

# Analysis of architect's performance indicators in project delivery process

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**Abstract.** Architect as a professional in the construction industry should possess a good performance in project delivery process. As a design professional, architect has an important role to ensure that the process is well-conducted by delivering a high-quality product for the clients. Thus, analyzing architect's performance indicators is crucial in the project delivery process. This study aims to analyze the relative importance of architect performance indicators in project delivery process among registered architects in North Sumatera, Indonesia. A total of five indicators that measure architect performance in project delivery process were identified and 110 completed questionnaires were obtained and used for data analysis. A relative importance index is used to rank the relative importance of architect performance indicators. Results indicate that focus on the clients is the most important indicator of architect performance in project delivery process. This study demonstrates project communication as one of crucial indicators perceived by the architects for measuring their performance, and fills a knowledge gap on the importance of identifying the most important indicator for measuring architect performance from their own perspectives which previous studies have overlooked to improve performance assessment in project delivery process.

## 1. Introduction

Architect as design professional in the construction industry has an important role to determine the project success. Architect's performance indicators in previous studies tend to be measured from the client's perspectives. The clients are the people who use the architect's services [1], therefore, the architect's performance indicators should be viewed from the clients' perspectives. The client's satisfaction is the number one marketing tool for the architect, thus, the client has the position to measure the architect's work [2]. However, gaining the architects' perspective is also important because they can also identify the most important indicators of their work performance. The architect works in each stage of the project delivery process – starting from the conceptual design to the final design stage. On the contrary, not every client involved in each process of delivering the project and some may not possess sufficient knowledge or the ability to read the architects' drawings. The architect collaborates with other professionals in the project delivery process to deliver successful project outcomes. Architects themselves know how they should perform and how much effort they give to produce a design. Therefore, architects are also capable of measuring and identifying which indicator is the most important for their performance in project delivery process. Thus, this study employs the self-evaluation approach, in which the architects as the individuals themselves rate the relative importance of their work performance indicators [6].



Self-evaluation provides behavior-based feedback to increase feedback accuracy and improve the measurement exercises that the employers need [3]. This approach is increasingly becoming the focus of research owing to its contribution for improving work performance and employees development because it makes employees tend to have more satisfaction and motivation in their work [4, 5]. Therefore, this study aims to cover the existing knowledge gap by analyzing and identifying the most important indicator using architects' rating of the relative importance of performance indicators in project delivery process.

The surveyed respondents were the registered architects in North Sumatera, Indonesia. Data analysis includes the use of Relative Importance Index (RII) to rank each performance indicator. The results would help clients and employers of consultant firms to better understand the architects' perspectives and incorporate the feedback in future projects to ensure a successful project delivery process and improve the performance measurement in project delivery process.

## **2. Architect Performance Indicators**

Performance is defined as the result of optimal work by an individual, team, or business entity [7] and the execution of the work in accordance with the responsibilities to achieve results that are in line with the expected [8]. The performance of professionals in the construction industry tend to be measured based on time, cost, and quality [9, 10]. These indicators used to measure the final products at the final stage. Instead of measuring the final products (completed design) in post-evaluation, architect performance should be measured during the process of delivering the project (design) itself [11]. Previous studies have highlighted performance indicators related to the duties and responsibilities of the architect during the project delivery process in relation with design. These indicators include quality of work, design buildability, focus on the clients, project communication and management skills.

### *2.1. Quality of work*

The ability to complete the project according to the scheduled time, cost, and quality defined the success of construction project [12, 13]. Quality pertains to the standard of how good and bad something is [14]. In the construction industry, quality refers to the totality of features required in services or products to satisfy needs and convince users and clients [15]. Therefore, architects should meet the expected standards and required features to satisfy the needs of their clients. Delivering high-quality work and satisfying clients help strengthen the architects' position within the highly competitive market in the industry. Quality of work includes aesthetics and design quality [16], high quality specification [17], minimal or absence of design deficiency [18], quality management strategies, conformity to codes and standards, and contribution in the production of construction inspection and testing program [1].

### *2.2. Design buildability*

Design buildability should be given appropriate attention by architects starting from the conceptual planning of design [1]. The buildability of the final design helps ensure the achievement of goals and the success of the project [19]. Design buildability relates with efficiency, ease of construction, and quality of the end product [20]. Achieving buildability entails that the design is flexible for changes, simplified, and complete, that the elements are standardized and dimensionally coordinated, that constructability review is carried out, and that the architect has sufficient knowledge on materials and components and performs effective site observations and inspections [1, 2, 21].

### *2.3. Focus on the clients*

Architects should realize that the clients are their most important person in the industry. They should focus on achieving a client's needs to ensure project opportunities in the future which may come in the form of clients using the architect's services again in the future or recommending the architect to other potential clients in the industry. These opportunities are important for architects to market themselves

and survive in the highly competitive industry. Understanding the clients' objectives will help the consultant firms have a competitive advantage in the industry [22]. These objectives relate to finishing the project on time, meeting the budget, and getting the highest possible quality [20, 23]. Thus, focusing on the clients implies being able to understand the clients' objectives, consideration, and forethought of user requirements, analyze the design concepts and requirements, design the project within the budget, identify and prioritize project objectives, complete the design on time, and conform the design to the client's requirements.

#### 2.4. *Project communication*

Creative ideas are useless if not communicated properly. Therefore, an excellent architect should learn to communicate ideas verbally and graphically into an action plan. Communication is an important indicator of performance because it signals the beginning of any project in the form of project briefing where clients' needs are understood. Communication entails expressing ideas and giving information [14]. Considering that communication also means exchange of information, architects should be able to communicate well with all project participants and effectively communicate ideas into drawings [24]. A successful project management relies upon a good project communication between the project participants [25, 26]. In contrast, bad communication among the project participants may lead to misinterpretation of ideas or information received and, subsequently, to defective design and project failure [2]. Therefore, having good performance in terms of project communication is crucial for architects to achieve overall optimum project performance. Project communication involves clarity, brevity, certainty, and comprehensiveness [21], as well as effective design communication to the contractor and other participants [22].

#### 2.5. *Management skills*

Possessing good management skills is important in achieving optimum project performance because defining project strategy as part of management skills contributes to project success [27]. Poor performance usually is experienced because of a poor management in formulating the project strategy [28]. Architects, as design team leaders, should understand that good management skills and abilities can ensure smooth and successful project delivery process. Management skills and abilities include providing assistance in defining the project strategy [27, 28], running effective pre-design project meetings, involving other professionals during the design stage [22], coordinating among phases of design and between design and construction, running effective project review meetings [1] and giving advice on contract provisions [29].

### 3. **Methodology**

This study used the quantitative approach using questionnaire survey to collect data and meet the study objective. The respondents who are chosen for the study are the architects registered with the Indonesian Institute of Architect (IAI) of North Sumatera. A total of 110 completed and useful questionnaires were used for analysis. Data analysis includes frequency, descriptive statistics, and the use of Relative Importance Index (RII). The Relative Importance Index (RII) is used to identify and rank the collected data on performance indicators based on the collective perceptions of the respondents. The RII for each indicator surveyed was calculated by the formula as shown below (see [30]):

$$RII (\%) = \frac{5(n5)+4(n4)+3(n3)+2(n2)+n1}{5(n1+n2+n3+n4+n5)} \times 100 \quad (1)$$

where: n1; n2; n3; n4; and n5, are the number of respondents who selected: 1, for not important; 2, for less important; 3, for moderately important; 4, for important; and 5, for extremely important. The questionnaire is divided into three sections. The first section gathers information on the respondent's background. The second section, which consists of thirty seven questions, identifies the importance of

performance indicators using Likert's scale adopted from previous study in ascending order starting from 1 (not important) to 5 (extremely important) [1]. The last section solicits respondents' comments on architect performance.

The Cronbach's alpha coefficient obtained in this study is 0.955, which indicates that all questions in the questionnaire are good and reliable in measuring architect performance [31]. The internal consistency indicates the homogeneity of items that form the construct [31]. The internal consistency of the questionnaire is tested by calculating the Cronbach's Alpha coefficient. The Cronbach alpha coefficient which is less than 0.6 is not good, 0.6–0.7 is acceptable, above 0.7 is good, and 0.8 is preferable. The coefficient obtained also indicates an acceptable measure of the questionnaire's reliability [32].

#### 4. Results and Discussion

From 110 respondents, most of the respondents are males (85.5%) and have worked in the construction industry for 5–15 years (68.2%) and they mostly have completed 20–40 projects (82.7%). 98 respondents have a bachelor's degree (89.1%), 11 have a master's degree (10%), and one has a PhD degree (0.9%). Majority of the respondents work in private firms (96.4%) where most of these firms have been established for 11–15 years (52.7%) and some more than 20 years (9.1%). The registered architects in North Sumatera as the respondents rated the relative importance of five indicators that measure architect performance. The results of the RII value and the rank of each indicator can be seen in Table 1.

The result shows that the respondents consider focus on the clients as the indicator with the highest level of importance in measuring architect performance, as reflected in the cumulative average RII value of 88.59 per cent. The result also indicates that the items under focus on the clients are the important items for architects, having obtained RII values of 88.59 per cent. Interestingly, previous study's assessment of architect performance from the clients' perspective shows that consideration and forethought of user requirements is one of the five most important criteria for measuring architect performance according to clients from the private sector [1]. Therefore, the result of this study confirms previous findings, and that architects who participated in the survey understand the need to focus on clients and understand their needs and requirements in order to compete in the industry because architects without satisfied client will have difficulties getting a project.

**Table 1.** Relative importance index values and ranks of architect performance indicators.

Rank	Performance Indicators	RII (%)
1	<b><i>Focus on the clients</i></b>	88.59
	Design the project within budget	
	Analyze the design concepts and requirements	
	Consideration and forethought of user requirements	
	Complete the design on time	
	Identify and prioritize project objectives	
	Understand the clients' objectives	
	Conform design to the client's requirements	
2	<b><i>Project communication</i></b>	87.66
	Communicate design clearly to the contractor	
	Communicate effectively with other professionals during design stage	
	Communicate ideas effectively into drawings	
	Be clear in communication	
	Communicate effectively with the clients	
	Be certain in communication	
	Be brief in communication	
	Be comprehensive in communication	
3	<b><i>Quality of work</i></b>	85.17
	Provide assistance in quality management strategies	

	Deliver aesthetics and quality of design	
	Deliver with no rework and deficiency in design	
	Conform design to codes and standards	
	Provide assistance in construction commissioning and testing program	
	Produce clarity and consistency of specification with drawings	
	Provide assistance in production of quality manuals for construction works	
4	<b>Management skills</b>	84.70
	Coordinate between design and construction	
	Organize people and work activities	
	Coordinate among design phases	
	Involve other professionals during design stage	
	Run effective pre-design project meetings	
	Run effective project review meetings	
	Provide assistance in defining project strategy	
	Provide advise on contract provisions	
5	<b>Design buildability</b>	83.27
	Flexible in design for changes	
	Complete and simplify design	
	Effectively conduct constructability review of design	
	Participate in site observations and inspections effectively	
	Standardization of elements	
	Have in depth knowledge of performance characteristics of materials and components	
	Dimensional coordination of elements	

Architect performance in previous study has been measured using four indicators: client focus, constructability and buildability of design, quality of works, and management systems [1]. The present study adds another indicator for measuring architect performance; project communication which measured with eight items. The results show that project communication is the second most important performance indicator with cumulative average RII value of 87.66 per cent, and indicates that all items under project communication are perceived by the respondents as extremely important. In previous studies, project communication has been identified as an essential factor to a firm's success and project performance [33, 34]. These findings indicate that registered architects of North Sumatera acknowledge project communication as fundamental to ensuring that their performance is at the optimum level. Given that every project starts with communication, architects need to ensure that good communication performance and effective communication exist in the process of project delivery to gain success in executing a project.

The third most important performance indicator perceived by the architects is the quality of work, with a cumulative average RII value of 85.17 per cent. The result indicates that the items under quality of work are also important for measuring architect's performance. Quality of work is considered a key performance indicator in the construction industry [9, 10, 35, 36]. Therefore, the results imply that registered architects of North Sumatera are also aware that achieving good quality of work is important for ensuring their optimum performance in project delivery process.

The next most important indicator is management skills with the cumulative average RII value of 84.70 per cent. The ability to realize strategic objectives for the project can be limited due to the deficiencies in managing the project [37], which means that non-performance in managing the project can lower the project performance level because the project strategy to achieve the project objectives is not properly identified. Thus, architects should have good performance in managing both the activities and the people involved in the project to ensure a smooth project delivery process. The finding indicates that the surveyed architects realize that having good management skills will help them to minimize problems, deliver a successful project and achieve higher performance in project delivery process.

Design buildability is the indicator with the lowest cumulative average RII value (83.27 per cent). The result implies that design buildability is less important for architects. In similar, previous study also found that items measuring design buildability, such as carrying out constructability review and design flexibility for changes and variations, are ranked by clients as the bottom two in terms of importance [1]. One possible explanation is clients' lack of knowledge on the advantages of design buildability, which translates to clients not perceiving design buildability as having equal importance as the other performance indicators. As a result, architects likewise do not consider design buildability as a very important performance concern, and therefore consider this indicator as the least important compared with the other four performance indicators presented in the study.

Nevertheless, the results show that the cumulative average RII for the five indicators conceptualized for measuring architect performance in this study has a weighted importance ranging from 83.27 per cent to 88.59 per cent. This result implies that all indicators presented in this study are perceived by the respondents as crucial for measuring architect performance in the project delivery process consistent with the argument that weighted importance between 80 and 100 implies that the RII value is within the range of extremely important in terms of its importance level [38].

## 5. Conclusion

Based on the results, this study suggests that focus on the clients is the most important indicator for measuring architect performance chosen by the respondents, indicating that architects who participated in this study realize that having good performance in terms of focus on the clients can help them to survive in the industry. In contrast, design buildability is chosen as the indicator with the lowest RII value, which means that architects perceive this indicator to be the least important among the given performance indicators. Architects should realize that design cannot be separated from construction, and they, therefore, should give more attention to design buildability in their work. Such findings are important for architects as well as other players involved in the project, such as clients, contractors, and management of consultant firms, in understanding which performance indicator should be given more attention. However, this study is limited to registered architects in North Sumatera; how architects in different part of Indonesia and other countries perceive the importance of these five indicators to measuring architect performance is an interesting research in the future. Further, this study adds project communication to the previous four indicators, and demonstrates that project communication is a very important indicator for measuring architect performance. The RII value of project communication shows that registered architects perceive project communication as an extremely important indicator and choose it as the second most important indicator for measuring architect performance. This study provides useful insights to architects, provides a basis for identifying the significance of performance indicators and their respective items for measuring architect performance, and provides guidance for future research in the construction area specifically in the field of architecture management and practice. Other important indicators may be included in the future to achieve a more holistic performance assessment.

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