Analysis of The Prosperity Level of Samarinda City in The Infrastructure Dimension

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Abstract. As the provincial capital and the center of government and economic activities in East Kalimantan, Samarinda City has been striving to improve the welfare of its citizens through various development programs, especially in the face of the relocation of the National Capital. Samarinda City has the highest urbanization rate in East Kalimantan, resulting in a significant increase in population every year. Despite ongoing development efforts, Samarinda faces significant deficiencies in public services, including inadequate transportation, limited healthcare, and poor urban form. Therefore, to ensure the efficient and seamless functioning of public activities, Samarinda City must evaluate how its urban infrastructure provision reflects the city's prosperity, particularly in light of its rapid urbanization and growing infrastructure demands. This study applied the City Prosperity Index (CPI) method, utilizing secondary data from both literature and local government agencies. The data, collected for 19 infrastructure types, consists of 21 dataset was then analyzed to assess the prosperity level of Samarinda City's infrastructure across five key dimensions. The level of city prosperity was analyzed using the City Prosperity Index approach to assess prosperity based on the infrastructure available in Samarinda. The study reveals that Samarinda City's infrastructure provision is categorized as weak, with a CPI score of 44.36%, and significant weaknesses in urban mobility and urban form infrastructure. These results indicate a need for focused policy interventions to improve infrastructure development, especially in urban mobility and urban form, to elevate the city's overall prosperity level.

Keywords: City Prosperity Index, Infrastructure, Urban Prosperity.

1 Introdiction

Samarinda is the capital of the province, which has the highest urbanization in East Kalimantan. The impact of the high urbanization is the population growth, which increases significantly every year [1]. Samarinda City has significant demographic growth, which has implications for increasing infrastructure needs. In 2023, the population in Samarinda City was 861,878 people with a population density of 1,200.39

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people/km2, while the population growth rate in 2022-2023 was 1.43%, and the population growth increases every year with an average of 2% due to the issue of the movement of country capital [2]. Samarinda City plays an important role as a partner in the Ibu Kota Nusantara (IKN) development plan and has a role in supporting the sustainable development of IKN, so the city government continues to make improvements in various sectors, including the development of the city's face, infrastructure, economy, and human resources.

Covering an area of 718 km² across 10 districts and 59 sub-districts. Samarinda is also home to the largest population in the province, with 861,878 residents as of 2023, accounting for 21.75% of the province's population and a population growth rate of 1.43%. This rapid population growth, alongside increasing economic performance, has placed significant pressure on the city's infrastructure. Over the past five years, the city's economic structure has seen a notable rise, with the Gross Regional Domestic Product (GRDP) increasing by 19.7 billion rupiah and per capita GRDP growing by 25.7 million rupiah. In 2022, the city's GRDP reached 83.3 billion rupiah, with a per capita income of 99.8 million rupiah and an economic growth rate of 6.15%. Despite these positive economic indicators, the lack of adequate infrastructure, particularly in transportation and social services, poses a serious challenge to sustaining this growth.

To achieve a prosperous life, the provision of basic needs, both physical and non-physical, is crucial [3]. Cities are considered a driving force for prosperity through innovation, wealth creation, and growth [4]-[5]. However, prosperity is not only about meeting basic needs, since urban prosperity goes beyond addressing urban issues [6]. One key element in improving the well-being and prosperity of society is the provision of infrastructure [7]-[9]. Infrastructures are important in supporting the economic development and growth of a city [10]-[11]. The provision of good infrastructures will impact the community's needs for regional facilities and infrastructures, establishing business opportunities and increasing community income through the increase of production capacity [12]. Infrastructures have a significant impact on economic growth in Samarinda City [13]. Therefore, to ensure the smoothness and easiness of community activities, Samarinda City needs to determine how the provision of urban infrastructures can reflect the city's prosperity.

While many studies have examined the relationship between infrastructure and economic growth in urban contexts, there remains a lack of focused analysis on cities like Samarinda, where rapid urbanization and regional development pressures pose unique challenges. Existing research often addresses specific issues without considering the broader context of Samarinda's overall condition, which can lead to the neglect of more pressing priority problems [14]-[19] which often lead to the emerging of new problems [19]. This study aims to fill this gap by evaluating the city's infrastructure provision using a comprehensive prosperity index.

Assessing city prosperity can be carried out using the City Prosperity Index (CPI) method. CPI is a measurement method developed by UN-Habitat to holistically evaluate a city's prosperity. This index not only measures economic growth or per capita income but also combines other factors, such as infrastructure, quality of life, environmental sustainability, and urban governance [14]. The aim is to provide a more comprehensive overview regarding the welfare and development potential of a city [3], [20],

[21]. In the context of research, CPI can be an effective instrument to assess how infrastructure has a role in determining the prosperity rate and how it correlates with other aspects of city prosperity [22]. Therefore, a study regarding the correlation between the success of infrastructure provision and the prosperity rate in Samarinda City is required. This study is expected to be able to provide a clearer overview regarding the contribution of infrastructures to the city's prosperity and provide recommendations for stakeholders. Thus, this study will show how does the current infrastructure provision in Samarinda reflect the city's overall prosperity, and which areas require urgent improvement to support sustainable urban growth.

2 Method

The analysis of the city's prosperity rate in infrastructure provision is carried out using CPI issued by UN-Habitat as an instrument to measure the city's sustainability by obtaining data provided by the city government. The focus of this method is not solely on the provision of large-scale infrastructure, but rather on how even the most "basic" infrastructure can be effectively utilized to support people-centered urban planning. This method has been used by several studies to assess the city's transformative dynamic, allowing the interdependencies among all aspects taken into account [3], [21]-[24]. This method follows a quantitative approach, employing secondary data obtained through agency reports and literature surveys based on year-2023 data. Data were analyzed using statistical methods (especially descriptive statistics), with infrastructure provision assessed across five dimensions: housing, social, ICT, urban mobility, and urban form.

In this study, CPI analysis was used to measure the success of infrastructure sustainability so the city's prosperity rate in the dimension of infrastructure could be determined. Measuring city prosperity consisted of five sub-dimensions, which were used as variables, and 19 types of infrastructure used as sub-variables.

$$Infrastructure = \frac{1}{5}[HI + SI + ICT + UM + UF] \quad (1)$$

Where:
HI= (1/6) [Improved Shelter + Access to Improved Water + Access to Improved Sanitation + Access to Electricity + Sufficient Living Area + Population density]
SI = (1/2) [Physicians Density + Number of Public Libraries]
ICT = (1/3) [Internet Access + Home Computer Access + Average Broadband Speed]
UM = (1/5) [Use of Public Transport + Average Daily Travel Time + Length of Mass Transport Network + Traffic Fatalities + Affordability of Transport]
UF = (1/3) [Street Intersection Density + Street Density + Land allocated to streets]

The weighting scheme applied in the sub-dimension of infrastructure had the same weight as a type of infrastructure. The CPI index provides an indication of a city's strengths or weaknesses as well as its prosperity factors. The resulting CPI values can be grouped into six different scales ranging from cities with very strong cities to cities with very weak factors. In the table scale urban prosperity [14] can be seen in table 1.

The higher the rate score, the more infrastructure provision will increase, and the welfare and prosperity of the city will be better and vice versa. The flowchart of this study can be seen in Fig. 1.

Table 1. The Scale of Urban Prosperity.

Scales (%)	City Prosperity Levels
80-100	Very Strong
70-79	Strong
60-69	Moderately Strong
50-59	Moderately Weak
40-49	Weak
0-39	Very Weak

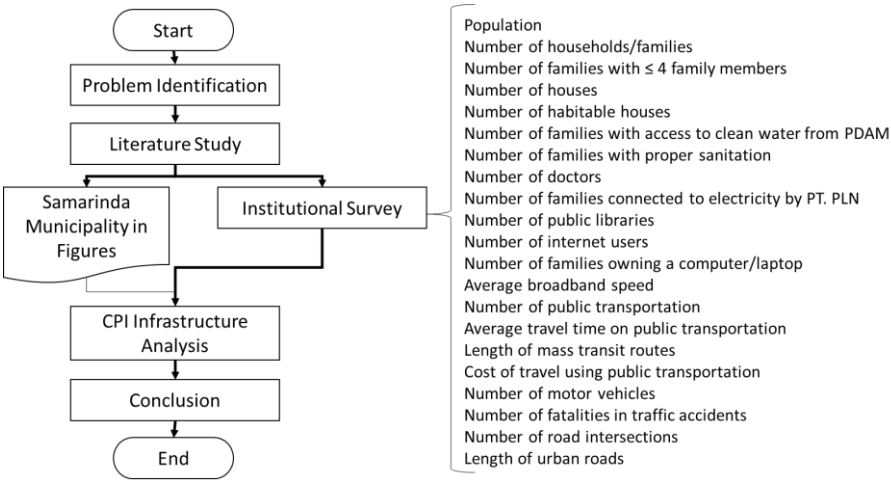

Fig. 1. Research Flowchart

3 Results and Discussion

Determining the prosperity rate of Samarinda City was carried out using CPI analysis, which was done according to the dimension of infrastructure. The assessment of the prosperity of Samarinda was carried out according to the five sub-dimensions and 19 types of infrastructures. The results of the assessment for each sub-dimension will result in the percentage of prosperity of Samarinda City according to the infrastructure provision.

Table 2. CPI by Housing Infrastructure Provision Level.

Types of infrastructure	Results	Percentage	Categories
Improved Shelter	0,8443	84,43%	Very Strong

Access to Improved Water	0,56	56%	Moderately Weak
Access to Improved Sanitation	0,6319	63,19%	Moderately Strong
Access to Electricity	0,8819	88,19%	Very Strong
Sufficient Living Area	0,673	67,3%	Moderately Strong
Population density	1200,39	8%	Very Weak
Housing Infrastructure		**61,19%**	**Moderately Strong**

The results of the analysis in the sub-dimension of housing infrastructure using CPI on all results of the infrastructure types obtained a score of the level of housing infrastructure provision in Samarinda City of 61.19%. This number is included in the strong category, which is included in the score range of 60%—69%. This indicates that Samarinda City has made good efforts to provide housing infrastructure for its residents

Table 3. CPI by Social Infrastructure Provision Level l.

Types of infrastructure	Results	Percentage	Categories
Physicians Density	0,9966	54,48%	Moderately Weak
Number of Public Libraries	3,481	41,35%	Weak
Social Infrastructure		**47,92%**	**Weak**

The results of the analysis in the sub-dimension of social infrastructure using CPI on all results of the infrastructure types obtained a score of the level of social infrastructure provision in Samarinda City of 47.92%. This number is included in the weak category, which is in the 40%—49% score range. The low score of social infrastructure occurs due to the lack of doctors and libraries in Samarinda City compared to the existing population, which will limit access to health services and learning opportunities

Table 4. CPI by Information and Communications Technology Provision Level

Types of infrastructure	Results	Percentage	Categories
Internet Access	0,9577	95,77%	Very Strong
Home Computer Access	0,6129	61,29%	Moderately Strong
Average Broadband Speed	20.000	60,63%	Moderately Strong
Information and Communications Technology		**72,56%**	**Strong**

The results of the analysis in the sub-dimension of information and communication technology infrastructure using CPI on all results of the infrastructure types obtained a score of 72.56 for information and communication technology infrastructure provision in Samarinda City of 72.56%. This number is in a strong category with a 70% - 79%

score range. This indicates that Samarinda City has made good efforts to provide adequate access to technology for its residents

Table 5. CPI by Urban Mobility Provision Level.

Types of infrastructure	Results	Percentage	Categories
Use of Public Transport	0,0006	0%	Very Weak
Average Daily Travel Time	79,2	0%	Very Weak
Length of Mass Transport	0	0%	Very Weak
Traffic Fatalities	9,51	71,62%	Strong
Affordability of Transport	8,81	78,14%	Strong
Urban Mobility		**29,95%**	**Very Weak**

The results of the analysis in the sub-dimension of urban mobility infrastructure using CPI on all results of the infrastructure types obtained a score for the level of urban mobility infrastructure provision in Samarinda City, which is 29.95%. This number is in the very weak category, included in the score range of 0%—39%. The low score of urban mobility infrastructure occurs due to the lack of public transportation services and facilities in Samarinda City, resulting in dependence on private transportation

Table 6. CPI by Urban Form Provision Level.

Types of infrastructure	Results	Percentage	Categories
Street Intersection Density	11,2	11,2%	Very Weak
Street Density	3,857	19,29%	Very Weak
Land allocated to streets	0,0203	0%	Very Weak
Urban Form		**10,16%**	**Very Weak**

The results of the analysis in the sub-dimension of urban form infrastructure using CPI on all results of the infrastructure types obtained a score of the level of urban form infrastructure provision in Samarinda City of 10.16%. This number is in the very weak category, included in the score range of 0%—39%. The low score of urban form infrastructure occurs due to the low availability of urban road infrastructures in Samarinda City. Road infrastructures have really important roles in supporting economic growth and opening access that supports regional connectivity

Table 7. Prosperity Level of Samarinda City in The Infrastructure Dimension.

Sub-dimension	Percentage	Categories
Housing Infrastructure	61,19%	Moderately Strong
Social Infrastructure	47,92%	Weak
Information and Communications Technology	72,56%	Strong
Urban Mobility	29,95%	Very Weak
Urban Form	10,16%	Very Weak
Infrastructure Dimension	**44,36%**	**Weak**

Overall, according to the results of the CPI analysis, infrastructure provision in Samarinda City fall in the weak category, and most of the infrastructure is in the very weak category as can be seen in fig. 2. This number indicates that Samarinda City requires an increase and improvement in infrastructure to support the growth and welfare of the community. This can be seen from the availability of social infrastructures in the form of the availability of doctors and libraries, which are still really weak compared to the population, urban mobility, which is still dominated by private transportation users if compared to the availability of public transportations, and the low availability of road infrastructures in the sub-dimension of urban.

Based on the Fig. 2, it is found that housing infrastructure and information and communication technology have a higher score than other infrastructures. It can be seen that the axis of the two infrastructures goes further towards the edge of the line, which shows that the two infrastructures have higher and better-quality levels or contributions in the dimension of infrastructure. Meanwhile, social, urban mobility, and urban form infrastructures have an axis close to the central point. This shows that the three infrastructures have fewer dominant contributions, so they do not have significant performance in connectivity with the dimension of infrastructure.

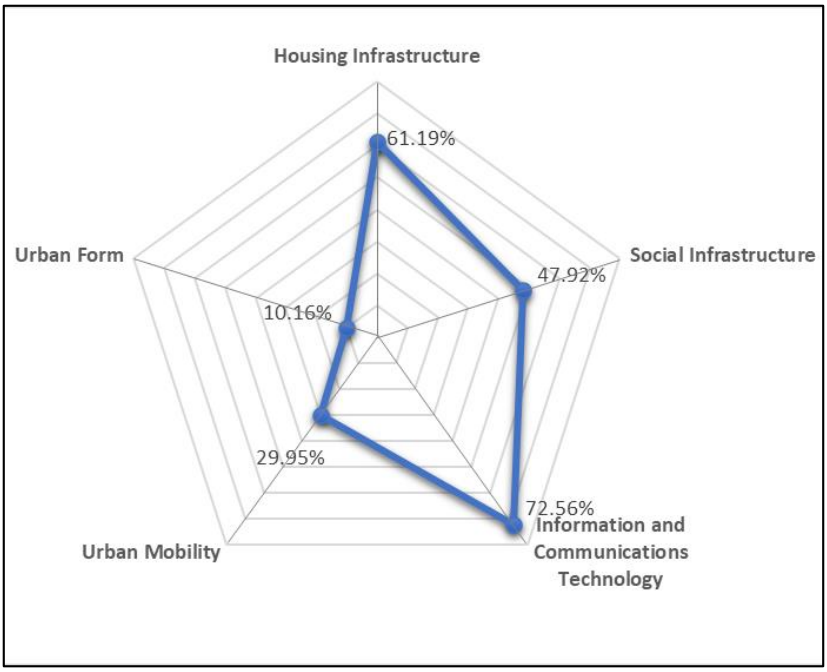

Fig. 2. Radar Chart Prosperity Level of Samarinda City in The Infrastructure Dimension

The findings of this study reveal that Samarinda City's infrastructure provision is classified as weak, with a City Prosperity Index (CPI) score of 44.36%. The research by [25] also identified significant urbanization challenges in Samarinda, particularly the rapid expansion of residential areas due to population growth, which exacerbates the strain on existing infrastructure. This mirrors the conclusion in our study that Samarinda's infrastructure, particularly urban mobility and social services, is inadequate to accommodate the city's growing population. In contrast, the study by [26] emphasizes the need for prioritizing transportation infrastructure development in provincial capitals, with Samarinda ranking lower in terms of road and public transportation availability compared to other cities. This discrepancy between Samarinda and other provincial capitals supports our study's assertion that urban mobility is a critical deficiency in Samarinda's prosperity. While other cities may have robust road networks, Samarinda's weak transportation infrastructure hinders economic activities and urban connectivity. These findings also align with [15] which suggests that sustainable smart city development in Indonesia requires addressing fundamental gaps in transportation and urban form. While ICT infrastructure in Samarinda shows promise with a strong score of 72.56%, this technological advancement alone is insufficient to drive overall prosperity without addressing foundational issues like urban mobility and housing.

This is particularly significant given the city's rapid urbanization and its role in supporting the development of Ibu Kota Nusantara (IKN). The analysis identified critical deficiencies in urban mobility and urban form, with both areas scoring in the "very weak" category, which directly impacts the city's capacity to sustain its growing population and support economic activities. These findings directly answer the research question, which sought to understand how current infrastructure reflects the city's overall prosperity and identify areas in need of urgent improvement. The low CPI score indicates that Samarinda's infrastructure, particularly in transportation and road network development, is insufficient to accommodate the city's growth and demands. Therefore, targeted interventions in these sectors are essential for elevating the city's prosperity levels.

The study's findings emphasize the urgent need for comprehensive infrastructure improvements in Samarinda, particularly in urban mobility and social infrastructure, to elevate the city's prosperity. Addressing these deficiencies is not just a matter of improving physical infrastructure but also crucial for ensuring equitable access to opportunities and services for the city's residents. The weak CPI score provides a clear answer: without significant improvements in transportation networks and social services, Samarinda will struggle to achieve the level of prosperity necessary to support its growing population and its role in the broader IKN project. The study's objective—to provide a comprehensive evaluation of infrastructure provision and its impact on prosperity—has been fulfilled by offering actionable insights that can guide future urban planning and policy decisions.

4 Conclusion

This study evaluated the infrastructure provision of Samarinda City using the City Prosperity Index (CPI) to assess the city's overall prosperity in the face of rapid urbanization and increasing infrastructure demands. The results revealed that Samarinda's infrastructure provision is categorized as weak, with a score of 44.36%. Key areas such as urban mobility and urban form were particularly deficient, with limited public transportation and inadequate road networks significantly affecting the city's prosperity. On the other hand, the city demonstrated stronger performance in the areas of housing infrastructure and information and communications technology (ICT), indicating that some sectors are progressing. The findings highlight the need for targeted improvements in weak infrastructure areas, particularly urban mobility and social infrastructure, to enhance overall prosperity. Addressing these gaps is essential for supporting the city's future development, especially as Samarinda plays a critical role in the Ibu Kota Nusantara (IKN) project. This study can be used to guide urban planners, policymakers, and researchers in identifying critical infrastructure gaps, prioritizing investments, and supporting sustainable urban development in rapidly growing cities like Samarinda

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