



Application of Digital Intelligence to Real Estate Technology Service Quality: A Conceptual Model

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DOI: <https://doi.org/10.30880/jtmb.2021.08.02.002>

Received 08 June 2021; Accepted 15 August 2021; Available online 26 December 2021

Abstract: The occurrence of this present global pandemic has further heightened the need for the full adoption and maximisation of digital technologies service-related activities within the built environment. For instance, the disruption in real estate transactions has since demanded digital technologies in its service delivery. With the adoption of real estate technologies (such as artificial intelligence, lease extraction technologies, Internet of Things, property passports, machine learning, automated valuation model, blockchain, and smart contracts, among others) for the global best practice, digital competencies, skills and attitudes are needed by real estate service providers to sustain the future of real estate transaction in the service industry. The new concept of digital intelligence is a set of skills needed by real estate service providers to meet digital technologies' demand in real estate transactions and the digital world's challenges. Incorporating this concept in real estate technology service quality would help fulfil customers' satisfaction, commitment, and retention in the service delivery. Therefore, this article is pertinent to review service quality models relevant to real estate service and develop a useful service quality model using digital intelligence in service delivery.

Keywords: Digitisation, digital intelligence, real estate, service quality, proptech

1. Introduction

Data is inevitable at every process involved in real estate transactions. Investors need information on an asset's performance index, cash flows, risks, maintenance, capital expenses, tenancy schedules, building operations, and spatial analysis among others in real estate investment. Data generated in this process needs to be transferred efficiently among current owners, legal advisors, real estate professionals, and other construction industry professionals. However, processes involved in real estate transactions could be subjected to inefficiency and delays. Inefficiency in real estate transactions could result from the difference between the perception and actual expectation in service delivery. The concept of service quality (SERVQUAL) enables management to identify inefficiencies and delays and thus help plan for the launch of quality improvement programs, profitability, and overall performance to enhance service delivery efficiency (Preko, Agbanu & Feglo, 2014).

Measuring service quality is an essential tool to understand the service gap between what professionals perceive as customers' needs and the customers' actual expectations of the service gap between what professionals perceive as

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customers' needs and customers' expectations. Therefore, knowledge derived could help develop an efficient technique for measuring customers' satisfaction in service delivery. Customers expect a satisfactory service delivery at all touchpoints in real estate transactions both in the physical and digital worlds. In real estate service quality, analogue and digitised techniques for measurement in service delivery have defined data collection, interpretation, management, transaction, and recording to achieve customer satisfaction. However, analogue techniques in service quality are determined by competencies, such as service reliability, assurance, reliability, responsiveness, and empathy. Digital transformation has led to the adoption of digitalised techniques of transacting real estate in the service industry to achieve customer satisfaction (Akinwamide & Hahn, 2021). Digitalised data allows computer programs to take the initiative while executing tasks without human intervention. Many start-up companies in real estate technologies (such as PropTech, FinTech, ConTech, BIM, Smart City, among others) currently offer digitalised platforms to enhance real estate transaction processes.

Digital transformation is the future of technologies that would eventually automate the traditional approach of doing things. Saull & Baum (2019) avow that the adoption rate of new technologies such as Big Data, Blockchain, automation, Internet of Things, smartphone apps, geospatial and 5G technologies, drone, sensors, Artificial Intelligence, and Machine learning in real estate industry is appalling. Technologies like Blockchain are regarded as disruptive innovations in real estate transactions because they change the current role of stakeholders' disruptive designs in real estate transactions. After all, they change the current position and functions of stakeholders in the real estate industry. The problems associated with digital techniques include data transfer in real estate transactions, data security, legal framework and technology transparency, social barriers, and trust in innovation. As a result of these technological opportunities, real estate firms make adequate improvements in their service delivery while real estate professionals adjust to real estate practice to achieve customers' satisfaction (Deloitte, 2017).

Furthermore, customers are reluctant to adopt new technologies because of the lack of trust based on their understanding of real estate transactions to achieve increased efficiency to specific stages and processes. According to Deloitte's (2018) information, the use of PEXA and Chain Matrix tends to favour an expected service rate at the expense of efficiency. This prevents the conveyancer from entering the transacted documents into the Chain Matrix platform. Coupled with the lack of adequate real estate knowledge, competencies, attitude, and skills among real estate professionals, there is a paradigm shift in the level of use and transparency of technology for real estate transactions in the real estate industry. The understanding of digital transformation has gone beyond leveraging the adoption of digital technologies and data to solve problems; it also includes how servicing customers can derive maximum satisfaction in service delivery.

According to Baum (2017), real estate service providers lack the appropriate strategies with the determination to protect incompetent fee-earning practices. Given this, real estate professionals need some degree of competencies and skills to achieve customers' satisfaction in practice and the digital world. Park (2016) defined Digital Intelligence (DQ) as the set of social, emotional and cognitive abilities that empowers an individual to handle the challenges and demands of digital life. DQ's concept includes eight interconnected skills and competencies: digital identity, digital use, digital safety, digital security, digital emotional intelligence, digital communication, digital literacy, and digital rights. To achieve customer satisfaction in the digital age era, this article reviews service quality models relevant to real estate and develop the best real estate technology service quality model while applying digital intelligence in service delivery.

2. Overview of Real Estate Technology

However, as with the introduction of any industry-disruptive technology, there can be associated with risks. Property buyers, sellers, and financiers should be aware of these risks as they enter the new era of electronic real estate transactions. Real estate technology could be referred to as the software tools and platforms (such as social media) adopted by professionals in the real estate industry (Olukolajo, Ojo & Akinwamide, 2015). These software tools and platforms include Big Data, Blockchain, automation, the Internet of Things, websites and smartphone apps, geospatial and 5G technologies, drone, sensors, Artificial Intelligence, and Machine learning (Akinwamide & Hahn, 2021).

In early 2016, a total number of 1,137 Real Estate Technology companies across 12 categories (i.e., online real estate rental and buying guides) was tracked by Venture scanner with a funding of \$16.99 billion combined. Furthermore, in late 2016, a total number of 1,258 Real Estate Technology companies in 12 categories across 61 countries were tracked with a total fund of \$28 billion by Venture Scanner. In view of this, it was reported by Real Estate Tech in 2017 that venture capitalists became further careful, preferring to back only established businesses (Baum, 2020). However, Property Technology (PropTech) could further be regarded as the real estate industry's broader digital transformation. According to Baum (2017), PropTech is a series of verticals that enable information, marketplace/transactions, or control/management, obtainable through the industry horizontals of Real Estate FinTech, Shared Economy, and Smart Real Estate. According to Obando (2019), investment in PropTech companies globally hit \$14 billion in the first half of 2019. This is more than all of the year 2017 combined, which saw a record \$12.7 billion in PropTech investment and a 309 percent increase from the first half of 2018. Studies had shown that real estate and its associated segments account for about 17-20% of global gross domestic product, which makes the sector more significant than the securitised debt and equity market globally" (Phillips, 2019).

Traditional real estate companies are also highly active in this field. With revenue streams under threat from alternative business models such as the "WeCompany", the industry is turning towards technology to maintain a

competitive advantage. According to Altus Group (2019), 53% of 400 major real estate companies surveyed are directly investing in at least one type of PropTech firm. The US offers a large domestic market, and investment comes in far bigger sums, and its influence on PropTech is likely to increase. While the US and China have a disproportionate amount of PropTech unicorns, there is a lack of representation in Africa (Kejriwal & Mahajan, 2018). Hughes (2019), in his analysis of regional real estate markets' digital transformation 'preparedness', finds that the US and European real estate markets are vastly more prepared to thrive in the digital era than those of Asia, Africa and South America. This explains the need for change in service delivery within the real estate industry and its consumers' satisfaction regarding technology-driven innovation in data assembly, online transactions, and the design of buildings and cities (Baum and Dearsley, reported in Davenport, 2019).

2.1 The Concept of Service Quality

According to Bitner & Zeithaml (2000), service quality is a critical element of customer perceptions and may be vital in determining customer satisfaction. Quality is derived when it conforms to specification and fits its intended purpose (De Vries Jr *et al.*, 1999; Buttle, 2004). Fitzsimmons & Fitzsimmons (2006) point out that service quality is assessed during the service delivery process. According to Baron *et al.* (2009), there are two elements of service quality. They are the technical quality (the quality of the service delivered) and functional quality (the way the service is offered). For instance, in letting a property, the prospective tenants adjudged the service on their perception of the quality of the property finishes (technical outcome quality) and that of the quality based on their perceptions on how the property was delivered (functional outcome quality).

Both the technical and the process characteristics are essential factors in customer perception of service. When customers are not sure of the service's process aspect, they will tend to use the technical quality in evaluating the service and vice versa. According to Bitner *et al.* (2009), "customers do not perceive quality in a one-dimensional way but rather judge quality based on multiple factors relevant context." Parasuraman *et al.* (1994) identified five determinants of service quality, namely; tangibles, reliability, responsiveness, assurance and empathy (see fig. 1)

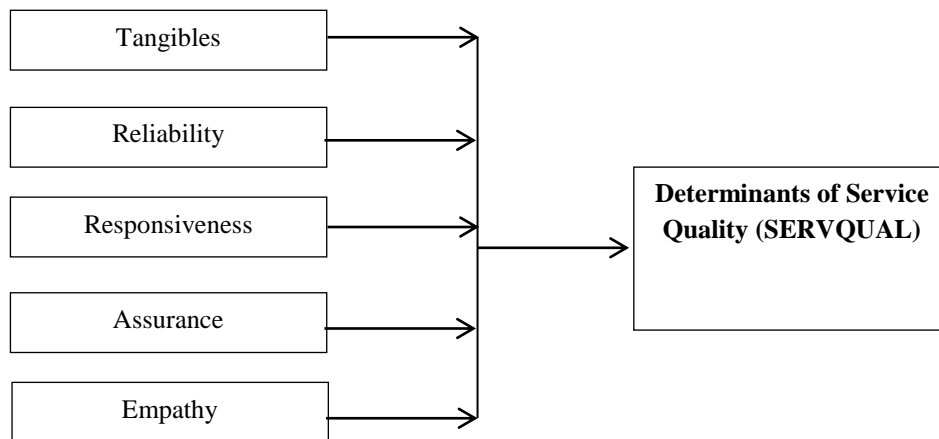


Fig. 1 - Determinants of SERVQUAL

From the diagram, service quality is seen to be one that can be determined by some specific dimensions or attributes. These include tangibles, reliability, responsiveness, assurance, and empathy. Service quality is a constituent of customer satisfaction. Although satisfying consumer needs is a broader concept, aside from service quality, it can also be dependent on the quality of the product, the price paid for such product, the situational surrounding the acquisition of the product, and the intrinsic to the purchaser. For instance, in the leasing of property, a prospective tenant may appraise the quality of service received from the real estate firm during the transaction process by looking at the specific service dimensions of reliability, responsiveness, assurance, empathy, and tangibles. However, even if the prospective tenants are happy with the quality of service provided, they will need much more than the quality service to have customer satisfaction. Prospective tenants might consider factors such as product quality, price, personal characteristics and situational factors when leasing an apartment. These factors will determine customer satisfaction with the real estate firm's service quality.

2.2 The Concept of Digital Intelligence

Digital transformation has led to the globalization of real estate markets, digitisation of real estate practice, and the Fourth Industrial Revolution's continued growth. As a result of this digital disruption in real estate transactions, digital intelligence has become a key competence for the future practice of real estate for both professionals and firms, in addition to other traditional business skills. The concept of digital intelligence in the real estate profession connotes the ability to acquire and apply new knowledge, competencies, and skills related to digital technologies (such as Big Data,

Blockchain, automation, Internet of Things, websites and smartphone apps, geospatial and 5G technologies, drone, sensors, Artificial Intelligence and Machine learning among others) (Akinwamide, 2021b).

However, DQ goes beyond the ability. It also involves how data generated and exploited from digital technologies could improve users' experience, optimise operational efficiency and achieve customers' satisfaction in service delivery. Digital intelligence is basically about real estate professionals' relationship with technology, while emotional intelligence deals with real estate professionals' relationship with clients and customers (Akinwamide & Bello, 2019b). Digital intelligence could, therefore, be the total of technical, cognitive, meta-cognitive, and socio-emotional competencies that empower real estate professionals to handle challenges and harness digital work-life opportunities (Akinwamide, 2021a; Akinwamide, 2021b). According to Park (2016) digital intelligence are broadly divided into eight (8) interconnected competencies as shown in Figure 2:

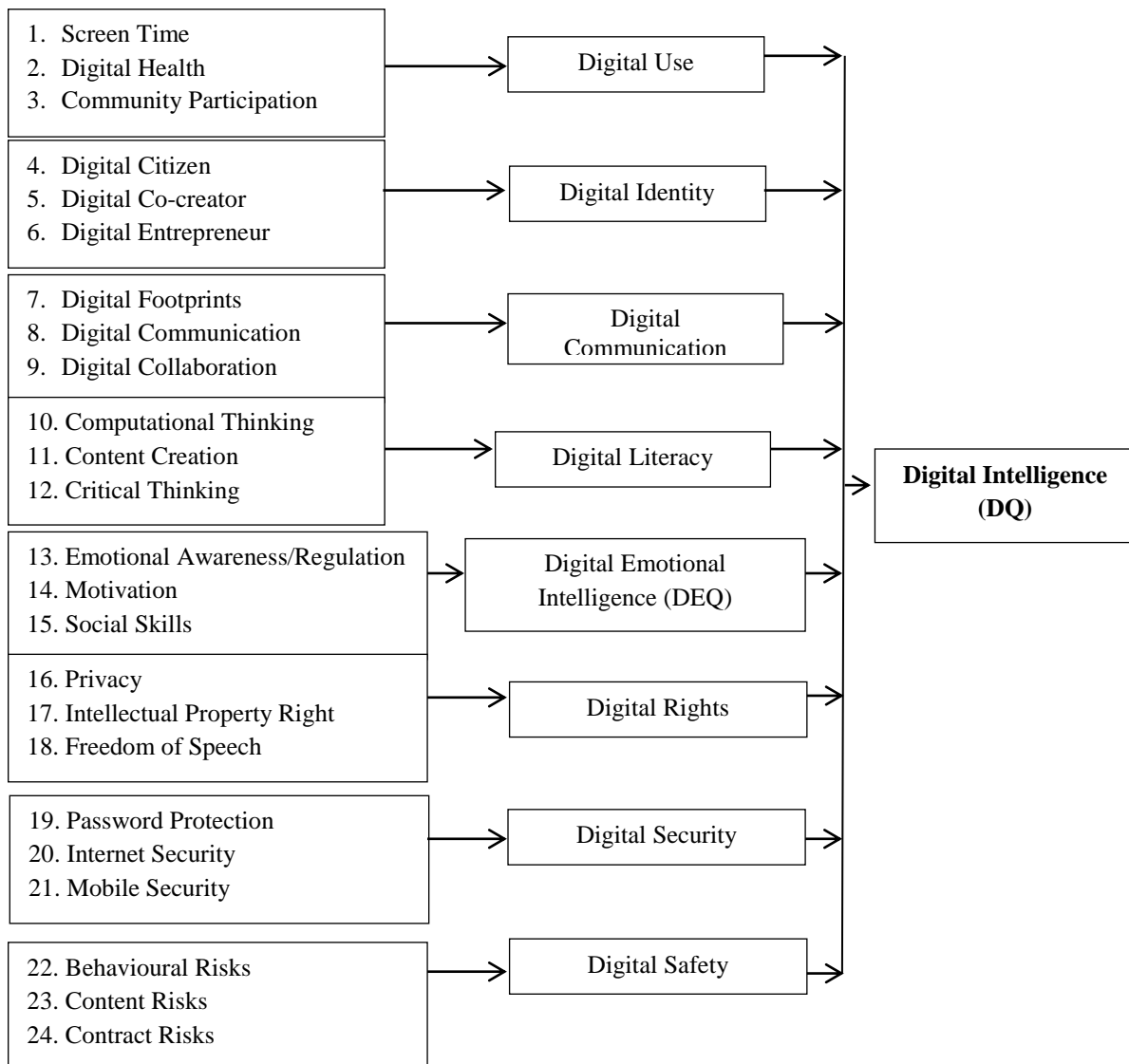


Fig. 2- Determinants of Digital Intelligence

- a) **Digital use:** The ability to use efficient and sufficient time on digital devices and media while ensuring a mastery control to achieve sound digital health and wellness for both online and offline life.
- b) **Digital Identity:** An individual's ability to effectively create and manage online identity, develop a sound online reputation, and control both the short term and long term impact on digital identity.
- c) **Digital Communication:** The ability to effectively communicate and collaborate with customers using digital footprints and signals in sharing of information.
- d) **Digital Literacy:** An individual's ability to adopt digital technologies to create and evaluate content while utilizing the best channels to share such content through computational thinking.
- e) **Digital Emotional Intelligence:** The ability to identify touchpoints, exercise empathy and build a sound relationship with online customers (Akinwamide & Bello, 2019a).

- f) **Digital Rights:** The ability to understand and support personal and legal rights such as digital privacy, intellectual property right, freedom of speech, and protection from hate speech.
- g) **Digital Security:** The ability to use suitable security tools for data protection, ensure secure internet access free from cyber threats (such as hacking, scams, and malware) and provide a secure mobile connection free from ransomware and virus attack.
- h) **Digital Safety:** The ability to manage and avoid online behavioural risks (such as cyberbullying, grooming, radicalisation), content risks (such as inaccurate or inappropriate information, violence and obscenity) and contract risks in an online transaction.

A real estate firm with the human capacity to develop digital intelligence among their employees can transform digital data into actionable, real-time, and customer-centric insights. For instance, an estate agent with the knowledge, skills and competencies in digital marketing would transform online customers’ feedback into actionable insight in service delivery (Akinwamide, 2021b). Furthermore, real estate firms with high digital intelligence can develop cross-collaboration among their practitioners to enhance innovations and ideas for development. As a result, DQ will become a vital employability skill required by real estate professionals to function in their real estate industry capacity. In view of this, the optimum goal of real estate educators/academics should go beyond thinking of Information, Communication and Technology (ICT) as a new educational platform, digital technologies also support e-learning (Dostal et al., 2017; Akinwamide, 2021c). Real estate educators/academics need to be well educated on the required knowledge, skills and competencies to excel in real estate technology services (Akinwamide, 2021a; Akinwamide, 2021c).

3. Conceptual Framework for Real Estate Technology Service Quality

This study developed a conceptual model for real estate service quality to effectively evaluate and determine customer satisfaction in delivering real estate technology services. Accordingly, customers’ needs were classified as functional, emotional, and digital markets in real estate service delivery. The service delivery needs were conceptualised into two instruments (i.e. SERVQUAL and DQ) for measuring the determinants of real estate technology service quality (RETSERV). Based on the tools adopted, the thirteen (13) determinants of RETSERV include service tangibles, assurance, reliability, responsiveness, empathy, digital identity, digital communication, digital literacy, digital emotional intelligence, digital rights, digital security, digital safety, and digital use. A total of 49 item wordings for the RETSERV determinants were adopted for the gap analysis between perceptions and expectations to achieve mental wellness and satisfaction in service delivery as expressed in Figure 3.

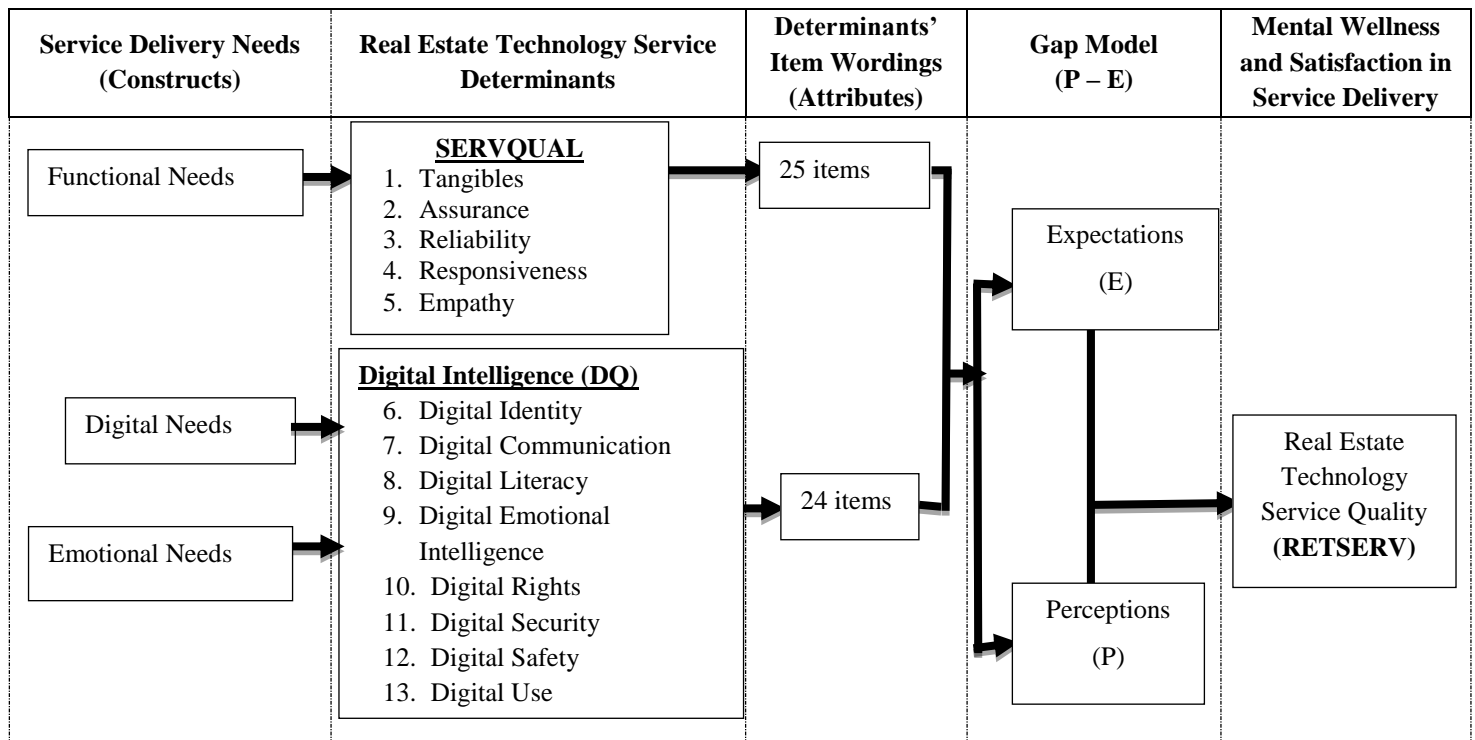


Fig. 3 - Conceptual framework for real estate technology service quality

3.1 Real Estate Technology Service Quality Attributes

Achieving mental wellness and customers' satisfaction in delivering real estate technology service could be determined by the customers' behaviour during the real estate transaction. However, customers' behaviour is based on their perception and expectation of real estate technology service quality in the transaction. Therefore, measuring the satisfaction level in real estate technology service delivery requires adopting various attributes (item wordings) of RETSERV determinants in the assessment. Table 1 itemizes forty-nine (49) characteristics of RETSERV determinants for measuring customers' satisfaction.

Table 1- Item wordings for Real Estate Technology Service Quality Determinants (Attributes)

A Service Tangibility

1. Office equipment in computerized modern-looking shape
2. Visual appealing of facilities
3. Professional qualifications of the service provider
4. The neat appearance of the service provider
5. Affiliation with other professional bodies and technology-based companies

B Service Reliability

6. Provision of service at the appointed time
7. Maintaining an accurate record and documentation of real estate transaction made
8. Advising service consumer on the best method of searching for real estate technology services
9. Providing a reliable and dependable service to achieve a flawless consumer experience
10. Office size and location in a good position.

C Service Responsiveness

11. Informing service consumers on the scheduled date of transaction.
12. Informing service consumer on the policies, terms, and conditions in the transaction.
13. Service providers' willingness to achieve customers' expectation in the transaction.
14. Request responsiveness to service consumers' needs
15. Maintaining frequent communication with the service consumer

D Service Assurance

16. Gaining confidence in service providers' transparency in real estate transaction
17. Assuring a safe transaction in real estate technology services
18. Service provider in consistent courteous in real estate transaction
19. Quality assurance on the knowledge and delivery of real estate technology services
20. Maintaining excellent integrity in real estate technology services

E Service Empathy

21. Providing personal attention to service consumers
22. Operating at convenient hours in real estate service delivery
23. Discerning service consumers' specific needs with a good display of empathy in real estate transaction
24. Ensuring that service consumers' best interests are considered first in service delivery
25. Informing and updating service consumers on information about matters of significant concern to them.

F Digital use

26. Spending efficient and sufficient time on digital devices responding to consumers' needs (i.e. screen time)
27. Ensuring a mastery control to achieve a sound digital health and wellness of service consumers in real estate technology service delivery.
28. Participating in various online communities (such as internet governance) to achieve quality delivery of real estate technology services.

G Digital Identity

29. Effective management of the service provider's online identity and developing a sound online reputation in real estate technology services.

-
30. Creating the company's brand awareness and controlling the short-long term impact on digital identity.
-
31. Utilizing digital technologies (such as Big Data, IoT, mobile and cloud solutions, etc.) to improve service quality and engage with service consumers.
-
- H. Digital Communication**
-
32. Effective use of digital footprints to understand the service consumers' behaviour in real estate transaction.
-
33. Frequent communication with service consumers using digital signals.
-
34. Adopting digital technology tools to collaborate, synthesize, and share information in real estate service delivery.
-
- I. Digital Literacy**
-
35. Automating solutions in real estate transaction through computational thinking in service delivery.
-
36. Creating content and utilizing the best channels to share digital media with service consumers in real estate technology services.
-
37. Evaluating content and critical thoughts through digital literacy in service delivery.
-
- J. Digital Emotional Intelligence**
-
38. Identifying touch points and understanding what data indicates through empathetic listening tools.
-
39. Evaluating data and knowing how to turn it into insight in real estate service delivery.
-
40. Knowing how data can drive digital consumer behaviour while applying it to ongoing consumer-brand relationships in real estate transaction.
-
- K. Digital Rights**
-
41. Adhering to service consumers' rights to digital privacy in internet policies for real estate transaction.
-
42. Having adequate knowledge of intellectual property rights and other legal rights in real estate technology services.
-
43. Ensuring freedom of speech and protection of hate speech in online real estate transactions.
-
- L. Digital Security**
-
44. Using secure password/tools for data protection in the online real estate transaction.
-
45. Ensure secure internet access free from cyber threats (such as hacking, scams, and malware) in online real estate transactions.
-
46. Ensure a secure mobile connection free from ransom ware and virus attack in online real estate transaction.
-
- M. Digital Safety**
-
47. Managing and avoiding behavioural risks (such as cyber bullying, grooming, radicalization) in online real estate transaction.
-
48. Managing and avoiding content risks (such as inaccurate or inappropriate information, violence, and obscenity) in online real estate transaction.
-
49. Managing and avoiding contract risks in real estate technology transaction in service delivery.
-
- Author's Construct (2020)

To effectively assess/evaluate customer satisfaction based on the stated attributes in Table 1 above, there is a need to check for the consistency and reliability of the data generated. However, the test of consistency and reliability would help determine the validity and originality of information supplied.

3.2 Conceptual Framework for RETSERV Gap Model

Gap model is expressed as the gap between the perceived service and the expected service in delivery. Five significant gaps were developed to analyze service quality to achieve maximum satisfaction (Zeithmal, *et al.*, 1985; Parasuraman *et al.*, 1988; Baffour-Awuah, 2018). According to Figure 4 below, two sections were designated in the real estate technology service quality gap model. The lower section designed for the service provider includes professionals' services in real estate and educators/academics in real estate education. However, consumers' behaviour in service expectation should be the optimum guidance for service providers' perception to design the best specification in service delivery. The best specifications result to an improved real estate service. While bridging the gap between service providers and consumers' understanding perceptions and expectations in real estate technology services helps achieve mental health and service delivery satisfaction. The upper section is designed for service consumers, such as real estate customers and students. However, consumers' behaviour regarding their perception and expectation in real estate technology services is influenced by their experience, personal needs (such as functional, digital, and emotional needs), and other associated communication through advertisement. For this study, the five gap models conceptualized for real estate service quality are expressed:

GAP 1: This is referred to as "Knowledge gap in real estate service quality model" (Shahin & Samea, 2010; Baffour-Awuah, 2018). This is the gap between the real estate consumers' expected service and management

perception of consumers' behaviour in service expectations in delivering real estate technology services. However, this gap discrepancy emanates from fundamental knowledge difficulty for management in meeting service expectations in RETSERV. This could be due to management's poor understanding of consumers' behaviour or lack of proper competencies in the delivery of property technology services. Relevant management competencies, processes, techniques, skills, attitudes, knowledge, market analysis mechanisms, and strategies are needed to be considered regarding this.

GAP 2: This is known as the "Standard Gap" of real estate service quality model (Baffour-Awuah, 2018). The difference between managements' perception of consumers' behaviour in service expectation and the specification of real estate technology service quality. This discrepancy arises from unsuitable real estate technology service quality standards, inappropriate planning procedures, deficient dedication to service quality, and inadequate job standardization.

GAP 3: This is known as the "Service Performance Gap model" of real estate service quality (Shahin & Samea, 2010). It's the difference between the specification of service quality and the delivery of essential service in real estate technology. This gap emanates from poor employee-job fit, low working environment, insufficient supervisory measures, improper organizational culture, poor teamwork and role ambiguity.

GAP 4: This is known as the "Service Delivered – External Communication Gap model" in real estate service quality (Shahin & Samea, 2010). It's the discrepancies between service providers' service and the communicated services to consumers/customers in real estate transaction. This gap emanates from promised services externally communicated to customers in public and the actual services delivered in real estate transaction. This gap also arises from inadequate parallel communication, the inappropriate link between communication planning and available real estate technology services, disparity between service specifications and managerial performance (i.e., the tendency to overstress to fit into overstressed promised real estate technology services and routine).

GAP 5: This is the gap between service consumers' perception and expectations in real estate technology services provided in real estate transactions. The real estate technology service gap model shows the factors influencing the gap. These include oral communication, previous experience in real estate service and consumer needs (such as functional, emotional, and digital needs).

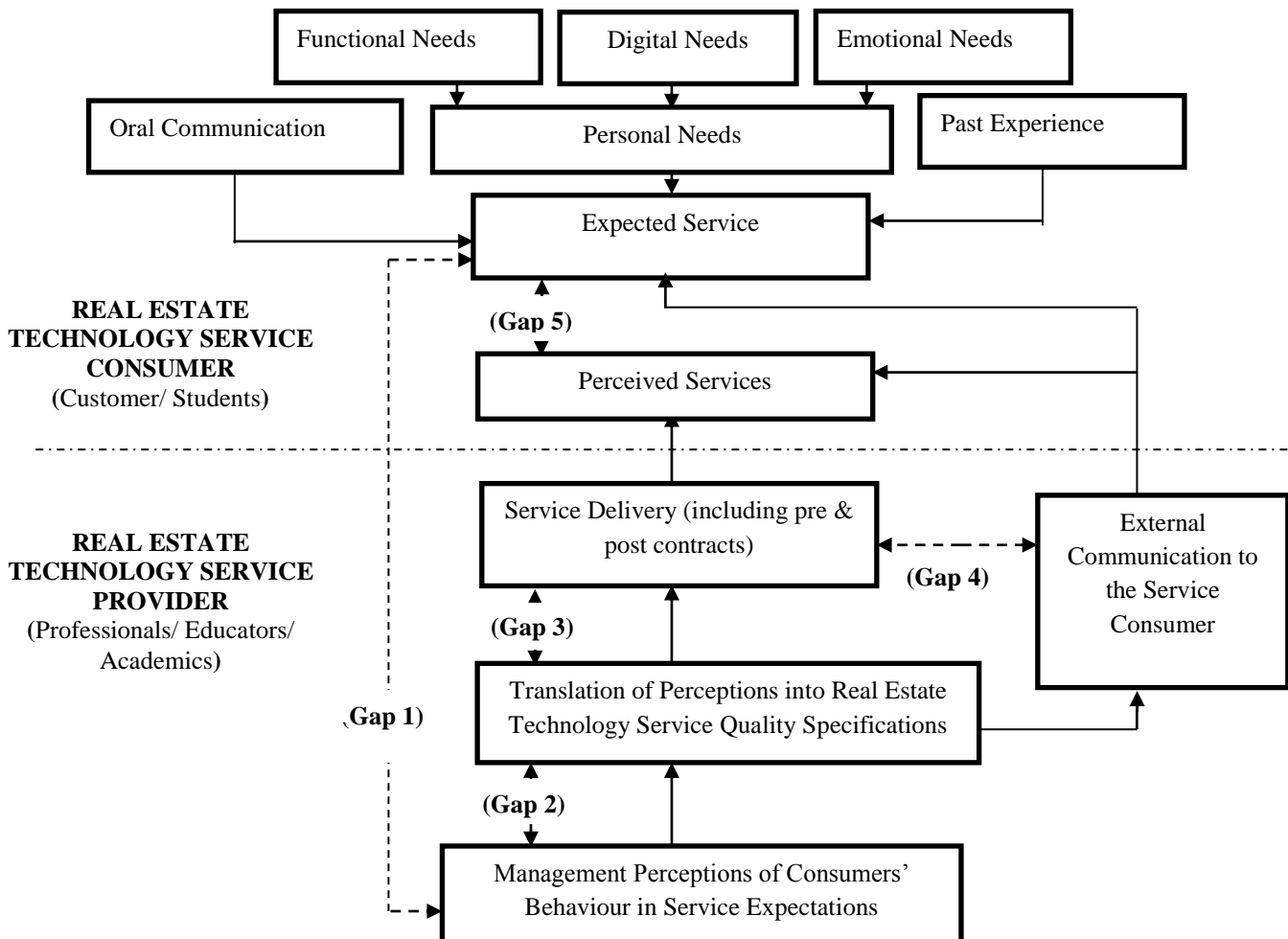


Fig. 4 - Proposed Gap Model for Real Estate Technology Service Quality

4. Conclusion

This article has reviewed service quality models relevant to real estate. The best real estate technology service quality model has been developed to apply digital intelligence in service delivery to achieve customers' satisfaction. The model designed for real estate technology service quality conceptualises customer needs (i.e. functional, emotional and digital needs) into two main measurement instruments (i.e., SERVQUAL and DQ) to achieve customer satisfaction service delivery. However, thirteen determinants were generated from these instruments for a practical assessment. Therefore, it can be concluded that this article has unveiled the need for digital intelligence as one of the employability skills in real estate practice. This article recommends that real estate firms adopt this conceptual model to effectively evaluate real estate technology service quality's performance on demand for digital needs in customers' satisfaction. Furthermore, further research is needed to check the credibility, validity, and reliability of the instruments adopted for the proposed model for measuring real estate technology service quality in service delivery.

Acknowledgement

We wish to acknowledge the generous support of Dr. Tunbosun Oyedokun, School of Social and Political Sciences, University of Glasgow, United Kingdom for his intellectual guidance and commitment for making all necessary corrections. Furthermore, special appreciation goes to the anonymous reviewers who helped in making the research paper better.

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