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INTEGRATION OF SERVPERF IPA AND QFD IN IMPROVING THE QUALITY OF CONSTRUCTION ENGINEERING CONSULTANT SERVICES BASED ON THE CLIENT'S PERSPECTIVE

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ABSTRACT: B2B services in the consulting industry form the foundational basis of interaction between clients and consultants. In the construction sector, the quality of services provided by engineering consultants has become a primary concern for clients, particularly due to the rising number of complaints regarding services that fall short of expectations. Several case studies, as revealed by PERKINDO, indicate that clients face issues such as miscommunication regarding project progress, inaccurate cost estimations, project delays, and poor accuracy of technical documents. In response to these challenges, this study aims to improve the service quality of engineering consultants in construction based on the client's perspective by integrating the SERVPERF (Service Performance), IPA (Importance-Performance Analysis), and QFD (Quality Function Deployment) methods. SERVPERF is used to evaluate perceived service performance, IPA to identify the Voice of the Customer, and QFD to translate client expectations into actionable technical specifications. The findings of the study indicate that out of 20 service quality attributes distributed across six main dimensions (Tangibles, Assurance, Reliability, Responsiveness, Empathy, and Flexibility), there are nine attributes that are most critical and best represent the client's voice. Accordingly, the prioritized service quality improvement recommendations include: (1) The implementation of modular service design along with agile and lean project management methodologies; (2) The establishment of two-way communication through real-time progress notifications and the appointment of a client engagement officer via regular weekly meeting agendas; (3) The implementation of multi-level peer reviews, regular quality audits of documents, and the deployment of a cloud-based integrated document management system enhanced by automated numerical and qualitative testing.

Keywords: Construction Engineering Consultant, Service Quality, ServPerf, Importance Performance Analysis (IPA), Quality Function Deployment (QFD)

INTRODUCTION

In the construction industry, engineering consultancy services play a crucial role as intermediaries between clients and contractors. These consultants are responsible for providing technical guidance, supervising project execution, and controlling cost and quality to ensure successful project delivery. However, service quality often falls short of client expectations. According to PERKINDO (2024), many clients in Indonesia experience service mismatches, including miscommunication on project progress, delayed technical responses, and substandard design documentation. This indicates a persistent gap between expected and

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actual service delivery in engineering consultancy. Similar issues are found internationally; Dosumu and Aigbavboa (2019) reported significant discrepancies in service quality in Lagos, particularly in reliability, project communication, and cost planning accuracy. Key aspects valued by clients—such as risk clarity, information transparency, and consultant professionalism—remain underdelivered, often leading to cost overruns, delays, and dissatisfaction. Umam et al. (2017) further emphasize that internal human resource quality and a firm's ability to ensure work quality are critical factors influencing client satisfaction.

These recurring issues highlight the urgency of systematically and objectively measuring service quality from the client's perspective, rather than relying solely on internal assumptions. One suitable approach is the SERVPERF model, which evaluates service performance across five key dimensions: tangibles, reliability, responsiveness, assurance, and empathy. However, given the multifaceted and stakeholder-intensive nature of construction projects, SERVPERF should be integrated with complementary tools. Importance-Performance Analysis (IPA) can be used to identify priority areas for improvement, while Quality Function Deployment (QFD) enables the design of service enhancements that are directly aligned with client needs. Together, these methods offer a structured and client-oriented framework for improving the quality of engineering consultancy services.

The study is designed to prepare a framework that improves the service quality of construction engineering consultancy through using the SERVPERF, IPA, and QFD methods. This research is meant to provide a service quality model that answers what customers require and increases the competitiveness of construction engineering consultants.

The purpose of the research is to discover (1) what clients believe about the service quality attributes in construction engineering consultancy services. Which of the service quality aspects are most important to clients' overall satisfaction? (3) What helpful suggestions can be given to better serve the quality of construction engineering consultancy services?. Corresponding to the issues discussed, the study aims to: (1) Review how construction engineering consultancy services perform through clients' eyes by applying the SERVPERF method; (2) Identify essential service attributes that greatly influence client satisfaction with the IPA method; and (3) Suggest actions for service quality improvement using the QFD method by lining clients' expectations with what the company can achieve internally.

The research is expected to help in theoretical and practical matters. It makes an important addition to theory by covering different quality measurement processes within construction consultancy, according to SERVPERF, IPA, and QFD. In practice, the study helps engineering consultants with strategies and tips to offer better services, satisfy clients, and improve the competitiveness of their organization in today's construction industry market.

RESEARCH METHODOLOGY

The research design used in this study is quantitative and research output in a qualitative form (practical recommendations), namely research whose data is processed and tested with a statistical approach (Validity Correlation Pearson Test, Validity Exploratory Factor Analysis Test and Cronbach Alpha Reliability Test). Table r from sum sample says that the minimum pearson coefficient is less than 0,396. It is also necessary to ensure a positive result in feasibility for service quality attributes in EFA tests, which means the KMO coefficient should be over 0.6, the result from the Bartlet test should be less than 0.05, the communality should be higher than 0.5, and the loading factor should be above 0.3. In the reliability test, Cronbach alpha performed better than 0.7. When everything is satisfied, the factor is seen as feasible and valid,

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and analysis for the factors can move ahead. Should it be found below the minimum value, it should be viewed as a reason to replace or eliminate it.

The research population includes business-to-business interaction participants from engineering consultancy work, specifically primary data from clients (such as owners, contractors, etc.) who have previously collaborated with construction engineering consultants. The sampling technique used purposive sampling to ensure that respondents met the relevant characteristics/criteria for the study. The respondent characteristics were as follows: 1) They have been clients (owners and contractors) of a construction engineering consultancy providing project management and engineering design services in Jakarta and Surabaya, Indonesia; 2) They have had experience working with a construction engineering consultancy on project management and engineering design services at least twice within a three-month project period; 3) They have at least up 4 years of work experience. After obtaining data from the client respondents, feedback data from the consultants was needed to formulate practical recommendations for improving the quality of services provided by construction engineering consultants. The criteria for respondents from the consultant's perspective were: 1) They are construction engineering consultants offering project management and engineering design services based in Jakarta and Surabaya, Indonesia; 2) They have experience working with clients in project management and engineering design tasks. The sample size of the study was taken from the number of clients who had worked with an EPC consulting firm. In this case, it is assumed that the number of samples taken from a document (Ministry of Public Works, 2014) which contains the amount of data on national construction service business entities that the total national client population (contractor).

1) Data Collection Stage: Identification of service quality attributes, namely Tangibles, Reliability, Assurance, Responsiveness, Empathy and Flexibility as many as 24 attributes based on previous reference references (Abu Oda et al., 2022b; Aluko et al., 2021b; Oyeyipo et al., 2022; Samson & Parker, 1994). 2) Data Collection Stage: Conducting questionnaire preparation and distribution of questionnaires to clients from engineering consultants. 3) Data Collection Stage: Conduct validity tests and questionnaire reliability tests. If it is not suitable, the attribute adjustment will be repeated. 4) Data Processing Stage: Conduct SERVPERF analysis by calculating the level of satisfaction of respondents and the level of importance of engineering consultant service quality attributes based on the respondent questionnaire obtained. 5) Data Processing Stage: Next, IPA analysis by calculating the gap in the level of importance and service quality satisfaction to find out which quadrant position of service quality attributes will be prioritized which will be used as the Voice of Customer for QFD analysis through the HoQ matrix. 6) Data Processing Stage: Based on the results of the analysis of the priority quadrant of the IPA attribute, then the input of the Voice of Customer in the planning matrix for the creation of a HoQ matrix aimed at formulating practical recommendations for improving service quality attributes using the QFD method. 7) Final Stage: Providing practical recommendations based on QFD analysis that aims to improve the quality of engineering consultant services as well as conclusions & research suggestions that support further research.

Some of the experience features receive a valid rating for the item (Pearson correlation) but fail the construct's validity test (applying EFA shows low communality for A3, A5, B2 and E4). One item-total pearson correlation value shows how much that item is related to the overall score of the construct. Here, communality shows the proportion of an item's variation that is explained by a common factor. As explained by (Hair et al., 2010), if the communality of an attribute is less than 0.5, it should be considered for exclusion since it does not display enough difference with the observed factor. Thus, we can say that an item with a communality value smaller than 0.5 may not help much in defining the factor and should be removed. Because of that, the analysis of the service quality attributes originally based on 24 attributes and 6 dimensions (Tangible, Assurance, Reliability, Responsiveness, Empathy, & Flexibility) is being cut to 20 attributes.

Data collection was carried out by surveying questionnaires to respondents, namely 33 clients who had worked with construction engineering consultants with profiles (age, job position, length of work experience, type of company, business field, type of service, and scale & frequency of projects. In this study, external factors such as economic conditions, government regulations, the level of intense business competition and the impact of technology application were not considered.

RESULT AND DISCUSSION

Service Performance Analysis (SERVPERF)

In the measurement of SERVPERF, the aim is to find out the client's perception of performance satisfaction (reality) on service quality, in the context of this research from the object of the construction engineering consultant. In addition, to find out the priority of attributes that want to improve the quality of their services by assessing the client's perception of the importance of the quality of the construction engineering consultant's service quality attributes. Therefore, it is concluded that all service quality attributes of construction engineering consultants get gaps in client satisfaction and interests that need to be improved to improve service quality and meet client satisfaction as visualized in Figure 1 graph as follows.

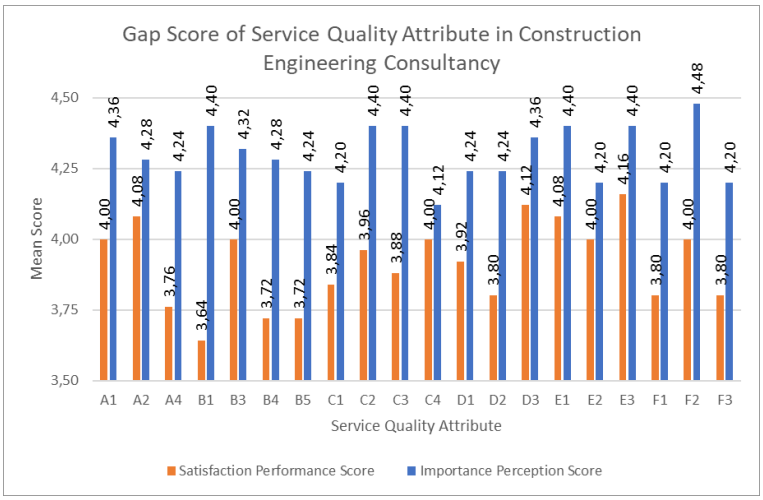


Figure 1. Gap in Client Satisfaction and Importance Score on the Service Quality Attributes of Construction Engineering Consultants

From the results of the servperf research questionnaire above, it is summarized per category of service quality dimension with the results of the gap value *of the Tangibles* dimension with a value of 0.34, *the Assurance* dimension with a value of 0.54, *the reliability* dimension with a value of 0.36, *the Responsiveness* dimension with a value of 0.33, *the Empathy* dimension with a value of 0.25, *the Flexiblity* dimension with a value of 0.42. Therefore, it is interpreted that the entire dimension that includes service quality attributes is needed to improve service quality in the current situation of construction engineering consultants.

The results of high expectations values in the dimension of service quality resulting in value gaps are strengthened by research according to (P. Juanzon, 2019). In this study, it is stated that the value of client satisfaction expectations is high in the *dimensions of Reliability, Responsiveness, Assurance,* especially the *Reliability dimension* because this dimension is the most important factor in implementing quality services for clients and construction engineering consultants. The following graph in value of client satisfaction and interest in the quality of construction engineering services.

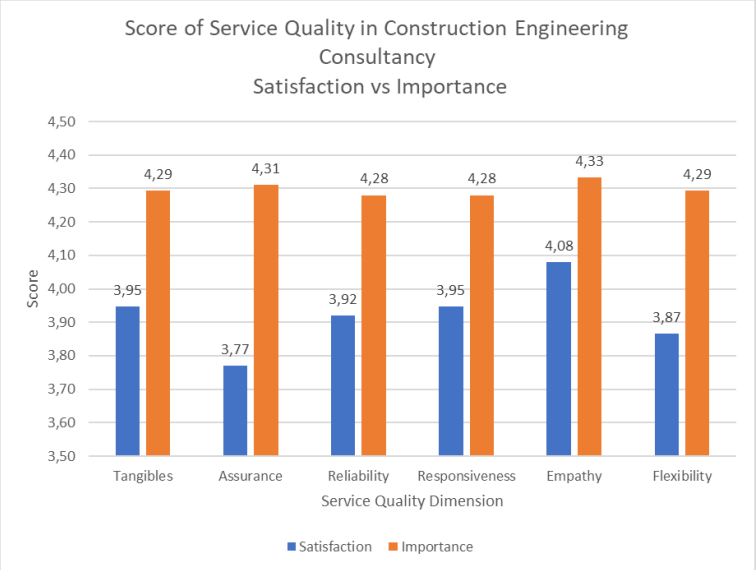


Figure 2. Client Satisfaction and Importance Score on the Dimension of Service Quality of Construction Engineering Consultants

From the performance satisfaction value, *the Tangibles* dimension with a value of 3.95, *the Assurance* dimension with a value of 3.77, *the* Reliability dimension with a value of 3.92, the Responsiveness dimension with a value of 3.95, the Empathy dimension with a value of 4.08 and the Flexibility dimension with a value of 3.87 and compared to the target values listed in Table II 1 Target Value of Construction Engineering Consultant Service Quality Dimension based on (Samson & Parker, 1994). Hence the benchmark assessment of the study (Samson & Parker, 1994) is in accordance with the current client's assessment of the need for all dimensions that include service quality attributes in order to improve the service quality of construction engineering consultants for the time being.

Client Needs Priority Analysis (IPA)

The importance of different client needs was checked through a scientific analysis after the SERVPERF analysis showed the results. At this step, the findings from quadrants A and B of IPA are added to the Voice of the Customer (VoC) in the Quality Function Deployment (QFD)

matrix along with the House of Quality (HoQ) table. The main goal is to put forward an appropriate and purposeful way to improve how products are developed. The purpose of this integration is to make sure customer expectations are met by structuring a way to rank their essential needs in terms of importance and accomplishment.

Quadrant A, which includes areas that are crucial but do not perform well, is very easy to pinpoint with the help of the IPA tool. If critical factors are mapped in a HoQ matrix, product teams can pay attention to aspects that customers are not satisfied with and make the development process more effective for everyone. We should not forget quadrant B as well, since representing values of importance and performance helps the business to hold and strengthen its lead in product design. This way of working improves the customer focus in the HoQ matrix and helps guide the use of resources to the areas with the greatest effect on customer satisfaction.

Furthermore, because QFD and IPA provide a structured approach, the collaboration between different teams is improved, making sure everyone agrees on what the customers require and what the product intends to achieve. That being said, it is necessary to watch out for any problems that can arise from such integrations. The results of scientific studies rely on having quality data and on how the analysts view what is important and how well a company is doing. Moreover, the way the organization integrates should be thought out so as not to disrupt the management and focus of the HoQ matrix. Ensuring that all the factors are considered is crucial for using IPA information with QFD effectively, which results in a product development process that responds well to customers and makes everyone happier.

Figure 3 includes a quadrant diagram that shows how the science analysis covered the quality of service aspects of construction engineering consultants.

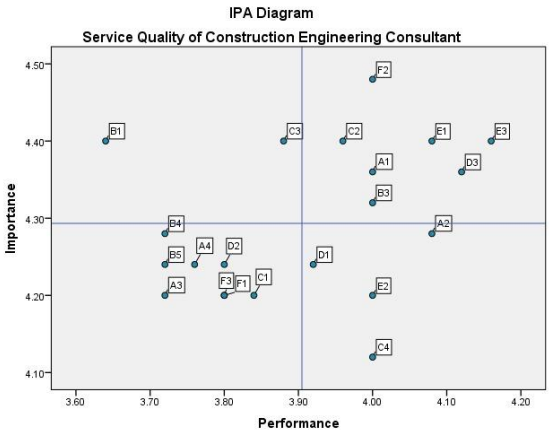


Figure 3. Science Quadrant Diagram on Construction Engineering Consultant Service Quality Attributes.

House of Quality Analysis

The formulation of priority practical recommendations that will be the research is through the *House of Quality* (HoQ) method approach which is a framework design known as *Quality Function Deployment* (QFD). The arrangement of HoQ is described as a house building that is mapped according to its function defined in the form of a matrix. These matrices consist of: (a) Customer Needs (Voice of Customer), (b) Customer Priority Level, (c) Competitive Assessment, (d) Technical Requirements (Response), (e) Relationship Matrix, (f) Correlation Matrix, Target Values.

The preparation of the HoQ is carried out by formulating a VoC taken from the output of the science analysis, then the formulation of a technical response to the *technical requirements*

matrix through an interview method with the construction engineering consultant and the results of knowing the elaboration of the results of practical recommendations are described through a matrix of *target values*.

a. Voice of Customer (VOC)

The VoC matrix consists of a picture of the client's needs and expectations. The client will provide an assessment of the perception of the quality of service provided by the construction engineering consultant. It is necessary to prioritize client needs formulated from 20 service quality attributes that have been assessed by the client so that through the IPA method it is filtered into 10 service quality attributes and their descriptions that will be used as *Voice of Customer* in the HoQ analysis presented in Table 1 below.

Table 1. Voice of Customer in the HoQ Matrix

Variable	Attribute	Description
B1	On-time Work	All stages and the entire project are completed according to the set schedule.
A1	Document Accuracy	All project documents, such as designs, specifications, and reports are prepared clearly and accurately
F2	Flexible Solutions	Offering innovative design solutions tailored to client needs.
C2	Standard Conformity	Comply with relevant standards, regulations and codes
C3	Maintenance of Confidentiality	Maintain the confidentiality of client data and information
E1	Service Personalization	Providing attention and services tailored to the client's needs.
E3	Enthusiasm for Clients	Demonstrate a genuine interest in meeting the client's expectations.
D3	Staff Availability	Staff who are always ready to help clients' needs.
B3	Team Coordination	Cross-disciplinary engineering cooperation to achieve project objectives.

b. Customer Priority Level

This matrix is built from 2 assessments called the Importance to Customer and the Customer Satisfaction Performance. The data shown in the table below comes from Table 2.

Table 2. Client Satisfaction and Importance Score in the HoQ Matrix

Voice of Customer	***Customer Importance Rating***	***Satisfaction Rating***
On-time Work	4,40	3,67
Document Accuracy	4,36	3,67
Flexible Solutions	4,48	3,33
Standard Conformity	4,40	3,67
Maintenance of Confidentiality	4,40	4,33
Service Personalization	4,40	3,67
Enthusiasm for Clients	4,40	3,33
Staff Availability	4,36	5,00

Team Coordination	4,32	3,67

c. Competitive Assessment

In the *Competitive Assessment matrix*, there is a competitor satisfaction performance value used to evaluate the performance of satisfaction in the context of competition In this case, the consultant's perspective is taken from a consulting company called ITSK (ITS Kemitraan) so that a performance assessment from a construction engineering consulting company of the same kind (different business fields, etc.) is needed. The following is the matrix data presented in Table 3 below.

Table 3. Competitor Satisfaction Performance Assessment on the HoQ Matrix

Voice of Customer	***Competitor Rating (SPL)***	***Competitor Rating (JPS)***	***Competitor Rating (XYZ)***
On-time Work	4,00	4,00	4,08
Document Accuracy	4,00	4,50	4,00
Flexible Solutions	3,86	4,00	3,85
Standard Conformity	4,00	4,50	3,77
Maintenance of Confidentiality	3,86	4,50	3,92
Service Personalization	3,86	4,50	4,08
Enthusiasm for Clients	4,00	4,00	3,77
Staff Availability	3,86	4,50	3,92
Team Coordination	4,00	4,00	4,08

d. Technical Requirements

The *Technical Requirements matrix* is a formulation process carried out by the company to meet the needs and desires of clients/customers. The formulation of technical responses can meet more than 1 VoC. In this matrix, the technical response was formulated by one of the top construction engineering consultants who serve engineering design and project management, namely ITSK (ITS Partnership). This data was collected through an online interview on April 26, 2025. The following is the technical response data that has been qualitatively processed by the researcher presented in the following:

a. Suggestions of multi-level checks by peers, regular checks of document quality, and the presence of a common cloud system of document management, which is facilitated by automatic confirmation of numerical and qualitative analysis.
b. The use of digital resource planners to plan workload and availability of the staff depending on the project schedules.
c. Pre-project activities involving the immersion of the client site, the creation of a brief summary of vision and project constraints, and preliminary internal workshops.
d. Implementation of dynamic/flexible report format, adoption of the tagging/classification system on technical documents and creation of client avatars and map of stakeholders.
e. Creation of two-way channels of communication, such as information on progress in real-time and appointment of client engagement officers, which was reinforced by regular meetings every week.
f. Modular service design, with the help of the agile and lean approaches to the project

management methodologies.

g. Optimization of project management platforms (e.g., Microsoft Project, Asana) with automated notifications and visual KPI dashboards.
h. The combination of SOPs, ISO standards, SNI (Indonesian National Standards), and internal guidance to the framework of digital quality management system, which is reinforced by routine employee training, multi-step quality control, and audit performance.
i. Deployment of ISO/IEC 27001-based information security management system (ISMS), particularly, VPN, data encryption and access control based on roles.
j. Incorporation of project performance dashboards and service-level reporting systems, founded on SLAs and technical quality indicators, including retrospective sessions, lessons learned and ongoing improvement programmes.

e. Relationship Matrix

The *Relationship Matrix* is used to determine the level of linkage between VoC and technical responses according to the rules in above. The following is the justification for the assessment presented in Table 4 below.

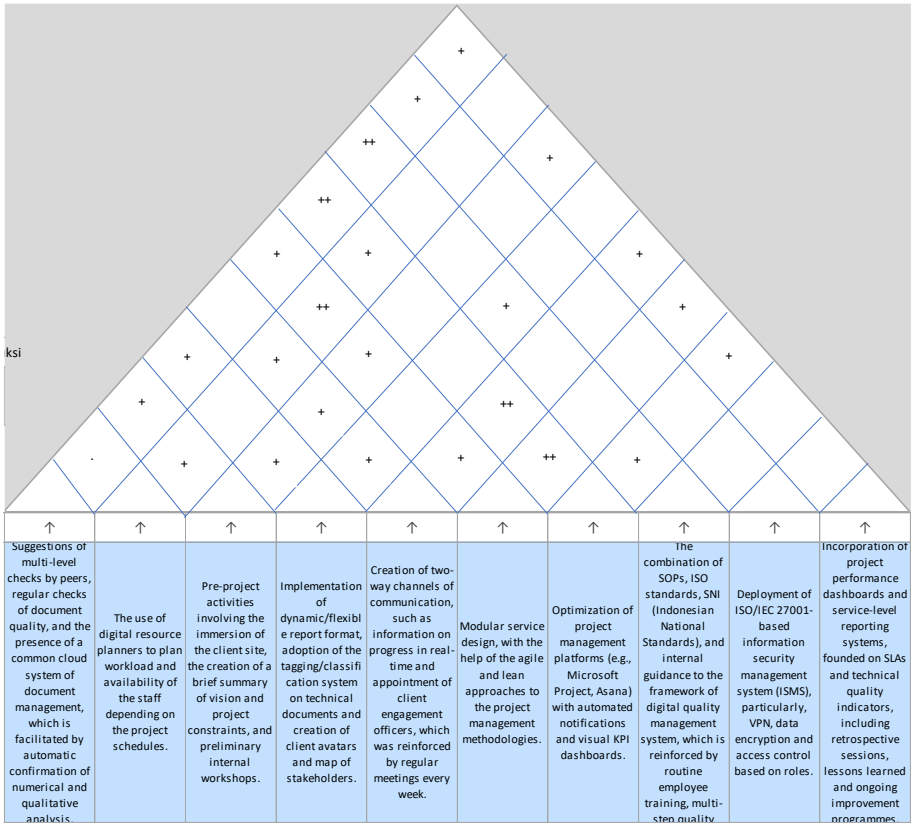
Table 4. Assessment of the Relationship of VoC with Technical Response on the HoQ Matrix

Functional Requirements (How's) → / Customer Requirements - (What's) ↓	Suggestions of multi-level checks by peers, regular checks of document quality, and the presence of a common cloud system of document management, which is facilitated by automatic confirmation of numerical and qualitative analysis.	The use of digital resource planners to plan workload and availability of the staff depending on the project schedules.	Pre-project activities involving the immersion of the client site, the creation of a brief summary of vision and project constraints, and preliminary internal workshops.	Implementation of dynamic/flexible report format, adoption of the tagging/classification system on technical documents and creation of client avatars and map of stakeholders.	Creation of two-way channels of communication, such as information on progress in real-time and appointment of client engagement officers, which was reinforced by regular meetings every week.	Modular service design, with the help of the agile and lean approaches to the project management methodologies.	Optimization of project management platforms (e.g., Microsoft Project, Asana) with automated notifications and visual KPI dashboards.	The combination of SOPs, ISO standards, SNI (Indonesian National Standards), and internal guidance to the framework of digital quality management system, which is reinforced by routine employee training, multi-step quality	Deployment of ISO/IEC 27001-based information security management system (ISMS), particularly, VPN, data encryption and access control based on roles.	Incorporation of project performance dashboards and service-level reporting systems, founded on SLAs and technical quality indicators, including retrospective sessions, lessons learned and ongoing improvement programmes.
On-time Work	9	3	1	1	3	9	9	3	1	3
Document Accuracy	3	1	1	3	1	1	1	3	1	3
Flexible Solutions	1	1	1	3	1	9	3	1	1	1
Standard Conformity	3	1	1	1	1	1	3	9	1	3
Maintenance of Confidentiality	1				1			1	9	1
Service Personalization	1		3	9	3	3	1	1		1
Enthusiasm for Clients	1	1	3	3	9	3	3	1	1	1
Staff Availability	1	9	1	1	1	1	3	1	1	1
Team Coordination	3	3	3	1	9	3	9	3	1	3

f. Correlation Matrix

The *Correlation Matrix* is used to determine the relationship that assesses the relationship between technical responses according to the rules in above. The following is the justification for the assessment presented in Table 5 below.

Table 5. Correlation Assessment between Technical Responses in the HoQ Matrix



g. Technical Importance

In the *Technical Matrix*, the calculation of technical importance is explained which consists of the calculation of priority, the weight of the technical response to the interests of the VoC, as well as the weight of the assessment of the client's interests in the VoC. The priority of technical response results related to VoC is as follows:

I. Optimization of project management platforms (e.g., Microsoft Project, Asana) with automated notifications and visual KPI dashboards.
II. Modular service design, with the help of the agile and lean approaches to the project management methodologies.
III. Creation of two-way channels of communication, such as information on progress in real-time and appointment of client engagement officers, which was reinforced by regular meetings every week.
IV. Suggestions of multi-level checks by peers, regular checks of document quality, and the presence of a common cloud system of document management, which is facilitated by automatic confirmation of numerical and qualitative analysis.
V. The combination of SOPs, ISO standards, SNI (Indonesian National Standards), and internal guidance to the framework of digital quality management system, which is reinforced by routine employee training, multi-step quality control, and audit performance.
VI. Implementation of dynamic/flexible report format, adoption of the tagging/classification system on technical documents and creation of client avatars and map of stakeholders.
VII. The use of digital resource planners to plan workload and availability of the staff depending on the project schedules.

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VIII. Incorporation of project performance dashboards and service-level reporting systems, founded on SLAs and technical quality indicators, including retrospective sessions, lessons learned and ongoing improvement programmes.
IX. Deployment of ISO/IEC 27001-based information security management system (ISMS), particularly, VPN, data encryption and access control based on roles.
X. Pre-project activities involving the immersion of the client site, the creation of a brief summary of vision and project constraints, and preliminary internal workshops.

From the order of priority, the importance of technical responses is presented in Table 6 below.

Table 6. Values of Technical Importance on the HoQ Matrix

Functional Requirements (How's) → / Customer Requirements - (What's) ↓	Suggestions of multi-level checks by peers, regular checks of document quality, and the presence of a common cloud system of document management, which is facilitated by automatic confirmation of numerical and qualitative analysis	The use of digital resource planners to plan workload and availability of the staff depending on the project schedules.	Pre-project activities involving the immersion of the client site, the creation of a brief summary of vision and project constraints, and preliminary internal workshops.	Implementation of dynamic/flexible report format, adoption of the tagging/classification system on technical documents and creation of client avatars and map of stakeholders.	Creation of two-way channels of communication, such as information on progress in real-time and appointment of client engagement officers, which was reinforced by regular meetings every week.	Modular service design, with the help of the agile and lean approaches to the project management methodologies.	Optimization of project management platforms (e.g., Microsoft Project, Asana) with automated notifications and visual KPI dashboards.	The combination of SOPs, ISO standards, SNI (Indonesian National Standards), and internal guidance to the framework of digital quality management system, which is reinforced by routine employee training, multi-step quality	Deployment of ISO/IEC 27001-based information security management system (ISMS), particularly, VPN, data encryption and access control based on roles.	Incorporation of project performance dashboards and service-level reporting systems, founded on SLAs and technical quality indicators, including retrospective sessions, lessons learned and ongoing improvement programmes	Weighted Score
On-time Work	9	3	1	1	3	9	9	3	1	3	184,8
Document Accuracy	3	1	1	3	1	1	1	3	1	3	78,48
Flexible Solutions	1	1	1	3	1	9	3	1	1	1	98,56
Standard Conformity	3	1	1	1	1	1	3	9	1	3	105,6
Maintenance of Confidentiality	1				1			1	9	1	57,2
Service Personalization	1		3	9	3	3	1	1		1	96,8
Enthusiasm for Clients	1	1	3	3	9	3	3	1	1	1	114,4
Staff Availability	1	9	1	1	1	1	3	1	1	1	87,2
Team Coordination	3	3	3	1	9	3	9	3	1	3	164,16
Technical importance score	100,88	83,04	61,36	96,8	126,88	132,4	140,16	100,88	70,32	74,48	987,2
Importance %	10%	8%	6%	10%	13%	13%	14%	10%	7%	8%	100%
Priorities rank	**4**	**7**	**10**	**6**	**3**	**2**	**1**	**4**	**9**	**8**	

Formulation of Practical Recommendations Priorities (QFD)

After knowing the priority of the technical response from the HoQ matrix, the priority of practical recommendations is then determined to answer the initial research objectives, namely to improve and improve the quality of construction engineering consultant services. In the QFD analysis process, three of the most important attributes were found, namely: On-Time Work (B1), Team Coordination (B3), and Enthusiasm for Clients (E3). Of these three attributes, they imply the quality of the work process, the results of the workmanship, and integrity and responsibility for the work.

On the other hand, to strengthen the priority decisions of practical recommendations that will be implemented to improve and improve the quality of services, opinions and knowledge of existing conditions and expectations from the consultant's perspective are needed. From this study, an online interview has been conducted with one of the C-Levels from ITSK (ITS Partnership) as one of the respondents from the consultant's perspective. The interview contains concrete solutions/technical responses from VoC that can be implemented to the company, the existing conditions of the VoC and tools of the company, the targets (KPIs) of achievement of the concrete solutions submitted, time and cost constraints to implement the concrete solutions as well as additional suggestions to make it easier to realize concrete solutions that can be implemented in the company. This can be used as a *benchmark* for other similar companies if they have the same client needs constraints.

In principle, the justifications prioritized in practical recommendations are based on the existence of significant gaps between current performance conditions and targets to be achieved, as established through relevant references or benchmarks. In addition, the ease of

investment in terms of cost and time is also a consideration, with the main focus on its usefulness to the operations of construction engineering consultant services, which ultimately has a positive impact on client satisfaction in a sustainable manner as in Table 7.

Table 7. Priorities of Practical Recommendations on QFD Analysis

Functional Requirements (How's) → / Customer Requirements - (What's) ↓	Suggestions of multi-level checks by peers, regular checks of document quality, and the presence of a common cloud system of document management, which is facilitated by automatic confirmation of numerical and qualitative analysis.	The use of digital resource planners to plan workload and availability of the staff depending on the project schedules.	Pre-project activities involving the immersion of the client site, the creation of a brief summary of vision and project constraints, and preliminary internal workshops.	Implementation of dynamic/flexible report format, adoption of the tagging/classification system on technical documents and creation of client avatars and map of stakeholders.	Creation of two-way channels of communication, such as information on progress in real-time and appointment of client engagement officers, which was reinforced by regular meetings every week.	Modular service design, with the help of the agile and lean approaches to the project management methodologies.	Optimization of project management platforms (e.g., Microsoft Project, Asana) with automated notifications and visual KPI dashboards.	The combination of SOPs, ISO standards, SNI (Indonesian National Standards), and internal guidance to the framework of digital quality management system, which is reinforced by routine employee training, multi-step quality	Deployment of ISO/IEC 27001-based information security management system (ISMS), particularly, VPN, data encryption and access control based on roles.	Incorporation of project performance dashboards and service-level reporting systems, founded on SLAs and technical quality indicators, including retrospective sessions, lessons learned and ongoing improvement programmes.
Current performance	Sudah ada tools teknis dan review ahli, tapi belum otomatis dan belum berlapis	Belum terimplementasi	Sudah mulai diterapkan (kunjungan, FGD, dokumen visi)	Template sudah ada; tagging dan client map baru saran tambahan	Sudah ada meeting mingguan, tapi komunikasi real-time masih minim	Baru dalam bentuk saran; belum menjadi sistem utama	MS Project sudah digunakan; belum seluruh fitur optimal	Sudah ada SOP & ISO; pelatihan & audit reguler masih dalam rencana	Sudah berjalan sebagian (role-based access, enkripsi, audit risiko)	Evaluasi pasca proyek ada, tapi belum terstruktur (form tracking belum ada)
Target	<2% kesalahan dokumen; 95% lolos QC otomatis; audit 6 bulanan	Belum ada target	Semua tim memahami konteks dan batasan proyek sebelum mulai	Akurasi dokumen >98%, kepuasan klien >90%	Respons SLA <1 jam (umum), <15 menit (kritis)	95% proyek tepat waktu & adaptif perubahan	90–95% proyek sesuai rencana dan termonitor KPI	100% kepatuhan SOP, pelatihan rutin, feedback mutu	Deteksi insiden <30 menit, kepatuhan penuh ISMS	Semua proyek dievaluasi, dokumentasi pembelajaran, tindak lanjut perbaikan
Difficulty	3	-	3	3	4	3	4	3	3	3
Cost and time	4	-	4	4	3	3,5	3,5	4	3	4
Priority to improve	**3**	**9**	**10**	**6**	**2**	**1**	**4**	**5**	**7**	**8**

So the order of practical recommendations to improve the quality of construction engineering consultant services is as follows:

I. Modular service design, with the help of the agile and lean approaches to the project management methodologies.
II. Creation of two-way channels of communication, such as information on progress in real-time and appointment of client engagement officers, which was reinforced by regular meetings every week.
III. Suggestions of multi-level checks by peers, regular checks of document quality, and the presence of a common cloud system of document management, which is facilitated by automatic confirmation of numerical and qualitative analysis.
IV. Optimization of project management platforms (e.g., Microsoft Project, Asana) with automated notifications and visual KPI dashboards.
V. The combination of SOPs, ISO standards, SNI (Indonesian National Standards), and internal guidance to the framework of digital quality management system, which is reinforced by routine employee training, multi-step quality control, and audit performance.
VI. Implementation of dynamic/flexible report format, adoption of the tagging/classification system on technical documents and creation of client avatars and map of stakeholders.
VII. Deployment of ISO/IEC 27001-based information security management system (ISMS), particularly, VPN, data encryption and access control based on roles.
VIII. Incorporation of project performance dashboards and service-level reporting systems, founded on SLAs and technical quality indicators, including retrospective sessions, lessons learned and ongoing improvement programmes.

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IX. The use of digital resource planners to plan workload and availability of the staff depending on the project schedules.
X. Pre-project activities involving the immersion of the client site, the creation of a brief summary of vision and project constraints, and preliminary internal workshops.

CONCLUSIONS

The conclusion is in accordance with the objectives of the research as follows:

1. Adjustments were obtained to 20 service quality attributes from 24 service quality attributes with the EFA method in the construction engineering consulting industry that serves technical design and management, including A1 Document Accuracy, A2 Ease of Access to Documentation and A4 Realistic Planning for the Tangibles dimension; B1 On-Time Work, B3 Team Coordination, B4 Adequate Resources, and Quality Control for Assurance dimension; C1 Team Competence, C2 Standard Conformity, C3 Confidentiality Maintenance, C4 Effective Communication for Reliability dimension; D1 Rapid Response, D2 Information Accessibility, D3 Staff Availability for the Responsiveness dimension; E1 Service Personalization, E2 Client's Primary Interest, E3 Client's Enthusiasm for the Empathy dimension; F1 Post-Project Evaluation, F2 Flexible Solutions, F3 Multidisciplinary Approach to Flexibility dimensions. From the assessment of client satisfaction and interests that has been carried out, it is concluded that all service quality attributes are expected to be improved and improved in service quality to meet client satisfaction because there is a gap with the existing benchmark assessment.
2. Significant factors were obtained for the quality of construction engineering consultant services based on quadrants A and B in the IPA analysis that can be used as a Voice of Customer for QFD analysis, including B1 Timely Work, A1 Document Accuracy, F2 Flexible Solution, C2 Standard Conformity, C3 Confidentiality Maintenance, E1 Service Personalization, E3 Enthusiasm for Clients, D3 Staff Availability, B3 Team Coordination.
3. Obtained the top 3 priorities of practical recommendations to improve the quality of services based on the opinions of consultant experts and client needs, including : (1) The implementation of modular service design along with agile and lean project management methodologies; (2) The establishment of two-way communication through real-time progress notifications and the appointment of a client engagement officer via regular weekly meeting agendas; (3) The implementation of multi-level peer reviews, regular quality audits of documents, and the deployment of a cloud-based integrated document management system enhanced by automated numerical and qualitative testing. This practical recommendation is formulated based on the existing conditions of the technical response with the benchmark target to be achieved to meet the KPIs of the construction engineering consulting company. And other reasons include the ease of constraints from the investment of time and cost when implementing the technical response and the usefulness of the operation of construction engineering consultant services to meet client satisfaction.

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