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SERVAQUA: TOWARDS A MODEL FOR SERVICE QUALITY IN POTABLE RETICULATED WATER SERVICES

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ABSTRACT

The purpose of this paper is to propose a conceptual model for total service quality in the provision of networked technological services, dominated by tangible elements, with specific reference to reticulated water for customers in urban environments. A range of methods to measure the level of service provided by water utilities exists, most of which focus on the intrinsic quality of water supply, measured from the perspective of the service provider. These methodologies largely omit the quality of service as experienced by the customer, limiting their ability to drive customer centric management. A conceptual model is derived from a synthesis of literature on services quality. The face and content validity of the model are assessed using a qualitative case-study approach in which the views of organisations representing customers in this industry were sought. It was found that existing service quality methodologies cannot account for the specific context of water services, a service with high tangibility and low customer interaction. The paper concludes with suggestions for further research into this problem.

INTRODUCTION

The provision of reticulated potable water, i.e. tap water, is a natural monopoly, which exist in most markets for networked services, such as telecommunication, transport, electricity, gas and sanitation and occur when “due to the economies of scale of a particular industry, the maximum efficiency of production and distribution is realised through a single supplier” (DiLorenzo, 1996, p. 34). Distinguishing issue for services provided in a natural monopoly is that dissatisfied customers can not change service provider. This impacts how water utilities manage their customers; without the threat of defection there is no intrinsic motivation for the organisation to maximise service quality (Flynn, 1990). Monopolised service provision and the associated absence of consumer choice has necessitated the regulation of such markets, often through so called ‘yard-stick competition’, where the performance of monopolistic service providers is compared with peer organisations in similar markets (Braadbaart, 2007).

These regulatory frameworks have driven many water utilities to initiate customer service programs. These are, however, often driven by the reporting requirements of the regulator rather than by an internally motivated customer-focus imperative (Karbowiak, 2003). A range of methodologies to implement performance measurement of reticulated water services exists (Berg, 2010; Cabrera, 2011), most of which focus on the intrinsic quality of water supply, they focus on technical parameters such as chemical composition and electrical conductivity, which are measured from the perspective of the service provider. These methodologies are problematic because they largely omit the quality of service as experienced by the customer, limiting their ability to drive customer focused management. The literature on service quality in networked services is sparse, with only one empirically tested model for service quality developed for reticulated water (Babakus, 1993). This methodology is, however, incomplete as it focuses on the supplementary services provided by water utilities, omitting consumer perceptions of core services.

The purpose of this paper is to propose a conceptual model for total service quality in the provision of networked technological services, dominated by tangible elements, with specific reference to reticulated water for customers in urban environments. A conceptual model is derived from a synthesis of literature on services quality. The face and content validity of the model are assessed using a qualitative case-study approach in which the views of organisations representing customers in this industry were sought. The paper concludes with suggestions for further research into this problem.

RETICULATED WATER SUPPLY AS A SERVICE

The supply chain for water and sanitation services is a closed system that forms part of the natural hydrological cycle (Grigg, 2012). Water in its natural environment has limited usability for customers in an urbanised setting as it is generally not fit for human consumption. The service provider extracts water form the natural environment and adds value through purification and pressurisation of the natural resource, delivering the final product into the customer's premises. Water is used by customers and subsequently returned to the natural environment.

The provision of tap water is a service as customers effectively only purchase the *right to use* the water and pay for the value

added by the service provider. The water itself does not change ownership, since the natural water cycle forces it back to the environment through evaporation or natural water flows. Consumption of water is thus defined by a reduction in quality of the technical parameters salient to customers (Zetland, 2011): purity and pressure. After water has been used by the customer, it is dispersed back into the natural environment at a level of quality lower than potable water. Unlike other products, water is returned to its original state as a raw product through technological and natural processes; ready to be harvested and included into the next value stream, closing the natural water cycle.

Reticulated water as a service is dominated by tangible elements as the water is a physical product, making it high in experience qualities (Rushton & Carson, 1985), i.e. the customer is able to assess the level of service through their own experience. Experience qualities are attributes, such as taste and aesthetic appearance, that can only be discerned after purchase or during consumption. A water service also contains credence qualities, which are attributes which customers find impossible to evaluate, in part because they do not possess the knowledge or skills to do so (Rushton & Carson, 1985). Credence qualities in reticulated water are particularly important with reference to the chemical and biological composition of the water required to maintain public health.

Reticulated water is provided at arm's length from the service provider as the water is directly delivered to the customer's premises. The service can as such can be classified as a *service factory*. These are services with a low degree of human interaction, minimal options for customisation, low labour intensity and a higher ability to manage heterogeneity then other types of services (Schmenner, 1986). The only interaction between staff and the customer occurs in situations of exceptions, i.e. updating customer information, billing or service recovery. These characteristics do, however, only apply to the core service provided by water utilities, i.e. the actual water as supplied to the customer's tap. The supplementary services, such as information provision, billing and complaints handling (Grönroos, 1990; Lovelock, 1992), require a much higher degree of interaction between service provider and customer and are in fact the only time when the customer directly interacts with the service provider. These characteristics are important considerations in defining a model for service quality of potable reticulated water, as proposed below.

MODELS OF SERVICE QUALITY

Service quality is a model of how the quality of service provision is perceived by customers (Zeithaml, Berry, & Parasuraman, 1993). Understanding how services are evaluated is of importance as it will enable the organisation to influence these evaluations in the desired direction (Grönroos, 1990). Service quality is of academic and managerial importance because of its apparent relationship to costs, profitability, customer satisfaction and positive word of mouth. Service quality is widely regarded as a driver of corporate marketing and financial performance (Buttle, 1996; Carrillat, Jaramillo, & Mulki, 2007). A rich literature on service quality has been published in the past three decades, which saw the development of two distinct schools of thought, the Anglo-Saxon and the Nordic model (Brogowicz, Delene, & Lyth, 1990).

The discourse on service quality is dominated by the ubiquitous SERVQUAL gap-model approach (Parasuraman, Zeithaml, & Berry, 1988). In this model, service quality is conceptualised as a gap between what the customer expects from a class of service providers, e.g. all hotels, and their evaluation of the performance of a particular service provider, e.g. The Langham Hotel (Buttle, 1996). The SERVQUAL construct consists of five dimensions, i.e, reliability, assurance, tangibility, empathy and responsiveness, four of which are related to intangible elements of service provision.

The presuppositions of the SERVQUAL model have been repeatedly criticised (Buttle, 1996). Firstly, there is evidence that the five dimensions of the construct have a high degree of intercorrelation. Research in a water utility by Babakus (1993) produced a single factor model of service quality instead of the traditional five factors. Possible explanations of this are mainly related to the nature of reticulated water as a service, being a low involvement service factory. The service quality construct might be factorially complex in some industries, but uni-dimensional in other industries. Service quality measurement should thus be context specific, accounting for the characteristics of the service under consideration. The generic model needs tailoring to industry-specific circumstances and several alternative models, building on the SERVQUAL methodology, have been developed over the years, such as HEdPERF in higher education (Abdullah, 2005) and LibQUAL+ in libraries (Cook, Heath, & Thompson, 2002). Secondly, the dimensions of SERVQUAL are weighted towards the intangible aspects of a service, which makes it less suitable to services dominated by tangible elements where the customer is better able to directly assess the quality of the service. Last objection to SERVQUAL germane to this paper is that the gap model has a process orientation and focuses on the process of service delivery, ignoring the outcomes of the service encounter (Buttle, 1996). Although the gap model recognises that actual service delivery influences perceived service quality, the model only measures the gap between expected service and perceived service, ignoring the gap between actual service delivery and perceived service delivery.

In the Nordic model of service quality, popularised by Christiaan Grönroos (1984, 1990), total perceived service quality is the outcome of an evaluation process where the customer compares context specific expectations of quality with the experienced quality. The expectations of quality are context specific to the firm under consideration and not based on the total class of service providers, as is the case in the Anglo-Saxon model. The expected service is influenced by the marketing activities of the service provider and external influences, such as word-of-mouth, corporate image and customer needs.

In the Nordic model, the outcome of the service and the process of service delivery are both recognised as forming part of the experienced quality. Services are characterised by the inseparability of production and consumption and the outcome of this production process is that which the consumer receives as the result of interacting with the service provider. In the Nordic model this outcome is expressed in the *technical quality* of the service, which can be assessed by the customer, like the technical dimensions of a product. But as services are produced in interaction between the consumer and the service provider, technical quality alone cannot account for the quality as perceived by the customer. Customers are not only interested in the outcome of a service process, they are also interested in how the service is provided, they are interested in the *functional quality* of the service.

Third quality dimension identified by (Grönroos, 1984, 1990) is the image of the service provider, which moderates both technical and functional quality to arrive at a perceived level of service. The public image of the service provider appears in both sides of the total perceived quality equation as it is also considered to moderate expected quality. Grönroos indicated that technical and functional quality are interrelated, but argued that functional quality was more important to the quality of the service, as perceived by customers, than the other factors and that the performance of staff in direct contact with customers can compensate for a lower technical quality (Brogowicz et al., 1990).

CONCEPTUAL MODEL: SERVAQUA

Several performance measurement models for water services have been reported in the technical literature on water supply (Berg, 2010; Cabrera, 2011). These methodologies are not customer centric as they are predominately focused on intrinsic quality of the water supply instead of service quality. These methodologies are based on measuring the technical parameters of service delivery, thus focusing on the product-like aspects of water services from the perspective of the service provider. Due to their internal perspective, these methodologies are not likely to be effective in driving customer focused behaviour by service providers.

The SERVQUAL methodology has been reviewed in the literature for use in water services (Vloerbergh et al., 2007), but little research has been undertaken to confirm its applicability. The SERVQUAL model has been investigated for an energy retailer, a service that can be considered analogous to water. It was found that SERVQUAL cannot fully account for service quality in these essential services (Babakus & Boller, 1992). This finding subsequently led to the development of a context specific service quality model for reticulated water (Babakus, 1993). This model comprised of a 15-item uni-dimensional service quality construct, consisting primarily of service attributes concerning the behaviour of employees. Both the model proposed by Babakus and the standard SERVQUAL methodology only account for the process aspects of water services and ignore the technical outcomes. These methodologies are heavily weighted towards supplementary services, which have different characteristics to core services in water supply, mainly due to the higher level of interaction between service provider and customer and the lower level of tangibility of supplementary services compared to core services. The inclusion of core services in measuring service quality in reticulated water is essential as the large majority of interactions between the customer and the service provider happen at the customer's tap and there is rarely any need for direct interaction between employees of the service provider and its customers.

The distinction between technical quality and functional quality makes the Nordic model a more suitable framework to develop a service quality framework in reticulated water. Technical quality constitutes the set of measurable physical parameters of the tangible aspects of the service, as perceived by the customer, i.e. the level of purity, pressure of the core services. Due to the lack of customer interaction in the provision of core services in water, it is reasonable to propose that functional quality in water supply is fully located in the supplementary services, e.g. billing, information provision and so on. To develop a salient model for service quality in water a distinction needs to be drawn between core service (technical quality) and supplementary services (functional quality).

Technical Quality: Core Services

The core service in reticulated water is dominated by tangible elements as water can be directly experienced by customers.

Evaluation of the service is based on experience qualities because the customer is able to assess most aspects of the core service through visual, tactile, olfactory and gustatory verification. Each opening of a tap consists of two Moments of Truth: the pressure and purity of the water are assessed against the customer's expectations. The technical quality of the service can, however, not be fully assessed by customers as some aspects of purity of water are imperceptible, i.e. some impurities can not be seen or tasted, although they do constitute a reduction in quality. These imperceptible qualities are credence qualities and although these qualities of the water can not be directly verified by the customers senses, they can be determined by the service provider.

Practical experience in the provision of water services reveals an inherent tension between technical quality and functional quality. Operators of drinking water systems are required to comply with local regulatory requirements. Meeting these requirements can, however, lead to a reduction in service quality. For example, adding chlorine is essential to ensure public health in that it destroys micro-organisms. In some communities, however, chlorine is perceived as an unwanted chemical, leading to a reduction in service quality (Kot, Castleden, & Gagnon, 2011). This example shows that the quality of a service can be defined from two perspectives: that of the customer and that of the service provider. The customer assesses the experienced quality attributes with reference to what is capable of being perceived. From the service provider's perspective, quality resides intrinsically within the service itself. The recognition of intrinsic quality does not negate the importance of the customer's perception, but relying on service quality alone fails to accommodate the importance of attributes intrinsic to the service in influencing service quality and value offered to the customer (Walker & Johnson, 2009). A distinction can thus be made between extrinsic and intrinsic technical quality. Extrinsic technical quality is based on the perception of customers, while intrinsic technical quality is embedded within the service itself and includes credence qualities not directly observable to the customer. These considerations lead to the suggestion that technical quality needs to be determined from both perspectives in order to provide a complete view of service quality.

To measure intrinsic technical quality from a customer's perspective, the time-price for water can be used to conceptualise this aspect of the construct. Customers don't only pay for the service with their money, but also with their time. This is specially important in services as production and consumption occur simultaneously (Becker, 1965; Davies & Omer, 1996). The time-price of residential water consumption in developed markets is negligible due to the technological advancement in hydraulic and chemical engineering. This is stark comparison with areas without reticulated water where woman may spend hours every day obtaining their daily allocation of water (Williams & Mountjoy, 2012). A time-price is, however, incurred when the core service does not meet the expectations of the customer, either water does not have the expected purity and can not be used for its intended purpose or the pressure is either to low or too high, or even zero. This leads to the idea that a water utility providing a perfect level of service is invisible to the consumer (Prevos, 2012). A perfectly invisible water company delivers water whenever customers wants it; customers never need to contact the service provider; bills are accurate, easy to understand and pay and so on. Customer pay additional time only in cases of service failures, in those instances where water is not available or needs to be boiled before it is suitable for human consumption due to treatment failures. Using this time-price concept and its relation to service failures, the intrinsic technical quality of the core service can be estimated by assessing the likelihood that a Moment of Truth is confirmed, i.e. the likelihood that expectations are met at each interaction with the service provider. Using methodologies developed for the Six Sigma improvement system (George, 2003), the level of service can be expressed in Defects per Million Opportunities (DPMO):

$$DPMO = \frac{disconfirmations * 10^6}{2 * Moments\,Of\,Truth * population}$$

For example: a water utility serves a population of 100,000 people who each use their tap an estimated ten times per day. On average, a service failure occurs to 10 customers in the system where water is dirty or not available for a period of half a day. This can be expressed as 50 disconfirmations of service expectations regarding purity. The level of service for that day, expressed in DPMO equals 25. This can also be expressed stochastically in that for 99.998% of all Moments of Truth in the core service, expectations were confirmed. To fully develop this measure, further technical modelling is required, which falls outside the context of this paper. Similar approaches to determine intrinsic technical quality can be developed for analogous service factories dominated by tangible elements.

Second perspective on technical quality are the extrinsic views of technical quality of the customers themselves. Customers will, however, only be able to evaluate the experience qualities of the water through sensory verification. Given the fact that the technical quality of the water supply also contains credence (intrinsic) qualities that cannot be assessed by customers, it is hypothesised that the intrinsic technical quality and extrinsic technical quality will not be the same.

Supplementary Services
The functional quality of water services is almost exclusively located in the provision of supplementary services, which are characterised by a high level of customer interaction with the service provider and a low level of tangibility. The scale developed by Babakus (1993) illustrates the importance of supplementary serves in the development of service quality perceptions as almost all items identified in his model relate to organisational behaviour. The uni-dimensional model consists of fifteen elements, all of which mainly relate to the supplementary services:

1. Billing accuracy
2. Reliability of services
3. Efficiency of services
4. Customer service
5. Safety consciousness
6. Dependability
7. Knowledge level of employees
8. Providing services at the promised time
9. Responsiveness
10. Reassurance and understanding
11. Having customers' interest at heart
12. Willingness of employees to assist customers
13. Quality of management
14. Billing clarity
15. Politeness of employees

In this list of scale items we can recognise several of the five dimensions of SERVQUAL, i.e. reliability (items 2 and 8), assurance (item 6), empathy (items 10–12 and 15) and responsiveness (item 3 and 9). There is, however, no mention of tangibility related items, which are all presumed to be located in the technical quality.

Conceptual Model
To measure service quality in reticulated water and analogous services, such as energy provision, the Nordic model of service quality is preferred over the SERVQUAL methodology due to its ability to distinguish between technical quality and functional quality. Reticulated water being a service factory, dominated by tangible elements, the technical quality is located in the provision of the core service, while the functional quality is considered to be located in the supplementary services. The conceptual SERVAQUA model is defined as follows:

- Technical Quality (core services):
  - Intrinsic: Likelihood of confirmation of expectations
  - Extrinsic: Consumer perception of technical quality
- Functional quality (supplementary services): Uni-dimensional model identified by Babakus (1993).

METHODOLOGY

To test the face and content validity of SERVAQUA an exploratory qualitative case study was undertaken to identify the antecedents of service quality in reticulated water services. Face validity is an intuitive form of judgement whether a scale measures what it is designed to measure (Burns & Bush, 2010). Content validity is the degree to which elements of an assessment instrument are relevant to and representative of the defined construct (Haynes, Richard, & Kubany, 1995; Lee & Lings, 2008). The concepts of face and content validity are sometimes used interchangeably, although not synonymous with construct validity, which is the degree to which an instrument measures the targeted construct (Churchill, 1979). Face validity can be interpreted as a precursor of construct validity (Turner, 1979) and content validation provides evidence of the construct validity of an instrument (Haynes et al., 1995).

Case studies are widely used in organisational research. The use of case studies is, however, problematic from a methodological perspective as there are virtually no specific requirements guiding case research (Meyer, 2001). The case study approach is a study in which a single case study or a small number of cases and information obtained from these cases is analysed in a qualitative manner (Dul & Hak, 2008). Case studies and other qualitative designs differ in that case studies are open to the use of theory or conceptual categories to guide the researcher (Meyer, 2001).

A qualitative methodology was employed by interviewing five organisations that represent customers of water utilities within

the same market in Australia. Most respondents also represent customers of energy retailers. One interview was conducted with a former water utility customer service manager. The interviews followed a semi-structured approach and questions focused around the respondent's perception of what constitutes a good level of service from the customer's perspective. Interview questions were modelled around the provision of core and supplementary services.

The literature on case studies generally advises to include several cases for analysis in order to strengthen generalisability and external validity (Eisenhardt, 1989). In this particular study only one reticulated water market was investigated. The generalisability of this research is justified by the reasonable assumption that reticulated water services are highly uniform across markets in developed urban areas. Respondents to this research are involved with customers of all water utilities that operate in the market under consideration. The interviews can thus be considered equivalent to a multi-case analysis and the findings generalises to reticulated water services in general.

Data Collection And Analysis

Interviews were recorded and transcribed using outsourced transcription services. All transcripts were confirmed by the researcher and subsequently coded and analysed using the RQDA software package (Huang, 2012), which forms part of the *R* computing language, an Open Source environment for statistical computing (R Core Team, 2012). Data was analysed using an a-priori coding approach, with codes identified from the literature review (Liamputtong & Eddy, 2005). The interviews were structured around the distinction between core services and enabling services and the impact of organisational behaviour on customers. The data was coded over three iterations. During the open coding stage, a-priori codes were assigned to relevant chunks of text, revealing forty individual topics. In the second stage, axial coding of the data organised the identified codes into seven categories. Some codes were associated to multiple categories, other codes were merged, renamed or removed. The last interview was coded after all other interviews had been analysed. This last interview did not introduce any new codes, indicating that the data was saturated and that the case study provides a complete overview of the market under consideration.

RESULTS

Core Service

Most respondents predominately interact with customers that had a negative experience with their services provider through either consumer advocacy, complaints handling or regulation. The provided information is therefore heavily skewed towards instances of service failure and recovery. Customers are, in the words of one respondent: “not ringing … to congratulate you, they just [ring when] the water … taste different [or] looks different”. From the respondents it became clear that the technical quality of the service is, due to the high level of technological investment in Australian water networks, not a major concern, as water utilities “don’t get many complaints around the core services of water”.

Customers of reticulated water have a low level of involvement and are generally “passive receivers of service”. Expectations are simple and customers “want very basic things”. The expectations for core service delivery were succinctly expressed by respondents: “efficient delivery of water services to their homes at a potable quality at a fair and reasonable cost … [without] interruptions to their delivery” and “clean, potable water that’s safe for people to drink and to use for other domestic purposes”. Customers are also concerned about non-technical aspects of water and there is “increasingly an expectation about the aesthetic water quality”, both visual and in taste.

Although the level of involvement with the service is considered low, customers have high expectations of the reliability of the core service: “people remember that one hour when slug of dirty water went through after a repair”. There is an expectation that service provision is seamless, “people expect the service to be there and have no concerns unless the service is not there” and customers only contact the service provider when “something unusual or different has occurred”.

Supplementary Services

The most prevalent topic raised by stakeholders were related to billing: “accurate and reliable bills, that they be timely, that they be simple to read and understand”. Respondents reported the importance of individual service, specially in cases of service recovery related to billing. Service providers implementing best practice offer a wide range of payment options, including “incentive schemes to help [customers] stay on track”. This is in contrast with the core service, where differentiation is almost impossible. The most sensitive issue raised was around managing customers that struggle pay their bills and the importance of “the ways in which water companies deal with that”.

Key issue identified by respondents was the ability of service staff to understand the needs of the individual customer when an issue arises. Service staff are required to “tease out what it is [customers] are concerned about” instead of indiscriminately

following scripts. Issues arise when, for example, staff don't use the language of the customer as “terminology is often the problem”. Some organisations have “specialised complaint-handling teams” that are trained in dealing with sensitive issues, which is a specialised competency. Due to the importance of human interaction in supplementary services it was identified that “a culture of actually wanting to understand complaints, wanting to … find the root cause and … prevent [future] complaints”.

The ability of utility employees to solve the issues raised by customer was perceived as important and staff that provide first contact to the service provider need to have “enough knowledge to be able to solve the problem”. The level of service provided, specially with regards to facilitating services, related to “how empowered their staff are”. Some water companies were able to provide a high level of service by initiating “specialised … hardship teams to deal with people who are struggling with affordability”.

The monopolistic nature of service provision was linked to a low level of customer focus as there is no “threat of losing customers” which can make service providers “pretty passive”. The monopoly situation was linked to organisational behaviour as it creates a “risk-averse industry”. Providing good service to customers was considered a “cultural issue” about “what water businesses think about their role … if they think their role is to … provide good quality services to customers … they are more likely to … listen to what they need and resolve a problem. If they see their business as an engineering business … then they’re less likely to take that approach.” A good service provider was considered to have a “culture of actually wanting to understand” customers.

In relation to supplementary services respondents acknowledged the importance of customer communication. Good water companies were seen to be “publishing messages about security of supplies” and “water efficiency advice”. Last salient aspect of the interviews was the importance of responsiveness in cases of service recovery: “people expect if there is leaks or anything, there’s a rapid response”.

DISCUSSION

Based on the outcome of the interviews, the proposed model for service quality in reticulated water has passed the face validity test and the proposed conceptual model is *prima facie* suitable for the measurement of service quality in core services for reticulated water. Respondents confirmed that core services play a lesser role in their interaction with water utilities due to the low involvement of customers with the service and the high technical development of water supply in Australia. The concept of using the rate of service failure and expressing a confirmed Moment of Truth stochastically as a service quality indicator was confirmed given the high importance placed by customers on a seamless service experience. The difference between extrinsic and intrinsic technical quality was also confirmed by respondents, given the high importance customers place on sensory qualities of the water over the intrinsic technical parameters.

With regards to supplementary services, the content validity of the proposed model was partially confined. Billing was the most common issue mentioned in the interviews, both accuracy and clarity (items 1 an14). The issue of reliability of services (item 2), efficiency (item 3) and dependability (item 6) were mainly expressed with reference to the provision of core services. Customer service (item 4) was not directly mentioned by respondents, but given the generic nature of this item it can be considered a composite of other aspects of the responses. Mention was made several times to the relationship between monopolistic service provider and a lack of customer focus. Respondents did not confirm the importance of safety consciousness (item 5). The knowledge level of employees (item 7), and in extension their empowerment to solve problems, was identified by respondents as an important determinant of service quality. The responsiveness of service providers (items 8 and 9) was seen as important in cases of service recovery. Another issue that was strongly represented in the responses was the importance of empathy from water utility employees, which relates to items 10–12 and 15 in the proposed model. The quality of the management of the service provider (item 13) was discussed in detail with respondents. Respondents repeatedly mentioned the fact that many water utilities are engineering focused organisations that occasionally loose sight of the customer perspective. One aspect mentioned several times by respondents, but not forming part of the model, is importance of providing timely and accurate of information.

CONCLUSION AND FURTHER RESEARCH

Reticulated potable water is a service provided at arm's length, with a high level of tangibility. This implies that the ubiquitous SERVQUAL method has limited applicability in measuring service quality in reticulated potable water services due to its focus on intangible elements and customer-service provider interaction. An enhanced model, based on the Nordic

model of service quality and a recognition of intrinsic quality, incorporating physical quality of core service provision, is proposed to measure total service quality in reticulated water.

The results of the interview largely confirm the proposed model. The information provided by the respondents allows for further fine-tuning of the model and identify dimensions and moderating factors to further develop and operationalise the proposed construct. Further research is required to test the theoretical assumptions in this paper and further develop the SERVAQUA construct.

The separation of technical quality in an intrinsic and extrinsic component is intuitively correct and was confirmed by the interviewees. This relationship requires further investigation through quantitative research. The relationship between technical quality and functional quality within high tangibility services has not been explored in detail in existing literature. The main question to be answered is whether there is a correlation between technical and functional quality. In other words, if a service provider supplies a high level of technical quality, will this result in an enhanced level of service quality? Second consideration is the relationship between extrinsic and intrinsic technical quality. The practice of reticulated water supply shows that these are not the same, due to the difference in experience and credence qualities. Quantitative research is required to further investigate this issue. These deliberations lead to the following null-hypotheses that require further research:

$H1_0$: There is no correlation between technical quality and functional quality.

$H2_0$: Intrinsic technical quality is equal to the extrinsic technical quality.

These hypotheses will be need to tested using quantitative research, including testing the model for construct validity.

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