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The Role of Owner's Consultant in the Planning and Design Phase of Government Building Construction

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ABSTRACT

Purpose: Many government infrastructure projects that fall into the complex category are organised by technical agencies, in this case the Ministry of Public Works and Public Housing (PUPR), however, there are also many construction projects that do not fall into the complex category and are specialised in nature that are handled by ministries or non-technical government agencies.

Design/Methodology/Approach: For complex work, the owner can use a construction management consultant (MK) as a companion, but for non-complex work the owner only uses a planning consultant, while the owner of a non-technical government agency needs an advisor in the technical planning process to help decide on design problems appropriately. This encourages owners or commitment-making officials (PPK) to use the services of experts as assistants during the technical preparation and planning process. This research examines the role of external personnel outside the planning consultant as a consultant to the owner (KPO) during the design process. Using the content validity ratio (CVR) method on the opinions of 15 experts in the field of design and construction services, 14 roles of the owner's assistant were obtained.

Findings: Through relative importance index (RII) analysis, it was found that the most important roles in the design stage are: ensuring terms of reference (KAK), providing standard design rules or guidelines, identifying owner's needs, documenting design decisions, assisting communication between owner and design team, controlling design schedule, reviewing own estimate price (HPS) and specifications, evaluating design proposals, ensuring value for money, suggesting design tools, identifying stakeholders, preparing selection documents, ensuring design decisions and getting the best performance of design consultants. Through independent t test , it is concluded that there is a significant difference in the mean value between the perception of the owner and design consultant regarding the role of KPO. The contribution of this research is to produce a validation of the role of KPO needed by non-technical government owners at the design stage to assist efforts to obtain quality design documents or detailed engineering design (DED).

Paper Type: Research Paper

Keywords: *Briefing, Accompanying consultant owner, CVI, RII, Independent t test.*

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I. INTRODUCTION

Some construction projects can be completed with few changes or variation orders, but there are also construction projects that experience many contract changes before the project is completed. Contract changes or change orders have an impact on reducing project performance (Sulistio & Wibowo, 2014) that occurred predominantly due to design changes (Hardjomuljadi, 2014). According to the study (Mahat & Adnan, 2018), Most of these design changes come from the owner's proposal, while the owner himself is the party involved in the design process.Design changes occur due to poor quality design documentation that causes project

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inefficiencies (P. D. K. Agbaxode et al., 2023). The less than optimal role of the owner in the design briefing process is one of the factors causing the poor quality of design documents or detailed engineering design (DED).This is because the DED is prepared based on the owner 'sbrief and the design product is decided by the owner at each stage.

Government construction owners in Indonesia can generally be divided into two, namely government owners of technical agencies (OPIT), and government owners of non-technical agencies (OPNIT) or novice owners.OPIT includes technical ministries both at the central level, namely the Ministry of Public Works and Public Housing (PUPR) and at the regional level (To Dinas PUPR); while OPNIT includes owners other than ONIT whose organisations are not filled with construction personnel. In the conventional delivery system, design bid build, the design documents are finalised before physical works commence. This design document is prepared by a technical planning consultant (design) based on information data and needs from the projectowner (owner) as stated in the terms of reference (KAK) or project brief. For complex project categories, the owner can be assisted by a construction management (MK) consultant. Outside that category, the government owner can be accompanied by a technical team or manager as well as experts if needed. For OPNIT or novice owners, this assistance is necessary, considering that the organisation does not prepare professionals in the field of construction services, as is the case in ministries or technical agencies or OPIT, where most of the staff are recruited with an educational background in construction.

Owner assistance in construction project management is very important even though the goods/services provider (planning consultant) has been appointed through selection or tender. Assistance serves as a control over the implementation of contracts that require expertise, while the owner does not have in-house expert staff.This research will examine the role of the owner 's advisory consultant on non-technical government construction projects (OPNIT) that are not eligible to use MK consultants. For OPNIT, complex or not, construction is a complicated matter for them, so anexternal client adviser is needed in managing the project, especially at the planning anddesign stage (Fewings & Henjewele, 2019).

The competence of government owners or also called commitment-making officials (PPK) in Indonesia is still considered low (Hidayat, 2021). The requirement to appoint PPK is only seen from the managerial aspect and does not require technical aspects. This encourages PPK to be allowed to appoint external experts to assist with the technical aspects of construction (Per LKPP 12, 2021). The lack of control over the technical planning process has led to design decisions being made by the owner in a rush to expedite the tender process for physical construction, resulting in potential changes to the DED during the construction phase.

The design documentation or DED is prepared by the planning consultant through the collaboration of professionals recruited as needed such as architectural, structural, mechanical-electrical-plumbing (MEP), and others. In Indonesia, the quality of planning consultants is also considered low, with a limited number of experts, uneven distribution, quality not in accordance with certification, low salaries, and weak professional supervision. (Tamin et al., 2015). An indication of the tendency of consulting companies to gain profit by recruiting consultants who are still inexperienced, plus low competence in the technical aspects of the owner , it can be predicted that the design documentation or DED will be of low quality, so there is a very large potential for contract changes due to design changes. (Hardjomuljadi, 2016).

Therefore, the role of the owner 's assistant or advisor is needed, especially for OPNIT. The significance of this research is that no study has been found that discusses the role of the owner 's advisors, even though the vacuum of their role has led to the low quality of DEDs with all its implications. So far, research has focused more on the role of MK consultants, or planning consultants. Only a few researchers have examined the theme of the role of the owner and owner 's assistants in the non-technical government construction project environment (OPNIT). The benefits of this research are expected to be a theoretical basis related to the role of owner 's assistant consultants on non-technical government construction projects at the planning and design stage. The literature review related to the research topic will be discussed in the next paragraph.

A. Literature Review

1. Government Building Project

Government building construction projects have different characteristics from private projects. Government building objects have the aim of supporting services and become state property financed from the state revenue and expenditure budget (APBN). The process of organising government projects begins with technical planning activities followed by construction implementation (PP 16, 2021). Three characteristics of government projects are limited by many rules, must be accountable and financed by the state budget. Therefore, the commitment-making official or PPK as a government project manager must have knowledge and experience in the field of construction services procurement which is manifested in the form of competence (PerLKPP 7, 2021). Based on the research results, the performance of private project owners or PPKs is better than the performance of government project owners (Dwi Hatmoko & Khasania, 2016). In a study by Nagara, 2019, that Government projects experienced problems caused by two main reasons, namely the low quality of project supervisors and the

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competence of PPK. Based on BPK audit findings that PPK does not fully understand its duties and has a lack of technical aspects so that this is exploited by irresponsible implementers (Khoirul Huda, Jawa Pos 2017).

2. Project briefing and technical planning (design) stage

The success of the project is determined by the performance of the planning and design stage, as 80% of the information related to the project to be built is determined at this stage (Dimyati & Nurjaman, 2014). The effectiveness of the briefing or architectural programming process which aims to ensure all parties involved in defining the scope, collecting and analysing initial data for the design process to avoid redesign at a later stage needs to be strengthened (Cherry and Petronis, 2016). The quality of the final document produced in the form of detailed engineering and design (DED) will determine the success of the tender and construction stages. At this stage the project owner's task is very dominant in providing direction and information(briefing) to the design team assisted by the parties, especially the building user or end user (Pegoraroa & Carísio, 2017). Previous studies revealed that the briefing construction process was ineffective because it was not carried out in a planned manner and involved the right parties and limited time (Becermen et al., 2018; Jallow et al., 2014; Yu & Shen, 2013).

Briefing on government projects starts during the process of identifying needs by the owner until the determination ofrequirements for the design process. In non-technical government owners(novice owners), where the majority of staff are not construction personnel, there will certainly be confusion, so they need professionals who help the technical planning process. The appointment of a technical team or technical manager comes from the ministry in charge of construction. Based on observations and interviews with some government owners, the assistance of technical personnel has not been adequate in number and performance. Meanwhile, these personnel are indispensable for the process of organising construction using conventional methods. In Indonesia, research results reveal that most construction projects use a conventional delivery system, where the technical planning stage is completed at the beginning before the implementation stage (Firdausi et al., 2020).

The obligation of the project owner or owner is to prepare technical planning documents as materials for tender documents and work implementation documents. Technical documents in the form of DED are products of the design stage, part of the asset management life cycle (planning, acquisition, operation and maintenance, and disposal and replacement) and project life cycle (preparation, technical planning, construction implementation, technical supervision, and post-construction stages). The main actors in both cycles are the planning (design) consultant and the owner involving stakeholders includingend-users. Theowner prepares the KAK from the results of the needs identification, then proceeds with the preparation of the design proposal by the planning consultant. The design process goes through four phases from concept design, pre-design, design development and detailed design. The owner's role in these four phases is to provide data and information, review and approve and decide the results of each phase before proceeding to the next phase (PP 16 RI, 2021; UU, 2017).

3. DED quality predictor

Poor quality DEDs are a source of construction project inefficiencies (Tilley et al., 2002). This has an impact on contract changes which ultimatelydelay project completion and increase costs (cost overrun) (Jamaludin et al., 2014). Some researchers (Akampurira & Windapo, 2018; Emmanuel & Windapo, 2016) obtained 37 factors grouped into four latent variables that are assumed to affect the quality of design documentation, namely industry/external variables, client/owner, design firm, and design professional variables.

A more updated study by (P. Agbaxode et al., 2021) They obtained 109 factors that were grouped into five latent variables, namely design documentation factors, design consultant factors, owner/client factors, collaboration factors, and external factors. There are differences in the variables created by the two researchers. Windapo (2016, 2018) argued that design professionals are a separate variable from design consultants; whereas Agbaxode (2021) does not separate the two, but adds the variables of collaboration and design documentation. Collaboration reflects the communication process between teams involved in the design process, while design documentation reflects the results of the design writing process undertaken by the design team.

The grouping of variables in the context of the design process can actually be divided into the categories of the two main design actors, namely the owner and the design consultant. The owner variable in the two studies above is directly operationalised into several indicators. Likewise, industry or external variables are directly operationalised into several indicators. While the design consultant variable (Emmanuel & Windapo, 2016) separated with the design professional variable. This separation further confirms that the position of design professionals has a significant influence on the quality of design outcomes. Although they work under the coordination of the design consulting firm in the design process, the design professionals' position has a significant influence on the quality of the design outcome.

The core activity of the design process is the briefing process. The briefing process is a procedure to identify, uncover, clarify, articulate the owner's requirements and needs, which are presented during the initial design process of a construction project (Yu & Shen, 2015). Studi dan Dokumentasi Bangunan atau International Council for Research and Innovation in Building and Construction (CIB) (1997) defines briefing as the process of the

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owner informing others of his needs, aspirations and desires or ambitions, either formally or informally with the brief being a formal document containing detailed provisions of the owner's requirements. The briefing process is also known asarchitectural programming or defining theproject scope which is required before the design process becomes more detailed (Dicks et al., 2017; Gibson & Gebken, 2003). The briefing process is a critical phase in achieving a successful construction project, and the Owner has a dominant role in this briefing process. (Ahmad et al., 2011).

One of the problems in the briefing process is related to the lack of involvement of the owner in the process. The owner is often absent from the design process and/or appoints a representative who is not competent in the design process, so design decisions are often not finalised or delayed (Bowen et al., 1997). There are three attributes of the owner 's role in the design briefing process: the quality of the owner's representative, the briefing management effort and the owner's organisational commitment (Ahmad et al., 2011). The quality of the owner 's representative means the level of competence in organising and managing construction projects, especially in the briefing process. This depends on his knowledge and experience in construction projects. This competency level relates to briefing management, which is how the owner conducts the process of planning, organising, coordinating, documenting, communicating and monitoring the client requirements process. The owner 's knowledge in terms of the briefing process is generally at a low level, even some owners consider the briefing task to be part of the design consultant's duties. (Blyth & Worthington, 2010). Another owner attribute is the commitment of the organisation in its seriousness to implement the previous two attributes by preparing resources in the form of budget and time support. Therefore, strengthening the owner 's capacity is necessary for the success of the briefing process in an effort to obtain quality design documents.

Strengthening the owner in the design process, one of which helps the communication process between the owner and the design team carried out by an independent team / owner's assistant. This is in line with the condition of government construction projects in Indonesia where the quality of design consultants and owner competence is still low (Puspa Negara et al., 2019; Putut Marhayudi et.al, 2021). In addition, to assist the owner/PPK in the design and technical field, PPK can be assisted by an independent review team (Tilley et al., 2002) atau penasihat klien independen (RIBA, 2020). The focus of this research will examine in depth the role of this independent team in assisting the owner/PPK at the design stage in order to improve the quality of design documents..

4. Owner's Assistance Consultant

In the procurement of construction services, there are planning consultants, supervisory consultants, construction management consultants (MK), and parties who carry out construction work, namely contractors as construction service actors. (PP 16 RI, 2021). In the conventional delivery system, where the DED document must be ready before tendering, the owner appoints a planning consultant to prepare the DED. In non-technical government owners, external personnel are needed as advisors during discussions with planning consultants. One of them is by applying for the help of a technical team or technical manager from a technical ministry agency. Under certain conditions, it can appoint a team or experts in the technical planning process who have the competence and qualifications to help become a companion / advisor to the owner, which in this study is called an owner's advisory consultant.

In some countries, it is common to use professional advisors to strengthen the role of the owner, as the owner is at the centre of decision-making at every stage of the project, especially at the beginning of the project, the design stage. However, the owner has many wishes andrequirements for the building to be procured. For this reason, the owner must identify the real needs and determine the requirements and what kind of building needs to be built. The owner's tasks include determining technical specifications, budget requirements, procurement strategies, appointing the right design team, reviewing design products and approving each stage of the product and organising the working relationships of the project team. To do all this and for the owner to make the right decisions, the recommendation of professional advisors is essential (Riba PoW, 2020). A client adviser is needed at the project initiation stage to help develop a strategic brief before the design concept is implemented (Fewings & Henjewele, 2019).

In Indonesia, if identified, the party that plays a role such as a companion to the government owner is a technical team or technical management personnel (PP 16, 2021; Permen PUPR 22, 2018). In addition, the owner can also appoint an expert or team if needed (Per LKPP 12, 2021) or probity advisor team (Kep Deputi 4 LKPP, 2021). All of them fall into the category of personnel or consultants or owner's advisors who work independently and professionally and can communicate effectively like professional consultants.

5. Conceptual Framework and Hypothesis

This research tries to build a framework that the technical planning process by government owners, especially in K / L non-technical agencies, requires other parties to assist PPK in the design process. PPK can submit a request for assistance from a technical team, technical manager or probity advise to the government agency in charge, either the central or regional Ministry of PUPR or to the Government Goods / Services

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Procurement Policy Agency (LKPP). Based on the researcher's observations, novice owners choose to use external experts with the consideration that they are independent, easy procedures, guaranteed availability and can choose according to their level of experience and ease of communication with PPK. The external experts, in this research, are called owner assistance consultants or KPOs.

Starting from the theoretical concept, two hypotheses are formulated to be answered in this research. Hypothesis one (H1): KPO has a very important role in improving the quality of engineering design (DED) documents. Second hypothesis (H2): There are different views between the PPK and the design consultant regarding the presence of KPO.

II. METHODS

A. Research design

The research approach chosen to prove these two hypotheses is a descriptive and verification quantitative approach (Creswell & Crewswell, 2018). Data were collected at one time or one-shot (cross-section) (Sekaran & Bougie, 2016), namely mid-2023. The research location is in the DKI Jakarta area. The research subjects were experts and practitioners of government construction projects as many as 11 sources/experts. Data collection techniques using survey techniques (Sekaran & Bougie, 2016). The research instrument was a questionnaire with close ended questions.

Data analysis techniques on the role of KPOs used three tools. Proving the first hypothesis (H1) using descriptive analysis, namely with Content Validity Ratio (CVR) (Lawshe, 1975; Aiken, 1985) to test the validity of KPO role indicators; and Relative Important Index (RII) (Sustiawan & Husin, 2011) to determine the ranking of KPO role indicators that have been validated with CVI. The proof of the second hypothesis (H2) uses verification analysis, namely by testing t for two samples(independent T test) (Jubilee Enterprise, 2014: Santoso, 2017) to determine the difference in perceptions between the PPK and the design consultant in relation to the role of KPO.

III. RESULTS AND DISCUSSION

A. Results

1. Demographic characteristics of interviewees/experts

The research subjects were 11 experts/practitioners of government construction projects. The characteristics of the 11 experts are summarised in Table 1.

Table 1 Expert Demographic Data

Demographic Data 11 Experts

Data Type		*Frequency*	*Percent*	*Valid Percent*	*Cumulative Percent*
Which organisation do you work for	*Construction company*	*7*	*63,6*	*63,6*	*63,6*
	Technical consultant	*2*	*18,2*	*18,2*	*81,8*
	Government (Bp2jk, dll)	*2*	*18,2*	*18,2*	*100,0*
	Total	*11*	*100,0*	*100,0*	
Position or Title as	*Directors*	*3*	*27,3*	*27,3*	*27,3*
	Manager	*6*	*54,5*	*54,5*	*81,8*

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	Professional	*2*	*18,2*	*18,2*	*100,0*
	Total	*11*	*100,0*	*100,0*	
Academic Qualifications	*Undergraduate*	*4*	*36,4*	*36,4*	*36,4*
	Master	*6*	*54,5*	*54,5*	*90,9*
	Doctoral	*1*	*9,1*	*9,1*	*100,0*
	Total	*11*	*100,0*	*100,0*	
Discipline of Science	*Civil engineering*	*3*	*27,3*	*27,3*	*27,3*
	Architecture	*3*	*27,3*	*27,3*	*54,5*
	Electrical	*1*	*9,1*	*9,1*	*63,6*
	General management	*4*	*36,4*	*36,4*	*100,0*
	Total	*11*	*100,0*	*100,0*	
Length of Experience as per Field	*Less than 10 years*	*1*	*9,1*	*9,1*	*9,1*
	10-20 years	*8*	*72,7*	*72,7*	*81,8*
	Up on 20 years	*2*	*18,2*	*18,2*	*100,0*
	Total	*11*	*100,0*	*100,0*	
Have you ever been an Owner Assistance Consultant	*Ever*	*6*	*54,5*	*54,5*	*54,5*
	Never	*5*	*45,5*	*45,5*	*100,0*
	Total	*11*	*100,0*	*100,0*	
If so, what types of companionship have been experienced	*Never been a co-consultant*	*5*	*45,5*	*45,5*	*45,5*
	Technical Manager	*2*	*18,2*	*18,2*	*63,6*
	Probity Adviser	*1*	*9,1*	*9,1*	*72,7*
	Individual Consultant	*2*	*18,2*	*18,2*	*90,9*
	MK Consultant	*1*	*9,1*	*9,1*	*100,0*

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	Total	*11*	*100,0*	*100,0*	
Typical projects you handle	*Building*	*4*	*36,4*	*36,4*	*36,4*
	Infrastructure	*4*	*36,4*	*36,4*	*72,7*
	Building and infrastructure	*3*	*27,3*	*27,3*	*100,0*
	Total	*11*	*100,0*	*100,0*	

Source: Research results (2023)

Table 1 shows that most (63.6 per cent) of the resource persons/experts were those working in construction companies. 18.2 per cent of the interviewees/experts worked for technical consulting institutions, and the government (BP2JK, etc.). Their positions or titles are mostly (54.5 per cent) managers, the second position (27.3 per cent) is directors, and the rest (18.2 per cent) are professionals.

In terms of academic qualifications, most of the resource persons/experts (54.5 per cent) were master's level, followed by the second position (36.4 per cent) was undergraduate level, and the smallest (9.1 per cent) was doctoral level. In terms of discipline, the largest (36.4 per cent) was general management. The next 27.3 per cent were civil engineering and architecture. The smallest (9.1 per cent) was electrical.

Based on the length of experience in the construction field, most of the interviewees/experts (72.7 per cent) had between 10-20 years of experience. There were 18.2 per cent who had more than 20 years of work experience. Only a few (9.1 per cent) had less than 10 years of work experience. In relation to this work experience, most of the interviewees/experts (54.5 per cent) had been some kind of KPO. The rest (45.5 per cent) had never been a KPO.

The types of KPOs they have played (for interviewees/experts with KPO experience) are technical managers, and individual consultants at 18.2 per cent each. MK consultant, and probity adviser, 9.1 per cent each. When they acted as KPOs, the typical projects they handled were buildings (36.4 per cent), infrastructure (36.4 per cent), and buildings and infrastructure (27.3 per cent).

2. Validation test results with Content Validity Ratio (CVR)

By identifying parties outside the planning consultant who assist the owner in the briefing process to establish project requirements as a basis for design, several names were found, such as in Indonesia technical team, technical management personnel, experts, MK consultants, probity advisors, while abroad it is known as Riba Client Adviser, external Consultant, briefing consultant, facilitator and expert. This study uses the name of a companion consultant or owner's advisor which is abbreviated as KPO. As for the role of KPO from the literature, the following results were obtained, as presented in Table 2.

Table 2. KPO Role Based on Literature & Legislation

No	*KPO's Role*	*Reference*
1	*Assist in identifying the owner's needs for the building to be the best solution according to field conditions, vision & objectives of the organisation.*	*(1), (3), (5), (6), (7)*
2	*Assist in carrying out feasibility studies and selecting the best procurement system to achieve project objectives*	*(5), (8)*
3	*Assist in compiling components or packages of procurement of consultancy services and construction works and their cost allocation.*	*(1), (2)*

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4	*Assist in identification, coordination and consultancy with stakeholders in determining project requirements and terms of reference (KAK).*	*(7), (8), (9)*
5	*Assist in preparing selection documents, explanations, evaluations and draft contracts for planning or supervisory consultant services / MK*	*(1), (2)*
6	*Assist in reviewing KAK and HPS documents and project technical specifications*	*(1), (2), (4)*
7	*Help ensure a complete and clear (unambiguous) project brief or KAK is delivered and understood by the design team.*	*(7), (8), (10), (11)*
8	*Provides a list of provisions, standards, guidelines, rules that are updated and used in the design process including licensing.*	*(1), (12)*
9	*Evaluate design proposals and review stages of design products continuously to comply with KAK documents and project requirements.*	*(1), (2), (5), (11)*
10	*Document the results of discussions or briefing documents for design decisions and anticipate changes during design.*	*(11), (12)*
11	*Ensure design solution decisions are implemented by the owner based on the results of coordination and approval of stakeholders in a balanced/equal manner.*	*(2), (5), (11), (13)*
12	*Assist communication between the owner and the design team to get quick and best decisions in the design process.*	*(14)*
13	*Assist in ensuring value for money against proposals from design consultants using value engineering methods.*	*(13)*
14	*Advise design tools such as BIM, directions and critiques for problem solving that arise during the design stage.*	*(2), (5)*
15	*Assist in checking the completeness of construction tender documents and evaluating the performance of planning consultants.*	*(1), (4), (15)*
16	*Help get the best performance from design consultants under time, scope and budget constraints.*	*(5)*
17	*Ensure the PPK has the time and ability to carry out its role during the preparation of design documents.*	*(9)*
18	*Helps gain lessons learned from previous similar projects or post-occupation evaluation (POE).*	*(5)*
19	*Assist in schedule control of DED document procurement stages and analysis of key risks in achieving project objectives.*	*(2), (5)*

Description:

Source number: (1) PP 16, 2021; (2) Permen PUPR 22, 2018; (3) PerLKPP 11, 2021; (4) PerLKPP 12, 2021; (5) Riba Client Adviser, 2019; (6) Kep Deputi LKPP 2, 2021; (7) Designingbuildings.co.uk, 2020; (8) Riba, 2020; (9) CABE, 2003; (10) Vahabi et al, 2020; (11) Van Meel & Stordal, 2017; (12) Cherry & Petronis, 2016; (13) Yu et al, 2006; (14) Chun & Cho, 2018; (15) Jawaharnesan & Price (1997)

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Furthermore, the 19 indicators of the role of KPO were included in a closed ended questionnaire, which is a Content Validity Ratio (CVR) questionnaire. The questionnaire was distributed to 11 resource persons/experts through interviews. The validation results based on the CVR test, presented in Table 3.

Tabel 3 Test Results Content Validity Ratio (CVR)

Content Validity Ratio (CVR)

Indicator Code	*Rates [(Number of Experts (M)]*	*Finding Judgment*					*Relevant and highly relevant (MP)*	*V (Raters=11, Rating Category = 4) = 0,79*	*CVR = 2*MP /M-1*	*Indicator Status (valid/invalid)*
		Very Irrelevant (1)	*Irrelevant (2)*	*Relevant (3)*	*Highly Relevant (4)*	*Information*	*(Relevant = 3, Highly Relevant = 4)*			
PRN-1	*11*	*0*	*1*	*3*	*7*		*10*	*0,79*	*0,8181*	*Valid*
PRN-2	*11*	*1*	*2*	*2*	*6*		*8*	*0,79*	*0,4545*	*Invalid*
PRN-3	*11*	*1*	*2*	*2*	*6*		*8*	*0,79*	*0,4545*	*Invalid*
PRN-4	*11*	*1*	*0*	*4*	*6*		*10*	*0,79*	*0,8181*	*Valid*
PRN-5	*11*	*0*	*0*	*3*	*7*	*(one person does not fill)*	*10*	*0,79*	*0,8181*	*Valid*
PRN-6	*11*	*0*	*0*	*1*	*9*	*(one person does not fill)*	*10*	*0,79*	*0,8181*	*Valid*
PRN-7	*11*	*0*	*0*	*2*	*9*		*11*	*0,79*	*1*	*Valid*
PRN-8	*11*	*0*	*0*	*3*	*8*		*11*	*0,79*	*1*	*Valid*
PRN-9	*11*	*0*	*1*	*3*	*7*		*10*	*0,79*	*0,8181*	*Valid*
PRN-10	*11*	*0*	*1*	*3*	*7*		*10*	*0,79*	*0,8181*	*Valid*
PRN-11	*11*	*0*	*1*	*6*	*4*		*10*	*0,79*	*0,8181*	*Valid*

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PRN -12	*11*	*0*	*0*	*5*	*6*	*11*	*0,79*	*1*	*Valid*
PRN -13	*11*	*0*	*1*	*5*	*5*	*10*	*0,79*	*0,8181*	*Valid*
PRN -14	*11*	*0*	*1*	*5*	*5*	*10*	*0,79*	*0,8181*	*Valid*
PRN -15	*11*	*0*	*2*	*3*	*6*	*9*	*0,79*	*0,6363*	*Invalid*
PRN -16	*11*	*1*	*0*	*5*	*5*	*10*	*0,79*	*0,8181*	*Valid*
PRN -17	*11*	*2*	*1*	*4*	*4*	*8*	*0,79*	*0,4545*	*Invalid*
PRN -18	*11*	*0*	*3*	*2*	*5*	*7*	*0,79*	*0,2727*	*Invalid*
PRN -19	*11*	*0*	*0*	*5*	*6*	*11*	*0,79*	*1*	*Valid*

Sumber: Hasil penelitian (2023)

Referring to Table 3, the first column shows the codes of the 19 indicators. The second column is the raters (with the symbol M) which is the number of sources/experts who provide judgment, in this case 11 people. The next four columns are the expert judgment for each indicator. The 11 resource persons/experts were asked to validate the 19 KPO indicator items, by choosing four alternative options, namely: very irrelevant, irrelevant, relevant, very relevant. Only the choice of sources on relevant, and very relevant, is counted as validity approval on an indicator which in this study is symbolized by MP. Given that the number of sources (raters) (symbol M) is 11 people, and the alternative choices are 4 choices; then the value of V is the number of sources (raters) divided by the number of choices, the value of V = 0.79. This figure becomes the limit, if the CVR value of an indicator exceeds V, then the indicator is valid; and vice versa. Next, the CVR value was calculated, namely "(2 times MP)/ M-1" for each indicator. The results of the 19 indicators, 14 of which were declared valid, because they had a CVR value> V value (0.79). The remaining five indicators (PRN-2, PRN-3, PRN-15, PRN-17, and PRN-18) were declared invalid, because they had CVR values < V value (0.79).

3. Results of KPO role indicator levels with Relative Important Index (RII)

Based on the CVR test, 14 indicators of the KPO role have been obtained which were declared valid through the judgment of 11 sources/experts (raters). The next step is to know the level or ranking of the 14 indicators, so that the most important or influential indicators in the role of KPO can be identified to the least important indicators. The number used for the weight (W) is based on the average value of the answers of the sources/experts when they make a judgment on the CVR test. The RII value is calculated based on the formula, which has a value between 0-1 for each indicator ranked. The results of the level or ranking of KPO role indicators based on RII are presented in Table 4.

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Tabel 4 Test Results Relative Important Index (RII)

Relative Important Index (RII)

	Weight (W)	*Highest Weight (A)*	*Number of Respondents (N)*	*RII = ΣW/(A x N)*	*Rangking*
PRN-1	*3,545454545*	*4*	*11*	*0,080578512*	*3*
PRN-2	*3,181818182*	*4*	*11*	*0,07231405*	
PRN-3	*3,181818182*	*4*	*11*	*0,07231405*	
PRN-4	*3,363636364*	*4*	*11*	*0,076446281*	*11*
PRN-5	*3,363636364*	*4*	*11*	*0,076446281*	*12*
PRN-6	*3,545454545*	*4*	*11*	*0,080578512*	*7*
PRN-7	*3,818181818*	*4*	*11*	*0,08677686*	*1*
PRN-8	*3,727272727*	*4*	*11*	*0,084710744*	*2*
PRN-9	*3,545454545*	*4*	*11*	*0,080578512*	*8*
PRN-10	*3,545454545*	*4*	*11*	*0,080578512*	*4*
PRN-11	*3,272727273*	*4*	*11*	*0,074380165*	*13*
PRN-12	*3,545454545*	*4*	*11*	*0,080578512*	*5*
PRN-13	*3,363636364*	*4*	*11*	*0,076446281*	*9*
PRN-14	*3,363636364*	*4*	*11*	*0,076446281*	*10*
PRN-15	*3,363636364*	*4*	*11*	*0,076446281*	
PRN-16	*3,272727273*	*4*	*11*	*0,074380165*	*14*
PRN-17	*2,909090909*	*4*	*11*	*0,066115702*	
PRN-18	*2,909090909*	*4*	*11*	*0,066115702*	
PRN-19	*3,545454545*	*4*	*11*	*0,080578512*	*6*

Sumber: Hasil penelitian (2023)

Table 4 shows the ranking of the 14 KPO Role indicators based on RII. The KPO Role indicators ranked 1-5 are PRN-7, PRN-8, PRN-1, PRN-10, and PRN-12. KPO Role indicators ranked from 6 to 10 are PRN-19, PRN-

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6, PRN-9, PRN-13, PRN-14. Meanwhile, the KPO Role indicators ranked 11-14 are PRN-4, PRN-5, PRN-19, and PRN-16. This ranking shows the order of KPO role indicators from the most important or most instrumental to the least instrumental in KPO.

4. Independent T- test results

The independent T test in this study is intended to compare the differences / similarities in perceptions of KPO between two groups of respondents, namely the owner group (PPK), and the design consultant group. The number of respondents (n) for the owner group (PPK) was 11 respondents, and for the design consultant group was 52 respondents. same). The results of the independent T test are presented in Table 5.

Table 5 Results of Test Statistics Group with Independent Sample T Test

Independent Samples Test

		Levene's Test for Equality of Variances		*t-test for Equality of Means*						
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*95% Confidence Interval of the Difference*	
									Lower	*Upper*
Konsultan Pendamping Owner (KPO)	*Equal variances assumed*	*4.267*	*.043*	*1.986*	*61*	*.052*	*.50622*	*.25488*	*-.00343*	*1.01588*
	Equal variances not assumed			*2.875*	*26.477*	*.008*	*.50622*	*.17606*	*.14464*	*.86781*

Sumber: Hasil penelitian (2023)

Based on the data processing results, it appears that the sig F-count for Equal Variance Assumed is 0.043 which means <0.05. This means that Ho is rejected, so the two population variances (Owner Group, and Design Consultant Group) are not identical (Equal Variance not Assumed). Given that in the first stage it was decided that Equal Variance Not Assumed, the basis for decision making for the second stage also uses Equal Variance Not Assumed, with the sig value of t count is 0.008, which means <0.05. This means Ho is rejected. This means that the two population means are not identical (the average level of perception of the two groups about KPO is different). This means that the level of perception of the two groups about KPO between the Owner Group (PPK) respondents and the Design Consultant Group respondents is different.

That there is a difference in perception between the owner / PPK and the design consultant, is also evident from the average value of the perceptions of the two parties on the 14 indicators of the role of KPO, as presented in Table 6.

Tabel 6 Owner's and Design Consultant's perception of KPO's role

No	*Role KPO*	*Average rating*	
		Owner/PPK	*Consultan*
1	*Project brief or KAK*	*5,55*	*5,17*
2	*Terms, standards, guidelines, rules*	*5,73*	*5,19*

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3	*Identify the owner's needs*	*5,73*	*5,21*
4	*Results of discussion or briefing document*	*5,64*	*5,02*
5	*Communication between owner and design team*	*5,55*	*5,12*
6	*Schedule control and risk analysis*	*5,45*	*5,04*
7	*KAK and HPS and technical specifications*	*5,73*	*5,10*
8	*Design proposal and product stage review*	*5,64*	*5,08*
9	*Value for money*	*5,36*	*5,08*
10	*Design tools like BIM*	*5,45*	*4,98*
11	*Coordination and consultation with stakeholders*	*5,55*	*5,00*
12	*Drawing up selection documents, explanations*	*5,55*	*4,85*
13	*Design solution decisions in a balanced/equal manner.*	*5,64*	*4,96*
14	*Best performance design consultant*	*5,36*	*5,04*
	Number of Average Values	*5,57*	*5,06*

Source: Research results (2023)

Table 6 shows the comparison of mean scores per indicator and in total, between the perceptions of the owner/PPK and the design consultant. The method in interpreting the average value on the Likert Scale (1-6), the following formula is used Table 6 shows the comparison of the average value per indicator and the total, between the perceptions of the owner / PPK and the design consultant. The method in interpreting the average value on a Likert Scale (1-6), the following formula is used (Riana, 2012):

I = R/K
Where:
I = Class intervals
K = Number of classes = 6 (Scale Likert 1-6)
R = Maximum value - the minimum value = 6 - 1 = 5
Class intervals in the scale of this study
I = R/K= 5/6= 0,83

Tabel 7. Interval Kelas dalam Likert 1-6

Class Intervals in Likert 1-6	*Meam (1)*
0,83- 1,66	*strongly disagree*
1,66 < X ≤ 2,49	*disagree*

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$2,49 < X \leq 3,23$	*somewhat disagree*
$3,23 < X \leq 4,15$	*somewhat agree*
$4,15 < X \leq 4,98$	*agree*
$4,98 < X \leq 6$	*strongly agree*

Sumber: Adopted from Riana (2012)

The total mean value of the owner/PK group respondents, as presented in Table 6, is 5.57 which, if referring to the class interval in Table 7, then the mean value is included in the strongly agree category because the mean value of 5.57 is in the interval $4.98 < X \leq 6$. Likewise, the mean value of the design consultant group respondents of 5.06 is in the same class interval. This means that both owner/PK group respondents and design consultant group respondents are in the category of strongly agreeing with the 14 roles of KPO. The difference is that the approval level of the owner/PK group respondents (with an average score of 5.57) is higher than that of the design consultant group respondents (with an average score of 5.57). This means that the two groups of respondents both need the role of KPO, it is just that the owner/PK group respondents feel a more urgent need for the role of KPO to help them, especially in the first two stages of the project life cycle, namely the preparation stage, and technical design/planning.

B. Discussion

1. The role of the co-consultant

If we look at the role of the owner's assistant obtained from the literature, then actually the assistant consultant or owner's advisor is already known and even many owners, especially private owners, use it. It's just that the names are different, some call them technical teams, technical management personnel, experts, client advisers, probity advisers, individual consultants, specialist consultants and others (Table 1). Of the 19 roles, there are five roles that experts consider inappropriate or irrelevant to the owner's assisting consultant, namely assisting feasibility studies, compiling procurement packages, checking the completeness of tender documents, ensuring PPK has time and helping lesson learn.

Feasibility studies on government building projects are not carried out as in private projects, but more towards the feasibility of meeting organizational needs to carry out tasks and functions (tusi). Procurement packages are prepared by the owner based on the name of the development activity, relatively easier and carried out one year before implementation. The completeness of the tender documents is checked by the goods/services procurement working group (pokja) team, not the accompanying consultant. Likewise, ensuring the PPK in allocating time for the design process and making lesson learned or post ocupation evaluation (POE), is considered by the resource person not the task of KPO.

The roles of the owner's advisory consultant identified from literature sources and laws and regulations are 19 roles, and validated by experts/resource persons of construction practitioners in Indonesia into 14 roles (Table 6) will be explained in the next paragraph.

Helping to ensure that the project brief or KAK is complete and clear and understood by the design team is the most prominent role among the roles of owner assistance consultants. The project brief is all directive information related to the project provided by the owner's team (PPK) to the design consultant team which becomes the basis of work reference in preparing the DED. Previous studies show that the briefing process did not go well, so a bridging role between the owner and the design consultant is needed.

Provide an updated list of provisions, standards, guidelines, rules to be used in the design process including licensing. This role provides valid assurance that what must be guided by regulations related to the project, so that the project is carried out without any violation of the law / regulations.

Help identify the owner's needs into the best solution according to field conditions, vision and goals of the organization. The real needs of the owner often need to be explored to get a solution that the organization really needs, whether it is a building with certain characteristics or quite simple. Sometimes the owner is trapped with an ambition that is not actually what is needed.

Documenting the results of discussions or briefing documents for design decisions and anticipating changes during design. This role is more of a backup to the reasons for design decisions, so that changes at the construction stage can be avoided if there is not enough reason.

Assist communication between the owner and the design team to get the best and quickest decision in the design process. Communication is the most important factor in the briefing and design process, which requires

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each party to have the same perception and understanding, because discussions are difficult to reach agreement if one party does not understand, and persists with its arguments.

Help control the schedule of the DED document procurement phase and analyze the main risks in achieving project objectives. This role is a referee between the owner and the design team, because the design process is limited by time and cost, so the process needs to be controlled, including early detection of the worst risks to project implementation.

Assist in reviewing KAK documents, HPS and project technical specifications. Every product needs to be reviewed by experts. In this context, the assisting consultant is the owner's expert whose role is to ensure that products such as KAK, HPS and technical specifications are appropriate.

Evaluate the design proposal and review the design product stages continuously to make sure they are in accordance with the KAK document and project requirements. The design process goes through four stages starting from the proposal to the final DED. Each stage has an owner's assistant who helps review, then the owner approves and proceeds to the next stage. This is very important so that no errors occur until the detailed design level.

Helping to ensure value for money against the design consultant's proposal using value engineering methods. The principle on government projects is to account for value for money as much as possible. A design decision must be best in terms of value for money, so that the principle of economy is achieved.

Suggesting design tools such as building information modeling (BIM), directions and critiques for problem solving that arise during the design stage. The design process requires tools that can help solve design problems quickly and effectively. The owner's assistant in this context is expected to suggest based on his experience, so that the right design tools are selected.

Assist in identification, coordination and consultation with stakeholders in determining project requirements and KAK. Government project owners often consist of various parties ranging from PPK, building users, to the maintenance department, all of which must be involved in the design process to get quality DED products. The role of the facilitator integrates various parties to be able to sit together to provide suggestions and design solutions, so that the final building product meets the expectations of all parties or stakeholders.

Assist in preparing selection documents, explanations, evaluations and draft contracts for planning or supervisory consultant services / MK (Permen PUPR 22, 2018). Owners or PPKs who have repeated experience will be smoother in the design consultant selection process, but on the other hand, non-technical PPKs whose personnel are rotating will require the role of the owner's assistant in preparing selection documents to the evaluation process and construction project consultancy contracts.

Ensure that design solution decisions are implemented by the owner based on the results of coordination and balanced/equal stakeholder approval. There are several design issues related to the interests of several parties, this will be difficult if there is no bridging party. In this situation, the role of assistants as owner's consultants is expected to play an important role. (Van Meel, J. J., & Stordal, 2017).

Helping to get the best performance from design consultants is faced with time, scope and budget constraints. Service products are different from physical products, so supervision is done differently. Design consultants appointed from the selection results in reality need control in the design process because there are time and scope constraints that must be met. Therefore, the owner needs to appoint another party in this supervision (*RIBA_Client Advisers 2019_FINAL.Pdf*, n.d.). In certain package situations, usually complex projects are assisted by MK consultants, but non-complex packages handled by PPK non-technical agencies need assistants called owner's assistant consultants, instead of MK consultants.

2. Owner and consultant views

The presence of KPO in the design or pre-design (planning) process adds new actors from the existing main actors, namely the project owner and design consultant, while the MK consultant is not an actor for the non-complex project category. However, as we know, the categories of complex and non-complex projects are determined in general by one of the technical parameters, namely the number of floors of at least four levels, a minimum floor area of 5,000 m2 and categorized as a special building or not simple. Related to the OPNIT owner to understand the needs of building construction in general is limited, even though it is below four floors and even above. This limited experience and knowledge of the owner is expected to be overcome by the design consultant. Unfortunately, the fact is that design consultants in Indonesia face problematic conditions in the form of low quality consultant personnel. This is the main reason why design document products always undergo significant changes, because they are not in accordance with the owner's actual needs and field conditions. This problem results in project delays and overbudget.

The presence of KPO can be considered as helping both of them or burdening one of them, for example, the owner must pay a certain amount of money for KPO services. KPO financing for government projects is charged to technical agencies at the Ministry of PUPR, both at the central and regional levels, but honorarium and operational costs are charged to the owner or PPK of the work unit. The current condition, the provision of

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technical management personnel by technical agencies that act as KPOs is very limited, so that the support of technical managers to assist work units in other ministries / government agencies is not sufficient. Considering the needs of some non-technical government owners, the owners still submit requests for technical manager support to the nearest technical agency. Related to the problem of limited personnel at technical agencies, some personnel are still seconded who act as technical personnel. Their function is to assist the owner/PPK, but assistance in the form of advice/input is limited.

Based on this experience, the idea arose to use KPO from professionals or external experts. This has been accommodated in a regulation, namely LKPP 12/2021 that the owner / PPK can request the assistance of an expert or team in carrying out their duties in part or all stages of PBJ. This is the type of KPO discussed in this study, namely KPO which is not limited to sources only from the technical ministry, but also from external professionals. So, in short, a KPO is a party outside the owner and outside the design consultant who assists the design process at the owner's expense, with the required role according to the identification results of this research.

Different views of owners and design consultants can be seen from the three biggest differences are perceptions of the role in helping to prepare selection and explanation documents, the role of helping to ensure design solution decisions by the owner based on the results of coordination and approval of stakeholders in a balanced / equal manner and the role of helping to review KAK and HPS documents and project technical specifications. As for the role with the smallest difference in view value between perceptions between the owner and the design consultant is to help ensure value for money against proposals from design consultants with value engineering methods, help get the best performance of design consultants faced with time, scope and budget constraints and help ensure a complete and clear (unambiguous) project brief or KAK is delivered and understood by the design team.

IV. CONCLUSION

A. Research novelty

The research novelty in this study is the discovery of 14 indicators of the role of KPO that are validated through the CVR method, and ranked the level of its role through the RII method. Another novelty of this research is that it found a comparison of perceptions between the owner/PK respondent group and the design consultant, which in the independent t test analysis found differences in perceptions between the two groups of respondents, but the difference was not far, because this was confirmed through the mean value analysis which found that the two groups of respondents both agreed on the importance of the presence of KPO. Thus, this study proves that there are parties who (should) play a very important role in the planning and design process of government construction projects, especially in non-technical government ministries/agencies that use conventional project delivery, design bid build. In this study, the party called the owner's assistant consultant empirically has a contribution in assisting the Government PPK. The survey results revealed that as many as 85.7% of respondents stated that non-technical government construction PPKs need to be accompanied by consultants/experts at the preparation and technical design/planning stages. Furthermore, this study examined the results of role identification from the literature study and narrowed down to 14 important roles required in assisting the owner / PPK at the construction planning and design stage. Although empirically there are different perceptions of the role of KPOs by owners and design consultants, both generally agree that KPOs are indispensable to owners/PPKs.

B. Research limitations and recommendations

This study has limitations in the sampling area, which only covers the DKI Jakarta area and the research subject is the owner and design consultant. In addition, this study is also limited to the initial phase of the construction project, namely the planning and design of government building projects.

It is recommended for future researchers, to be able to develop the results of this study by using a wider sample covering representative regions of Indonesia, and adding the contractor as a research subject. It is recommended that future research be more comprehensive, with the phases used can include planning, design, and implementation.

C. Conclusion

The success of a construction project is greatly influenced by the quality of the technical planning document or DED. The quality of this document is determined by the presence of the roles of the parties who compile it, especially the technical planning team and the owner. In government owners in K / L non-technical agencies with very limited availability of construction personnel, it is necessary to appoint parties outside the owner's organization to assist the owner's duties at the construction planning and design stage. Based on the research results, this role does not have to be prepared by technical personnel from government technical agencies but can

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be from experts or professionals outside the government organization. The identification of roles was successfully presented into 14 roles required to assist the owner in the process of preparing DED documents. The three roles with the highest scores are helping prepare the project brief or terms of reference so that it is clearly accepted by the design team, providing a list of standard provisions and rules/guidelines in the design process and helping identify the owner's needs by involving end-users. These three are the most important cornerstones in the process of preparing the DED document.

There are differences in perceptions by owners and design consultants towards the role of KPO, but in general they agree that it is very important for the owner /PK Government in K / L non-technical agencies to get professional assistance in the form of a companion consultant or owner's advisor to help get quality design documents.

Recommendations for the government project management team to appoint professionals as assistants or advisors to the owner / PPK in the process of procuring construction services so that the success of construction projects can be achieved with a high level of certainty. The appointment of KPO is adjusted to the needs if the scope is quite simple, at least one person, but if it is very complex, several assistants / advisors are needed. The novelty of this research is that 14 KPO roles were validated through the CVR method, and can be ranked through the RII method. It is known through the independent t test that there is a difference in perception between the owner / PPK respondent group and the design consultant, but the difference is not far because it is confirmed by the average value of their perceptions that both require the presence of the KPO role. Another novelty is that this research can provide empirical evidence that the Government owner/PK must be accompanied by professional assistants outside the design consultant in the implementation of construction services procurement, especially at the design or technical planning stage.

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