

Original Article

Service Innovation for Architectural Firm: Using AHP Method to Identify and Structured Client's Preferences

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Abstract: This research delves into the dynamic landscape of Indonesia's architectural services sector, particularly emphasizing the growth and challenges within the property and real estate industry. The substantial contribution of architectural services to the national GDP is evident, propelled by government regulations mandating building permits and renovations. However, N. Studioworks, operating in this sector, faces challenges in sustaining business growth, underscoring the crucial need to align with clients' preferences. The study utilizes an integrated methodology, encompassing Customer Journey Maps (CJMs) and the SERVQUAL Framework, to thoroughly explore client experiences and preferences. Through in-depth interviews, the research aims to map the multifaceted stages of the client journey and evaluate architectural services based on dimensions such as reliability, responsiveness, assurance, empathy, and tangibles. The Analytic Hierarchy Process (AHP) method is employed to systematically identify and structure client preferences, providing a comprehensive approach to understanding and prioritizing various criteria. This research aspires to offer actionable insights for N. Studioworks, proposing a new service innovation model to not only meet but exceed evolving service quality for architectural firms.

Keywords: AHP, Architecture, CJMs, Innovation, Service, SERVQUAL.

I. INTRODUCTION

The property industry or the real estate industry, an industry that uses a lot of architectural service personnel, is experiencing growth in the level of income from around 15 trillion rupiahs in 2010 to 30 trillion rupiahs in 2017, thus contributing to the growth of the condition of the National GDP. The contribution of the creative economy, architecture as a sub-sector, has a very positive impact on national GDP. The government obliges every citizen to establish or carry out renovations that result in changes in the initial form of the building; it requires each homeowner to make an IMB (Building Permit). In submitting the IMB, building drawings or designs are needed, so architectural services are needed to make the design. (Marthian, 2019). The contribution of the property industry as one of the leading sectors to drive the Indonesian economy towards GDP in the second quarter of 2023 is recorded at 9.43% for the construction sector and 2.40% for the real estate sector. The property industry also provides a multiplier effect for supporting industries and influences the development of the financial sector while significantly absorbing the workforce. Although the real estate sector in the second quarter of 2023 still shows a decrease of 12.30% (yoy), sales of large-sized houses have increased by 15.11% (yoy). From the demand side, the Commercial Property Demand Index for the leasing category grew by 5.87% (yoy), and the Commercial Property Demand Index for the sales category increased by 0.36% (yoy) in the second quarter of 2023. The increase in demand indices could create positive momentum in the commercial property industry, potentially boosting activity and property sales in Indonesia as a whole. (Kementrian Koordinator Bidang Perekonomian Republik Indonesia, 2023).

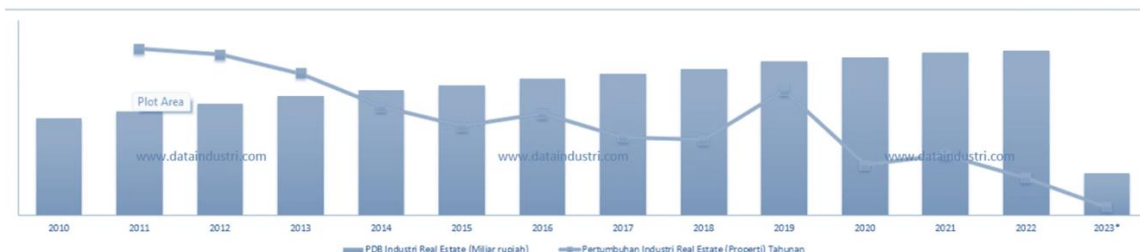


Figure 1: Property Growth Tren Related to Indonesia's GDP (Data Industri, 2023)

Both opportunities and challenges characterize the architectural business firm situation in Indonesia. In the development of a country, architecture plays a significant role in shaping the perception of what era a nation stands in. Indonesian architecture is composed of many interventions, driving factors, and political events from the colonial period to the present: political factors, cultural values, economics, the presence of globalization, technology, and transportation – all of these



influence the development era in architectural discourse in Indonesia. Politics, in modernization, takes a substantial role in moving a thought on how to get to "a goal." (Hanum, 2020). N. Studioworks operates in the architectural services sector, also facing challenges within a rapidly changing industry landscape. The business issue revolves around the critical need to assess and refine innovative strategies for sustainable growth and success. A comprehensive examination of client feedback and industry insights is required to formulate strategic plans for enhancing service delivery and fortifying client relationships.

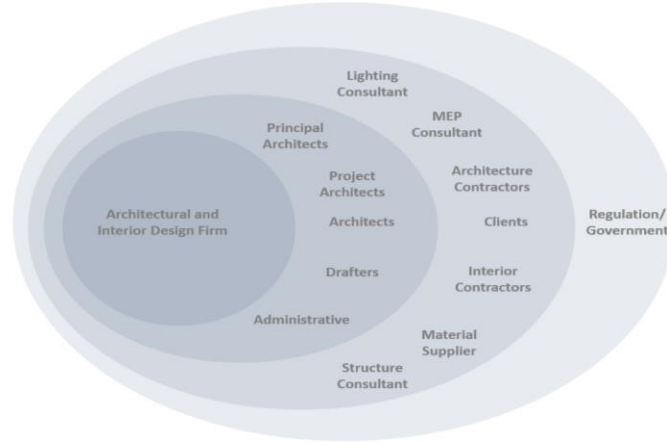


Figure 2: Architecture and Interior Design Firm Stakeholder (Author, 2023)

The internal stakeholders within N. Studioworks play pivotal roles in shaping the company's trajectory. The principal architects/founders, comprising top executives and decision-makers, hold the responsibility for strategic planning, guiding the company's vision, and ensuring its overall success and growth. Their decisions impact various aspects of the organization, including resource allocation, expansion initiatives, and overarching business strategies. On the operational front, Employees such as project architects, architects, drafters and administrators are essential contributors involved in the day-to-day implementation of architectural services and the execution of improvements. Their dedication and expertise directly influence the quality of service delivery, making them integral to achieving the company's objectives. Externally, N. Studioworks engages with a diverse set of stakeholders. Clients, being the end-users of architectural services, are paramount in the assessment process. Their expectations and satisfaction levels directly influence the company's success. Industry Partners such as structure consultants, MEP consultants, lighting consultants, contractors, and material suppliers/distributors, comprising collaborators and allies, contribute significantly to the company's positioning within the architectural domain. Collaborative ventures, shared projects, and a positive relationship with partners can enhance N. Studioworks' standing in the industry. Regulatory Bodies or governments represent another critical external stakeholder group. Compliance with industry standards, regulations, and ethical practices is essential for sustained operations, and maintaining a positive relationship with regulatory bodies ensures the company's adherence to legal and industry requirements.

Table 1: Issue Mapping from Stakeholder

No	Stakeholders	Issue
1	Principal Architects/Founders	➤ The leadership team must prioritize strategic enhancements in service delivery and performance evaluation. ➤ <i>Decision-Making:</i> Informed decisions regarding service innovation and improvements based on a comprehensive analysis are crucial.
2	Employees	➤ <i>Challenges:</i> Employees may face challenges in adapting to new service delivery strategies or incorporating improvements. ➤ <i>Opportunities:</i> Successful resolution benefits employees by fostering a positive work environment and potential professional growth.
3	Clients	➤ <i>Expectations:</i> Clients expect architectural services that align with their vision and exceed their expectations. ➤ <i>Concerns:</i> Dissatisfaction may arise from perceived gaps in service quality or deviations from expectations.
4	Industry Partners	➤ <i>Expectations:</i> Industry partners expect N. Studioworks to maintain a competitive edge and uphold collaborative relationships. ➤ <i>Implications:</i> Failure to address industry expectations may impact partnerships and collaborative ventures.
5	Regulatory	➤ <i>Compliance:</i> Strategic enhancements should align with industry regulations to ensure continued compliance and ethical business practices.

To thoroughly explore and clarify the root cause of the identified business issue at N. Studioworks, a comprehensive analysis, including a Potential Problem/Opportunity Analysis, is necessary. By employing a Potential Problem/Opportunity Analysis, potential issues and opportunities can be systematically evaluated. This analysis involves:

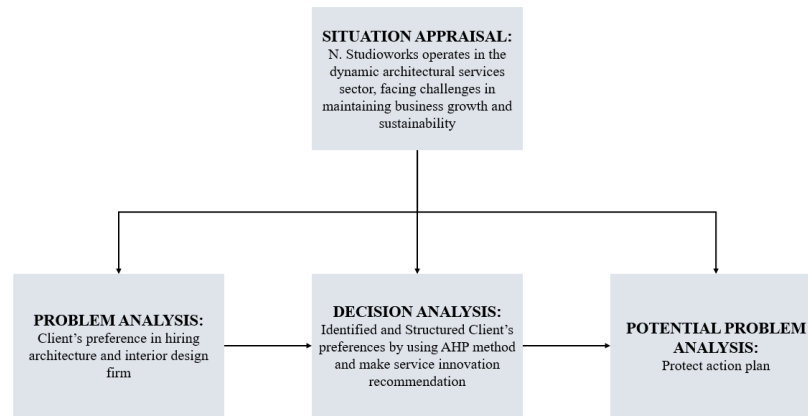


Figure 3: Exploration and Clarification of Root Cause of Problem of N. Studioworks by using Potential Problem/Opportunity Analysis (Author, 2023)

In the dynamic landscape of the architectural services sector, N. Studioworks encounters challenges in sustaining business growth. A critical issue identified is understanding and aligning with clients' preferences when hiring architecture and interior design firms. To address this, a decision analysis utilizing the Analytic Hierarchy Process (AHP) will be used to systematically identify and structure the client's preferences. This includes criteria identification, pairwise comparisons, and consistency checks to prioritize factors influencing clients' decisions. To mitigate potential problems in the implementation of the service innovation recommendation, a protective action plan will be devised.

II. LITERATURE REVIEW

This research embarks on an exploration of the client experience within the architectural domain, employing an integrated methodology to uncover nuanced insights into client preferences for hiring an architectural firm. Utilizing Customer Journey Maps (CJMs) as a qualitative data collection tool by using in-depth-interview method, this study aims to map the multifaceted stages of the client journey, highlighting critical touchpoints and discerning moments of improvement. Grounded in the SERVQUAL Framework, a comprehensive assessment model for service quality, this research seeks to evaluate architectural services across dimensions of reliability, responsiveness, assurance, empathy, and tangibles. Additionally, the Analytic Hierarchy Process (AHP) method will be employed to identify, structure, and prioritize client preferences, offering a systematic approach to understanding the relative importance of various criteria. By synergizing these methodologies, this research aspires to provide actionable insights for N. Studioworks, enabling them to tailor the architectural offerings to meet and exceed the evolving expectations of clients in Indonesia.

A) Architectural Firm

The need for architectural and engineering services is influenced by the level of residential and commercial construction activities, along with corporate and government expenditures. The profitability of firms in this industry hinges on their capacity to secure a steady stream of work through contracts and accurately estimate project costs. Smaller firms can compete effectively with their larger counterparts by specializing in specific areas of expertise. On the other hand, larger firms possess advantages in handling and overseeing extensive projects across diverse geographical regions (D&B Company, 2023). Within a standard architectural/engineering firm, there exists a diverse blend of talents. The architectural team comprises individuals with varying skill levels, ranging from draftsmen without design experience to registered architects with extensive design capabilities. While possessing proficiency across all architecture domains, these individuals occasionally specialize in specific areas like commercial building design, hospital or school planning, or landscape architecture. Similarly, each engineering discipline (structural, mechanical, electrical, and civil) is covered by a comparably varied staff. Additionally, the technical staff receives support from individuals equipped with secretarial, accounting, and data processing skills. The majority of architectural/engineering firms function within a project-centric framework. All client-related tasks are carried out on a project-by-project basis, and often, project numbers are assigned to designate non-client activities, such as departmental meetings or computer operations. Consequently, the effective management of employee expertise transforms into a matter of adept project management. If an architectural/engineering firm can effectively strategize and implement its ongoing projects, it will adeptly oversee its labor resources, ensuring the successful management of its workforce. (Wilson, 1980)

There is a lack of agreement regarding the prevailing conceptual model for organizational structure. Most of the examined literature acknowledges the presence of two overarching organizational types: hierarchical and centralized, as well as flexible and decentralized. However, there is a noticeable absence of distinct connections between these organizational types and the sizes of offices. This lack of clarity is attributed to the significant impact exerted by the environmental context on organizational structure (Mintzberg, 1979). The distinct nature of architecture offices, encompassing activities ranging from client interactions and negotiations to intricate creative processes, occasionally results in a separation between operational tasks and administrative responsibilities, (Peter K. Mills, Leidecker, & Margulies, 1983). The most imaginative duties encourage individual accountability and promote direct engagement with the client, necessitating a significant level of independence and decentralized decision-making. This complexity makes the coordination of these highly specialized areas challenging. (Annick Willem, 2009)

Regarding performance, there is a widespread consensus that it should be evaluated based on efficiency, benefits, and satisfaction (Donaldson, 2014). While satisfaction is commonly interpreted to refer exclusively to the staff, (J.C. Sang, & Dainty, 2009), in this evaluation the perception of the client becomes increasingly (Oyedele & Tham, 2007). Extensive research has explored the correlation between unsatisfactory outcomes in the implementation of construction projects and various factors, with one of the foremost being the distinct attributes of the project, such as its type, size, duration, and complexity (Akinsola, Potts, & Ndekugri, 1997). The offices bear some responsibility for this, commonly linked to perceived delays in their response times. (Chan & Kumaraswamy, 1997)

This serves as another illustration of the challenging coexistence between design offices and builders, acknowledged as one of the most significant issues in the construction sector (Puddicombe, 1997). Regarding the interaction with specialized professionals during the design phase, some authors have delved into methods for assessing the performance of these seemingly less innovative professionals. They do so by studying their involvement in isolation. (Torbett, 2001). In this regard, it is essential to conduct research that examines performance from the standpoint of coordinating with the design team of the architectural office. (Koutsikouri, Austin, & Dainty, 2008).

B) Service Measurement Instrument

a. Customer Journey Maps

A visual representation tool enables a comprehensive understanding of a customer's journey, covering all interactions with a company's services. This tool is commonly known as a Customer Journey Map or Customer Experience Map. (Content Engine LLC, 2023). Based on McBee, there are 5 stages of Customer journey maps for service business, there are awareness, consideration, acquisition, service and loyalty.

b. SiERQUAL Framework

Observing and assessing customer satisfaction provides service providers with insights into particular areas where performance enhancements can be made. A review of academic literature indicates that customer satisfaction is predominantly measured using the SERVQUAL model or its adaptations, including SERVQUAL (Riefined), SERVPERF, and others. Milner & Furnham highlighted that the criteria used to evaluate service quality, as outlined in these models, are consistently reiterated in nearly every academic study exploring customer satisfaction. It is the foundation on which customers' perception of service quality is built. Customer satisfaction across five service quality factors (Durdyev, Ihtiyar, Banaitis, & Thurnell, 2018):

1. Reliability
2. Responsiveness
3. Assurance
4. Empathy
5. Tangibility.

The SERVQUAL model became the basis for other models to find its sub-criteria for client preferences and develop them into sub-criteria.

c. Analytical Hierarchy Process Method

Conducting pairwise comparisons of specified criteria yields greater information saturation per respondent in comparison to a straightforward ranking of criteria, as demonstrated by Abduh and Omar in 2012. Hence, the AHP method was selected, as it enables the acquisition of meaningful and dependable results even with a limited sample of respondents, as indicated by Mielillo and Picchia in 2016. When employing the AHP method, the prevailing range for the sample size typically involves 2 to 100 experts, according to Sahin and Yurdugul in 2018. While there is no stringent minimum sample size requirement for AHP analysis, certain studies have utilized sample sizes ranging from 4 to 9, with only a limited number of studies opting for a sample size exceeding 30, as

noted by Darko et al. in 2019. On average, conducting interviews with more than 7 to 10 experts may lead to the collection of redundant information, as highlighted by Hickman and Longman in 1994. The AHP method facilitates the assignment of values to criteria, establishing the preference of criteria or the ranking of alternatives. These assigned values are instrumental in selecting alternatives within a hierarchical structure, as outlined by Lital in 2020. While AHP is commonly employed to rank criteria weights when deciding among multiple alternatives, in instances involving a single alternative, the emphasis shifts to the weights of the criteria themselves. The process involves the following steps in the design of the research instrument, data collection, and data analysis:

- A matrix for pairwise comparisons is created, with identical criteria listed in both the first column and the first row. Each criterion is systematically compared with every other criterion in pairs. It is noteworthy that criteria are not compared with themselves, as the importance of a criterion compared with itself will consistently be identical.
- Participants input the values for pairwise comparisons in a table (matrix) based on a table of relative importance levels, commonly referred to as the Saaty table in scientific literature (Saaty, Decision making with the analytic hierarchy process., 2008).
- A specific emphasis is placed on addressing and rectifying inconsistencies between assessments whenever possible and practical. When dealing with more than two options (criteria), the potential for assessment inconsistencies arises. For instance, if $a > b > c > a$, it implies that a is deemed more important than b , b is more important than c , and c is more important than a , resulting in a circular comparison. To resolve inconsistencies, a correction like $a > c$ is applied instead of $a < c$. However, eliminating inconsistencies in assessments may not always be achievable, particularly when dealing with more than seven options. (Miller, 1956).

The acquired information is subjected to mathematical processing based on the methods outlined by Saaty (Saaty, Decision making with the analytic hierarchy process., 2008). As stated by Atanasova-Paciemska, Lapievski, & Timovski, when comparing n elements, matrix A is generated with dimensions $n \times n$:

$$A = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nm} \end{bmatrix}$$

The association among the elements to be evaluated is articulated as:

$$a_{ij} = \frac{\omega_i}{\omega_j}$$

As per Saaty's mathematical model (Saaty, Decision making with the analytic hierarchy process., 2008), when element A is considered n times more significant than element B , it implies that element B holds an importance of $1/n$ relative to element A .

$$a_{ij} = \frac{\omega_i}{\omega_j}$$

Upon inputting the values into matrix, A , a normalized matrix B [b_{ij}] is generated, with its elements computed:

$$b_{ij} = \frac{a_{ij}}{\sum_{j=1}^n a_{ij}}$$

The determination of the weights for the elements in the normalized matrix B , represented as the eigenvector $w = [w_i]$, involves computing the arithmetic mean for each row of the matrix using the following formula:

$$\omega_i = \frac{\sum_{j=1}^n b_{ij}}{n}$$

Next, it is essential to assess the consistency of the respondent's viewpoint. As per Saaty & Ozdemir, mathematically, the consistency of matrix $A = (a_{ij})$ is achieved when $a_{ijk} = a_{ik}$; however, in practical terms, it is unusual for this formula to be entirely applicable. According to Atanasova-Paciemska, Lapievski, & Timovski, when matrix A is fully consistent, a matrix C is formed wherein all elements w are uniform:

$$C = \begin{bmatrix} \frac{w_1}{w_1} & \frac{w_1}{w_2} & \dots & \frac{w_1}{w_n} \\ \frac{w_2}{w_1} & \frac{w_2}{w_2} & \dots & \frac{w_2}{w_n} \\ \vdots & \vdots & \ddots & \vdots \\ \frac{w_n}{w_1} & \frac{w_n}{w_2} & \dots & \frac{w_n}{w_n} \end{bmatrix}$$

Thierieforie, undier idieal conditions, as posited by Saaty and Ozdiemir (Atanasova-Paciemska, Lapievski, & Timovski, 2014), thie iequation $Aw = nw$ holds trueie:

$$A_w = \begin{bmatrix} A_1 & \dots & A_n \\ A_1 \left| \begin{smallmatrix} \frac{w_1}{w_1} \\ \vdots \\ \frac{w_n}{w_1} \end{smallmatrix} \right. & \dots & A_n \left| \begin{smallmatrix} \frac{w_1}{w_n} \\ \vdots \\ \frac{w_n}{w_n} \end{smallmatrix} \right. \end{bmatrix} \begin{bmatrix} w_1 \\ \vdots \\ w_n \end{bmatrix} = n \begin{bmatrix} w_1 \\ \vdots \\ w_n \end{bmatrix} = nw$$

Noniethieliess, as outlinied by Atanasova-Paciemska, Lapievski, & Timovski in 2014, if matrix A lacks consistency, thie rielativie wieight w_i is iestimatiied by computing thie avieragie of thie n ieliemients in row i of thie normalized matrix C. Oncie an avieragie viector $\rightarrow w$ is dierivied, thie calculation of λ_{max} biecomes fieasible.

$$\sum_{i=1}^n \left(\sum_{j=1}^n a_{ij} \varpi_i \right) = \lambda_{max} \sum_{i=1}^n \varpi_i = \lambda_{max}$$

Thie proximity of thie numerical valuiie of λ_{max} to thie numbiier of ieliemients n indicaties thie diegrieie of consistency in matrix A. Using this critierion, thie consistency ratio CR is computed:

$$CR = \frac{CI}{RI}$$

CI—consistency indix:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

RI—random indix. Valuiies of RI diepiend on thie numbiier of matrix ieliemients n

Table 2: Values of RI Depend on the Number of Matrix Elements n

<i>n</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49	1.52	1.54	1.56	1.58	1.59
<i>n</i>	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
RI	1.60	1.60	1.61	1.62	1.63	1.64	1.65	1.65	1.66	1.66	1.66	1.67	1.67	1.68	1.68

(Saaty & Ozdemir, *Why the magic number seven plus or minus two.*, 2003)

As per Saaty & Ozdemir in 2003, the prescribed upper limit for the consistency ratio CR is set at 0.10. As the number of elements n increases in the matrix, there is an elevated probability of the consistency ratio exceeding 0.10, indicating potential inconsistency in the decision maker's opinion. The authors attribute this phenomenon to the insights of Miller (1956), rooted in the characteristics of the human psyche.

III. RESULTS AND DISCUSSION

A) Participants

The sample of 15 participants was selected by purposive in-depth-interview method. To gather insights into the client's perspective for N. Studioworks, this interview selected appropriate interviewees such as recent clients, previous clients and clients who are using another firm, with more than two ongoing or completed projects. Consider the following criteria when choosing participants for in-depth interviews focused on customer perspectives;

1. Recent Clients: Recent clients provide insights into the firm's current practices and service quality. Their experiences are likely to be fresh and relevant.
2. Previous Client: Previous clients can offer insights into the consistency of the firm's service quality over time. Their feedback can highlight any changes or improvements.
3. Client Using Another Architectural Firm: Individuals currently using services from another architectural firm can

provide a comparative perspective. Understanding why they chose a different firm can offer valuable insights.

4. Has completed one or more projects
5. For anonymity purposes, the participants were given codes P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14 and P15 for the analysis of the data. The full characteristics of the participants are presented in Tables 3, 4 and 5.

Table 3: Participants Characteristic "Recent Clients"

Participants	P1	P2	P3	P4	P5
Criteria of Participants					
Age	58	37	29	25	25
Female/Male	Male	Male	Male	Male	Male
Job/Position	Ex CEO of PT. PP Property & Ex CEO of Perumnas	CEO of House Developer	Business Owner	CEO of House Developer & CEO of Health Care	Head of Foundation Dibimbing Pendidikan Indonesia
Projects	Apartment Building	Office	Mass House	Interior Clinic	Campus
	Mass House	Mass House	Private House	Mass House	Apartment Interior
	Private House	Private House		Private House	

Table 4: Participants Characteristic "Previous Clients"

Participants	P6	P7	P8	P9	P10
Criteria of Participants					
Age	27	41	37	33	34
Female/Male	Male	Male	Female	Female	Female
Job/Position	CEO of FnB and CEO of Mining Company	Consoler Doctor	Business Owner	Assistant Manager of Architecture Lotte Land Modern Realty	Assistant Manager Structure Lotte Land Modern Realty
Projects	Café	House Interior	House Interior	Apartment Building	Apartment Building
	Private House	Private House	Private House	Mass House	Mass House
		Private Huse		Office	Office

Table 5: Participants Characteristic "Using Other Architectural Firm"

Participants	P11	P12	P13	P14	P15
Criteria of Participants					
Age	25	29	28	28	28
Female/Male	Male	Male	Female	Female	Male
Job/Position	Business Owner	Staff at Tech Company	Staff at Material and Manufacturing Company	Ex Staff BP Batam	Staff at Private Company
Projects	Café	Apartment Interior	House Interior	Studio Interior	House Interior
	Private House	House Interior	Private House	Urban Plan	Private House
		Private House			

B) Survey Materials

Parasuraman, Zeithaml, and Berry formulated SERVQUAL, a model for assessing service quality, through a sequence of subsequent studies. This development facilitated an objective evaluation despite the of services. The model introduced five key factors: tangibles, reliability, responsiveness, assurance, and empathy. Following an in-depth interview with 15 participants, the author identified 15 recurring sub-criteria derived from the application of SERVQUAL's five factors during the interviews.

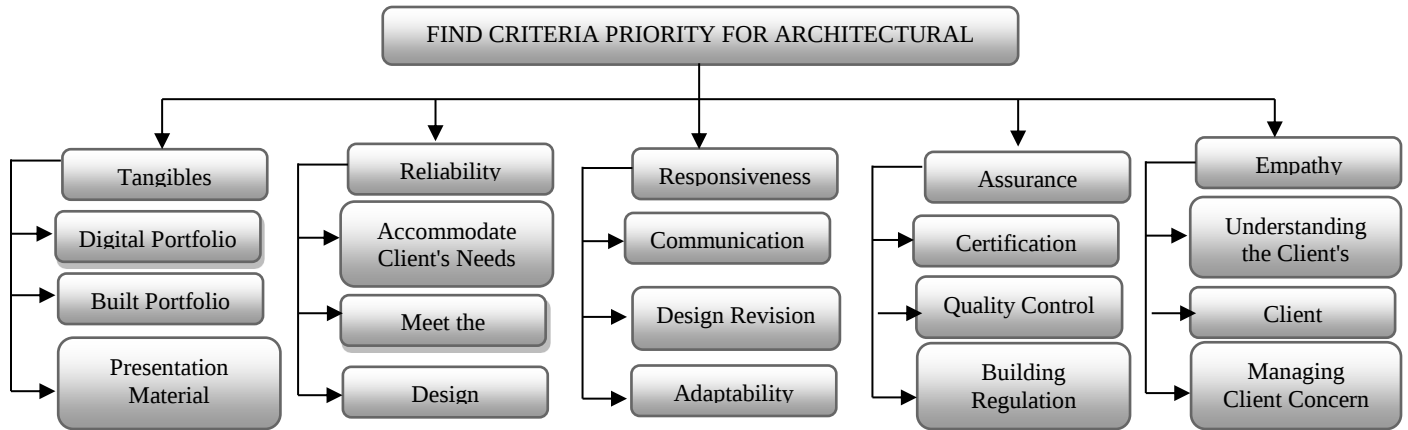


Figure 4: Identifying Client's Preferences based on SERVQUAL factors (Author, 2023)

15 sub-criteria derived from the application of SERVQUAL;

1. Understanding the Client's Vision: Grasping and interpreting the client's ideas, goals, and preferences to inform the design and execution of architectural projects.
2. Client Involvement: The degree to which clients participate in and contribute to the decision-making and development processes of architectural projects.
3. Managing Client Concern: Effectively addressing and resolving issues, questions, or uncertainties raised by clients throughout an architectural project.
4. Communication: The exchange of information and ideas between parties, crucial for effective collaboration and understanding in the context of architectural projects.
5. Design Revision: The process of reviewing and making changes to a design based on feedback, requirements, or evolving project needs.
6. Adaptability: The capacity to adjust and thrive in changing circumstances or environments, a crucial attribute in the dynamic field of architecture.
7. Quality Control: Systematic processes and measures implemented to ensure that the output, whether design or construction, meets predefined quality standards.
8. Building Regulation: Legal guidelines and standards set by authorities to ensure the safety, functionality, and compliance of buildings with established norms.
9. Certification: Official recognition or documentation verifying compliance with specific standards, regulations, or qualifications in the architectural context.
10. Presentation Material: Visual and informational content prepared for conveying ideas, proposals, or designs to an audience, often including slides, images, and supporting documentation.
11. Built Portfolio: A compilation of completed physical projects, demonstrating an individual or company's expertise and experience in constructing tangible structures or designs.
12. Digital Portfolio: A curated collection of digital representations showcasing an individual or company's work, typically including design projects, achievements, and capabilities.
13. Design Development: The iterative process of refining and evolving a conceptual design into a detailed and feasible plan, considering various factors such as functionality, aesthetics, and practicality.
14. Accommodate Client's Need: The ability of a service provider to adjust and tailor their offerings to meet the specific requirements and preferences of their clients.
15. Meet the Deadline: Completing tasks or projects within the specified timeframe or agreed-upon schedule.

C) Validity & iEthics

To ensure the research's internal validity, participants critically examined the factors influencing their choice of an architectural firm using a customer journey map. To validate the effectiveness of the participant selection criteria, a control group consisting of 15 participants was included in the survey. This control group represented a diverse mix, including recent clients, previous clients, and those working with another architectural firm, all of whom had been involved in more than two ongoing or completed projects. This approach aimed to enhance the robustness of the research findings by considering perspectives from various client experiences and preferences within the architectural context.

AHP Method

Table 6: Sub-Criteria Comparison Matrix

Sub-Criteria Comparison Matrix	Understanding the Client's Vision	Client Involvement	Managing Client Concern	Communication	Design Revision	Adaptability	Quality Control	Building Regulation	Certification	Presentation Material	Built Portfolio	Digital Portfolio	Design Development	Accommodate Client's Needs	Meet the Deadline
Understanding the Client's Vision	1,00	3,00	3,00	0,33	3,00	3,00	3,00	5,00	5,00	2,00	2,00	2,00	2,00	2,00	3,00
Client Involvement	0,33	1,00	0,50	0,50	3,00	0,33	0,50	3,00	3,00	2,00	2,00	0,50	0,33	2,00	2,00
Managing Client Concern	0,33	2,00	1,00	0,33	2,00	2,00	3,00	3,00	3,00	2,00	2,00	2,00	0,33	2,00	0,06
Communication	3,00	2,00	3,00	1,00	3,00	3,00	3,00	5,00	5,00	2,00	2,00	3,00	2,00	3,00	0,16
Design Revision	0,33	0,33	0,50	0,33	1,00	0,20	0,50	2,00	2,00	0,33	0,33	0,20	0,33	0,33	0,03
Adaptability	0,33	3,00	0,50	0,33	5,00	1,00	0,50	3,00	3,00	2,00	2,00	2,00	0,33	0,33	0,50
Quality Control	0,33	2,00	0,33	0,33	2,00	2,00	1,00	5,00	5,00	0,50	2,00	0,33	0,33	0,33	0,33
Building Regulation	0,20	0,33	0,33	0,20	0,50	0,33	0,20	1,00	3,00	0,20	0,33	0,33	0,20	0,20	0,33
Certification	0,20	0,33	0,33	0,20	0,50	0,33	0,20	0,33	1,00	0,33	0,33	0,33	0,20	0,20	0,33
Presentation Material	0,50	0,50	0,50	0,50	3,00	0,50	2,00	5,00	3,00	1,00	2,00	2,00	0,50	0,50	2,00
Built Portfolio	0,33	0,50	0,50	0,50	3,00	0,50	0,50	3,00	3,00	0,50	1,00	0,50	0,33	0,33	0,50
Digital Portfolio	0,50	0,50	0,50	0,33	5,00	0,50	3,00	3,00	3,00	0,50	2,00	1,00	0,33	0,33	0,50
Design Development	0,33	2,00	2,00	0,50	3,00	3,00	3,00	5,00	5,00	2,00	3,00	3,00	1,00	0,50	0,33
Accommodate Client's Needs	0,50	3,00	3,00	0,33	3,00	3,00	3,00	5,00	5,00	2,00	3,00	3,00	2,00	1,00	0,33
Meet the Deadline	0,33	0,50	0,50	0,33	0,33	2,00	3,00	3,00	3,00	0,50	2,00	2,00	3,00	3,00	1,00
Total	8,73	21,00	16,50	6,07	37,33	21,70	26,40	51,33	52,00	17,87	26,00	22,20	13,23	16,07	11,42

The sub-criteria comparison matrix involves a comprehensive analysis of 15 sub-criteria essential in evaluating the service quality of architectural firms. The matrix compares aspects such as understanding the client's vision, client involvement, managing client concerns, communication, design revision, adaptability, quality control, building regulation, certification, presentation material, built portfolio, digital portfolio, design development, accommodate client's need, and meet the deadline. This comparison matrix serves as a valuable tool to systematically assess and prioritize these sub-criteria, providing a nuanced understanding of their relative significance in ensuring success and client satisfaction in architectural projects. The aim is to derive insights that contribute to the refinement and enhancement of N. Studioworks' service offerings in response to the diverse and evolving needs of their client.

Table 7: Sub-Criteria Value Matrix

Sub-Criteria Comparison Matrix	Understanding the Client's Vision	Client Involvement	Managing Client Concern	Communication	Design Revision	Adaptability	Quality Control	Building Regulation	Certification	Presentation Material	Built Portfolio	Design Portfolio	Design Development	Accommodate Client's Needs	Meet the Deadline
Understanding the Client's Vision	0,11	0,14	0,18	0,05	0,08	0,14	0,11	0,10	0,10	0,11	0,08	0,09	0,15	0,12	0,26
Client Involvement	0,04	0,05	0,03	0,08	0,08	0,02	0,02	0,06	0,06	0,11	0,08	0,02	0,03	0,12	0,18
Managing Client Concern	0,04	0,10	0,06	0,05	0,05	0,09	0,11	0,06	0,06	0,11	0,08	0,09	0,03	0,12	0,01
Communication	0,34	0,10	0,18	0,10	0,08	0,14	0,11	0,10	0,10	0,11	0,08	0,14	0,15	0,19	0,01
Design Revision	0,04	0,02	0,03	0,05	0,03	0,01	0,02	0,04	0,04	0,02	0,01	0,01	0,03	0,02	0,00
Adaptability	0,04	0,14	0,03	0,05	0,13	0,05	0,02	0,06	0,06	0,11	0,08	0,09	0,03	0,02	0,04
Quality Control	0,04	0,10	0,02	0,05	0,05	0,09	0,04	0,10	0,10	0,03	0,08	0,02	0,03	0,02	0,03
Building Regulation	0,02	0,02	0,02	0,03	0,01	0,02	0,01	0,02	0,06	0,01	0,01	0,02	0,02	0,01	0,03
Certification	0,02	0,02	0,02	0,03	0,01	0,02	0,01	0,01	0,02	0,02	0,01	0,02	0,02	0,01	0,03
Presentation Material	0,06	0,02	0,03	0,08	0,08	0,02	0,08	0,10	0,06	0,06	0,08	0,09	0,04	0,03	0,18
Built Portfolio	0,04	0,02	0,03	0,08	0,08	0,02	0,02	0,06	0,06	0,03	0,04	0,02	0,03	0,02	0,04
Design Portfolio	0,06	0,02	0,03	0,05	0,13	0,02	0,11	0,06	0,06	0,03	0,08	0,05	0,03	0,02	0,04
Design Development	0,06	0,10	0,12	0,08	0,08	0,14	0,11	0,10	0,10	0,11	0,12	0,14	0,08	0,03	0,03
Accommodate Client's Needs	0,06	0,14	0,18	0,05	0,08	0,14	0,11	0,10	0,10	0,11	0,12	0,14	0,15	0,06	0,03
Meet the Deadline	0,04	0,02	0,03	0,05	0,01	0,09	0,11	0,06	0,06	0,03	0,08	0,09	0,23	0,19	0,09

The data analysis indicated that the consistency ratio (CR) for the control group was 0.07. Essentially, this means that the control group's consistency ratio remained below 0.1 as its threshold, which is crucial for validating this type of study. This outcome strongly suggests that the indicators utilized by the participants effectively contributed or were consistent. The study's robustness is underscored by the control group's adherence to the established consistency criteria, affirming the reliability of the chosen methodology and participant selection process. The survey's external validity is guaranteed through the selection of the survey instrument. As highlighted by Pauer et al. (2016), Saaty's Analytic Hierarchy Process (AHP) is specifically tailored for decision-makers (DMs) dealing with intricate multi-criteria decision problems. This method operates on the premise that assessing the relative importance of multiple criteria through appropriate pairwise comparisons within a hierarchical framework is more dependable than gauging their absolute importance. According to Wind and Saaty (1980), while traditional criterion analysis involves a trade-off task for respondents, the analytic hierarchy approach achieves this by assessing a sequence of straightforward pairwise comparison matrices. Consequently, in this research, the utilization of the AHP approach enabled to attain more precise results.

Table 8: Sub-Criteria Weight

Total	Priority	Eigen Value	Sub-Criteria	Weight	Rank
1,84	0,12	0,56	Understanding the Client's Vision	0,122	2
0,97	0,06	1,35	Client Involvement	0,064	8
1,06	0,07	1,16	Managing Client Concern	0,071	6
1,99	0,13	0,80	Communication	0,132	1
0,36	0,02	0,90	Design Revision	0,024	13
0,95	0,06	1,37	Adaptability	0,063	9
0,78	0,05	1,37	Quality Control	0,052	11
0,30	0,02	1,03	Building Regulation	0,020	14
0,26	0,02	0,89	Certification	0,017	15
1,00	0,07	1,19	Presentation Material	0,066	7
0,59	0,04	1,03	Built Portfolio	0,039	12
0,79	0,05	1,17	Design Portfolio	0,053	10
1,38	0,09	1,22	Design Development	0,092	4
1,57	0,10	1,68	Accommodate Client's Needs	0,105	3
1,17	0,08	0,89	Meet the Deadline	0,078	5
Total	1,00	16,63			

Research ethics: Participants participated in the study of their own free will. Before the survey began, participants were briefed on the purpose, method, and ethics of the study. The participants did not object to being assigned a unique code. To ensure the anonymity of the participants, during the data collection phase, the matrices containing the criteria scores by the participants were stored in a Microsoft Excel document without the names of the participants.

D) Result

The participants' pairwise comparisons of the client preferences criteria for architectural firm service quality (hereafter referred to as 'criteria'), calculated by the AHP method, resulted in percentage weights for each of the criteria. By employing geometric averaging to consolidate these weights, the participants' assessments assigned average percentage weights to all the evaluated criteria, culminating in a prioritized ranking of their importance. The examination uncovered disparities among the criteria, indicating that not all criteria held comparable weight. Table 9 visually represents this characteristic, showcasing the order of significance for each criterion, their respective percentage scores (with the sum totalling 100% across all 15 criteria), and the arithmetic differences between each criterion's higher position and the subsequent position in the order. It can be observed that the difference between the first and the second criterion is 0.010 percentage points, between the second and the third criterion 0.018, etc. The highest difference between the ranks is 0.018 and the lowest 0.001.

Table 9: Client Preferences Criteria for Architectural Firm Service Quality

Sub-Criteria	Weight,%	Weight	Gap	Rank
Communication	13%	0,132		1
Understanding the Client's Vision	12%	0,122	0,010	2
Accommodate Client's Needs	10%	0,105	0,018	3
Design Development	9%	0,092	0,012	4
Meet the Deadline	8%	0,078	0,014	5

Managing Client Concern	7%	0,071	0,008	6
Presentation Material	7%	0,066	0,004	7
Client Involvement	6%	0,064	0,002	8
Adaptability	6%	0,063	0,001	9
Design Portfolio	5%	0,053	0,010	10
Quality Control	5%	0,052	0,001	11
Built Portfolio	4%	0,039	0,013	12
Design Revision	2%	0,024	0,015	13
Building Regulation	2%	0,020	0,004	14
Certification	2%	0,017	0,003	15

The size of the interval between the different criteria determined the ranking of the criteria into units. The largest (0.018) gap in values between criteria 2 and 3 justify the attribution of these criteria to a separate unit of most significant criteria, whereas the gap between the 10 and 11 criteria indicates a very low weight difference relative to each other. With a margin of 0.001, it would be difficult to argue that one criterion significantly outweighs another.

IV. CONCLUSION

Applying this rationale, the entire set of criteria evaluated by participants has been categorized into five distinct units based on their levels of impact. These units comprise essential, significant, sufficiently significant, marginally significant, and less significant criteria pertaining to client preferences for Architectural Firm services. Essential criteria, holding the utmost significance, exert the most considerable influence on clients' preferences for services. Significant criteria complement essential ones, offering additional measures to ensure client satisfaction. Sufficiently significant criteria positively contribute to clients' preferences but with a comparatively lower impact. Marginally significant criteria provide only a marginal impact on clients' preferences, while less significant criteria hold lower importance than others. Based on empirical results, restructuring N. Studioworks' services is recommended by:

- Introducing a category for marginally significant criteria in customer preferences for an Architectural Firm.
- Reordering the criteria based on their level of significance among criterion groups.
- By classifying these criteria according to their significance, a Service Innovation Model for an Architectural Firm was developed, visualized in Figure 5, based on client preferences and service quality.

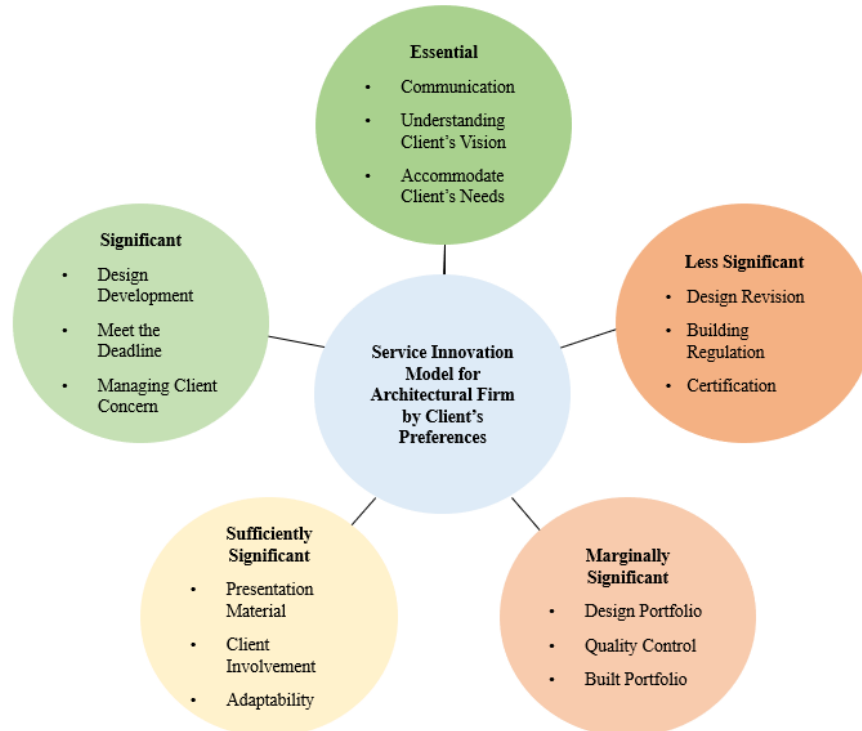


Figure 5: Service Innovation Framework for Architectural Firm of Client's Preferences with Service Quality (Author, 2023)

Utilizing the Analytic Hierarchy Process (AHP) for participant evaluation, the author identified and organized client preferences within an architectural firm into fifteen criteria, resulting in five distinct groups of significance. The prioritized ranking of these criteria provides a more precise understanding of priorities in terms of perceived service quality, facilitating a targeted approach to enhance client satisfaction. This empirically derived model of client preferences in architectural firms has the potential to enhance professionals' and researchers' comprehension of crucial aspects for client satisfaction, incorporating the latest academic insights and practical evidence. Moreover, the model benefits service users, guiding clients in selecting providers capable of delivering high service quality. The ranked criteria encourage a nuanced examination of quality and preference, emphasizing the relationship and importance of each criterion in relation to others. It is noteworthy that the study's limitations include its focus on one sector (project consulting services) in a specific geographical area (Indonesia). Generalizability to other architectural firm services and locations should be examined, and periodic research could identify evolving trends in criteria significance, historical changes, and forecast potential future adjustments.

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