ANALYSIS OF TOURISM SECTOR DEVELOPMENT ON REGIONAL DEVELOPMENT THROUGH ROAD INFRASTRUCTURE IN LAKE TOBA NATIONAL TOURISM STRATEGIC AREA IN INDONESIA

a Rosadi Patra Tanjung, b Johannes Tarigan, c Badaruddin, d Agus Purwoko

ABSTRACT

Background: The tourism sector is a catalyst for the economic advancement of an area. To enhance sustainable tourism, it is important to address the requisite infrastructure and facilities in the area. Tourist destination must possess compelling attraction that captivates visitors, promoting increased expenditures and this phenomenon propels local economic growth. Therefore, this research aimed to analyze the role of the Medan-Berastagi-Merek road infrastructure in moderating the influence of tourism development in Lake Toba National Tourism Strategic Area (KSPN), Indonesia.

Method: The measurement of variables and sub-variables was discussed and analyzed using an explanatory approach and Structural Equation Models.

Results: The results showed that tourism development did not impose a direct and significant influence on regional development. However, a positive impact was manifested on regional progress when mediated by the development of road infrastructure. The policy implications showed the significance of road infrastructure development in Lake Toba KSPN. This was not a supportive element but rather an essential factor that indicated prioritization by the Indonesian government and local administrations.

Conclusion: Various aspects of road infrastructure, including road quality, ease of mobility, connectivity, minimal obstacles, security/safety, accessibility, and timeliness, were developed as crucial factors influencing economic players in the tourism sector. Recognizing these facets had substantial policy implications, showing the importance of prioritizing road infrastructure development in the holistic progress of Lake Toba KSPN.

Keywords: road infrastructure, tourism, national tourism strategic area, regional development, Lake Toba.
ANÁLISE DO DESENVOLVIMENTO DO SETOR DE TURISMO NO DESENVOLVIMENTO REGIONAL ATRAVÉS DA INFRAESTRUTURA RODOVIÁRIA NA ÁREA ESTRATÉGICA NACIONAL DE TURISMO DO LAGO TOBA NA INDONÉSIA

RESUMO

Histórico: O setor do turismo é um catalisador para o avanço económico de uma área. Para melhorar o turismo sustentável, é importante abordar as infra-estruturas e instalações necessárias na área. O destino turístico deve possuir atração atraente que cative os visitantes, promovendo o aumento dos gastos e este fenômeno impulso o crescimento económico local. Portanto, esta pesquisa teve como objetivo analisar o papel da infraestrutura rodoviária Medan-Berastagi-Merek na moderação da influência do desenvolvimento do turismo na Área Estratégica Nacional de Turismo do Lago Toba (KSPN), na Indonésia.

Método: A mensuração das variáveis e subvariáveis foi discutida e analisada por meio de abordagem explicativa e Modelos de Equações Estruturais.

Resultados: Os resultados mostraram que o desenvolvimento do turismo não impôs uma influência direta e significativa no desenvolvimento regional. No entanto, manifestou-se um impacto positivo no progresso regional quando mediado pelo desenvolvimento de infra-estruturas rodoviárias. As implicações políticas mostraram a importância do desenvolvimento da infra-estrutura rodoviária no Lago Toba KSPN. Este não foi um elemento de apoio, mas sim um factor essencial que indicou a priorização por parte do governo indonésio e das administrações locais.

Conclusão: Vários aspectos da infra-estrutura rodoviária, incluindo a qualidade das estradas, facilidade de mobilidade, conectividade, obstáculos mínimos, segurança protecção, acessibilidade e oportunidade, foram desenvolvidos como factores cruciais que influenciam os actores económicos no sector do turismo. O reconhecimento destas facetas teve implicações políticas substanciais, mostrando a importância de dar prioridade ao desenvolvimento de infraestruturas rodoviárias no progresso holístico do Lago Toba KSPN.

Palavras-chave: infraestrutura rodoviária, turismo, área estratégica nacional do turismo, desenvolvimento regional, Lago Toba.

1 INTRODUCTION

Tourism development is expected to be more focused on improvement and the creation of a sustainable ecosystem since the designation of Lake Toba as an Indonesian Super Priority Tourist Destination (DPSP) (Widianingsih et al., 2023). The complexity of issues and challenges in realizing Lake Toba as a priority area faces problems in different dimensions, starting from socio-economic perspectives, environmental ecology, infrastructure, land, and mutually counterproductive institutions (Ollivaud & Haxton, 2018).

In supporting efforts to enhance social development and regional growth, infrastructure is a crucial aspect considered. Development cannot proceed smoothly when the infrastructure is not in good condition (Posumah, 2015). Every aspect of social and...
economic life has its infrastructure, which is the largest unit and the main tool in various activities. Therefore, in achieving success in the development of social and economic sectors, attention must be paid to the infrastructure. Tourism is one of economic sectors that theoretically has the most significant impact on regional economic growth (Laut et al., 2021). The variable functions as a catalyst for regional economic growth, enhancing the quality of a locale by serving as a source of local income. This directly influences job creation and the well-being of the surrounding area or city in proximity to tourist destination (et al., 2018).

Tourism industry is based on regional approach. Meanwhile, the division of tourism area is related to the potential, including non-moving attraction, namely natural beauty, monuments, and natural phenomena, and moving attraction where human factors play a crucial role, such as arts, customs, ceremonies, celebrations, and fairs. The development of tourism must be accompanied by the preparation of infrastructure to support tourism activities (Westoby et al., 2021). This infrastructure serves as a facility for the mobilization of tourists, making it easier and faster to reach the intended tourist destination. The readiness of infrastructure aims to attract the interest of tourists. The presence of well-prepared infrastructure facilitates the development of traffic due to the influx of tourist visitors. Certainly, the development of visitors enhances the quality of the area, city, and land use in tourist location.

This research aims to discover, analyze, and propose conceptual model of regional development based on tourism sector with the support of road infrastructure. Furthermore, this is intended to contribute new knowledge, theories, or practices in the field of regional planning. The specific objectives are to analyze the role of the Medan-Berastagi-Merek road infrastructure in moderating the influence of tourism development in support of Lake Toba National Tourism Strategic Area (KSPN). The crucial aspects of road infrastructure were also explored from the perspective of economic players in tourism sector.

2 MATERIALS AND METHODS
2.1 DATA COLLECTION
This research was conducted in Lake Toba tourism area in Karo Regency and parts of Simalungun Regency, specifically in tourist destination accessed through Medan-Berastagi-Merek-Lake Toba road route. An explanatory research design was explored with a quantitative approach through measurements of variables, sub-variables, and
indicators transformed into numerical values (Almeida et al., 2017). Primary data were obtained through direct interviews with tourism industry stakeholders using a questionnaire as a tool, supported by field observations. Secondary data collection was carried out through literature review and exploration related to the research from institutions, government, and non-government agencies, as well as other sources (Li et al. 2018).

Variables serve as the subjects of investigation or the focal points of research (Djollong, 2014). These include all states, factors, conditions, treatments, or actions influencing the outcomes of an experiment. The variables used in this research are Tourism Development as the independent/exogenous variable, regional development (dependent/endogenous), and Road Infrastructure Development as the intervening/endogenous variable.

<table>
<thead>
<tr>
<th>Variable Type</th>
<th>Variable Name</th>
<th>Operational definition</th>
<th>Sub-Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent Variable</td>
<td>Tourism</td>
<td>Tourism contributes to job creation, and infrastructure improvement and helps develop regional infrastructure (Zaei &amp; Zaei, 2013).</td>
<td>Attraction ($X_1$); Accessibility ($X_2$); Amenities ($X_3$); Ancillary ($X_4$);</td>
</tr>
<tr>
<td>Exogenous</td>
<td>Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$X$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervening/Endogenous</td>
<td>Road</td>
<td>Traffic performance is determined based on the assessment of road users who are tourism business actors in Lake Toba area. The value given by road users is directly proportional to traffic performance (Sri et al., 2022).</td>
<td>Road quality ($Y_1$); Mobility ($Y_2$); Connectivity ($Y_3$); Obstacles ($Y_4$); Security/Safety ($Y_5$); Accessibility ($Y_6$); Timeliness ($Y_7$);</td>
</tr>
<tr>
<td></td>
<td>Infrastructure Development ($Y$)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dependent/Endogenous</td>
<td>regional</td>
<td>Regional development is a combination of using human potential to process natural resources found in the territory (Sukmana, 2018)</td>
<td>Income ($Z_1$); Job opportunities ($Z_2$); Business opportunities ($Z_3$); Turnover growth ($Z_4$); Health ($Z_5$); Education ($Z_6$);</td>
</tr>
<tr>
<td></td>
<td>development</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$Z$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this research, data collection in the questionnaire used Likert scale. The scale was used to gauge the level of opinion, attitude, or perception of an individual toward a particular topic or statement (Subedi, 2016). Furthermore, it consisted of a series of statements or questions related to a specific topic (Ho, 2017). Respondents were asked to assess these statements by responding to the form of agreement or disagreement, or in some cases, levels of importance or satisfaction (Harpe, 2015).
Table 2. Likert scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Very good/very high</td>
</tr>
<tr>
<td>4</td>
<td>Good/high</td>
</tr>
<tr>
<td>3</td>
<td>Medium/moderate</td>
</tr>
<tr>
<td>2</td>
<td>Not good/low</td>
</tr>
<tr>
<td>1</td>
<td>Very bad/very low</td>
</tr>
</tbody>
</table>

2.2 DATA ANALYSIS

2.2.1 SEM (Structural Equation Models)

The adopted model is a causality or mutually influencing relationship. The analysis method used to test the proposed hypotheses is Structural Equation Models (SEM). This identifies the dimensions of a construct and simultaneously measure the influence or degree of the relationships between the identified dimensions (Sahadi & Wibowo, 2015). The method is adopted to comprehensively explain the relationships among the variables in the research (Carvalho & Chima, 2014). The steps of SEM modeling include (1) developing a theoretical model, (2) creating a path diagram, (3) converting the path diagram into SEM equations, (4) selecting input matrices and estimation methods, (5) assessing identification problems, (6) evaluating the model, as well as (7) interpreting and modifying the model. Various types of fit indices are used to measure the degree of fit between the hypothesized model and the presented data. In this research, several fit indices are used to assess the accuracy of the generated model (Ferdinand, 2005). Several fitness indices and criteria employed to assess the acceptability or rejection of the generated SEM model are cited from Gerbing & Anderson (1992); Wang et al. (2020); Smith & McMillan (2001); Moshagen (2012); and Shi & Maydeu-Olivares (2019).

3 RESULTS AND DISCUSSION

3.1 SEM TEST RESULTS

3.1.1 Measurement Model Evaluation

Measurement model evaluation is conducted through Confirmatory Factor Analysis (CFA) to test the validity and reliability of constructs (Awang et al., 2015). Therefore, the factor loading values of each indicator and the Average Variance Extracted (AVE) are examined to test construct validity. An indicator is considered valid when the value is greater than 0.5, and the reliability test is performed by analyzing Critical Ratio (CR) value. Meanwhile, a construct is reliable when CR value is ≥ 0.7, and first-order
CFA analysis shows that the constructs meet the criteria for validity and reliability (Laksmita et al., 2020).

CFA for tourism development construct is built on four dimensions, namely attraction, accessibility, amenities, and ancillary, tested for suitability on eight indicators with a good fit result. These four sub-variables are measured by 12 indicators, which are valid and reliable. The Infrastructure Road Development construct is built on seven dimensions, namely road quality, mobility, connectivity, obstacles, security/safety, accessibility, and timeliness. The seven goodness-of-fit measures have good fit indices, with only one indicator of the goodness-of-fit measure falling into marginal fit AGFI. The validity and reliability tests for the sub-variables and indicators of the infrastructure development construct show good validity and reliability. Regional development construct is built on six dimensions measured by tourism industry stakeholders, namely revenue growth, income, job opportunities, business fields, health, and education. These six have a good fit index for the measurement model, with only an indicator falling into a marginal fit, namely AGFI. The sub-variable indicators of regional development construct also have good validity and reliability. Therefore, the variables and sub-variables are valid and reliable for conducting the model test.

3.1.2 SEM assumption testing

a. The distribution of the observed variable is normal in a multivariate manner

CR skewness and kurtosis values for each indicator are between -2.58 and +2.58, hence, the data meets the univariate normality assumption. The multivariate cr value obtained was 2.577. Since CR value is lower than 2.58, the data meets the assumption of multivariate normality.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Min</th>
<th>Max</th>
<th>Skew</th>
<th>CR</th>
<th>Kurtosis</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z61</td>
<td>2,000</td>
<td>5,000</td>
<td>-0.045</td>
<td>-0.259</td>
<td>-0.319</td>
<td>-0.921</td>
</tr>
<tr>
<td>Z62</td>
<td>2,000</td>
<td>4,000</td>
<td>-0.068</td>
<td>-0.392</td>
<td>0.835</td>
<td>2.411</td>
</tr>
<tr>
<td>Z63</td>
<td>3,000</td>
<td>5,000</td>
<td>0.119</td>
<td>0.687</td>
<td>-0.539</td>
<td>-1.557</td>
</tr>
<tr>
<td>Z51</td>
<td>2,000</td>
<td>5,000</td>
<td>-2.12</td>
<td>-1.222</td>
<td>-0.779</td>
<td>-2.248</td>
</tr>
<tr>
<td>Z52</td>
<td>2,000</td>
<td>5,000</td>
<td>-2.16</td>
<td>-1.250</td>
<td>-0.341</td>
<td>-0.985</td>
</tr>
<tr>
<td>Z53</td>
<td>2,000</td>
<td>5,000</td>
<td>-2.62</td>
<td>-1.514</td>
<td>-0.438</td>
<td>-1.266</td>
</tr>
<tr>
<td>Z41</td>
<td>2,000</td>
<td>5,000</td>
<td>0.369</td>
<td>0.212</td>
<td>0.738</td>
<td>2.129</td>
</tr>
<tr>
<td>Z42</td>
<td>2,000</td>
<td>5,000</td>
<td>0.350</td>
<td>0.2019</td>
<td>0.357</td>
<td>1.030</td>
</tr>
<tr>
<td>Z43</td>
<td>2,000</td>
<td>5,000</td>
<td>0.105</td>
<td>0.604</td>
<td>0.872</td>
<td>2.518</td>
</tr>
<tr>
<td>Z33</td>
<td>2,000</td>
<td>5,000</td>
<td>0.149</td>
<td>0.862</td>
<td>0.871</td>
<td>2.513</td>
</tr>
<tr>
<td>Z32</td>
<td>2,000</td>
<td>5,000</td>
<td>0.009</td>
<td>0.052</td>
<td>-0.261</td>
<td>-0.753</td>
</tr>
</tbody>
</table>
The outliers test was carried out using the Mahalanobis Distance criterion at the p<0.001 level. The distance is evaluated using X2 at degrees of freedom equal to the number of variable indicators. The number of indicators used is 51 and at the p level of 0.001 the X2 table value is 87.968. Therefore, the highest Mahalanobis Distance value is 26.799.
lower than 87.968, meaning there are no outlier data. Based on Table 4, the highest value is 72.442 (lower than X2).

Table 4. Outlier test with AMOS software

<table>
<thead>
<tr>
<th>Observation number</th>
<th>Mahalanobis d-squared</th>
<th>p1</th>
<th>p2</th>
</tr>
</thead>
<tbody>
<tr>
<td>84</td>
<td>72.442</td>
<td>.026</td>
<td>.995</td>
</tr>
<tr>
<td>40</td>
<td>70.749</td>
<td>.035</td>
<td>.993</td>
</tr>
<tr>
<td>37</td>
<td>70.359</td>
<td>.037</td>
<td>.981</td>
</tr>
<tr>
<td>3</td>
<td>70.240</td>
<td>.038</td>
<td>.949</td>
</tr>
<tr>
<td>10</td>
<td>69.659</td>
<td>.042</td>
<td>.928</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.1.3 Evaluation of structural models

The conceptual relationship between the analyzed variables is realized in a structural equation model. The following image is the initial equation model from testing using the AMOS computer program.

Figure 1. AMOS Output Research Model (Initial Model)
Table 5. Size of Measurement Model Conformity

<table>
<thead>
<tr>
<th>GOF Indicator</th>
<th>Expected Size</th>
<th>Estimated Results</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>Smaller than 1286.870 (df=1205)</td>
<td>1274.037</td>
<td>Good Fit</td>
</tr>
<tr>
<td>Significance Probability (p)</td>
<td>≥ 0.05</td>
<td>0.082</td>
<td>Good Fit</td>
</tr>
<tr>
<td>RMSEA</td>
<td>≤ 0.08</td>
<td>0.017</td>
<td>Good Fit</td>
</tr>
<tr>
<td>GFI</td>
<td>≥ 0.90</td>
<td>0.809</td>
<td>Marginal Fit</td>
</tr>
<tr>
<td>AGFI</td>
<td>≥ 0.90</td>
<td>0.790</td>
<td>Bad Fit</td>
</tr>
<tr>
<td>CMIN/DF</td>
<td>≤ 2.00</td>
<td>1.057</td>
<td>Good Fit</td>
</tr>
<tr>
<td>TLI</td>
<td>≥ 0.95</td>
<td>0.988</td>
<td>Good Fit</td>
</tr>
<tr>
<td>CFI</td>
<td>≥ 0.94</td>
<td>0.989</td>
<td>Good Fit</td>
</tr>
</tbody>
</table>

Based on Table 5, the majority of the eight goodness-of-fit measures obtained already have a good fit index, namely Chi-Square, Significance Probability (p), RMSEA, CMIN/DF, TLI, and CFI. The measure in the marginal and bad fit categories are GFI and AGFI. Due to the presence of criteria for a bad fit, modifications were made to improve the model fit. This is conducted by connecting errors on indicators based on Modification Indices from AMOS output (Davvetas et al., 2020). Similar facts and solution methods were also applied in AMOS 21 (Prithviraj & Sundaram, 2023) and 22 (Arif et al., 2020).

Figure 2. AMOS Output Research Model (Final Model)
Table 6. Size Conformity Model Full Model Measurement (after modification)

<table>
<thead>
<tr>
<th>GOF Indicator</th>
<th>Expected Size</th>
<th>Estimated Results</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>Smaller than 1279.635 (df=1198)</td>
<td>1199.831</td>
<td>Good Fit</td>
</tr>
<tr>
<td>Significance Probability (p)</td>
<td>≥ 0,05</td>
<td>0.480</td>
<td>Good Fit</td>
</tr>
<tr>
<td>RMSEA</td>
<td>≤ 0,08</td>
<td>0.003</td>
<td>Good Fit</td>
</tr>
<tr>
<td>GFI</td>
<td>≥ 0,90</td>
<td>0.820</td>
<td>Marginal Fit</td>
</tr>
<tr>
<td>AGFI</td>
<td>≥ 0,90</td>
<td>0.800</td>
<td>Marginal Fit</td>
</tr>
<tr>
<td>CMIN/DF</td>
<td>≤ 2,00</td>
<td>1.002</td>
<td>Good Fit</td>
</tr>
<tr>
<td>TLI</td>
<td>≥ 0,95</td>
<td>1.000</td>
<td>Good Fit</td>
</tr>
<tr>
<td>CFI</td>
<td>≥ 0,94</td>
<td>1.000</td>
<td>Good Fit</td>
</tr>
</tbody>
</table>

Based on Table 6, the six measures of suitability have good fit model indices, namely Chi-Square, Significance Probability (p), RMSEA, CMIN/DF, TLI, and CFI. Marginal Fit is a condition of a measurement model under the criteria of absolute or incremental fit, but can be continued in further analysis (Sari & Hariyana, 2019). Prakoso (2020) also obtained the same results in line with Helmy (2016) and Fitriyana et al., (2013).

3.2 MODEL TEST RESULTS

3.2.1 Regression equation

Regression equation is created as a model for estimating the relationship between the variables and sub-variables used, an equation model can be prepared as follows:

\[ Y = 0.191X, \text{ R-square} = 0.370 \]
\[ Z = 0.126X + 0.250Y, \text{ R-square} = 0.091 \]

Table 7. Summary of Partial Hypothesis Testing

<table>
<thead>
<tr>
<th></th>
<th>Standardized</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y ←→ X</td>
<td>.191</td>
<td>.138</td>
<td>2.404</td>
<td>.016</td>
<td>Significant</td>
</tr>
<tr>
<td>Z ←→ X</td>
<td>.126</td>
<td>.109</td>
<td>1.615</td>
<td>.106</td>
<td>Not significant</td>
</tr>
<tr>
<td>Z ←→ Y</td>
<td>.250</td>
<td>.064</td>
<td>3.130</td>
<td>.002</td>
<td>Significant</td>
</tr>
</tbody>
</table>

The regression coefficient of variable X is 0.191 with a positive direction, showing a positive relationship. The obtained R-square value is 0.37, meaning that variable X has a 37.0% influence on Y. R-square value obtained is 0.091, showing that tourism development with the support of road infrastructure can only explain 9.10%. Therefore, regional economy in the area is significantly influenced by factors outside of tourism activities. The community heavily relies on agricultural activities as its main source of livelihood, with tourism serving as an additional activity. Meanwhile, this fact shows the
inability of tourism sector to become a key sector in increasing regional economic growth. The situation is not in line with Nugroho theory (2018), where tourism sector can be an economic driver that propels globalization. The transformation in global production and consumption patterns poses a challenge to conventional economic assumptions, world trade, markets, and business drivers associated with the establishment of a global community. According to Widianingsih et al. (2023), intentionally organized events in Lake Toba area can drive economic development through global tourism activities. This possibility is connected with Hajar (2022), stating that tourism development has not formulated an integrated plan. The absence of integrated plan is one of the major obstacles to developing tourism potential in Lake Toba area. Tourism development policies are determined by each district, and there is no shared policy regulating tourism potential, particularly in terms of economic potential.

3.2.2 Partial hypothesis testing results

The relationship between the independent and dependent variable can be seen as presented in Table 7 below:

a. Hypothesis 1: Tourism development (X) has a significant effect on road infrastructure development (Y). Tourism development variable has a CR value of 2.404 and a P-value of 0.016 (lower than 0.05). Since CR value (2.404) is greater than the t-table (1.96) and the p-value (0.016) is lower than 0.05, then H1 is accepted. Tourism development is stated to have a significant influence on the development of road infrastructure.

b. Hypothesis 2: Tourism development (X) has a significant effect on regional development (Z). Tourism development variable has CR value of 1.615 and a P-value of 0.106 (greater than 0.05). Since CR value (1.615) is smaller than the t-table (1.96) and the p-value (0.106) is greater than 0.05, H2 is rejected. Tourism development is stated to have no significant effect on regional development.

c. Hypothesis 3: Road infrastructure development (Y) has a significant effect on regional development (Z). The road infrastructure development variable has CR value of 3.130 and a P-value of 0.002 (lower than 0.05). Since CR value (3.130) is greater than the t-table (1.96) and the p-value (0.002) is lower than 0.05,
then $H_3$ is accepted. The development of road infrastructure is stated to have a significant influence on regional development.

### 3.2.3 The Influence of Tourism Development on Regional Development

Based on the data processing results in Table 7, tourism development does not significantly influence regional development in Lake Toba tourism area. Theoretically, this result is interesting in line with Rogerson (2015), where tourism development is one of the effective drivers of regional development.

The development of tourism sector can encourage the development of the surrounding area. This is the same as several previous research such as Kenjeran Integrated Tourism Area, Surabaya (Khomenie & Umilia, 2013), the Bangka Belitung Fishing Tourism Area (Yofianti et al., 2022), the Rambak Beach and Rebo Beach Areas in Bangka (Suta & Mahagangga, 2018), and the Thousand Islands (Abdur Razak & Suprihardjo, 2013).

Empirically, the above-mentioned fact occurs because tourism activities have not become the mainstay sector for the community. At a macro level, tourism activities have not been able to contribute significantly to employment, business opportunities, and reliable income for the community, when the road infrastructure has not adequately supported the development of tourist attraction in the area. The majority of the population still relies on agricultural activities (specifically horticulture) as the backbone of the economy that can be relied upon. Agricultural commodities such as fruits (specifically oranges), vegetables (specifically cabbage, carrots, mustard greens, tomatoes, onions, chili), plantation commodities (specifically coffee), and food crops (corn, cassava, and potatoes) remain the mainstay of the economy for the people in the area. They generally engage in tourism-related businesses as an alternative job during the busy tourist season, as a side job, or even just occasionally. Only a small percentage of the population, specifically the younger generation, actively obtain employment and works in tourism sector.

The phenomenon is suspected to be related to the explanation that tourism development is a dynamic and continuous process including adjustments based on monitoring, evaluation, and feedback from the implementation of previous plans. Tourism planning cannot stand alone but is related to a cross-sectoral and cross-regional development system. The main objective is to enhance economic value, create job
opportunities, and expand business prospects to reduce unemployment. Tourism can also improve the quality of life through economic benefits. However, the influence has unique characteristics, where tourism products cannot be stored, and demand is highly dependent on tourist visitation season. Visits to the area have not become the primary choice for the local population due to the constraints posed by inadequate road infrastructure. This results in the majority of the population relying on the agricultural sector, specifically horticulture, as the main source of income, with a small portion working in tourism sector.

3.2.4 The Influence of Tourism Development on Road Infrastructure Development

From Table 7, the influence of tourism development has a partially positive and significant effect on the development of road infrastructure. The theoretical explanation is as stated by Nur (2014) where the existence of a potential business sector encourages stakeholders to allocate a supporting infrastructure development budget. The existence of economic activity will promote the government to support the concept through the necessary infrastructure, including roads (Mina, 2016).

The empirical explanation of the conceptual relationship is supported by the designation of Lake Toba as a UNESCO Global Geopark in 2020 (Pakpahan et al., 2023). This designation has spurred central and regional governments to more intensively enhance various facilities and infrastructure needed to develop and respond to the potential value created. The status must also be maintained to prevent its revocation by UNESCO during the monitoring and evaluation process. Through Presidential Regulation of Indonesia No. 60 of 2021, Lake Toba has been designated as one of KSPN, alongside other areas such as Bromo-Tenger-Semeru (East Java), Borobudur (Central Java), Wakatobi (Southeast Sulawesi), Lombok (West Nusa Tenggara), Tanjung Kelayang (Bangka-Belitung), Labuan Bajo (East Nusa Tenggara), Morotai (North Maluku), Manado-Likupang-Bitung (North Sulawesi), and Raja Ampat (West Papua). As a consequence, Lake Toba is also designated as a National Super Priority Destination, which promotes the allocation and prioritization of budget for its infrastructure development, including roads in the area. This contributes to the superior quality of the road infrastructure compared to other routes, including the main access route from the capital of North Sumatra Province, Medan.

Tourism development plays a crucial role in improving regional economy. The concept serves as a significant motivation for the revitalization of cities in this era. With
the resurgence of cities worldwide, communities prosper, and a middle class develops, driving an increase in demand for tourism and recreation. Prominent urban centers featuring diverse attraction, including historical heritage and contemporary projects, attract visitors from developed countries. This trend extends beyond traditional tourist destination, such as beaches and mountains. As the influx of tourists into a city increases, the city assumes a responsibility to cater to the requirements of these visitors. A method of addressing the needs of tourists includes the establishment of essential tourism facilities, such as hotels, restaurants, cafes, tour agencies, money changers, and various commercial areas (Ocsuanda, 2018).

Füller & Michel (2014) stated that tourism played a crucial role in improving regional economy and supporting the revitalization of cities. The enhancement of a city appeal, including historical heritage and new projects, stimulates tourist visits from developed countries to the city, in addition to visiting tourism areas such as beaches and mountains. The city is responsible for providing essential tourism facilities such as hotels, restaurants, cafes, and other commercial areas. Furthermore, tourism development has significant social, cultural, economic, and political impacts. Tourism stimulates economic growth by creating demand for consumption and investment, which drives the production of goods and services. The expenditures create direct demand for goods and services and increase indirect demand for capital goods, spurring investments in transportation, accommodation, craft industries, and the service sector (Nurhajati, 2018).

3.2.5 The Influence of Road Infrastructure Development on Regional Development

Table 6 shows that the development of road infrastructure has a positive and significant impact on regional development. These results are consistent with the theory and assumptions of the hypothesis. Füller & Michel, (2014) explained that well-developed road infrastructure would promote economic improvement of an area through increased connectivity and accessibility. The results are in line with several similar research in Indonesia, such as in North Tapanuli (Simamora et al., 2016), Bali Province (Sumadiasa et al., 2016), Nganjuk Regency (Primadany et al., 2013), Bogor City (Sari, 2018), and South Minahasa Regency (Pendong et al., 2020).

The intensive development of road infrastructure started in 2021 through the National Strategic Priority Area Development project. This project is implemented institutionally through Lake Toba Authority (BPODT), a working unit under the Ministry
of Tourism and Creative Economy. The agency was established based on Presidential Regulation Number 49 of 2016 to accelerate integrated tourism development. This is also a public service managed professionally to prioritize efforts in synchronizing and coordinating stakeholders, related to investment and tourism industry businesses.

The transportation infrastructure built facilitates accessibility to tourist attraction. Previously, the considerable distance from the population center of Medan City made it difficult to make a day trip. The improvement in transportation infrastructure can overcome this obstacle, promoting an increase in the number of visitors requiring overnight accommodation. The development of tourism is expected to enhance the role of tourism sector as a source of livelihood for the local community. The agricultural sector, which has been a key sector can become a growth partner through the development of integrated tourism activities, using agricultural potential as tourist attraction. The research by Sulistyadi (2019) in Taman Hutan Raya Banten stated that tourism combined with agriculture could be developed integratively into a prominent attraction and income generator for the local community in tourism area. The case in Tanzania (Sanches-Pereira, 2017) also showed that tourism combined with agriculture could be developed integratively in tourism areas.

3.3 EVALUATION OF THE DIRECT AND INDIRECT INFLUENCE OF TOURISM DEVELOPMENT ON REGIONAL DEVELOPMENT

Based on the model and results of hypothesis testing, the direct and indirect influence of tourism development variables through road infrastructure.

<table>
<thead>
<tr>
<th>Influence</th>
<th>Direct (L) Regarding Regional Development</th>
<th>Indirect (TL) Through Road Infrastructure Development</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourism Development (X)</td>
<td>(0.126)^2 x 100 = 1.6%</td>
<td>0.191 x 0.250 x 100 = 4.8%</td>
<td>TL &gt; L (Mediating)</td>
</tr>
<tr>
<td>Regional Development (Z)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The outcome of calculating the percentage of influence shows that the direct impact of tourism development on regional development possesses a low and statistically insignificant coefficient. However, the indirect influence of tourism development on regional development through the enhancement of road infrastructure shows a more robust and statistically significant relationship coefficient (Table 7). Road infrastructure
development is a mediating variable in the influence of tourism development in Lake Toba tourism area. Infrastructure development is a crucial aspect of accelerating the national and regional development process. The variable also plays an important role as one of the driving wheels of economic growth. The rate of economic growth and investment cannot be separated from the availability of infrastructure such as transportation, telecommunications, sanitation, and energy. This causes infrastructure development to become the foundation of sustainable economic development. The increase in infrastructure and improvements by the government are expected to influence economic growth.

Prapti et al. (2015) explained that road infrastructure had impacts on economic and social sectors. Transportation is one type of activity that includes meeting human needs by altering the geographical location of goods and people, resulting in transactions. Ng et al. (2019) stated that road infrastructure played a significant role in economic development. The reason for this relationship is that road infrastructure facilitates the movement of people and goods in production activities. Therefore, the development of road infrastructure will increase the output of an area due to the increased productivity. Road infrastructure can be interpreted as physical capital stock, a factor input in the production function. The increase in output shows an increase in income, and economic development of the area will consequently improve. High levels of accessibility facilitate transactions between producers and consumers at low costs, providing ease in accessing healthcare facilities, education, and other services (Primanto and Undang, 2022).

Susanti and Armijon (2013) explained that the development of increasingly complex road infrastructure, both within and outside the city, created new centers of activity and urban functions along the existing roadways. Expansion of settlements, trade, and services mostly occurs on both sides of transportation routes. This results in a tendency for the growth of residential, commercial, and industrial areas around transportation routes. The construction has a significant impact on the development of city facilities as new focal points. The development of road infrastructure, by adding routes, widening roads, or improving the quality of road sections in Medan-Berastagi-Merek-Lake Toba area, greatly influences the use of urban land for residential, commercial, or service purposes.

The development of infrastructure is one of the crucial aspects of expediting the national and regional development processes. Infrastructure also plays a significant role
as the driving force for economic growth. The rate of a country economy and investment cannot be separated from the availability of infrastructure such as transportation, telecommunications, sanitation, and energy. This makes infrastructure the foundation of sustainable economic development. An increase in infrastructure and its improvement is expected to stimulate economic growth (Sumadisa et al., 2016).

The results are in line with Shkarlet et al., (2020), explaining that infrastructure development is a crucial aspect to drive national and regional development. This variable also plays a significant role as a catalyst for economic growth. The growth rate of country or area in terms of economy and investment is inseparable from the availability of infrastructure such as transportation, telecommunications, sanitation, and energy. This makes infrastructure the foundation for sustainable economic development. The addition and improvement by the government are expected to stimulate economic growth.

Ke et al. (2020) explained that the development of roads and other transportation infrastructure such as railways is a strategy to increase the economy. Road infrastructure is a crucial factor in supporting development, specifically in developing countries. The government plays a significant role in providing investment for infrastructure development. As roads are considered public infrastructure, government inclusion, and intervention are crucial to yield optimal results in driving growth. Another aspect of concern is that roads have an impact lasting for several years after the construction or in the long term.

The development of road infrastructure also has the potential to create negative effects. According to Susanti and Armijon (2013), the construction of road infrastructure significantly influences the development of urban facilities as new focal points. The highly dynamic development of area with diverse urban populations has the potential to trigger land use changes due to the complexity of road infrastructure, leading to various negative problems. The construction of road infrastructure within or on the outskirts of a city increases the population growth rate, impacting the high use of urban land. To mitigate the effects of infrastructure development on land use changes, integrated planning is required, incorporating spatial planning and road map development for economic sectors inseparable from the concepts of sustainable aims (Yang, et al., 2020).
4 CONCLUSION

In conclusion, the development of road infrastructure was reported to have a significant impact on the development of area based on tourism sector in Lake Toba KSPN. Tourism development did not have a significant impact on regional development in the area. However, it had a significant impact on regional development indirectly through road infrastructure as the moderating variable. In this context, road infrastructure was an essential factor needed to drive regional economic development in the area. According to the perspective of businesses in tourism sector, the aspects of road infrastructure included quality, ease of mobility, connectivity between cities and tourist destination, minimal obstacles, security/safety, accessibility to the area and tourist attraction, as well as punctuality. The aspects of regional development were income, job opportunities, business opportunities, revenue growth, education, and health. Therefore, the Indonesian government and local authorities should prioritize and focus more on developing road infrastructure, addressing these seven aspects as mandatory conditions to drive the improvement of regional economy in Lake Toba area.
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