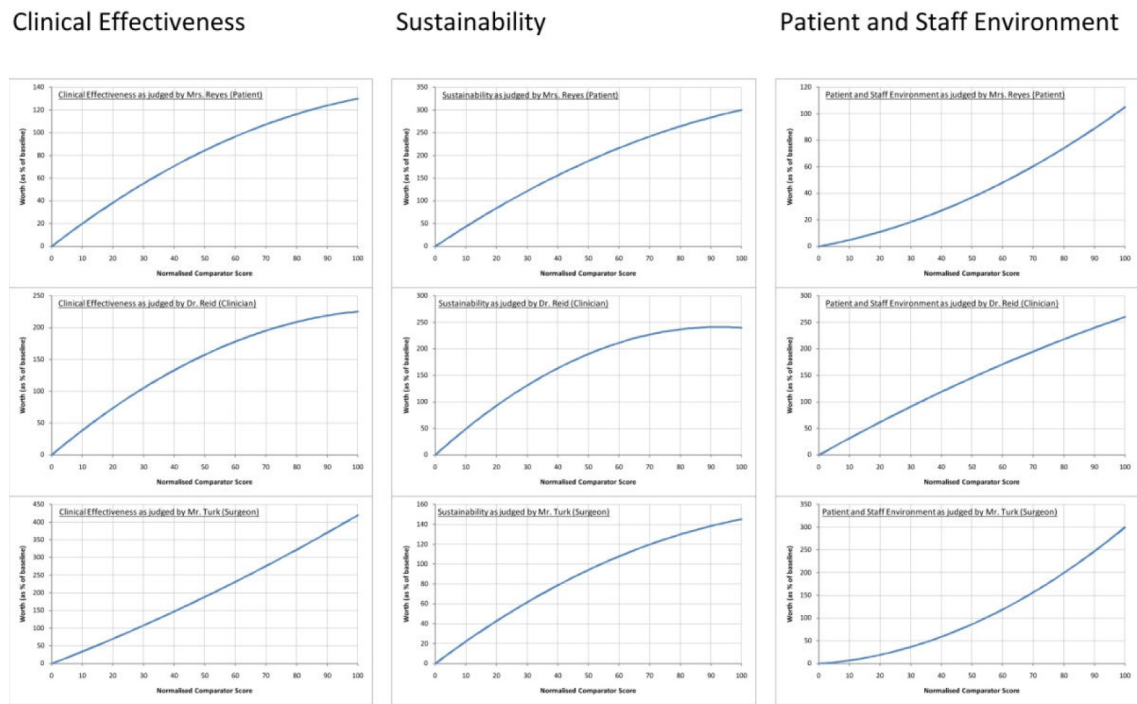


Fig. 8. Example Individual Stakeholder Benefit Functions Resulting from Initialisation Activities (note: not specific to the example; actual data)

This activity highlighted a notable compromise made by the BQM to promote usability over academic integrity: the BQM assumes that all benefit functions pass through the origin, following the principles of Kahneman and Tversky's (2000) Prospect Theory. Economic theory suggests that this is not the case. The absence of benefit generating qualities may actually be desired to some extent by stakeholders, in which case they would judge some worth to arise out of no provision of those qualities. The opposite could also be true in certain situations.

6.3.3 Quantifying the Benefits

As soon as the initialisation workshop was finished, the BQM was able to provide quantifications of benefits realisation. The benefit functions were available for use to translate these perceptions into meaningful quantifications of benefits realisation, based on the worth of that magnitude of realisation to the stakeholders. Quantifications were gathered in this way on the Acme Acute Hospital project as follows.

Bob used the three quantification activities to inform business case formation, gateway reviews, concept design selection, periodic design reviews, and post-occupancy reviews. A typical example arose upon production of the initial concept design for the hospital building, when stakeholders' reactions were sought. Bob requested some time in the concept design review workshop to address its performance in terms of benefits realisation using the 'Review Comparators' quantification activity. He asked the stakeholders to review the previously-agreed

comparators that defined what the realisation of that benefit might 'look like' in terms of the presence of its benefit generating qualities in a possible investment outcome.

Bob then implemented the following 'Evaluate Proposals' activity by asking each stakeholder to review the concept design (i.e. the information available describing the current state of the investment outcome). Focusing on the "Clinical Effectiveness" benefit as an example, Dr. Reid stated she would prefer two departments to be more closely located to minimise the travel time for patients. She provided a moderate evaluation of benefit realisation as she did not consider the benefit generating qualities associated with "Clinical Effectiveness" to be present in the concept design in the manner suggested by the 'excellence' comparator. Mrs. Reyes could not offer a medical perspective but she had some understanding of the benefit (from preceding business cases) and considered all its benefit generating qualities to be reasonably well represented. She accordingly gave a moderate evaluation of their presence. Mr. Turk firmly opined that the two departments identified by Dr. Reid must be adjacent to each other and, upon not seeing this, did not consider the benefit generating qualities associated with the "Clinical Effectiveness" benefit to be present. He reflected this view in his evaluation.

After hearing these divergent views, Bob helped the stakeholders negotiate a collective evaluation representing all their views. On asking the stakeholders to explain to each other how they interpreted the concept design to reach their individual view, Bob found that the negotiation process was eased by the examples of that benefit's realisation previously agreed in the comparators. The stakeholders used the three anchors to help them agree a single evaluation of benefit generating quality presence. This was repeated for all benefit generating qualities associated with each project benefit. Bob recorded the evaluations in the BQM spreadsheet (Fig. 9).

Comparator Evaluations:

Project Benefit	Benefit Generating Qualities	Weight (%)	Current Evaluation Score (0 - 100)	Contribution to Benefit Realisation
1. Clinical effectiveness	1.1 Clinical adjacencies	20%	80	16
	1.2 Noise	40%	30	12
	1.3 Equipment	40%	55	22
	1.4 Not defined.	0%		0
			Current Evaluation =	50
2. Sustainability	2.1 Energy source	10%	50	5
	2.2 Recycling	15%	25	4
	2.3 Building envelope	75%	65	49
	2.4 Not defined.	0%		0
			Current Evaluation =	58
3. Patient and staff environment	3.1 Lighting	50%	45	23
	3.2 Noise	40%	65	26
	3.3 External environment	10%	85	9

Fig. 9. Example Evaluations of Benefit Generating Quality Presence

As the final step in the quantification process, Bob recalled the benefit function for each benefit and implemented the 'Quantify Benefit Worth' activity. In the same manner as the last initialisation activity, he elected to perform this activity in the presence of the stakeholders. Even though this was not required, it helped achieve stakeholder support for the quantifications resulting as stakeholders could see how they were produced.

Bob used the BQM spreadsheet to recall the relevant benefit function (Fig. 10). The production of a meaningful quantification of benefits realisation was a simple matter of plotting the current (collective, in this case) evaluation of the extent to which the associated benefit generating qualities were represented in the concept design proposals on the evaluation scales (1). These were simply translated into the function to calculate the current quantification of benefit worth (2), expressed as a multiple of the original notional quantification (recall the 'Elicit Worths' initialisation activity). As an alternative, Bob could have performed this translation graphically or could have asked the stakeholders to do it themselves.

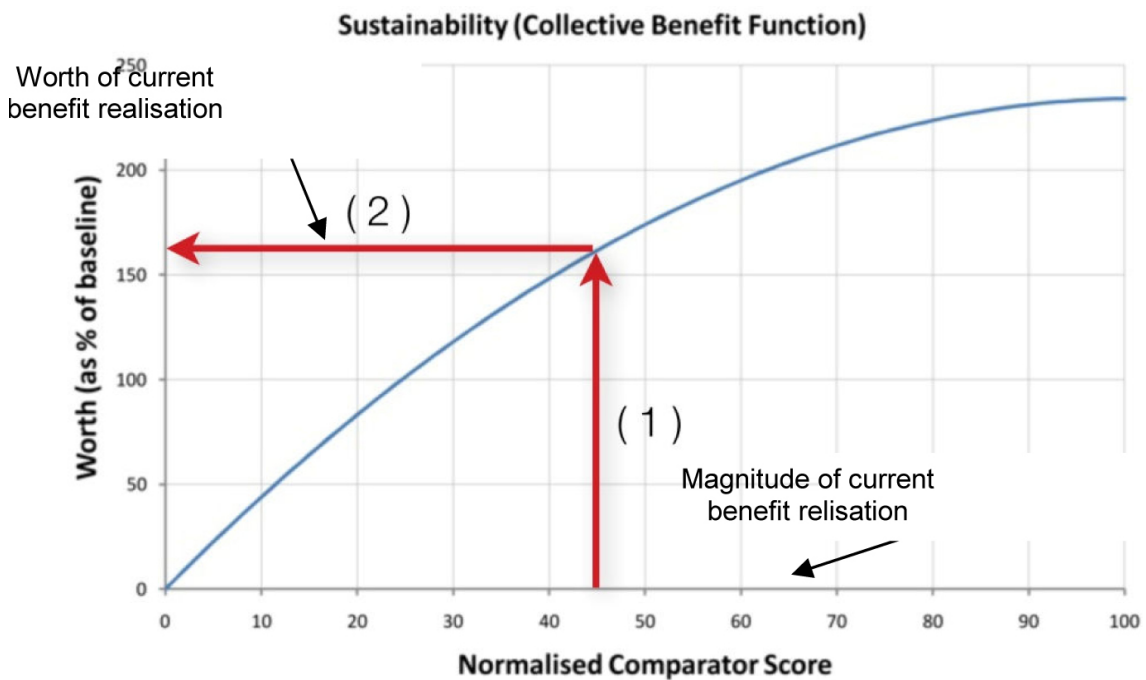


Fig. 10. Use of a Benefit Function to Translate an Evaluation of Benefit Presence into a Meaningful Quantification of the Worth of that Presence

7. Conclusion And Further Work

This paper has briefly summarised content and typical approach to application of the Benefits Quantification Method. Its role in informing a BRMP has been introduced and the salient points of an illustrative example presented. It is apparent from this review that the BQM can provide meaningful quantifications of the benefits realised by investments in healthcare infrastructure, as perceived by stakeholders. Its operationalisation of utility theory complies entirely with axiomatic economic theory and is not contentious. Despite this, some synthesised benefit functions did not exhibit diminishing marginal utility (recall Fig. 8). Whether this is a trait of the stakeholders from whom the data was gathered or a consequence of the methods used to gather it requires further

investigation. Further work is also required to test the validity of its additional concepts (notably benefit generating qualities and the notion of benefit worth) in a wider range of situations and stakeholder types to those already explored by the understanding research study.

The underlying research has established the viability of the component parts of the BQM by working with stakeholders on several NHSScotland Health Board capital investment projects. Subject to funding, the BQM as a whole will be tested in subsequent work, where the opportunity to engage with an ongoing capital investment project arises. This future work will seek to confirm the appropriateness of the academic and analytical compromises identified in the preceding discussion as being considered necessary to ensure stakeholder engagement and practicality of the BQM “in the field.” Although the method implements a heavily operationalised form of many of its key components, the advantages of using the method over the ad hoc and, as Thomson et al. (2010) have established in the case of project benefits definition, superficial treatments of these issues in current practice contribute a marked advance.

A full description of the Benefits Quantification Method, including free access to the BQM Manual and access to the BQM Spreadsheet that guides and supports the facilitator is available at www.benefitsquantification.com or from the authors.

8. Acknowledgements

The authors gratefully acknowledge the financial support of the Engineering and Physical Sciences Research Council's “Health and Care Infrastructure Research and Innovation Centre (HaCIRIC)” (www.haciric.org) which funded the “Benefits Quantification Method” project (www.benefitsquantification.com) from which this paper is derived. The work was performed by the authors at the School of the Built Environment, Heriot-Watt University (www.sbe.hw.ac.uk).

The assistance and guidance of the University of Salford and Loughborough University is also acknowledged. The authors further appreciate the support of NHS Grampian, NHS Fife, NHS Forth Valley, NHS Lothian, NHS Tayside, Davis Langdon, and Health Facilities Scotland who contributed to the underlying research study.

9. References

- Abdul-Samad, Z. & Macmillan, S. (2005). Improving Design Quality and Value in the Built Environment through Knowledge of Intangibles. *Engineering Management Conference*, 2004. Proceedings. 2004 IEEE International, 18-21 Oct., 3, pp.898–902.
- Centre of Expertise Programme and Project Management (2011). *OGC Gateway Review: A Guide to Gateway Review in the Scottish Government*. Edinburgh: Scottish Government Gateway Hub.
- HM Treasury (2003). *The Green Book: Appraisal and Evaluation in Central Government*. London: TSO.
- Johannesson, M. (1996). The willingness to pay for health changes, the human-capital approach and the external costs. *Health Policy*, 36(3), pp. 231–244.
- Kahneman, D. & Tversky, A. (2000). Prospect Theory: An Analysis of Decision under Risk. In D. Kahneman & A. Tversky, eds. *Choices, Values and Frames*. Cambridge: Cambridge University Press, pp. 17–43.

- Maitlis, S. (2005). The Social Processes of Organizational Sensemaking. *The Academy of Management Journal*, 48(1), pp. 21–49.
- Mitchell, R., Agle, B. & Wood, D. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review*, 22(4), pp. 853–886.
- MSP and Office of Government Commerce (2007). *Managing Successful Programmes*. London: The Stationary Office.
- Office of Government Commerce (2004). *OGC Gateway Review 5: Benefits evaluation*. London: Office of Government Commerce.
- Office of Government Commerce (2007a). *OGC Gateway Process Review 2: Delivery strategy*. London: Office of Government Commerce
- Office of Government Commerce (2007b). *Project procurement lifecycle: the integrated process. Achieving Excellence in Construction Procurement Guide 3*. London: Office of Government Commerce.
- Office of Government Commerce (2009). *A Client Guide to Construction Appraisal and Evaluation*. London: Office of Government Commerce.
- Office of the Third Sector (2009). *Social Return on Investment - and commissioning: How commissioners can use SROI to achieve better results*. London: The Cabinet Office.
- Pearce, D. & Özdemiroglu, E. (2002). *Economic Valuation with Stated Preference Techniques: Summary guide*. London: Department for Transport, Local Government and the Regions, ISBN: 1 85112569 8.
- Sapountzis, S., Harris, K. & Kagioglou, M. (2007). *Benefits Realisation Process for Healthcare*, Salford: International SCRI Symposium.
- Sapountzis, S. et al. (2009). Realising benefits in primary healthcare infrastructures. *Facilities*, 27 (3/4), pp. 74–87.
- Scottish Government Health Directorates (2009). *Scottish Capital Investment Manual: Business Case Guide*. Edinburgh: The Scottish Government.
- Smith, R. & Richardson, J. (2005). Can we estimate the "social" value of a QALY? Four core issues to resolve. *Health Policy*, 74(1), pp. 77–84.
- Thiry, M. (2001). Sensemaking in value management practice. *International Journal of Project Management*, 19(2), pp. 71–77.
- Thomson, D. et al. (2010). Quantifying the Benefits of Healthcare Infrastructure Investment. In *Proceedings, HaCIRIC International Conference 2010*. Edinburgh, pp. 57–74.
- University of Salford (undated). *BeReal: Benefits Realisation*. <http://www.bereal.salford.ac.uk> [Last Accessed: 5 June 2011]