

Appendix 3.2.B – Third party report on triangulation methodology

Wessex Water

September 2018

Business plan section	Supporting document
Board vision and executive summary	
1 Engaging customers	
2 Addressing affordability and vulnerability	
3 Delivering outcomes for customers	3.1 Performance commitment overview
	3.2 Triangulation methodology
	3.3 Cost benefit analysis – methodology and results
	3.4 Calculation of incentive rates including enhanced incentives
	3.5 Inputs to RORE for outcome delivery incentives
	3.6 Sharing success – Proposals for a Wessex Water community foundation
4 Securing long term resilience	
5 Markets & innovation: wholesale	
6 Markets & innovation: open systems & DPC	
7 Markets & innovation: retail	
8 Securing cost efficiency	
9 Aligning risk and return	
10 Financeability	
11 Accounting for past delivery	
12 Securing trust, confidence and assurance	
13 Data tables and supporting commentaries	

REVIEW OF WESSEX TRIANGULATION

Assurance paper

15 June 2018



CONTENTS

1	Introduction	5
1.1	Context	5
1.2	Scope of our review	5
1.3	Criteria for our review	6
1.4	Summary of findings and recommendations	8
2	Wessex research and triangulation	10
2.1	Overall approach to determining WTP	10
2.2	Summary of triangulation methodology	14
3	Evaluation of approach	16
3.1	Coverage of research	16
3.2	Approach to triangulation	18
3.3	Transformation of units of valuation	21
4	Conclusions and recommendations	22
4.1	Coverage of research is good	22
4.2	Approach to triangulation appears reasonable	22

1 INTRODUCTION

Wessex Water has commissioned Frontier Economics to carry out an assurance review of the triangulation methodology that it has used to determine customer valuations of different outcomes (such as reduced flooding, unexpected interruptions, and environmental factors). These valuations will be used by Wessex to its set targets and incentives as part of its next price control (PR19). In this initial draft report, we set out our assessment of the triangulation methodology itself and take the different pieces of research as largely given.

We understand that Wessex would ultimately like to submit to Ofwat an assurance paper on its approach to triangulation. We have discussed an initial draft version of the report with Wessex (dated 11 April 2018). This final version of report takes account of our further discussions with Wessex and the additional information provided by Wessex to us since then.

1.1 Context

At PR14 (the 2014 price control), Ofwat challenged the water industry to carry out more customer research and to base even more decisions on what customers want. In particular, the PR14 outcomes framework required companies to set their targets and incentives based on customer valuations. Water companies then used these to inform their investment decisions and set outcomes in their respective business plans. Where companies used customer valuations at PR14, they generally used one data point for each valuation, and heavily relied on stated preference willingness to pay (WTP) surveys to estimate them.

Recognising the limitations of WTP approaches and the importance of the robustness of the valuation data, at PR19 Ofwat challenged companies to achieve a richer evidence base by using multiple customer research approaches “where it is proportionate to do so”¹. To take account of the different pieces of evidence, Ofwat suggested that companies should run sensitivity tests and “triangulate”² the results they have. It stated that “companies should test how sensitive their performance commitments are to changing the customer valuation in the CBA”³ and CCWater commissioned a project on how triangulation could be applied in the water sector at PR19.⁴

1.2 Scope of our review

As part of PR19, Wessex has carried out extensive customer research, including WTP surveys as well as more qualitative pieces of research. It has triangulated the different sources of evidence to produce a final set of customer valuations to

¹ Ofwat (2017), Delivering water 2020: consultation on PR19 methodology, Appendix 2: Delivering outcomes for customers, p. 44

² Ofwat (2016), Ofwat’s customer engagement policy statement and expectations for PR19, p. 16

³ Ofwat (2017), Delivering water 2020: consultation on PR19 methodology, Appendix 2: Delivering outcomes for customers, p. 44

⁴ ICF (2017), Defining and applying ‘triangulation’ in the water sector

be used in setting performance commitments and outcome delivery incentives (PCs and ODIs).

As described above, we assess Wessex’s triangulation methodology itself and take the different pieces of research as largely given. We sense-check the approach taken in terms of its logic and appropriateness given Ofwat’s recommendations, highlighting any concerns we identify. We provide a high level review of the underlying research but do not carry out a detailed assessment of it.

In particular, our review covers:

- The rationale for giving different relative weights to different sources of information; and
- The approach used for transforming customer valuations from one unit of measure to another to make them fit for purpose.⁵

Once the triangulation is complete and Wessex has determined the customer valuations of each of the measures, these will be used to inform the design of ODIs. This will then be combined with cost estimates of the work required to improve service levels. Some of Wessex’s reward and penalty rates are based on cost only, and not customer valuations. We note that Wessex may wish to seek assurance for these separately, especially since Ofwat calls for cost estimates to include forecast efficiency gains.

Our initial review was based on the following documents provided to us by Wessex:

- An Excel spreadsheet e-mailed to us on Monday 2 April 2018 (file name: “Triangulation stage 1”);
- A Word document e-mailed to us on Monday 2 April 2018 (file name: “Triangulation note”);
- Phone conversations with key Wessex staff; and
- An in-person meeting with Wessex staff to discuss our initial findings (Friday 13 April).

Wessex subsequently provided us with the following documents that we have taken into account in this revised review:

- Two Excel spreadsheets e-mailed to us on Thursday 19 April (file names: “PC - ODI alignment and process” and “Triangulation Calcs”); and
- Three Word documents e-mailed to us on Thursday 19 April (file names: “Research findings”, “Triangulation note”, and “Triangulation Story”).

1.3 Criteria for our review

Based on Ofwat’s recommendations for PR19, there are three main areas that we consider in our review:

- The range of sources and techniques used;
- The weights assigned to different pieces of evidence; and

⁵ For example, a WTP survey may have asked a question on a ‘per property’ basis, whereas the measure may require information on a ‘per km of river’ basis.

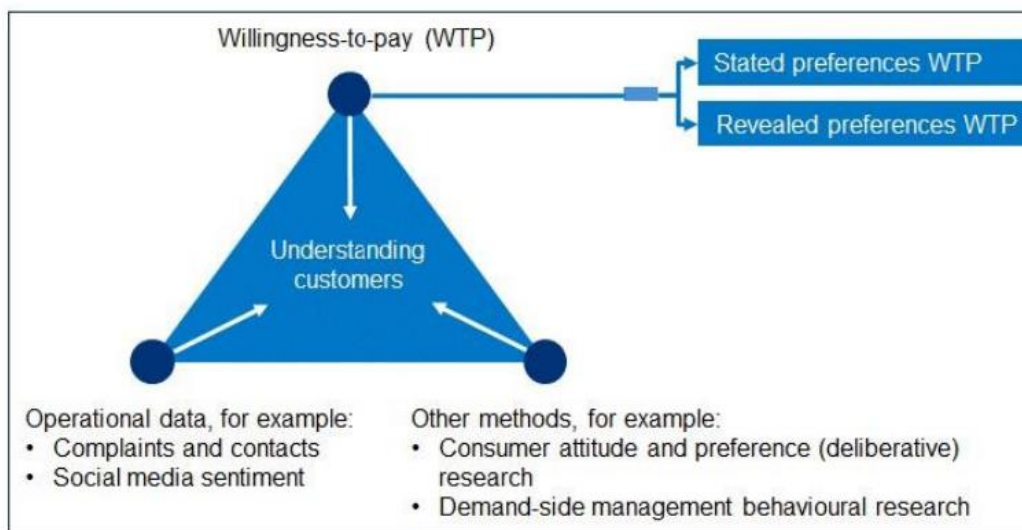
- The use of an iterative process.

These are described in further detail below.

1.3.1 Range of sources and techniques

In PR19, Ofwat set out a range of different sources water companies could use to assess customer valuations in its policy statement on customer engagement. This is summarised in the figure below. We would therefore expect Wessex's triangulation approach to demonstrate that each of these methods had been considered.

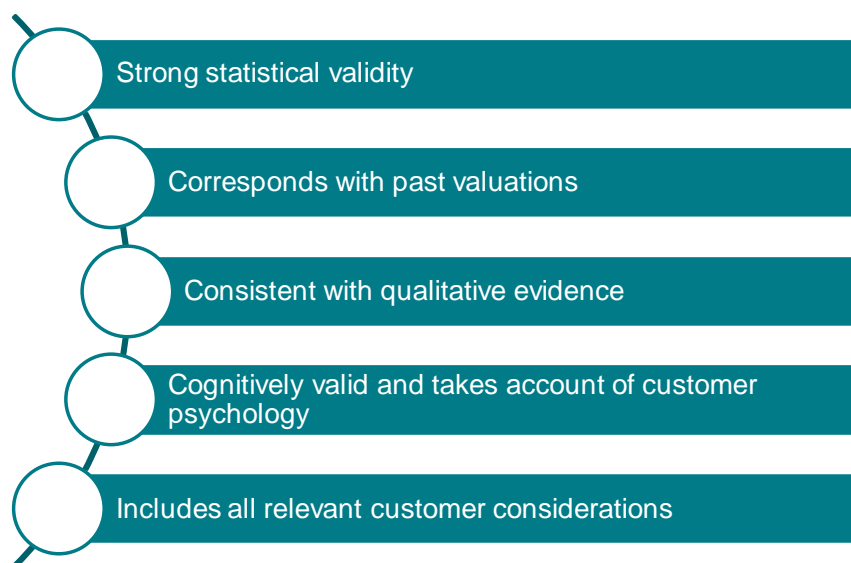
Figure 1 Use of multiple customer valuation methods



Source: Ofwat (2016), Customer engagement policy statement and expectations for PR19, p. 15

1.3.2 Weights placed on different sources

In addition, based on the report that Frontier Economics prepared for Ofwat on PCs and ODIs (March 2017), we would also expect the methodology to demonstrate that the evidence it has relied upon demonstrates the characteristics illustrated in the figure below.

Figure 2 Required characteristics of evidence relied upon

Source: Frontier Economics

1.3.3 Use of an iterative and proportionate approach

In order to increase the robustness of the calculation of PCs and ODIs, we would expect an iterative approach that focuses on the customer valuations of attributes that have the biggest impact on the business plan. This could be because of either, or a combination, of two factors:

- The measures have material expenditure associated with them; and
- The measures where the setting of the PC or ODI is most sensitive to reasonable variations in valuations.

Ofwat also expects an approach that prioritises “PCs that are associated with high cost levels; and PCs for which [the water companies] are planning to deliver a significant improvement in service levels. Companies should assign more time and resources to these PCs, as it is most important that the customer valuations are robust for these PCs.”⁶

1.4 Summary of findings and recommendations

After the initial review of the Wessex methodology, we identified a number of areas for clarification and refinement. These are summarised in the figure below.

⁶ <https://www.ofwat.gov.uk/wp-content/uploads/2017/07/Performance-commitments-and-ODIs-at-PR19.pdf>

Figure 3 Summary of recommendations from Frontier’s initial review and how these have been addressed by Wessex

Initial findings	Wessex response
Demonstrating that Wessex has used an iterative approach to its research	Detail provided
Demonstrating how operational data was used	Detail provided
Greater detail on how various sources performed with respect to the different criteria when determining weightings	Additional detail provided in discussions and in written materials and spreadsheet
Describing how units of willingness to pay were transformed	Provided spreadsheet with calculations

After further information from Wessex we completed our assessment and based on the information provided to us, we find that, overall, Wessex has adopted a reasonable approach to using triangulation to determine customer willingness to pay for different performance measures. In particular, we find that Wessex has:

- Used a wide range of both quantitative and qualitative data sources;
- Used a wide range of research techniques including surveys, interviews and online games;
- Evaluated different pieces of evidence according to all the criteria that we would consider reasonable;
- Used an iterative approach to carrying out research that placed greater emphasis on ensuring robust estimates for measures that it knew to be customer priorities and/or had large investment associated with them; and
- Transformed units of willingness to pay using an appropriate methodology.

2 WESSEX RESEARCH AND TRIANGULATION

In the rest of this section, we provide a summary of Wessex’s overall approach to determining customer valuations for different attributes (Section 2.1). We provide an overview of the quantitative and qualitative research that Wessex has relied on in Section 2.2. Further detail on these areas is provided as part of our review in Section 3.

2.1 Overall approach to determining WTP

In broad terms, Wessex carried out its estimation of customer willingness to pay in four main steps:

- Consideration of existing knowledge base to steer research priorities;
- Carrying out initial research and identifying potential issues;
- Conducting further research to address issues identified; and
- Triangulation of data points from various sources.

These are described in further detail below.

2.1.1 Consideration of existing knowledge base to steer priorities

In the first step, Wessex used its existing knowledge base to identify customer priorities and the main drivers of customer satisfaction. It used the PR14 willingness to pay study⁷ to identify sewer flooding as being customers’ top priority by a long way. The PR14 industry study showed large variations in the willingness to pay estimates across water companies. Therefore, Wessex used it to identify areas where its own research was potentially weak (for example, because its estimates were out of line with the rest of industry). Wessex also used evidence from its continuous customer engagement (including ongoing research and tracker surveys).⁸ It then commissioned SDS to carry out qualitative research to identify areas of priority for the first phase of research.⁹

2.1.2 Initial research phase

In the second step, Wessex commissioned an initial phase of research consisting of two quantitative studies and two qualitative studies. Wessex used the outputs of these to define its first draft list of ODIs.

⁷ This is labelled as “PR14 conjoint analysis” in Figure 4 below.

⁸ A variety of surveys conducted on an ongoing basis, including: Multi-channel customer feedback surveys; Contact data including repeats and complaints; Wessex Water online panel surveys; Wessex Water image tracking (1000 interviews every year); Social media feedback; Wessex Water magazine surveys (SDS .priorities research, bill impacts survey, acceptability testing)

⁹ A combination of deliberative events, group discussions, depth interviews and face-to face interviews.

In one of the quantitative studies, Accent carried out stated preference research in two stages.¹⁰ However, Wessex identified considerable uncertainty in the final valuation it derived from this study.

In the other quantitative study, Wessex commissioned Supercharge to develop an online business plan game using a slider tool to elicit customers' priority areas.¹¹

The qualitative studies focussed on resilience and leakage.¹² The resilience study consisted of in-depth deliberative research around the environment, supply interruptions, hosepipe bans and sewer flooding. The leakage study consisted of in depth research and was also used to inform a more education strategy and more community engagement in this area.

¹⁰ These are labelled as "MaxDiff stage 1 survey" and "Maxdiff stage 2" in Figure 4 below

¹¹ This labelled as "Business Plan game" in Figure 4 below.

¹² These are labelled as "resilience" and "leakage" respectively in Figure 4.

Figure 4 Initial research

Survey name	Description of method used
MaxDiff stage 1 survey	<p>Quantitative surveys carried out by Accent. Wessex Water partnered with Bristol Water in the spirit of water companies working together and to provide efficiencies of scale.</p> <p>The stage 1 survey questionnaire was designed around two interlinked exercises</p> <p>(1) a 'MaxDiff' exercise focussed on which types of service issue would have the most, and least, impact on respondents if they were to be affected by them; and</p> <p>(2) a 'Package' exercise focussed on high level trade-offs between service improvements or deteriorations and changes in the level of the bill. An assumption is required on the allocation of a customer's utility (i.e. whether they want the improvement for themselves or for the whole of society – or somewhere in between). This assumption creates a wide range of uncertainty for several attributes.</p>
Maxdiff stage 2	<p>Quantitative surveys carried out by Accent. Wessex Water partnered with Bristol Water in the spirit of water companies working together and to provide efficiencies of scale.</p> <p>The stage 2 survey was designed around two core Stated Preference exercises; a "Community engagement MaxDiff exercise" and a "Water resources management exercise" including their willingness to pay.</p>
Business Plan game	<p>Online survey "game" using six animated characters representing different areas of Wessex Water's work, developed by Supercharge. The game educates through a reminder of the water cycle and the use of an animated screen at the end showing the impact of the respondents' choices</p>
Sliders	<p>An online slider tool that allows respondents to select their preferred level of investment in 12 different areas, developed by Populus. After rating all attributes, customers were shown the impact of their choices on their water bill and told that they could adjust their choices if preferred.</p>
Resilience	<p>Immersive research using film to introduce the topic and extensive stimulus development around four attributes (supply interruptions, water restrictions, environmental damage, sewer flooding).</p> <p>6 x 1-hour friendship paired depth interviews using 'Listening Project' approach: friends discussing future scenarios in private conversation.</p> <p>4 x 3-hour deliberative events held in community venues.</p> <p>2 x 2-hour groups with economically vulnerable customers.</p>
Leakage	<p>Immersive workshops with customers attending two sessions each.</p> <p>The first workshop involved briefing customers on key leak subject areas and discussing specific aspects.</p> <p>The second workshop involved co-creation by customers of leakage performance promises and communications.</p>
Young people's panel	<p>20+ young people aged 16-18 were selected from applications from across the Wessex Water region, invited to two day-long board meetings at Wessex Water headquarters.</p> <p>The first session immersed the young people in Wessex Water's business, through 'speed dating' with executives, tours of the building and splitting the group into four to set a live business task.</p> <p>The second session involved the young people pitching their ideas to a panel of senior executives.</p>

Source: Wessex Water note

2.1.3 Further research to address remaining issues

In the third step, Wessex's research built further on its existing knowledge base and the findings from the first phase of research.

Given the assessed limitations of the Accent research in the first phase of research, Wessex commissioned Accent to carry out an additional stated preference survey using conjoint analysis. This meant that fewer attributes were considered so Wessex commissioned further research. This consisted of using preference slider tools to consider peoples' favoured intersection between supply and demand curves. That is, it does not consider a true willingness to pay.

Wessex also used revealed impact studies using operational data (post event surveys). Wessex considered the avertive behaviour customers undertook when they were subject to a supply interruption.

Figure 5 Further research

Survey name	Description of method used
Conjoint analysis	A series of discrete choice experiments (DCE) carried out by Accent, similar to the questionnaires used for WW at PR14 (except water and sewerage service measures were combined into a single survey instrument) and following UKWIR (2011) guidelines. The survey was composed of three lower level choice exercises and a package exercise.
Sliders	An online slider tool that allows respondents to select their preferred level of investment in 12 different areas, developed by Populus. After rating all attributes, customers were shown the impact of their choices on their water bill and told that they could adjust their choices if preferred.
Post event surveys, revealed impact	Post-event surveys using SMS (text) and telephone interviewing, to obtain valuations on avertive behaviour regarding unplanned and planned interruptions.

Source: Wessex Water note

2.1.4 Triangulation of data points

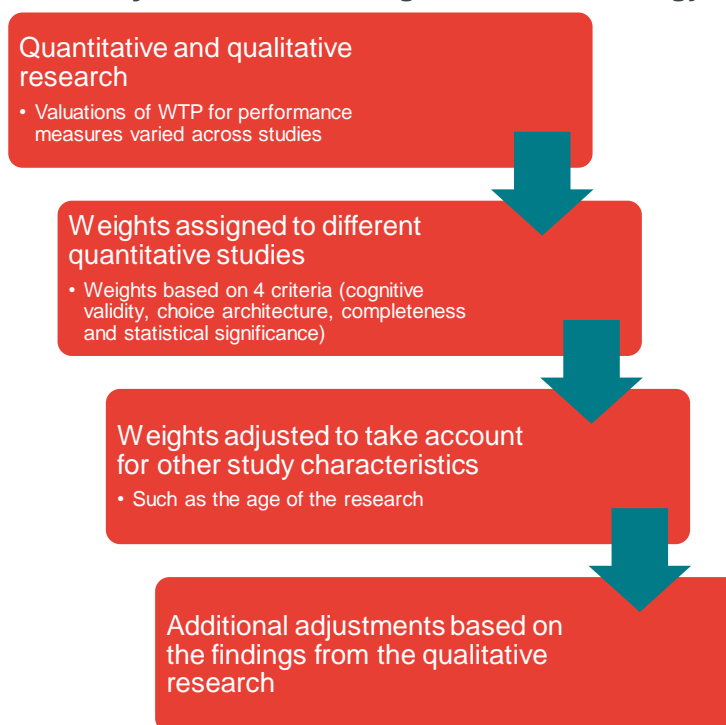
In the final step, Wessex considered the information available to it in the round in order to determine the weightings that should be attached to different pieces of evidence (i.e. triangulation). This is described in further detail below.

2.2 Summary of triangulation methodology

As described above, Wessex carried out a number of quantitative and qualitative research studies in order to quantify customers' willingness to pay for certain service levels of different attributes. Wessex applied the same adjusted weights to the different WTP valuations to the different quantitative survey results for the performance measures. The Wessex methodology also assumes that the weights are the same for the valuations of household and non-household customers.

Wessex used four criteria to assess the quantitative studies and to determine the relative weighting that should be placed on each study. These weights were then adjusted to take account for other issues (such as the age of the research). Further adjustments were applied to the weightings based on the findings from the qualitative research. Wessex has advised us that these weightings and adjustments were developed by an expert group within the company. This approach is summarised in the figure below.

Figure 6 Summary of Wessex's triangulation methodology



Source: Frontier interpretation of Wessex note

2.2.1 Quantitative research

The figure below summarises the quantitative surveys that Wessex relied on for its initial valuation of customers' willingness to pay for different service outcomes.

The table below shows the weights that Wessex assigned to the results of each of the studies. We note that in the spreadsheet analysis, the post event surveys were assigned a weight of 1% but that this was not reflected in the calculations within the spreadsheet. We also note that the surveys did not lead to valuations for each and every performance measure. Therefore, in practice, the weights assigned in

the spreadsheet are adjusted to account for this. For example, “Improved biodiversity” relied on data points from the “Sliders” and the “Business Plan game” studies. The data points were given their respective weights and then divided by the total of those weights.

Figure 7 Weights applied to results of each of the studies

Study	Weight assigned to sub-results	Weight applied to overall study
MaxDiff stage 1 survey		3%
- Part 1	1%	
- Part 2	1%	
- Part 3	1%	
Maxdiff stage 2	12%	12%
Conjoint analysis	33%	33%
Business Plan game		17%
- Part 1	3%	
- Part 2	4%	
- Part 3	9%	
Sliders		27%
- Part 1	9%	
- Part 2	18%	
PR14 Conjoint analysis	7%	7%
Post event surveys, revealed impact	1%	1%

Source: Wessex spreadsheet

3 EVALUATION OF APPROACH

In this section, we provide our evaluation of Wessex's approach in terms of:

- The coverage of the research relied on (Section 3.1);
- The approach to triangulation (Section 3.2); and
- The transformation of units of valuation (Section 3.3).

3.1 Coverage of research

In this section, we consider the coverage of Wessex's customer research and the extent to which there appear to be any gaps.

3.1.1 Prioritisation/focus

As described in Section 2.1, Wessex prioritised its consumer research so that it was able to focus on measures of performance that it already knew to be particularly valued by its customers. It did this by looking at the results of previous studies, operational data from continuous customer engagement. It also looked at previous studies to identify measures where it considered its existing evidence base was relatively weak. Wessex also commissioned qualitative research. We consider this to be a reasonable starting point as it is focused on customer evidence and considered a range of sources.

Based on this, Wessex used both quantitative and qualitative research methods in its initial research phase to define its first draft list of ODIs. We consider it appropriate that Wessex reviewed the results of this initial phase of research to identify any weaknesses and then to commission further research to address those weaknesses in a subsequent phase of research. As described further in Section 0, this research approach led to the use of a wide range of data sources including innovative research techniques.

We note that for areas that were identified as high priority, Wessex was able to rely on a number of different sources. These are described in the table below.

Figure 8 Research for key service areas

Service area	Wessex comment	Data sources relied on
External flooding	Key service area so asked about multiple times in different guises to ensure robustness of estimate	Maxdiff 1 Populous Sliders PR14 Conjoint PR19 Conjoint
Internal sewer flooding	Key service area so asked about multiple times in different guises to ensure robustness of estimate. We will exclude the restricted toilet use as it represents a much less impactful service failure (as seen in the maxdiff rankings)	Maxdiff 1 Populous Sliders PR14 Conjoint PR19 Conjoint Supercharge Game
Interruptions	Key service measure, so research undertaken to understand preferences for multiple types of service failure. In light of consistency project and enforcement of the common ODI we asked specifically about all interruptions > 3hrs and will use only these directly comparable results in triangulation for incentive setting	Populous Sliders PR14 Conjoint PR19 Conjoint Supercharge Game
Leakage	Key area, multiple points to triangulate	Maxdiff Stage1 and 2 Populous Sliders Supercharge Game

In absolute terms, there were a large number of measures for which Wessex only relied on one data source. In our initial review, we highlighted that this could be a concern where Wessex assigned a low weighting to that source to reflect its low confidence in the survey's results. However, based on the further information provided to us, we consider Wessex's approach to be reasonable given that these measures were identified by Wessex as being immaterial for any one or combination of the reasons below.

- Not a material area of investment or incentive (e.g. landholding assessed for biodiversity, reducing greenhouse gas emissions, consumer education about sewer misuse and water fittings, rota cuts and low pressure); or
- Not used in the business plan (e.g. water softening, and CSO spills affecting good bathing waters).

3.1.2 Use of multiple sources

As described in Section 2.1, Wessex has used a number of quantitative and qualitative research studies in order to determine customer valuations of the 49 different attributes (although we note that some of these attributes are not used in Wessex's determination of its business plan).

3.1.3 Range of research techniques used

As described below, the quantitative and qualitative surveys relied on a range of techniques. This suggests that findings from these surveys were likely to have been informative when Wessex was interpreting the quantitative data. However, it would be useful to see how that evidence has been used in practice.

The quantitative surveys relied on a range of techniques that asked respondents to consider:

- The service issues that would have the most and least impact on them;
- The high-level trade-offs between service level changes and the total bill;
- Trade-off analysis (discrete choice experiments);
- Online "game";
- Online slider tool; and
- The revealed impact of various real-life events after they have occurred.

The qualitative research also used a range of approaches:

- Immersive research including some using film and some using direct contact with executives and working on a live business task;
- Deliberative events;
- Group discussions;
- Face to face interviews; and
- Operational data.

3.2 Approach to triangulation

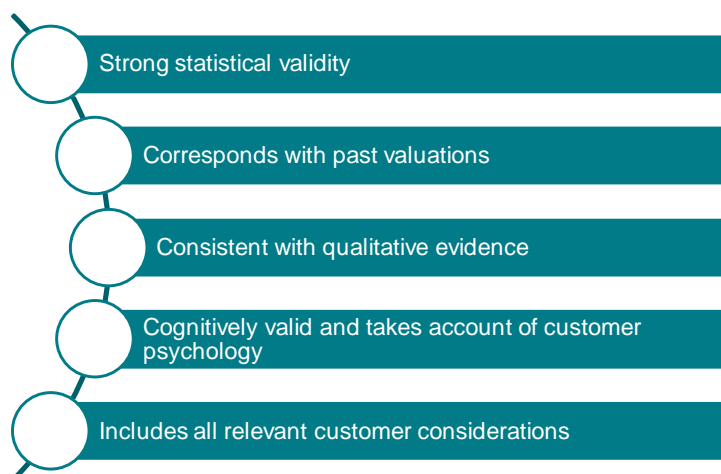
3.2.1 Same weightings applied to all attributes

Based on our review of the Wessex spreadsheet, it appears that Wessex uses the same weightings for all the attributes it considers. We consider this to be a pragmatic approach that is not necessarily problematic, particularly given the large number of attributes that rely on only one source anyway.

3.2.2 Criteria for evaluation

In order to assess the reasonableness of Wessex's approach, we have identified the criteria below to assess the weight that could be given to different valuations for each of the different outcomes. We consider that Wessex's approach is largely reasonable and we have not identified any concerns with the weights applied.

Figure 9 Criteria for determining weightings of different valuations



Source: *Frontier Economics*

Wessex's approach to assigning weights to different valuations is largely in line with what we would expect. However, as described in Section 3.1.1, an alternative option would have been to calculate we would expect Wessex to have calculated an upper and a lower limit for the customer valuations. Nevertheless, using the method it has used, Wessex still has the ability to carry out analysis, outside of the triangulation, of the sensitivity of various areas of its business plan to reasonable variations in customer valuations. Although the range in values may not be as accurate in that case, we still consider this would be a reasonable approach to sensitivity testing.

Figure 10 Wessex's assessment of weights against criteria

Survey name	Statistical validity	Cognitive validity	Completeness of value	Weight assigned by Wessex (adjusted)
MaxDiff stage 1 survey	Large sample but synthesis of two exercises provides very low confidence	Cognitive testing; innovative architecture	Wide range of service areas	3%
Maxdiff stage 2	Large sample	Traditional conjoint analysis with cognitive testing; innovative approach to choice architecture	Conducted over limited set of attributes	12%
Conjoint analysis	No comment provided	Cognitive testing and piloting; trade-off analysis so no status quo bias; single survey so removed PR14 'adding up' issue; some commentators dislike methodology	Wide range of service areas	33%
Business Plan game	Some doubts (possible status quo bias); self-selecting respondents could lead to unrepresentative sample	Two sets of pre-release testing for cognitive validity	Large number of attributes considered	17%
Sliders	Sample weighted to be representative of customer profile; manageable survey size. possible minor status quo bias	Wording used from previous survey to maximise cognition; some issues on understanding (biodiversity)	Reasonable breadth of attributes but not as complete as other surveys	27%
Post event surveys, revealed impact	Large sample but not representative	Telephone interviewers can ensure cognitive validity but not for SMS; revealed preference uncovers actual behaviour but is 'second best' as optimal behaviour is removed	Limited area of impact	1%

Source: Wessex note. The table shows the adjusted weight as we do not have information on the initial (unadjusted) weights.

3.2.1 Adjustments made to weights

Wessex has not provided us with information on the adjustments that were applied to reflect the age of research or to reflect the qualitative evidence. This means that we are not able to assess the reasonableness of the weights Wessex has assigned to each of the data sources.

3.3 Transformation of units of valuation

The table below shows the attributes for which Wessex transformed its valuations into units to make them fit for purpose, and its methodology for doing so. We consider that this is a reasonable approach.

Figure 11 Transformation of units of willingness to pay

Attribute	Description	Original unit	Transformed unit	Methodology
BW	Bathing waters of 'less than good quality'	per % of beaches	per % of bathing waters	Multiply by percentage of beaches with bathing waters (1 out of 48), then multiply by 100
SMETER S	New smart meters fitted	per % of houses	per meter	
UI3+	Unexpected supply interruptions (3+ hours)	per % chance reduction	per incident	
UI36	Unexpected Interruption 3-6 hours	per % chance reduction	per incident	
PI36	Planned Interruption 3-6 hours	per % chance reduction	per incident	Divide by difference in service level between SQ and SQ+1, then divide by number of properties (542,000)
UI612	Unexpected interruption 12-24hrs	per % chance reduction	per incident	
DCW	Discoloured Water	per % chance reduction	per incident	
T&S	Taste and Smell	per % chance reduction	per incident	
UI3+	Unexpected supply interruptions (3+ hours)	per % chance reduction	per incident	

4 CONCLUSIONS AND RECOMMENDATIONS

In this section, we summarise our overall conclusions, including any recommendations for Wessex. As part of addressing the areas identified in this report, we would suggest that Wessex identifies any remaining areas where it could improve in the future. This would provide a signal to Ofwat that it is seeking to improve on an on-going basis.

4.1 Coverage of research is good

Based on the information available to us, the coverage of Wessex's customer research appears to be good. As described in Section 2.1, Wessex has used a process in which it has identified the areas that its customers value the most and where Wessex considered its evidence was the weakest. It has conducted its research in several stages in order to ensure that it had a number of robust estimates for the measures that were identified as being high priority. As described in Section 3.1, Wessex has used a range of both quantitative and qualitative techniques. While there are a large number of measures for which customer valuations rely on only one source, Wessex has advised us that either these are not used in its subsequent analysis or that they represent measures that are low priority for customers or account for a low proportion of investment. We therefore consider that Wessex's approach to research is in line with our expectations.

4.2 Approach to triangulation appears reasonable

The approach that Wessex has described to us appears broadly reasonable in terms of the criteria it has described it has used to evaluate different sources of information and the weight it then places on those sources. We note however, that we have not seen specific details on the statistical validity, cognitive validity and the completeness of the valuations for each of the studies. Also, we have not seen how Wessex has adjusted the weights applied to account for the age of the research and findings from its qualitative data. Therefore, we do not comment on the appropriateness of the weights assigned to each data source.

