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Market Concentration in Construction Tenders in West Papua

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ABSTRACT: This study aims to determine the level of market concentration in construction work tenders in West Papua and to investigate the correlation between the market concentration index and the average participation in tenders, the number of work packages, and average tender savings. West Papua has privileges in procurement and has special autonomy funds for development. The study uses tender data from 2018-2022 and employs the Herfindahl-Hirschman Index (HHI) and Concentration Ratio 4 (CR4) to calculate market concentration. The results indicate that, based on HHI, the market concentration in the building construction and civil engineering subsectors is generally low, except for civil engineering in 2022. However, based on CR4, the market concentration in the building construction subsector is moderate, and in the civil engineering subsector, it is low, except for 2018. Moreover, there is a negative correlation between the number of packages and average participants, as well as between the number of packages and CR4 values. The findings of this study can be useful for construction providers to understand the competition in tenders and assist the government in developing competitive procurement strategies. Future research can investigate the economic benefits of local West Papua businesses when market concentration is low.

Keywords: Concentration Ratio, Government Procurement, Herfindahl-Hirschman Index, Tender.

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INTRODUCTION

Government procurement of goods and services (PBJ) is a potential market for businesses in Indonesia. According to the (LKPP, 2022), at least 1,052 T rupiahs of the national budget is spent on PBJ. Given this sizeable proportion, PBJ is regulated by presidential regulations and other derivative regulations, which are continuously adjusted to meet the government's needs and circumstances. However, for a market, rigid regulations can be a barrier to entry.

The Presidential Regulation on PBJ is mandatory for government agencies, including local governments such as the West Papua Province. The Indonesian government provides Special Autonomy Funds (Dana Otonomi Khusus) to West Papua and other provinces with similar special

autonomy status. The government allocated IDR 12.8 trillion as the special autonomy fund for Papua and West Papua Provinces (Ardimansyah, 2022), which can be utilized to accelerate the economic development and welfare of the people in the autonomous region. One of the ways this is achieved is through PBJ.

Regarding PBJ, the Indonesian government has introduced Presidential Regulation 17 of 2019 as a measure to expedite economic growth in Papua and West Papua. This regulation is aimed at regulating the procurement of goods and services in the two provinces. Among the provisions of the regulation is a concession granted to local Papuan entrepreneurs, allowing them to participate in the PBJ without compromising the quality of their work. This move is expected to promote the involvement of Papuan businesses in government procurement activities, and consequently stimulate the economic development of the region (Mansawan, 2021). The purpose of the Special Autonomy Fund and the specialization of PBJ regulations in West Papua may face obstacles. The results of the integrity assessment in a survey conducted by the Corruption Eradication Commission show that the integrity index in West Papua is below the national average (Wibowo et al., 2021). Moreover, in developing nations, (Williams-Elegbe, 2018) discovered that deviation in government procurement is primarily driven by weak regulations and law enforcement, insufficient accountability to the public, and limited public participation in reporting fraudulent activities to internal control mechanisms or law enforcement agencies.

Referring to the Presidential Regulation, the purpose of PBJ is to increase the role of business actors and ensure value for money for the goods and services obtained (Presiden Republik Indonesia, 2021). Many barriers to doing business can weaken the competition (Diaby & Sylwester, 2015). To improve the role of businesses, the government's policy is to make it easier for them to participate in PBJ as procurement service providers, which is also expected to create employment opportunities and stimulate economic growth. With more businesses providing services, these objectives become more achievable. Value for money in PBJ can be assessed from the cost perspective. PBJ is expected to provide the best goods and services at the lowest possible cost without sacrificing quality or timeliness. In terms of cost, procurement service providers are expected to provide competitive bids, which ultimately result in savings for the national budget. Thus, competition is essential to create the fair price (McAfee & McMillan, 1987). In another study, competition reduced collusion (Ryvkin & Serra, 2020).

One of the procurement methods that allows open competition is tender. Tender in government procurement is the selection of providers through an open announcement with the determination of the winner based on the bids submitted by participants (LKPP, 2021). Auction is an economic game that contains format and information (Watson, 2013). In this case, the format determines the rules on how to announce, submit bids, and determine the winner. Each participant will conduct an assessment of the qualifications they have, the value of the work, potential competitors, and the risks involved in the work before submitting a bid (Ballesteros-Pérez et al., 2016; Hanák et al., 2021; Kocher et al., 2015; McAfee & McMillan, 1987). When evaluating bids, the participant with the lowest price and the technical qualifications is selected as the winner so the bid price becomes important.

In a cost accounting perspective, prices can be determined by adding the costs and the desired rate of return (Carter, 2006). Each participant has information that influences their assessment of the auction object. The value of the object surely differs among participants. According to (Vickrey, 1961) the optimal bid a provider can offer is the value they expect to receive from the project in the tender. (Podwol & Schneider, 2016) shows that there is nonstandard bidder behavior in auctions. In tender markets, providers who have a competitive advantage, whether it be in technical qualification or pricing, may come to dominate the market by consistently winning project bids. This is not a problem for the government as long as the advantage is gained through legitimate means such as efficiency and capacity. However, if the advantage is due to collusion with procurement actors, then it becomes a major issue that needs to be addressed to prevent unfair competition.

Procurement of goods and services in Indonesia has been previously studied. From a governance perspective, the use of information technology through e-procurement is believed to have reduced the potential for collusion in PBJ implementation ((Huda et al., 2017)(Salman & Survanto, 2019); (Nani & Ali, 2020); (Wicaksono et al., 2017)). The use of IT can reduce face-to-face meetings between tender organizers and bidders, thereby reducing the risk of collusion between bidders and organizers. In addition to governance aspects,(Johantri et al., 2022) examines the relationship between contract prices in public procurement tenders and several other variables. (Johantri et al., 2022), which uses tender data from the Ministry of Finance, is corroborated by the findings of (Raharjo & Gultom, 2022), who uses data from all local governments. Both studies show that the more tender participants, the greater the government's cost savings. The number of participants can indicate that competition will affect prices.

In an economy, companies that have the ability to establish prices above marginal cost hold an advantage over those that cannot. The presence of market power and its evaluation through market concentration as a measure of market power is a significant issue (Pavic et al., 2016). Previous research has been conducted on market concentration in public procurement. (Svoboda, 2016) examined market concentration in public procurement using the Herindahl-Hirschman Index (HHI) and Concentration Ratio of the top four companies (CR4). (Peleckis, 2022) studied the construction market, while (Berkovich et al., 2021) focused on the internet market, both using HHI to measure market concentration. The studies on market concentration of construction industry have been carriedout ((Kawai & Nakabayashi, 2022); (Škuflić et al., 2018); (Dinarjito, 2022); (Wang & Li, 2021)). However, market concentration in government procurement for construction tenders is still difficult to find.

The aim of this study is to determine the level of market concentration in government procurement tenders in the construction sector in West Papua, and to investigate the correlation between market concentration and the average number of tender participants, number of tender packages, and average percentage of tender savings. The study found that there were differences in market structures in the construction subsector when using different measures. The findings of this study could be valuable for practitioners and policy-makers seeking to enhance the effectiveness and efficiency of tendering practices, particularly in the context of West Papua.

METHOD

This study employs construction tender data from the period of 2018 to September 2022, obtained from the government tender announcement website of West Papua Province, available at https://tender.Papuabaratprov.go.id/eproc4/lelang. The sample data were purposively selected based on data completeness, resulting in a sample size of 796 construction job packages. The tender population, and research samples are as shown in Table 1 below:

Table 1. Population and Sampel

Discriptions	Package
Registered tenders	1.679
The tender failed, and the data is incomplete	164
non-construction tenders	719
Sample	796

Once the data has been obtained, the next steps in the research process involve descriptive analysis, determination of market concentration, and correlation analysis. This study employs the Herfindahl-Hirschman Index (HHI) and Concentration Ratio 4 (CR4) to measure market concentration. HHI is considered more precise as it includes all business players in the calculation of market concentration, while CR4 only describes the strength of the top 4 providers (Pavic et al., 2016). However, the study uses CR4 to determine the level of concentration in the four dominant providers.

HHI is calculated based on formula (Pavic et al., 2016):

$$HHI = \sum_{i=1}^{N} (MS_i)^2$$

The *MSi* represents the total contract value of packages won by a provider, with *N* being the number of providers. A HHI value below 100 indicates high competition, a value below 1,500 indicates an unconcentrated market, a value between 1,500 and 2,500 indicates moderate concentration, and a value above 2,500 indicates high concentration.

The CR4 calculation is performed using the formula (Pavic et al., 2016):

$$CR_4 = C_1 + C_2 + C_3 + C_4$$

CR4 represents the sum of the market share of the top four largest companies. Low concentration occurs when the CR4 value is up to 40%. Values between 40%-70% indicate moderate concentration, while values between 70%-100% indicate the presence of oligopoly to monopoly in the procurement of goods and services.

Market concentration calculations are carried out for each fiscal year with reference to Ramadhani & Setiawan (2019), who stated that fiscal year has an influence on government budget absorption. Calculation was also conducted based on the construction subsector given that each subsector has

different job characteristics and requires different provider requirements (LKPP, 2021). This study categorizes construction into building construction subsector (Building), civil engineering subsector (Civil), and other subsectors (Other).

The next step is to calculate the correlation between market concentration and the average number of participants, the number of packages, and the percentage of savings. This study employed Spearman's rho analysis as the data was not normally distributed. In addition, due to data limitations, correlation analysis was not conducted for the other subsectors.

RESULT AND DISCUSSION

During 2018-2022, the majority of tenders for construction in West Papua are civil engineerings. There is a significant difference in the quantity of the number of tender packages between the subsectors. There are 631 tenders were Civil, 154 tenders were Building, and 11 were Other. Table 2 describes construction tenders by fiscal year.

Table 2. Tender per Years

Sub-sector	2018	2019	2020	2021	2022	Total
Building						
Number of Package	51	40	25	24	14	154
Number of Participant	1.396	1.130	725	945	579	4775
Max Participant	67	85	65	65	113	113
Min of Participant	7	6	7	14	12	6
Average participant per package	27,37	28,25	29	39,38	41,36	31,00
Civil						
Number of Package	125	108	149	146	103	631
Number of Participant	3.148	1.928	3.202	3.791	1.645	13.714
Max Participant	79	85	81	86	48	86
Min of Participant	4	3	5	6	3	3
Average participant per package	25,18	17,85	21,49	25,97	15,97	21,73
Other						
Number of Package	8	3				11
Number of Participant	150	27				177
Max Participant	24	18				24
Min of Participant	11	4				4
Average participant per package	18,75	9				16,09
Overall						
Total Packages	184	151	174	170	117	796
Total Participant	4.694	3.085	3.927	4.736	2.224	18.666
Max Partisipan	79	85	81	86	113	113
Min Partisipan	4	3	5	6	3	3
Average participant per package	25,51	20,43	22,57	27,86	19,01	23,45

Based on Table 2, the number of participants in civil engineering tenders is greater than the number of participants in Building tenders. However, the average number of participants per Civil tender is smaller than the average number of participants per Building tender. The competition to win a building construction contract is tighter compared to civil engineering contracts, and this condition occurs throughout the observation period (2018-2022). On average, each building construction project is followed by 31 participants, while each civil engineering package is followed by 22 participants. The competition to win tenders is looser for other subsector as the average number of participants is only 16 per project. This data needs to be carefully considered by providers who want to participate in procurement in West Papua. Referring to the study by (Raharjo & Gultom, 2022), the average number of participants in tenders in West Papua is higher than the average number of bidders in tenders in Java and Bali for 2020-2021. However, according to (Johantri et al., 2022), the average number of bidders in West Papua is lower than the average number of bidders in the Ministry of Finance for 2019-2021.

From the perspective of the value for money objective, Table 3 shows the average percentage of budget savings from the tender process. Tender savings are calculated as the difference between the Self-Estimate Price (Harga Perkiraan Sendiri or HPS) and the contract value. The savings percentage represents the percentage of this difference from the HPS value.

Tabel 3. Average percentage of tender saving

Sub-sector	2018	2019	2020	2021	2022	Min	Max	Average
Building	6,99%	3,80%	5,36%	6,49%	3,95%	3,80%	6,99%	5,54%
Other	2,98%	1,39%				1,39%	2,98%	2,55%
Civil	4,51%	3,37%	3,50%	3,70%	3,79%	3,37%	4,51%	3,77%
Average	5,13%	3,45%	3,77%	4,10%	3,81%			4,10%

The average value from Table 3 over the course of 5 years was only 4.1%, with the highest average in 2018 and the lowest in 2019. When observed by sub-sector, the highest savings were achieved in 2018 for Building, while the lowest savings were achieved in 2019 for Other. The percentage of savings from construction tendering can be considered relatively low compared to the Ministry of Finance, which shows that the difference between contract values and tender ceiling prices ranges between 8% to 10% (Johantri & Aprilia, 2021). The data indicates that construction job tenders in West Papua utilize budget more optimally. Optimizing budget utilization is directly related to the goal of economic equality in government expenditure. However, the value for money of the work outcomes still needs to be further investigated.

This study uses the LKPP regulations to divide the construction subsector. Although (Rajala et al., 2022) concludes that there is a difference between profits from renovation works and those from new building construction, research data does not allow for an accurate division. The concentration index of each sub-sector is as Table 4.

Table 4 shows the results of HHI and CR4 based on sub-sector.

Tabel 4. HHI and CR4 per sub-sector

	HHI			CR4		
	Building	Civil	Other	Building	Civil	Other
2018	633,86	289,51	1.426,18	39,01	23,79	66,95
2019	1.381,17	229,21	7.527,63	51,20	18,76	100,00
2020	1.462,36	215,55		54,74	17,30	
2021	815,31	202,98		46,39	18,13	
2022	1.673,11	276,51		70,39	24,33	

Referring to (Pavic et al., 2016), based on the calculations in Table 4, the HHI of the sub-sector for building construction indicates low market concentration, except for 2022 where it shows moderate concentration. The result is in line with (Dinarjito, 2022). However, if market concentration is measured using CR4, there is moderate concentration in 2019-2022. This may be due to the presence of one or two large companies that have a significant market share, thus affecting the overall market concentration. In this case, although the HHI indicates low market concentration, the CR4 indicates moderate concentration because the market share of the top four companies is still quite significant. Therefore, the results of the HHI and CR4 measurements can provide different information about market concentration in an industry.

The high market concentration can be interpreted as a situation where a few providers are capable of winning many contracts. To win tenders, providers usually need to offer lower prices in addition to meeting all technical requirements. In this context, competitive advantages can differentiate one provider from another. Since 2020, the Ministry of Public Works has issued regulations on what can be required in tenders. Essentially, these regulations align with the spirit of the presidential regulation on procurement of goods and services, in which technical requirements are simplified to facilitate providers in participating in tenders. These regulations reduce entry barriers for providers who previously found it difficult to enter the PBJ tender market. However, given the high concentration that occurred in 2022, further research could delve deeper into how concentration can be moderated despite the decreasing barriers to entry for providers.

In Table 2, the number of contracts awarded for each sub-sector of work varies by year. When the market share being contested is low, concentration may occur because winning a few contracts is enough to dominate the market. On the other hand, a larger number of participants will result in greater competition, and concentration may decrease when the number of participants increases. A larger number of participants, budget savings will be greater (Johantri et al., 2022; Raharjo & Gultom, 2022). To show the correlation between these factors, the correlation matrix is as follows:

Table 5. Correlation of HHI in Building Construction subsector

			HHI Building	CR4 Building	Participant Building	Package Building	Saving Building
Spearman's rho	HHI Building	Correlation Coefficient	1,000	1,000**	,700	-,700	-,700
		Sig. (2-tailed)	.	.	,188	,188	,188
		N	5	5	5	5	5
	CR4 Building	Correlation Coefficient	1,000**	1,000	,700	-,700	-,700
		Sig. (2-tailed)	.	.	,188	,188	,188
		N	5	5	5	5	5
	Participant Building	Correlation Coefficient	,700	,700	1,000	-1,000**	-,300
		Sig. (2-tailed)	,188	,188	.	.	,624
		N	5	5	5	5	5
	Package Building	Correlation Coefficient	-,700	-,700	-1,000**	1,000	,300
		Sig. (2-tailed)	,188	,188	.	.	,624
		N	5	5	5	5	5
	Saving Building	Correlation Coefficient	-,700	-,700	-,300	,300	1,000
		Sig. (2-tailed)	,188	,188	,624	,624	.
		N	5	5	5	5	5

**. Correlation is significant at the 0.01 level (2-tailed).

Based on Spearman's rho correlation calculation in the building construction subsector, the HHI is not significantly correlated with the number of tender packages, average tender participants, or average savings percentage. Thus, even though the studies by (Raharjo & Gultom, 2022) as well as (Johantri et al., 2022) show that the number of bidders has a negative effect on contract prices, the decrease in value is not significantly correlated with market concentration.

There are several possible reasons why the decrease in value due to the presence of more bidders may not be significantly correlated with market concentration. While market concentration is an important factor in determining pricing power, it is not the only factor that affects the competitiveness of the bidding process. Other factors such as the level of competition, the quality of the bids, and the level of demand for the project may also have a greater impact on the final contract price. Secondly, even if there are a few dominant firms in the market, if they do not have a significant market share, they may not be able to exert enough pricing power to affect the contract price. In such cases, the number of bidders may have a more significant impact on pricing than market concentration. The other possibility is the data used in this study is relatively limited, therefore future research is recommended to use more data to better explain the correlations.

Based on Table 5, there is a significant correlation between the number of tender packages and the average number of participants, with a negative correlation coefficient of 0.9. The finding indicates that as the number of tender packages increases, the average number of participants decreases, and this relationship is statistically significant. The negative correlation coefficient of 0.9 suggests a strong negative relationship between these two variables. This means that there is a tendency for fewer bidders to participate in tenders when the number of tender packages is high. This finding could be used by policymakers and practitioners to develop strategies to increase the number of participants in tender processes, which may lead to increased competition and better value for money in public procurement.

Table 6. Correlation of HHI in Civil Engineering subsector

			HHI Civil	CR4 Civil	Participant Civil	Package Civil	Saving Civil
Spearman's rho	HHI Civil	Correlation Coefficient	1,000	,800	-,400	-,600	,600
		Sig. (2-tailed)	.	,104	,505	,285	,285
		N	5	5	5	5	5
	CR4 Civil	Correlation Coefficient	,800	1,000	-,500	-,900*	,600
		Sig. (2-tailed)	,104	.	,391	,037	,285
		N	5	5	5	5	5
	Participant Civil	Correlation Coefficient	-,400	-,500	1,000	,700	,200
		Sig. (2-tailed)	,505	,391	.	,188	,747
		N	5	5	5	5	5
	Package Civil	Correlation Coefficient	-,600	-,900*	,700	1,000	-,200
		Sig. (2-tailed)	,285	,037	,188	.	,747
		N	5	5	5	5	5
	Saving Civil	Correlation Coefficient	,600	,600	,200	-,200	1,000
		Sig. (2-tailed)	,285	,285	,747	,747	.
		N	5	5	5	5	5

*. Correlation is significant at the 0.05 level (2-tailed).

Based on the correlation matrix in Table 6 for the civil engineering subsector, the results differ from those of the building construction subsector. Although both CR4 and HHI describe market concentration, CR4 is significantly correlated with the average number of participants, with a negative correlation coefficient of 0.9. A negative correlation coefficient indicates an inverse relationship between the two variables being studied. In this case, the significant negative correlation between CR4 and the average number of participants in the civil engineering subsector suggests that as the concentration of the market increases (as indicated by the CR4), the number

of participants in tender packages decreases. This finding may suggest that a more concentrated market in the civil engineering subsector is associated with fewer participants in tender packages. This result is in line with (Svoboda, 2016).

The reason why CR4 is significantly correlated with the average number of participants in the civil engineering subsector may be due to the characteristics of the industry. Additionally, a more concentrated market may result in barriers to entry for smaller companies, which can limit competition and decrease the number of participants in tender packages. Further research is needed to explore the underlying factors that contribute to this relationship between market concentration and the number of tender package participants in the civil engineering subsector.

CONCLUSION

Market concentration refers to the extent to which market share is concentrated. In the context of the objectives of government procurement, the division of a larger market share among many business actors brings the objectives of economic equality and increasing the role of business actors closer to achievement. Although procurement in West Papua still has risks, based on HHI, market concentration for the building construction and civil engineering sub-sectors is relatively low except for the building construction sub-sector in 2022. Based on the CR4 value, the market concentration for the building construction subsector is moderate while the market concentration for the civil engineering subsector is low.

In the subsector of building construction, there is a significant and strong negative correlation between the number of tender packages and the average number of participants. Meanwhile, in the civil engineering subsector, there is a significant and strong correlation between the CR4 value and the number of tender packages, with a negative correlation direction. This suggests that the market concentration of the four dominant players decreases as the number of tender packages in the civil engineering subsector increases.

The current study employs the names of business entities in calculating market concentration. Future research can utilize the names of business owners to gain a deeper understanding of market concentration in West Papua. Other approaches may also be used in future studies to determine whether indigenous West Papua business players benefit economically in government procurement when market concentration is low.

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