Towards understanding the anticipated customer benefits of digital water metering

Supplementary File

Ian Robert Monks^{a,b}, Rodney Anthony Stewart^{a,b*}, Oz Sahin^{a,b}, Robert J Keller^{c,d}, Peter Prevos^e

^aDepartment Engineering and Built Environment, Griffith University, Gold Coast, Australia; ^bCities Research Institute, Griffith University, Gold Coast, QLD, Australia; ^cMonash University, Clayton, VIC, Australia; ^dR. J. Keller & Associates, VIC, Australia; ^eVictoria University, Melbourne, VIC, Australia

*Corresponding author. Email: r.stewart@griffith.edu.au

Towards understanding the anticipated customer benefits of digital water metering-Supplementary File

This document provides supplementary information and data from the study of perceived customer satisfaction changes from the benefits of digital water metering. Part 1 provides an analysis of the responses to the preliminary questions and a summary of comments made in the closing question. A table of scores for the benefit scenarios is provided. Part 2 is the survey instrument used in the study. Part 3 presents the Digital Metering Benefits Taxonomy updated to include the new benefit identified during the customer satisfaction survey, “Reduced customer self-reading of meters”.

Part 1. Survey Participant Details and Benefit Scores

1. Survey Outcomes

This section provides some descriptive statistics from the survey responses. The purpose of the questions on previous bad experiences with water services and attitude to current water service provider was to raise the consciousness of water supply issues in the mind of the participant prior to asking them to score their current level of customer satisfaction and the benefit scenarios. The positioning of the demographic questions was to separate the scoring of the current level of customer satisfaction from the scoring of the benefit scenarios to avoid straight-lining scores off the current customer satisfaction score.

The responses reveal background information of the participants’ interactions with their water services provider which shape their scores for current level of customer satisfaction (CS).

1.1 Survey responses

The customer survey was conducted during the period October to December, 2019. No incentives were offered to participants.

In total, 245 surveys were started, 53 (22%) dropped out without starting the survey, 178 were sufficiently completed, the other 14 (6%) were deemed unusable due to no consent (n=2), survey test (n=1), streamlining (n=5), or inconsistent/vexatious answers (n=6) (Gitlin 2019, Sauro 2019).

A check against the primary reason showed that all participants except one adhered to the unwritten rule that 0 was the low score. That participant emailed the contact researcher to change their score after realising their error.

The rate of respondents continuing from the 10 mandatory scenario questions onto the optional scenarios was 60% (106) and far exceeded the expected rate of 10%. This was interpreted as indicating strong interest among those willing to complete the survey. Each scenario question for residential and small business customer benefit generated between 100 to 131 answers, and for business customer benefits, between 69 and 78 answers.

Social Media was a poor source of responses, in both quantity and quality terms, despite extensive invitation postings. It accounted for just 37 (21%) of the usable surveys and 7 (50%) of the excluded surveys. The 152 Facebook pages had an

approximate total reported membership of just over 1,300,000 people ¹ which received multiple postings by the researchers during the survey period. The participation rate achieved was just 0.003%. Some people expressed their concerns through comments to the posted invitations, including:

- EN (name omitted, southern NSW, 19 Oct 2019) “When you say digital, do you mean like a smart meter with remote reading abilities? Cause that worked so well in the electricity industry pfffft”
- JC (name omitted, regional Victoria, 23 Oct 19) “How did you get onto this community when you are in Queensland? Why is your facebook account set up only for this "survey"? Why would you be interested in something that seemingly would only be of interest to water companies?”
- LP (name omitted, Facebook page administrator, northern NSW, 20 Oct 2019) “By all means post it. 😊 You may not get a great response as historically these sorts of surveys don’t get a good audience on our page because country people are typically suspicious of government controls and don’t like to identify themselves. Even though it’s presented as anonymous, IP addresses are not.”

The contribution of each survey channel is shown in Figure 1. Social media contributed 37 (21%), Griffith University (GU) Research Volunteers accounted for 63 (35%) of the participants while the Other group accounted for 61 (34%) and 17 (10%) could not be identified. Of the excluded surveys, 7 (50%) came from social media, 3 (21%) from Other, and 2 (14%) from each of the GU Research Volunteers and Unknown channels.

Figure 1 Customer surveys by source channel. (a) Clean and completed surveys, (b) Excluded surveys. Channel of incomplete surveys is unknown.

1.2 Participants

Victoria and Queensland dominated the state representation of usable surveys with 74 (42%) and 64 (36%) respectively (see Table 1). Participation from other States, including Queensland outside the GU research volunteers, was low or nothing despite frequent postings. The lack of success might be explained, in part, by the bush fire emergencies and drought conditions that people in NSW, Queensland, Western Australia and South Australia were enduring during the survey period. Participants were

¹ Figure includes possible double counting due to people having multiple Facebook group memberships.

allocated to States based on the locale of their town, except for those of national Facebook groups (n=9) and the incomplete surveys (n=17) which were categorized as State unknown (UNK).

Table 1 Number of usable and excluded surveys by State of Australia

State	Clean Surveys		Excluded Surveys	
	Number	%	Number	%
Northern Territory	0	0	0	0
New South Wales	10	6	1	7
Queensland	64	36	2	14
South Australia	1	0	1	14
Tasmania	0	0	0	0
Victoria	74	42	10	65
Western Australia	3	2	0	0
Unknown	26	15	0	0
	178		14	

The number of occupants of residential type properties ranged from 1 to 8 (see Figure 2). The average of 2.62 occupants per property is in line with the 2016 Australian Census average of 2.61 occupants per household (ABS (Australian Bureau of Statistics) 2019). The one clearly identifiable business included in the survey reported 5000 people at a mix of properties comprising train stations, depots, offices, substations and train stabling yards. The other two properties with high occupancy are both described as strata communities.

Figure 2 Frequency of number of people at properties of survey respondents.

Participants were asked to rate the level of their water use efficiency (see Figure 3). Only one of the 178 analysed responses considered themselves wasteful, 16 (9%) considered themselves inefficient, nearly half (44%) considered themselves normal (ie. neither efficient nor inefficient), almost as many 67 (38%) considered themselves efficient while 16 (9%) considered themselves really careful with water use.

Figure 3 Frequency of self-assessed water use efficiency.

1.3 Previous bad experience and current attitude to water supplier service levels

The respondents were asked to consider previous possible bad experiences with their water supply and their feelings towards their water supplier (see Figure 4). The question had no time frame set on the experience, such as “within the last 5 years, ...”. Unexpectedly, the rate of insurance claims from concealed leaks and water theft was high (23 of 178, 13%). This benefit was an unrevealed issue in the literature, first raised by an insurance assessor interviewed early in the study (Interviewee#8 (Insurance) 2018, Monks, Stewart et al. 2019). The number of concealed leaks and unexplained high water bills was consistent with customers at a rate of 10% pa experiencing an issue over 5 years or 5% pa over 10 years. This was consistent with previous findings (Monks, Stewart et al. 2019).

Figure 4 Rate of bad experiences recorded by customers

For the 6 types of bad water service experiences listed in the survey, 47 (26%) reported no bad experiences, 61 (34%) reported one or two, 58 (33%) reported three or four, and 12 (7%) reported five or all 6 of the bad experiences (see Figure 5).

Figure 5 Frequency of number of bad experience types reported by respondents

Figure 6 Level of agreement to customer attitude to water services supplier

Participants generally believed that their water services supplier provide a good service (57% Agree/Strongly Agree, 10% Disagree/Strongly Disagree) and take complaints seriously (32%, 8%). They were evenly split on whether their water services supplier tried to operate efficiently (21%, 26%), and whether they get value for their water bill (39%, 30%). Notably, the respondents felt that more information could be provided to them to reduce their water bill with 41% disagree/strongly disagree that they were provided information to reduce their bill and 35% agree/strongly agree that they do. Even more participants felt they should be provided with access to their water usage data by their water services supplier (59% Agree/Strongly Agree, 11% Disagree/Strongly Disagree).

Participants were asked about water appliances in use at the property. Figure 7 shows the frequency of use among the participants. 29% reported that they did not have any of the listed appliances. Of the other 71%, water tanks were in use at 31%, solar hot water was being used at 28%, 17% had swimming pools and 16% had evaporative coolers.

Figure 7 Frequency of water appliances used at participants' properties

2. Selected closing comments made by participants

This section provides a broad sample of comments entered by participants in the Customer Survey after completing the background reading provided and scoring the benefit scenarios presented to them. The comments are included verbatim here are followed by the identifying code given to the participant, where the letter indicates the Survey version they completed.

Comments have been grouped into topics.

2.1 Budgeting and Sustainability

"I think smart meters are the way forward, especially when they can be used to allow the customer greater control over their budget planning, and allowing us all to be water conscious and stop wasting it.", Participant C57

"Sounds greatt (sic) for those of us on fixed income." "I would be interested in digital water meters as we already have one for our power which I believe has reduced our usage and costs as we are more aware of our usage.", C75

"Everyone wants to do their bit to conserve our resources. Saving money is also great.", A60

"Lots of possible benefits to reduce or slow increases in bills; more importantly assistance to reduce/control water usage.", C65

2.2 Access to more data

"I already access this kind of data through my electricity bill so I am in favour of being able to see the same with my water consumption", C71

"A good initiative to help better understand water use and to help to reduce usage.", C15

"The most beneficial to the customer are about having information to manage their usage, reduce their consumption and bill or early detection of faults / leaks.", A39

"I am experiencing mystery amounts of water usage, resulting in big bills, and cannot identify a leak and would love to get a detailed breakdown of daily water usage. I have been so careful with how I'm using water, but apparently as a single person I am

using close to a 1000 litres a day which is just not possible. Would love a water meter that I can access similar to the electric meter, to see what's using water. It would avoid the need for having to chase up compensation from the water company by the time a leak is identified and fixed. I would also like to have the capability of paying monthly what I use, instead of doing evenpay.”, C45

“I think the benefits highlighted (sic) in this survey would go a long way to change people's water usage habits. As things stand, we have no way of knowing how much water we are using on a daily basis and so it is hard to make changes to how we operate. Being more informed may lead to better water decision.”, A42

2.3 Vacant property monitoring

“Very keen to see smart water meters so we can monitor consumption at all times, in particular while away.”, B46

“Our council already has satellite monitoring of meters and have already helped us find a leak while we were away. Its really helpful. I would also be really interested in a web portal or app that let me monitor water in near real time for myself rather than waiting on Council to flag a leak.”, A86

Fairness: “Make it fairer for all to reduce cost and improve water quality.”, B17

2.4 Appliance usage

“I would love to be able to use an app that can show my daily water usage! In summer, using the evaporative cooler, I would be able to gauge actually how much it costs me to run it. Also, seeing how much other people use could be an indication that my unit is aged and I should update. I hate wasting water. Love the ability to be made aware of a hidden leak before I get a massive bill!”, B5

“...If it was possible to measure which taps/appliances in a house used the most water that would be especially useful, although may not be possible. For example toilets, washing machine, shower, garden taps, etc - it'd be good to know which have most impact on water consumption.”, A101

2.5 Regulation compliance

“... Current water bills show average consumption over 3 months compared to other households, but if other households are over-using water that won't be much help! In times of drought like this, it would be especially useful to track usage against any restrictions, and see the correlation with weather patterns/temperature. ...”, A101

2.6 Leak alerting

“People can now read their meters at any time. Web listing would make it easier. Notification of Sudden leaks is a good outcome.”, B48

2.7 Strata management

“I'm keen on efficient water usage and decreasing wasted water, so hope that this research helps! I like the idea of: - monthly billing - webpage access to daily use in order to potentially decrease usage - early notification of leaks . I'm a tenant but own investment property so answered about strata title properties also”, A79

“This sounds like a great idea, as a strata manager would be very beneficial. ”, D9

2.8 Multi-site management

“Digital water meters would be a game changer for my business. We have over 300 properties across 4 water utilities, with ageing infrastructure prone to leaks. We often have sites experiencing undetected leaks between bills. We have data loggers on the most leak prone sites, but don't have funding to roll out (and maintain) across all our sites.”, D6

“If we were able to be contacted about an irregular metre (sic) reading by our Water company- I think that would/could be of great use in identifying a water leak. On bigger business sites, where a leak can cost thousands of dollars not only in water, but also in repairs- getting information about this leak as soon as possible would be of significant benefit. ”, D10

2.9 Doubts and cynicism

“It sounds good but I am a tenant and the water companies will not deal with us in any form including answering enquiries (sic). It also means our billing is somewhat random depending on when the real estate can be bothered. I cannot see any utilities (sic) benefits flowing to the tenant”, A98

“Automation and big data for efficiency and ease of use are welcome. Water suppliers using the data to game the system (same as banks & insurance companies) eg micro cost increases over time are not welcome. The government using the data to create another stream of revenue by fines is definately (sic) not welcome. Until they have proven a higher level of trust, anonymised data is preferred.”, A56

“I find it very difficult to believe that any water corporation will lower its service charges due to Digital Water Metering. Given that they will lower costs for themselves significantly - simply because they no longer need employees to read the meters, as well as quicker leak detection - service tariffs should be lowered accordingly. I highly doubt they'll do that.”, A45

“sounds good but will believe it when I see it, highly sceptical ”, C63

“I can't see that digital metering would reduce tariffs as the cost of supplying/replacing those meters is higher than manually read meters. Also, it hasn't lessened prices in the electricity sector.”, C50

“...I am sceptical as to whether any savings in metering would be passed on to consumers. ...”, C19

“if digital meter can bring in lower pricing tariffs (sic) it would be useful. if it is all just saving cost of the water supplier it would be useless”, B56

“There are good benefits for me as a customer but I am cynical that any financial benefit will be available from the introduction of the technology. ...”, B55

“... I do not believe the domestic consumer will save any money by the proposed introduction of the new meter type. The water companies will want the consumers to pay for the supply and installation of the new equipment (which is what happened when the "smart" electricity meters were mandated in the previous decade.) My electricity costs increased significantly after their installation. There was no saving to the consumer. ...”, B17

“The majority of the survey sounded good. However it did not address the cost of new meters, who would pay for them, and what supply disruption would occur.”, B7

““All of the benefits you've listed sound really useful, especially the ability to flag any irregular usage (eg caused by leaks) and monitor changes in consumption. As long as this doesn't trigger 'big brother' style warnings ...”, A101

Issues with the survey: “many suggested so-called benefits appear to be unsubstantiated (sic)”, C14 (Authors’ note – it was never intended to substantiate benefits as part of presenting scenarios)

“a lot of questions were repetitive”, B23

“A lot of the questions related to benefits in terms of reduced costs. This changed how I answered some of the questions. There were things that are important to me for environmental or social justice reasons, but I am not overly concerned about the corporate costs or reducing the price paid by the customer. ...”, A111

2.10 Change in sentiment

Seventy-three participants provided both a primary reason for the current-CS score and a closing comment after reading and scoring the benefit scenarios. A sentiment analysis categorised responses as negative, neutral or positive. Table 2 shows the change in sentiment after reading the benefit scenarios.

Table 2 Change in sentiment after reading the benefit scenarios

		TO: Negative	Neutral	Positive
FROM:	Negative	4	5	12
	Neutral	2	1	23
	Positive	4	1	21

Forty of the 73 participants (55%) with a Negative or Neutral attitude before reading the benefit scenarios shifted their attitude to their water services provider in a positive way. However, 7 (10%) expressed a more negative attitude from being either Positive or Neutral to Neutral or Negative.

3. Benefit scenario scores with statistical testing outcomes

Table 3 Summary of scores awarded to each benefit scenarios with the Average Score and Gain on the Current Average Score, and Dmax from the Kolmogorov-Smirnov Test. The alternative customer categorisation scale suggested by the results of the sentiment analysis has been applied to calculate a relationship margin (RM), %Promoter(RM) - %Detractor(RM), based on the suggested scale: Detractor(RM) (0-4), Passive(RM) (5-7) and Promoter(RM) (8-10).

Mandatory in Survey Version	Benefit (question code & short description)	Dont know	0	1	2	3	4	5	6	7	8	9	10	Total	Average Score	Gain on Current Score	K-S Test ² Dmax /Status	Detractor (RM) ³ (0-4)	Passive(RM) (5-7)	Promoter (RM) (8-10)	RM ⁴
BUSINESS BENEFITS: Not applicable to this survey															5.8 (current Customer Satisfaction average)						
SHARED BENEFITS: Customer Interaction: Complaints																					
A	L11 - Reduced customer billing complaints	4	0	2	0	2	7	4	5	10	30	32	34	130	8.1	2.3	0.47 (Chngd)	9%	15%	76%	67%
B	L12- Reduced external costs of Ombudsman (eg. EWOV) referred complaints	4	3	4	1	3	2	10	10	19	23	11	22	112	7.1	1.3	0.24 (Chngd)	12%	36%	52%	40%
C	L13 - Reduced internal costs of Ombudsman (eg. EWOV) referred complaints	8	2	0	3	3	4	8	11	17	28	16	16	116	7.3	1.5	0.26 (Chngd)	11%	33%	56%	44%
C	L14 - Improved outcomes from billing disputes	3	4	3	0	2	3	6	6	16	36	17	24	120	7.5	1.7	0.37 (Chngd)	10%	24%	66%	56%
Customer Interaction: Customer Assistance Programs																					

² K-S Test : Kolmogorov-Smirnov Test

³ (RM) indicates the relationship margin range of scores, the score awarded when the customer reflects on the service rather than providing a reactive score immediately or soon after the event

⁴ RM : The suggested Relationship Margin is adapted from the Net Promoter Score method of measuring customer loyalty. RM = %Promoter(RM) - %Detractor(RM)

Mandatory in Survey Version	Benefit (question code & short description)	Dont know	0	1	2	3	4	5	6	7	8	9	10	Total	Average Score	Gain on Current Score	K-S Test ² Dmax /Status	Detractor (RM) ³ (0-4)	Passive(RM) [5-7]	Promoter (RM) (8-10)	RM ⁴
A	L15 - Reduced HULA (High Usage Leak Allowance) costs from concealed leaks	4	2	0	0	1	2	5	3	21	28	20	43	129	8.3	2.5	0.44 (Chngd)	4%	23%	73%	69%
B	L16 - Reduced plumbing assistance costs	2	2	2	0	2	5	6	10	11	25	19	31	115	7.8	2.0	0.37 (Chngd)	10%	24%	66%	57%
C	X3 - Reduced Government assistance grants	4	2	0	1	2	7	9	10	14	22	19	28	118	7.6	1.8	0.31 (Chngd)	11%	29%	61%	50%
Customer Interaction: Credit Management																					
A	P11 - Reduced supply restriction case costs	10	2	1	2	3	2	8	14	24	14	21	30	131	7.6	1.8	0.29 (Chngd)	8%	38%	54%	45%
D	P12 - Reduced debt recovery/legal action case costs	15	3	1	1	2	6	10	13	15	12	10	12	100	6.7	0.9	0.16 (U/chgd)	15%	45%	40%	25%
Customer Interaction: Customer Interactions																					
B	L17 - Reduced contact centre calls	3	2	2	4	3	2	14	13	7	22	18	23	113	7.2	1.4	0.28 (Chngd)	12%	31%	57%	45%
C	M11 - Enhanced communications	1	2	0	0	1	1	11	19	21	24	14	23	117	7.5	1.7	0.31 (Chngd)	3%	44%	53%	49%
Customer Interaction: Goodwill																					
A	F11 - An improvement of value of goodwill from information sharing with their customers	4	2	1	0	1	6	3	9	16	23	26	43	134	8.1	2.3	0.42 (Chngd)	8%	22%	71%	63%
B	F12 - An improvement of value of goodwill from new products and services	3	6	3	0	0	6	14	16	14	23	11	18	114	6.8	1.0	0.18 (Chngd)	14%	40%	47%	33%
D	F13 - An improvement of value of goodwill from customer recognition of operational efficiency and capital management	4	4	2	1	5	4	7	10	22	23	11	12	105	6.8	1.0	0.22 (Chngd)	16%	39%	46%	30%
C	F14 - An improvement of value of goodwill from more flexible tariffs	0	1	1	3	1	1	9	6	15	26	26	30	119	7.9	2.1	0.40 (Chngd)	6%	25%	69%	63%
Regulation/Compliance: Metering																					

Mandatory in Survey Version	Benefit (question code & short description)	Dont know	0	1	2	3	4	5	6	7	8	9	10	Total	Average Score	Gain on Current Score	K-S Test ² Dmax /Status	Detractor (RM) ³ (0-4)	Passive(RM) [5-7]	Promoter (RM) (8-10)	RM ⁴
D	D33 - Improve meter sizing for non-residential customers	35	1	1	0	2	9	2	5	5	5	2	7	74	6.3	0.5	0.10 (U/chgd)	33%	31%	36%	3%
A	D34 - Tighter meter performance/NMI compliance monitoring	8	4	1	0	1	6	8	14	10	35	16	33	136	7.6	1.8	0.36 (Chngd)	9%	25%	66%	56%
B	D35 - Undertake meter failure analytics	3	1	1	3	1	4	9	6	19	28	15	25	115	7.6	1.8	0.32 (Chngd)	9%	30%	61%	52%
D	D36 - Meter silting detection (large meters)	34	2	1	0	3	5	3	6	4	6	4	6	74	6.3	0.5	0.1 (U/Chgd)	28%	33%	40%	13%
C	D37 - Detect revenue losses caused by declining or failed meter accuracy after break in main	7	2	0	1	2	5	7	8	20	28	17	22	119	7.6	1.8	0.32 (Chngd)	9%	31%	60%	51%
Regulation/Compliance: Monitoring																					
A	P13 - Enable automated regulation compliance monitoring	2	3	2	2	1	3	6	10	12	17	35	39	132	8.0	2.2	0.41 (Chngd)	8%	22%	70%	62%
B	G16 - Reduction in audits required (through targeted SWM water quality testing)	2	2	2	0	1	4	9	10	17	27	14	26	114	7.6	1.8	0.31 (Chngd)	8%	32%	60%	52%
CUSTOMER BENEFITS: Customer Service: Usage Cost																					
A	K11 - Reduce costs by being alerted to leaks at their property	2	1	0	1	0	0	4	3	9	27	32	54	133	8.8	3.0	0.57 (Chngd)	2%	12%	86%	85%
B	K12 - Reduce their water use through awareness and education	2	4	4	1	1	1	7	11	6	26	19	29	111	7.6	1.8	0.39 (Chngd)	10%	22%	68%	58%
D	K13 - Be more water efficient and reduce their bill through bill prediction	1	4	0	1	3	4	5	6	11	26	20	25	106	7.6	1.8	0.38 (Chngd)	11%	21%	68%	56%
C	K14 - Be more water efficient and reduce costs through monthly billing	3	8	2	0	6	4	9	10	12	20	17	26	117	7.0	1.2	0.26 (Chngd)	18%	27%	55%	38%
B	L18 - Reduction in insurance claims by customers	1	0	0	0	3	4	2	6	11	24	25	36	112	8.3	2.5	0.47 (Chngd)	6%	17%	77%	70%
Customer Service: Complex Property/multiunit usage reconciliation																					

Mandatory in Survey Version	Benefit (question code & short description)	Dont know	0	1	2	3	4	5	6	7	8	9	10	Total	Average Score	Gain on Current Score	K-S Test ² Dmax /Status	Detractor (RM) ³ (0-4)	Passive(RM) [5-7]	Promoter (RM) (8-10)	RM ⁴
D	X1 - Faster and easier reconciliation of bills for properties with multiple accounts	31	1	0	0	1	8	9	5	4	5	3	9	76	6.6	0.8	0.13 (U/Chgd)	22%	40%	38%	16%
D	X2 - Identify plumbing irregularities in properties with complex plumbing	34	1	2	0	0	4	2	2	11	8	4	8	76	7.1	1.3	0.28 (Chngd)	17%	36%	48%	31%
Customer Service: New Services																					
C	N11 - Enable customer selection of their billing day	4	9	3	8	0	4	7	8	11	22	14	26	116	6.8	1.0	0.26 (Chngd)	21%	23%	55%	34%
A	N12 - Enable information to be provided to customers on their evaporative cooler water use	7	1	0	0	2	8	6	8	12	30	14	38	126	7.9	2.1	0.40 (Chngd)	9%	22%	69%	60%
D	N13 - Enable non-residential customer end-use data logging and analytics	31	3	1	0	2	7	5	5	8	7	2	10	81	6.4	0.6	0.13 (U/Chgd)	26%	36%	38%	12%
Customer Service: New Products																					
D	N14 - Enable customised product offers to be made to customers	31	2	2	0	2	4	3	7	5	3	3	9	71	6.4	0.6	0.15 (U/Chgd)	25%	38%	38%	13%
B	M12 - Provide a service to non-residential and residential customers for disaggregated/appliance end use	0	3	1	2	0	9	6	12	13	23	22	19	110	7.3	1.5	0.29 (Chngd)	14%	28%	58%	45%
Customer Service: Security																					
A	N15 - Enable water businesses to offer customers vacant property water use monitoring and alerting	3	1	0	0	1	1	3	4	9	36	30	43	131	8.6	2.8	0.56 (Chngd)	2%	13%	85%	83%
C	L19 - Increased security for home and business owners	5	8	5	4	2	8	17	10	11	19	11	18	118	6.2	0.4	0.13 (U/Chgd)	24%	34%	42%	19%
New Knowledge: Appliance usage/End-use																					
B	M13 - Integration of smart meters with "smart" appliances	9	4	0	0	3	5	12	14	12	19	14	17	109	7.1	1.3	0.21 (Chngd)	12%	38%	50%	38%

Mandatory in Survey Version	Benefit (question code & short description)	Dont know	0	1	2	3	4	5	6	7	8	9	10	Total	Average Score	Gain on Current Score	K-S Test ² Dmax /Status	Detractor (RM) ³ (0-4)	Passive(RM) (5-7)	Promoter (RM) (8-10)	RM ⁴
C	J17 - Gain new knowledge of the impact of appliance efficiency on total demand	3	4	1	3	1	3	10	10	14	33	16	22	120	7.3	1.5	0.31 (Chngd)	10%	29%	61%	50%
New Knowledge: Benchmarking																					
A	N16 - Enable water businesses to offer benchmarking of water demand of J18 - evaporative coolers	21	1	1	2	1	4	14	12	15	23	12	25	131	7.4	1.6	0.25 (Chngd)	8%	37%	55%	46%
D	J18 - Develop benchmarks for customer segments	1	3	0	1	0	6	5	8	14	30	13	21	102	7.6	1.8	0.34 (Chngd)	10%	27%	63%	53%

Part 2. Survey Questions

Question

Consent and Acknowledgement

A1. Do you consent to participating and wish to proceed with this survey?

A2. Do you understand that the situations presented in this survey are hypothetical only and do not necessarily represent the policies or intent of any water supply company or Council?

Previous bad experiences

B1[B1SQ001]. Have you experienced any of the following water supply issues?

[Unexplained high water bill?]

B1[B1SQ002]. Have you experienced any of the following water supply issues?

[Concealed leak at your property?]

B1[B1SQ003]. Have you experienced any of the following water supply issues? [Water supply disruption (more than 5 hours duration)?]

B1[B1SQ004]. Have you experienced any of the following water supply issues?

[Estimated Bill?]

B1[B1SQ005]. Have you experienced any of the following water supply issues? [Billing Error?]

B1[B1SQ006]. Have you experienced any of the following water supply issues?

[Difficulty paying a water bill?]

B1[B1SQ007]. Have you experienced any of the following water supply issues? [Needed to claim on insurance for water damage caused by concealed bursts and leaks within your property?]

B2. How often are you billed for your water use?

B2[other]. How often are you billed for your water use? [Other]

B3. Do you pay using a monthly payment plan?

Current attitudes

To what extent do you agree or disagree with these statements?

C1[C1SQ001]. My water supplier provides a great service.

C1[C1SQ002]. My water supplier provides me with the information that I need to reduce my water bill.

C1[C1SQ003]. My water supplier deals with my complaints seriously.

C1[C1SQ004]. I get value for money for my water bill.

Question

C1[C1SQ005]. My water supplier endeavours to operate more efficiently to keep costs down.

C1[C1SQ006]. Other companies provide me with access to detailed usage information. My water supplier should also.

Current satisfaction questions

Considering your past and current experiences, please answer the following question.

E1[SQ001]. On a scale of 0 to 10 how likely are you to say positive things about your water supplier to family, friends or colleagues?

E2. What is the primary reason for this score?

Respondent profiling questions

F1. What type of property do you have?

F1[other]. What type of property do you have? [Other]

F2. How many people are at your property?

Do you have any of the listed water using systems?

F3[SQ001]. Evaporative Cooler

F3[SQ002]. Solar hot water

F3[SQ003]. Irrigation (Manual operated)

F3[SQ004]. Irrigation (automated operation)

F3[SQ005]. Swimming Pool

F3[SQ006]. Spa

F3[SQ007]. Paddock water troughs

F3[SQ008]. Water Tank(s)

F3[SQ999]. None of the above

F5. Does your property have a digital water meter?

F6. How would you rate the water use by your household/property users?

Mandatory questions in version A of the Survey:

For each situation, on a scale of 0 to 10, would you be likely to talk positively to family, friends or colleagues about your water supplier if you experienced these events?

G1[A065D34]. If much more data is collected your water supplier may be able to continuously monitor the accuracy of customers' water meters so that they operate within Government determined accuracy guidelines, making it fairer for all.

G1[A100K11]. You may be alerted to a suspected leak in your property's water pipes or appliances by your water supplier within a few days of it starting rather than receive a high-usage notice with your next bill. You may save money on your water bill because of the early detection.

Question

G1[A105L11]. You experience fewer mis-readings or estimated readings of your water meter when the readings are automated.

G1[A109L15]. When customers are quickly alerted to possible leaks at their property or become aware by checking their data online regularly, they experience fewer high bills and, as a result, water companies have to spend less on crediting customers who experience high usage.

G1[A120N12]. Through a web portal or mobile app access to daily and sub-daily readings you may be able to see how much water your evaporative cooler or other water appliances use based on your current usage patterns, or if it has developed a fault or is configured incorrectly.

G1[A123N15]. Your water supplier may be able to offer you a service to alert you to any water use at your property when you are not there for an extended period.

G1[A124N16]. You have an evaporative cooler/solar hot water system and you would like to know if its water usage is comparable to other evaporative coolers/solar hot water systems. Your water supplier may be able to provide benchmarks for you to compare your appliance against.]

G1[A126P11]. More data is available to inform customers (generally business customers) of actual water use on a daily and sub-daily basis, so there are fewer high-bill disputes leading to non-payment of accounts that can result in customers being inconvenience by the water supplier restricting water flow to the property.

G1[A128P13]. In times of drought and other periods when restrictions are in place, fair use of water by customers and water conservation may be improved when much more data is available and customers who are not adhering to usage regulations are more easily identified.

G1[A130F11]. You may be able to understand your water use better and improve the efficiency of your water use as a direct result of having increased information shared by your water supplier on your daily and sub-daily usage.

H0. Do you have more time for this survey and would like to continue to consider more scenarios?

Optional questions in version A of the Survey:

Thank you for continuing. These questions are optional. To exit at any time press NEXT at the end of this page. The following situations do not necessarily reflect the policy or intent of water supply companies or Councils. For each of the following situations, on a scale of 0 to 10, would you be likely to talk positively to family, friends or colleagues about your water supplier if you experienced these events?

H1[B066D35]. Water meters may wear over time and increasing reading inaccuracies may be identified earlier when much more data is collected. As a customer you will have greater confidence that billing is accurate and fairer for all.

Question

H1[B085G16]. If your water supplier automates the reading of meters at frequent intervals it may be able to automate water quality data collection through the same network, lowering their operating costs and maintaining quality. Reduced costs may lead to lower tariffs or reduced price rise pressures.

H1[B101K12]. Your water supplier may make available to you, your water usage data at daily and sub-daily (eg. hourly) intervals through a web portal or mobile app. Through that access you may identify some opportunities to reduce your water use and your water bill.

H1[B106L12]. Your water supplier may be able to reduce the number of customer complaints taken to the water Ombudsman and the time and charges to resolve disputes when the reasons for disputes are reduced. This could result from you and other customers having direct access to detailed usage data, being alerted to possible leaks within a few days of them starting and experiencing fewer estimated bills and mis-read bills.

H1[B110L16]. Your water supplier may be able to reduce the cost of plumbing assistance programs it provides by advising customers earlier of possible leaks and other water wastage, reducing the size of the issues requiring assistance. Reducing operating costs may lead to lower tariffs or reduced price rise pressures.

H1[B111L17]. Your need to call your water supplier during business hours may be reduced if you can access information on your water use at daily and sub-daily readings at any time through a web page or mobile app making it more convenient for you and reducing your water supplier's costs.

H1[B112L18]. Water damage to your property from concealed leaks and any subsequent insurance claims may be able to be reduced if you are alerted to constant water flow occurring within a few days of it starting before any damage becomes significant.

H1[B116M12]. Using the much greater number of readings, your water supplier may offer a breakdown of water uses at your property compared to typical water uses at similar properties.

H1[B117M13]. As technology gets "smarter" it may be possible to integrate your water services with your appliances making life easier and safer.

H1[B131F12]. Your water supplier may be able to use the extra data collected to create new products and services that you, as a customer, you could take advantage of.

H1[C068D37]. The accuracy of customer meters may be affected when sediment enters the water main during a break in the main pipe. Change in reading accuracy may be able to be detected so that it can be replaced ensuring that billing is fairer for you and all customers.

Question

H1[C097J17]. Your water supplier may be able to provide information about the efficiency of older and newer models of appliances to assist with reducing your water use and decisions to upgrade your appliances.

H1[C103K14]. Your water supplier may be able to bill you monthly instead of every three, four or six months enabling you to keep a closer watch on your usage and water bill and make budgeting easier.

H1[C107L13]. Your water supplier incurs internal costs for administering billing disputes taken to the water Ombudsman. These costs may be lowered if customers have access to data on their daily and sub-daily usage, are alerted to possible leaks within a few days of them starting and when there are fewer estimated bills and mis-read bills. Reduced costs may lead to lower tariffs or reduced price rise pressures.

H1[C108L14]. As a customer your billing queries may be more easily and amicably resolved if your water supplier and you are able to access and understand information on your daily and sub-daily water use. Reduced costs may lead to lower tariffs and reduced price rise pressures.

H1[C113L19]. If your water supplier automates meter reading then a meter reader no longer has to visit your property which may be more convenient for you and may increase your security situation.

H1[C115M11]. As a customer you may be able to get more information and assistance from your water supplier when much more data is collected enabling both you and your water supplier to understand your needs in more detail.

H1[C119N11]. Your water supplier may be able to bill you monthly but, additionally, they may allow you to select which day of the month your direct debit/payment is due.

H1[C133F14]. Your water supplier may be able to use the sub-daily readings to offer alternate tariffs that better suit your water use or enable you to modify your water use to reduce your water costs.

H1[C135X13]. Your water supplier may be able to lower its costs of administering customer applications for Government assistance by advising customers earlier of possible leaks and other water wastage enabling issues to be kept smaller. Reduced costs may lead to lower tariffs and reduced price rise pressures.

H1[D064D33]. (for business customers) New, large industrial customers and new commercial and apartment developments need to pay for their large main meters. Using the information on plans and the data from digital meters, water suppliers may be able to advise, and charge for, the use of a more efficient type and better sized meter. The larger

Question

meter used in existing properties may be able to be re-sized based on the water use when the property use changes. Better selection of large meters can mean fairer costs and billing for all customers.

H1[D067D36]. (for business customers) Large customer meters may have their reading accuracy compromised due to silting within the mechanism resulting in incorrect billing for large water users. Your confidence in your water supplier may be increased if early identification of possible silting or other irregularities could ensure billing is accurate and fairer for all.

H1[D098J18]. Your water supplier may be able to provide you with a comparison of your property's water use against a benchmark of other properties of the same business type or residential type.

H1[D102K13]. Through a web portal or mobile app you may be able to check your water use since your last bill and see a prediction of your next bill. This may help you reduce your water use if it is too high or to fit your budget.

H1[D121N13]. (for large commercial/industrial customers and managers) Your water supplier may offer a service to monitor water use at your business at very short intervals for a period and provide a breakdown of end-uses of the water within the property.

H1[D122N14]. (for larger commercial/industrial customers and managers) Your water supplier collects more frequent data about water use at your property and may be in a position to provide products tailored to your needs.

H1[D127P12]. There may be fewer customers (generally business customers) that your water supplier takes legal action against as a result of non-payment of their account if high bills can be avoided and more data is available to inform customers of their actual water use on a daily and sub-daily basis.

H1[D132F13]. As a customer you may become aware (through bill inserts, web posts, social media or word of mouth) that your water supplier has improved its operating efficiency through improved planning and operations as a result of having much more detailed data available to their technical staff.

H1[D136X11]. (for large commercial/industrial, strata customers and managers) Where a property has multiple accounts (such as strata titled, large commercial sites and large industrials) the increased collection frequency of meter readings and access to the data by customers and strata manager, you and your water supplier may be able to reduce the time and number of calls required to reconcile bills when anomalies occur.

Question

H1[D137X12]. (for large commercial/industrial, strata customers and managers) If your property has complex plumbing (such as strata titled and large industrials) you or your Strata Manager or your water supplier may be able to identify any irregularities in the plumbing system (eg. cross connections) much earlier using the greater amount of data being collected and access to the data through a web page or mobile app.

I1. Would you like to make a comment about the benefits that you have read about in this survey (optional)?

Part 3 Updated digital metering benefits taxonomy

A taxonomy of digital metering benefits was developed as part of the literature review of this study (Monks, Stewart et al. 2019).

This updated version of the Digital Metering Benefits Taxonomy includes the shared benefit of “Reduced customer self-reading of meters” which reduces the operational costs to the water utility and the impact on the customer to read and forward the meter reading to the water utility for processing.

Figure 8 Taxonomy of digital metering by beneficiary, category and sub-category.

References

- ABS (Australian Bureau of Statistics). (2019). "2016 Community Profiles." Retrieved July 29, 2019, from https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/036?opendocument.
- Gitlin, J. (2019). "Survey data cleaning: 7 things to check before you start your analysis." Retrieved 27 Dec 2019, from <https://www.surveymonkey.com/curiosity/survey-data-cleaning-7-things-to-check-before-you-start-your-analysis/>.
- Interviewee#8 (Insurance) (2018). Insurance issues arising from concealed leaks/water damage. Interviewed by author (I.M.): Melbourne, Victoria, Australia. (17 Dec 2018).
- Monks, I., R. A. Stewart, O. Sahin and R. Keller (2019). "Revealing Unreported Benefits of Digital Water Metering: Literature Review and Expert Opinions." *MDPI-Water* **11**(838): 32.
- Sauro, J. (2019). "Cleaning Data From Surveys & Online Research." Retrieved 27 Dec 2019, from <https://measuringu.com/cleaning-data/>