

## Evaluation of the Palopo City Activity Service Center System in Terms of Settlement Patterns and Transportation Systems



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### ABSTRACT

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#### Keywords:

*socio-economic characteristics, spatial planning policies, settlement patterns, transportation systems, urban service effectiveness, spatial disparities*

This research aims to evaluate the effectiveness of the Palopo City service center system by examining the interaction between socio-economic characteristics, spatial planning policies, settlement patterns, and transportation systems. The method used is a quantitative approach with path analysis, and data collection was done through observation, documentation, and surveys. The analysis results show that socio-economic characteristics and spatial planning policies significantly influence settlement patterns and transportation systems. However, the effectiveness of the city's service system is more dominantly determined by settlement and transportation patterns, where population concentration and the availability of public transportation in PPK and SPPK support fast and efficient service access, while PPL areas still face limitations. Another result is spatial disparities in the equitable distribution of facilities, so service effectiveness is not uniform across the entire city area. This research concludes that integrated urban planning is necessary to strengthen the equitable distribution of facilities, the development of public transportation, and the consistency of spatial planning policy implementation. The contribution of this research lies in providing an evaluation model that connects socio-economic aspects, spatial policies, settlement patterns, and transportation in determining the effectiveness of urban service systems in the context of medium-sized cities like Palopo.

## 1. INTRODUCTION

The interaction between various modes of transportation and regional structures is crucial for understanding traffic flows, migration behavior, and the distribution of urban services and resources. In this context, transportation infrastructure emerges as a key factor that can facilitate or hinder urban growth; good accessibility promotes the development of specific regions, while limited access can create disparities [1]. Furthermore, urban spatial planning policies also play an important role in shaping settlement patterns. Specifically, road infrastructure development and land use planning directly influence the spatial distribution of the population, often driving suburbanization or the "doughnut phenomenon," where city centers experience a decline in activity [2]. Alongside these factors, socioeconomic elements have a significant influence on urban development and travel behavior. For example, economic factors impact travel patterns through travel behavior, while higher employment levels are positively correlated with economic characteristics, influencing transportation choices and accessibility levels [3].

Although socioeconomic factors and urban policies have been tested, both can also lead to injustice in access to transportation and urban resources, especially in medium-sized city service systems. This highlights the need for an

inclusive and integrated urban planning approach across various dimensions of the Palopo City service system, which not only promotes growth and efficiency but also ensures equitable access and opportunities for all members of society.

## 2. LITERATURE REVIEW

Urban service centers play a strategic role in ensuring both efficiency and equitable provision of services for urban residents. The effectiveness of service centers is not only determined by operational management capacity but also by spatial quality, accessibility, and citizen involvement in governance. In the context of Palopo, understanding the city's central service system needs to be linked to a number of interacting factors.

First, the socio-economic characteristics of the population are a major driving factor influencing how society shapes demand for settlement patterns, transportation needs, and spatial planning policy directions. Residents' perceptions of accessibility, usability, and the impact of services on daily life form the basis for evaluating service centers [4]. Second, settlement patterns play a role in determining the spatial suitability, distribution, and reach of services. Previous studies have shown that good spatial quality supports geographical

and demographic accessibility for communities [5].

Third, the transportation system plays an important role in connecting settlements with the city's activity centers. Data integration and transportation coordination are considered to improve efficiency, accountability, and ease of access to service centers [6]. Fourth, urban spatial planning policies serve as a regulatory instrument that governs the distribution of settlements, transportation networks, and the location of service centers. The experience of implementing technology integration in call center systems highlights the importance of coordinated city governance to improve service quality [7].

Ultimately, the effectiveness of a city's central service system is determined by the extent to which all these factors work in harmony, supported by performance evaluation and continuous improvement mechanisms [8]. Equally important, citizen involvement in participatory maintenance is key to creating transparency and accountability while also building a collaborative environment between the city government and the community [9]. Therefore, evaluating the city's central service system should not solely focus on quantitative aspects but also needs to accommodate residents' qualitative experiences, resulting in a more balanced and holistic approach. With this understanding, the research hypothesis can be formulated as follows:

- H1: The socio-economic characteristics of the population positively influence the city's central service system. The socio-economic characteristics of the population directly influence service demand, the type of facilities, and the effectiveness of the city's central service system. Population structure determines need priorities, while the level of economic activity shapes the scale and intensity of required services [10]. Good socio-economic conditions promote data-driven planning, more equitable service distribution, and the functional integration of service centers [11, 12].
- H2: The socio-economic characteristics of the population influence the transportation system. Community income influences private vehicle ownership and ultimately impacts the transportation system [13]. Additionally, household age and size play a role in determining preferences for transportation mode use [14]. The location of settlements is also closely linked to the daily travel patterns of the population [15]. Previous research results explain that the settlement system and socio-economic factors influence mobility and transportation characteristics in Palopo City. Accessibility, spatial distribution, and income and service conditions determine transportation movement patterns and demand. This role underscores the need for a comprehensive approach to transportation planning [16].
- H3: The socio-economic characteristics of the population influence settlement patterns. The socio-economic characteristics of a population influence the form and dynamics of settlements. Diversification of livelihoods in Kampong, for example, encourages the formation of clustered settlement patterns [17]. Increased income and migration have been shown to change housing conditions and the spatial structure of settlements [18]. Rapid urbanization demonstrates how income and employment become determining factors in changing settlement patterns [19]. Meanwhile, in southern European cities, the socioeconomic profile of the population plays a role in shaping variations in

urban form and settlement dynamics [20]. Settlement systems and socio-economic factors influence transportation mobility and characteristics in Palopo City [16].

- H4: The socio-economic characteristics of the population influence urban spatial planning policies. Socioeconomic characteristics affect the effectiveness of policies in social cohesion [21]. Policies that shape the urban hierarchy demonstrate how economic factors influence spatial structure [22]. Urban policy patterns are closely related to the local economic context [23]. Urban space management is also influenced by socio-economic attributes, which impact the provision of ecosystem services [24]. Finally, the polycentric spatial structure of cities has been shown to support economic growth [25].
- H5: Urban spatial planning policies influence the city's service center system. Polycentric urban development changes the spatial structure of cities by distributing services more evenly [26]. The vitality of a commercial center is also determined by spatial planning decisions, which influence pedestrian flow and urban dynamics [27]. Additionally, the Transit-Oriented Development (TOD) approach improves the efficiency of service centers by promoting balanced urban growth [28]. Integrating traffic planning into spatial models has been shown to improve urban spatial patterns and strengthen service systems [29]. Meanwhile, the policy shift towards decentralization and densification affects the location and accessibility of services at the city level [30].
- H6: The transportation system has a positive impact on the city's central service system. Multimodal transport integration can strengthen service connectivity and accessibility [31]. The utilization of Intelligent Transportation Systems (ITS) also optimizes transportation networks and supports the sustainability of service centers [32]. Smart mobility innovations, such as autonomous vehicles and mobility-as-a-service, contribute to improved access and urban resilience [33, 34]. Sustainable mobility planning integrated with land use promotes efficient service distribution. Additionally, the GIS-based approach in assessing accessibility highlights the importance of transportation in ensuring service equity for all segments of society, including the elderly [35].
- H7: Settlement patterns have a positive influence on the city's central service system. Concentration of population in limited areas creates unequal access and extends travel time to service centers [36]. The radar imaging approach also highlights the importance of settlement pattern analysis for economic planning and resource management in urban areas [37]. Urbanization and industrialization are driving spatial-temporal changes in settlements that are influencing sustainable urban development [38]. The dynamics of logistics moving from the city center to the suburbs and vice versa, demonstrating its impact on the efficiency of goods and services distribution [39]. Understanding this settlement pattern is also relevant for integrating urban logistics systems and developing smart cities to support sustainability [40].

However, most research on urban service centers focuses more on large metropolitan contexts and technology-based

smart cities, while medium-sized cities in developing countries receive less attention. In fact, medium-sized cities with relatively accessible spatial structures towards compactness and a simple transportation network face different challenge. In this context, accessibility is more influenced by the connection between settlement patterns and transportation systems with dominant individual mobility [16, 41-43] than by technological sophistication.

Palopo City, as one of the regional activity centers in South Sulawesi, faces significant disparities in the distribution of services and facilities between sub-districts. Although Wara and East Wara serve as major service centers with the highest level of centrality, their access to educational facilities and infrastructure is still limited. Conversely, sub-districts with a smaller role, such as North Wara and Mungkajang, actually have better access. This condition confirms the existence of an imbalance in regional planning, which, if not addressed immediately, has the potential to widen the development and service gap between sub-regions in Palopo City [16, 44].

As a medium-sized city in eastern Indonesia, m Palopo City serves as a relevant example for discussing this phenomenon. With a compact spatial form and a fairly adequate transportation network, most service centers are considered easily accessible to the public. However, a number of administrative services, such as taxation, licensing, and population registration, are still centralized in one location, creating an access gap in some areas.

This research emphasizes an integrative approach that combines socio-economic characteristics, spatial planning policies, settlement patterns, and transportation systems within a single analytical framework. Additionally, focusing on Palopo City as a medium-sized city in the Global South offers a fresh perspective that is still rarely researched, while also providing insights into the paradox between service centralization and equitable access in the context of a compact urban environment. The importance of this research is very high considering the significant disparities in the distribution of services and facilities between districts, which could potentially widen the development gap. Many administrative services are still centralized in a few locations, limiting access for people in other areas. The results of this research are expected to serve as a basis for policymakers to formulate more just, effective, and socially and economically needs-based urban planning strategies.

Based on these conditions, this research aims to evaluate the central service system of Palopo City by examining settlement patterns and transportation systems. This study is directed towards understanding how the socio-economic characteristics of the population, spatial planning policies, settlement patterns, and transportation systems interact in determining the effectiveness of the city service center. This study is expected to enrich the literature by providing a perspective from a medium-sized city in the Global South while also offering new insights into the paradox between equal access and service centralization in the context of compact urban areas.

### 3. MATERIAL AND METHODS

This study uses a quantitative approach with causality

testing to analyze the interaction of socio-economic characteristics, spatial planning policies, settlement patterns, and transportation systems on the urban service system within a single analytical framework in Palopo City (Figure 1). The study focuses on the locations of Palopo City's service centers, including the City Service Center (PPK), Environmental Service Center (PPL), and City Service Sub-Center (SPPL), as spatially illustrated in Figure 2, which visualizes the distribution of city service facilities across service areas, PPK, SPPK, and PPL.

#### 3.1 Data collection

In this study, the sample was determined based on the population size of 21 sub-districts in Palopo City, which were divided into three service clusters in Palopo City, namely the City Service Centre (PPK), Sub-City Service Centre (SPPK), and Environmental Service Centre (PPL). A total of 400 respondents were selected using proportional cluster sampling. According to Davis [45], cluster sampling begins with a list of mutually exclusive clusters that comprehensively cover the entire population. In this study, the 21 sub-districts served as clusters representing the entire region. The number of respondents was determined proportionally based on the number of subdistricts in each service cluster, not based on the number of residents. Each sub-district provided approximately 18–20 respondents so that the representation of PPK, SPPK, and PPL was balanced according to their administrative composition. This proportional sampling approach ensured that the socio-spatial variations and characteristics of the community in each city service cluster were accurately represented.

Data sources in this study include surveys, observations, and documentation. Observations and documentation were used to describe socio-economic characteristics, spatial planning policies, settlement patterns, and transportation systems in relation to urban service systems. Surveys were conducted through questionnaires to collect data on socio-economic characteristics, spatial planning policies, settlement patterns, and transportation systems in relation to urban service systems. The indicators were measured using a Likert scale, with responses ranging from (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, to (5) strongly agree. This scale allows for a more detailed assessment of respondents' views on various aspects of the settlement system and related factors.

#### 3.2 Analysis method

Path analysis is a statistical technique that extends multiple regression to evaluate causal relationships between variables. This method allows researchers to assess how independent (exogenous) variables influence dependent (endogenous) variables, both directly and indirectly. Path analysis is very useful in social sciences, agriculture, and other fields to confirm theoretical models against empirical data [46]. As for path analysis, the Jamovi software is used [47]. In the initial stage, all aspects were measured as independent variables and urban service centers as dependent variables. Then, the properties that correlate within the transportation system and settlement patterns, socio-economic characteristics, and urban spatial planning policy were identified as the main path.

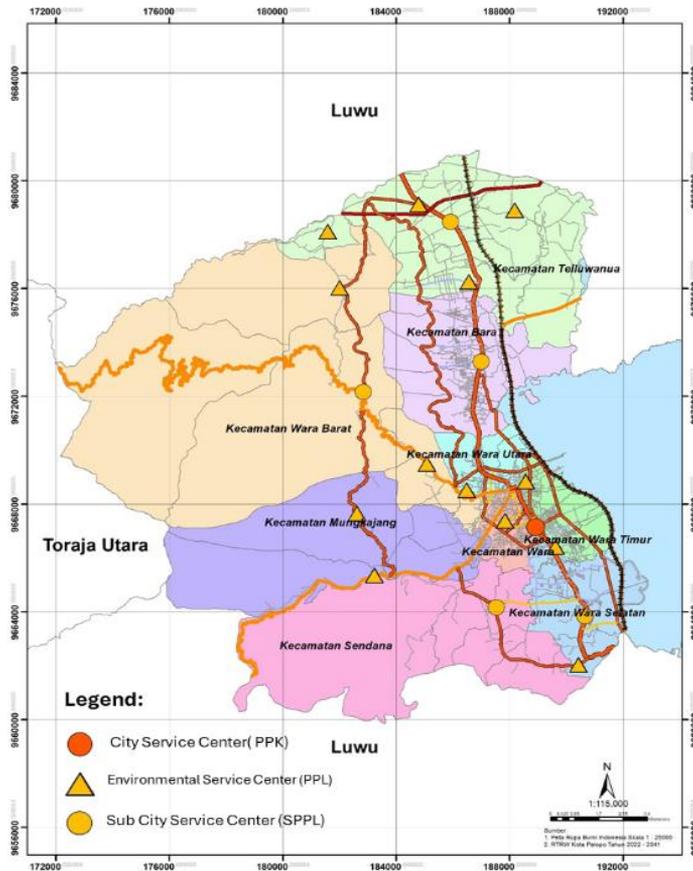


Figure 1. Research area [16]



Figure 2. Visualisation of city service facilities in services, PPK, SPPK, and PPL

transportation systems, and settlement patterns as mediating variables, and also as dependent variables in the second path correlation tested, have a correlation based on socio-economic characteristics and urban spatial planning policy. In the next stage, the correlation coefficient can also be determined indirectly, and the sequential path analysis diagram is drawn using EdrawMax software (Figure 3).

Path analysis is a tool for graphically illustrating the causal relationship structure between independent variables, intervening variables, and dependent variables. The path model diagram is created based on the variables being studied. In this study, the variables examined include socio-economic characteristics ( $\chi_1$ ), spatial planning policies ( $\chi_2$ ), settlement patterns and transportation systems ( $\gamma$ ), and urban service systems ( $Z$ ).

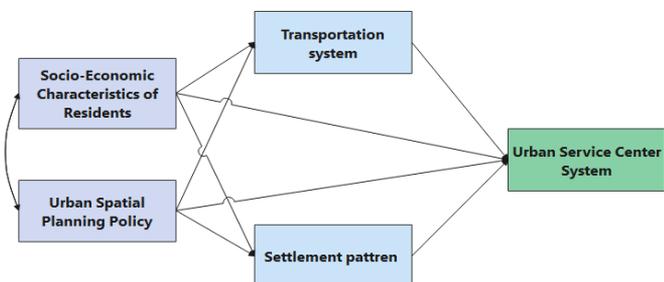


Figure 3. Conceptual model of the interaction path of socio-economic characteristics, spatial planning policies, settlement patterns, and transportation systems on the urban service center system

In the second stage, the results of the independent variables,

$$\gamma_1 = \rho\gamma x_1 + \rho\gamma x_2 + e_1 \quad (1)$$

$$\gamma_2 = \rho\gamma x_1 + \rho\gamma x_2 + e_2 \quad (2)$$

$$Z = \rho z y_1, \rho z y_2, \rho z x_1, \rho z x_2 + e_3 \quad (3)$$

## 4. RESULT

### 4.1 Evaluation of the service center system in Palopo City

To assess the regression model's suitability, we tested the relationship strength ( $R$ ) and the contribution of independent variables ( $R^2$  and Adjusted  $R^2$ ). These results show how socio-economic characteristics ( $\chi_1$ ) and spatial planning policies ( $\chi_2$ ) influence the transportation system ( $y_1$ ), settlement

patterns (y2), and urban service systems (z). Table 1 summarizes the model feasibility test results.

**Table 1.** Model fit measures

Dependent Variable	R	R <sup>2</sup>	Adjusted R <sup>2</sup>
y1	0.524	0.274	0.271
y2	0.480	0.230	0.226
z	0.776	0.603	0.599

Notes: \*\*t-value is below 1.96 and \*p < 0.05

- $\chi_1 \rightarrow$  Socio-economic characteristics
- $\chi_2 \rightarrow$  Spatial planning policies
- $\gamma \rightarrow$  Settlement patterns and transportation systems
- Z  $\rightarrow$  Urban service system

The results of the regression model feasibility test indicate variations in the strength of the relationship and the contribution of independent variables to each dependent variable. In the model with dependent variable y1, the correlation value (R) is 0.524, indicating a moderate relationship, with a coefficient of determination (R<sup>2</sup>) of 0.274, meaning that approximately 27.4% of the variation in y1 can be explained by the independent variables in the model. The model with dependent variable y2 yields an R value of 0.480, also indicating a moderate relationship, with an R<sup>2</sup> value of 0.230, meaning that only 23% of the variation in y2 can be explained by the model.

Conversely, the model with the dependent variable z shows significantly stronger results. An R value of 0.776 indicates a high correlation between the independent variables and z, while a coefficient of determination (R<sup>2</sup>) of 0.603 shows that 60.3% of the variation in z can be explained by the model. This indicates that the model with the dependent variable z (urban service system) has a better fit compared to the models y1 (transportation system) and y2 (settlement patterns).

In addition to assessing the overall model fit, regression analysis was also conducted to examine the contribution of each independent variable to the dependent variable. The results of the regression coefficient estimation show the direction of the relationship (positive/negative), the magnitude of the effect, and its significance through the t-statistic and p-value. Thus, it can be determined which variables have the most dominant influence on the transportation system (y1), settlement patterns (y2), and urban service systems (z). The results of the model path coefficients are presented in Table 2.

**Table 2.** Path coefficient and P-values, F count

Model Coefficients - y1				
Predictor	Estimate	SE	t	p
Intercept	1.718	0.1996	8.61	< .001
X1	0.451	0.0474	9.52	< .001
X2	0.143	0.0530	2.70	0.007
Model Coefficients - y2				
Predictor	Estimate	SE	t	p
Intercept	1.769	0.1964	9.01	< .001
X1	0.335	0.0466	7.19	< .001
X2	0.217	0.0522	4.15	< .001
Model Coefficients - Z				
Predictor	Estimate	SE	t	p
Intercept	0.3551	0.1492	2.38	0.018
X1	0.1974	0.0352	5.61	< .001
X2	0.0913	0.0360	2.54	0.012
y1	0.3082	0.0374	8.24	< .001
y2	0.2944	0.0380	7.74	< .001

Notes: \*\*t-value is below 1.96 and \*p < 0.05

- $\chi_1 \rightarrow$  Socio-economic characteristics
- $\chi_2 \rightarrow$  Spatial planning policies
- $\gamma_1 \rightarrow$  Transportation systems
- $\gamma_2 \rightarrow$  Settlement patterns and
- Z  $\rightarrow$  Urban service system

The results of the path analysis of the conceptual model of the interaction path of socio-economic characteristics, spatial planning policies, settlement patterns, and transportation systems on the urban service system are as follows in Table 3. In the first model (y1), the socio-economic variable ( $\chi_1$ ) makes the most dominant contribution with a positive coefficient of 0.451 (p < 0.001). Socioeconomic characteristics have a significant influence on transportation patterns. This means that improving the socio-economic conditions of society directly drives the development of a more advanced transportation system.

The spatial planning policy variable ( $\chi_2$ ) also showed a positive and significant effect on transport patterns, with a coefficient of 0.143 (p = 0.007) as shown in Table 3. This coefficient value indicates that spatial planning policy continues to play a significant role in influencing urban transport patterns, although its influence differs in magnitude from that of socio-economic variables. These results suggest that spatial planning aspects operate through structural and functional mechanisms, influencing the transportation system in the long term, particularly by regulating spatial patterns, service networks, and urban structure.

In the second model (y2), socio-economic factors remain dominant (0.335; p < 0.001), but the role of spatial planning policy appears stronger than in model y1 (0.217; p < 0.001) as shown in Table 3. This indicates that socio-economic characteristics and spatial planning policies have a significant influence on transportation patterns and settlement patterns. Therefore, settlement patterns are more sensitive to the direction of spatial planning policy than to the transportation system.

**Table 3.** Triangulation table of findings

Variable	Statistical Findings	Field Findings
Socio-Economic Characteristics (X1) $\rightarrow$ Settlement Patterns (y1)		Access to basic facilities ( $\leq$ 7 minutes) in PPK & SPPK, difficult in PPL
Socio-Economic Characteristics (X1) $\rightarrow$ Transportation (y2)		High mobility in the city center, limited transportation in peripheral areas
Spatial Planning Policies (X2) $\rightarrow$ Settlement Patterns (y1)		Facilities concentrated in PPK, uneven distribution
Spatial Planning Policies (X2) $\rightarrow$ Transportation (y2)	significant	Public transportation is adequate in the city center, limited in peripheral areas
Spatial Planning Policies (X2) $\rightarrow$ Urban Services (Z)		Policies exist, but implementation is weak in PPL areas
Settlement Patterns (y1) $\rightarrow$ Urban Services (Z)		Population concentration $\rightarrow$ faster access (PPK, SPPK)
Transportation (y2) $\rightarrow$ Urban Services (Z)		Good transportation $\rightarrow$ higher service effectiveness; slower in PPL

Furthermore, in the urban service system model (Z), it was found that socio-economic factors (0.197;  $p < 0.001$ ) and spatial planning policies (0.091;  $p = 0.012$ ) still have a significant influence. However, the greatest contribution comes from the transportation pattern variable ( $y_1$ ) at 0.308 ( $p < 0.001$ ) and the settlement pattern variable ( $y_2$ ) at 0.294 ( $p < 0.001$ ). This indicates that although basic factors such as socio-economic conditions and spatial planning policies remain important, the success of improving the urban service system is more determined by how transportation and settlement patterns are formed and managed.

Socioeconomic characteristics are the most consistent fundamental factor influencing all intermediate and output variables, while spatial planning policies provide significant additional influence, particularly on settlement patterns. Ultimately, transportation and settlement act as very powerful mediators in amplifying the impact on urban service systems.

Field observation results show that community access to urban services in Palopo City varies greatly between regions. In the PPK and SPPK areas, basic facilities such as education, healthcare, and commerce are generally accessible within a short time, less than seven minutes. This indicates a concentration of facilities that support the daily activities of the residents. Conversely, in the PPL region, access to intermediate facilities such as high schools and universities is relatively difficult, highlighting the uneven distribution of services.

These findings in Palopo illustrate conditions that are both aligned with and contrasting to the principles of the 15-Minute City. On the one hand, several service centers can be reached in  $\leq 7$  minutes, suggesting that Palopo has, in theory, surpassed the accessibility threshold set by the 15-Minute City concept. On the other hand, such accessibility is still highly dependent on the use of private vehicles, while the distribution of facilities remains unequal and the availability of public transportation is limited, particularly in PPL areas. Thus, consistent with the insights of Diab and Lu [48], Palopo also faces structural and policy challenges in realizing the full implementation of the 15-Minute City, especially in relation to equitable facility distribution and the development of active and public transportation systems.

From a transportation perspective, people in the city center have higher mobility due to the availability of adequate public transportation, while transportation is still limited in the suburban areas. This pattern impacts the effectiveness of the service system, where population concentration and transportation connectivity in PPK and SPPK accelerate service access, while in PPL, which has a more dispersed settlement pattern, transportation limitations actually slow down access.

Service conditions in the PPL area in terms of distribution and service have not shown any improvement. It is due to the consequences of the hierarchical structure of Palopo's urban development, where PPK and SPPK were initially designated as centers for facilities and transport networks. It has resulted in public investment, education, health services, and public transport being concentrated in the city center, while PPL has developed more slowly due to lower population density and lower demand for travel than in the center. Thus, greater distance, uneven services, and limited transport reflect the structural challenges typical of suburban areas, requiring strategies for equal distribution of facilities and strengthening connectivity in the development of Palopo City.

Existing spatial planning policies have indeed supported the

availability of services in the city center, but their implementation has not been able to reach all areas evenly. This condition indicates that equal access to facilities and transportation remains a major challenge in realizing a more effective city service system in Palopo.

## **5. DISCUSSION: SETTLEMENT PATTERNS, TRANSPORTATION SYSTEMS, AND URBAN SERVICE EFFECTIVENESS**

This research shows that socio-economic characteristics and spatial planning policies play a significant role in shaping settlement patterns and transportation systems, which in turn determine the effectiveness of the city's service center system in Palopo. First, the analysis results show that the socio-economic characteristics of the population have a positive influence on settlement patterns and transportation systems. This aligns with the findings of Zhao et al. [13] and Murdock et al. [14], who emphasized that income, age, and household size influence vehicle ownership and transportation mode preferences. Similarly, research by Kafy et al. [3] and Wang and Zhang [19] confirmed that increased income and migration play a role in changing settlement patterns. In other words, the socio-economic conditions of the Palopo community serve as the main driving factor influencing the direction of spatial development and urban mobility.

Second, spatial planning policies have proven to be an important variable linking socio-economic factors with the provision of urban services. The results of this study are consistent with the findings of Chen [22] and Tombolini et al. [23], who stated that spatial policies serve as regulatory instruments in managing urban hierarchies and spatial structures based on the local economic context. Additionally, empirical evidence in Palopo also supports the concept of polycentricity proposed by Wu et al. [26], where a more even distribution of services can be achieved through targeted spatial planning.

Third, this research confirms that settlement patterns and transportation systems act as significant mediators. Settlement patterns that tend to be centralized or dispersed affect the accessibility of city services, as stated by Linard et al. [36] and Ma et al. [38]. On the other hand, an integrated transportation system has proven to strengthen the connectivity and efficiency of service centers, aligning with the findings of Alessandretti et al. [31] and Shiva et al. [32]. In the context of Palopo, the roles of both are very important, considering the limitations of a medium-sized city, where accessibility is more determined by basic transportation networks and population concentration [16] compared to smart mobility technology as in metropolitan cities [43].

Fourth, the contribution of the city's service system is not only operational but also strategic. Kelly and Swindell [8] and Blečić et al. [9] emphasized the importance of citizen involvement in service governance. This is relevant to Palopo, where the limitations of formal infrastructure and resources can be offset by the active participation of the community in the planning and monitoring of city services.

The results of this study have been compared with findings from a number of medium-sized cities in Indonesia, and a consistent pattern has been observed. Studies of medium-sized cities show that public facilities and transport services are generally concentrated in city centers, while suburban areas experience limited access and service coverage. This condition

is also found in large cities in Indonesia, where educational and health facilities, as well as public transportation, are more dominant in the center of activity, leaving suburban areas behind in terms of accessibility [49, 50]. The main difference between Palopo and other cities is that accessibility in PPK and SPPK is relatively fast ( $\leq 7$  minutes), although it is highly dependent on private vehicles. Access inequality in PPL is also in line with research on the distribution of public facilities in Indonesian provinces/districts, which shows a pattern of structural inequality. These findings reinforce the recommendation that a gradual equalization strategy, particularly through the provision of additional facilities and the development of integrated public transport, is essential to reduce spatial inequalities in services in Palopo.

Overall, the results of this study confirm that the transportation system and settlement patterns are key variables in bridging the socio-economic relationship and spatial planning policies with the city's central service system. This finding enriches the literature, which previously focused more on metropolitan cities and large cities with complex spatial structures and high technology. In the context of medium-sized cities in developing countries, the effectiveness of service centers is determined more by simple accessibility, compact spatial patterns, and basic transportation connectivity, rather than just technological sophistication. This underscores the importance of a contextual approach in formulating strategies for planning and managing city service centers.

## 6. CONCLUSIONS

Socioeconomic characteristics have been proven to significantly influence settlement patterns and transportation systems. Field findings indicate that communities in the PPK and SPPK regions have close access to basic facilities and high mobility, while communities in PPL still face limitations, particularly in access to secondary education and public transportation. Spatial planning policies play an important role in shaping settlement patterns, transportation, and urban service systems. However, the implementation of these policies is still uneven. Facilities and services are more concentrated in the city center, while suburban areas still have poor accessibility and limited service availability. Settlement patterns and transportation systems emerged as the most dominant factors in determining the effectiveness of urban service centers. Population concentration and the availability of public transportation in PPK and SPPK support faster and more efficient service access, while the dispersed settlement and limited transportation in PPL actually reduce service effectiveness.

The effectiveness of the Palopo City service center is the result of the combined influence of socio-economic factors and spatial planning policies, but ultimately it is more determined by the management of settlement patterns and the transportation system. This finding emphasizes the need for an integrated planning approach that not only promotes growth and efficiency but also ensures equitable access to urban services for all areas of the city.

This study recommends improving service facilities in PPL through phased additions, not relocation from PPK, so inequality can be reduced without disrupting existing service centers. Strengthening an integrated and affordable public transport network is essential to connect PPL with PPK and

SPPK. More consistent implementation of spatial planning policies is needed to support a balanced distribution of settlements and facilities. From the PPK perspective, allocating resources to PPL provides system-wide benefits, such as reducing service pressure in the city center and improving overall urban efficiency, making it a strategic investment rather than a loss. An integrated planning approach that combines socio-economic conditions, spatial planning, settlement patterns, and transportation is therefore key to realizing an effective and equitable urban service system in Palopo.

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