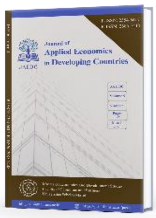

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# LEADING BUSINESS SECTORS THEIR RELATIONSHIP FOR REGIONAL DEVELOPMENT IN TEGAL REGENCY

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**ABSTRACT**

The emergence of Covid-19 has impacted changes in the economic structure of leading business sectors and regional development in various areas. The purpose of this study is to determine the leading business sectors in Tegal Regency before and after the Covid-19 pandemic. In contrast to previous research, this research emphasizes the analysis of regional development in Tegal Regency. Descriptive research with a quantitative approach is used in this study. Data sources were obtained from the Central Bureau of Statistics (BPS) in the form of ADHK Gross Domestic Regional Product (GDRP) by business sector in Tegal Regency and Central Java Province, covering the last 8 (eight) years, from 2016 to 2023. The data analysis techniques used are Location Quotient (LQ), Shift-Share (SS), and Klassen Typology to identify leading sectors based on their quadrant analysis. There are 4 (four) leading business sectors in Tegal Regency, namely Mining and Quarrying; Accommodation and Food and Beverage Services; Information and Communication; and Education Services. This analysis indicate that business sectors are linked to regional development in Tegal Regency. These findings confirm a shift in the economic structure after the pandemic, which opens opportunities for strengthening the Information and Communication sector as well as the Education Services sector. The policy implication for the local government is to formulate economic recovery strategies based on leading sectors that are adaptive to structural changes. The results of this analysis indicate that the fourive business sectors are linked to regional development in Tegal Regency.



## 1. INTRODUCTION

Regional development is a fundamental component in enhancing community quality of life (Akbar et al., 2023; Mouratidis, 2021), bolstering economic resilience (Giannakis & Bruggeman, 2020), and fostering equitable development within a nation (Siregar et al., 2020). Simultaneously, swift regional growth can positively influence infrastructure enhancement, elevate community welfare, and generate new employment chances (Harahap et al., 2023; Kesumawati & Fisabilillah, 2024; Simarmata & Iskandar, 2022).

Regional growth and advancement are intricately associated with Gross Domestic Product (GDP), a crucial metric for assessing the degree of wealth and economic activity within a region (Kartini et al., 2023; Kristiawan, 2020; Putri et al., 2022). Regional economic development necessitates the involvement of several stakeholders, including the community, business sector, and local government, to effectively manage resources for job creation and economic stimulation (Dewi, 2015). To expedite goal attainment, local governments must evaluate the economic sectors within their territory that are identified as potential catalysts for economic growth. The expansion and impact of economic sectors on regional GDP are crucial elements in regional development planning.

Since the onset of the Covid-19 epidemic in late 2019, nearly every nation has encountered substantial economic repercussions, including Indonesia (Malahayati et al., 2021). In addition to the economy, other sectors were immediately affected, including trade and services, tourism, transportation, and agriculture (Arbianti et al., 2023; Olivia et al., 2020; Ridhwan et al., 2023; Suryahadi et al., 2020). Regional GDP is a significant consideration for local governments in developing economic recovery policies (Gagnon et al., 2023; Vrontos et al., 2024). The Covid-19 epidemic prompted a change in sectoral contributions to the GRDP of Central Java Province. This is apparent from the substantial decrease in the transportation, warehousing, and manufacturing sectors (Kurniawan & Makarim, 2022). The tourism sector must improve the appeal of tourist attractions and hotels to positively influence GDP (Andriyani & Salam, 2022). Nonetheless, the economic growth of Central Java Province is seen as superior to that of the national economy. The measures implemented aim to enhance revenue by curtailing superfluous expenditure in state and regional budgets (Cherlyn et al., 2021). The regencies and cities in Central Java Province exhibit prominent business sectors, predominantly in agriculture, services, and mining and quarrying (Fikri & Fafurida, 2018).

Tegal Regency possesses competitive industries in mining and quarrying, wholesale and retail trade, and motor vehicle and motorcycle repair (Karunia & Faidah, 2017). Recent analysis of the 2016 to 2021 GRDP identifies three predominant sectors in Tegal Regency: mining and quarrying, accommodation and food services, and other services (Suliantoro, 2022). Furthermore, an analysis conducted from 2018 to 2022 revealed that only the lodging and food services sector emerged as a prominent sector within that timeframe (Akhmad & Sarjanti, 2024). A comprehensive study was previously undertaken on business sectors within a more confined geographical area, specifically in each sub-district of Tegal Regency (Mushoffa, 2009). These findings suggest dynamic shifts in Tegal Regency's economic structure, yet the relationship between these leading sectors and regional development, particularly in the post-Covid-19 context, remains underexplored.

The Covid-19 pandemic affected the economy of Tegal Regency, particularly by weakening purchasing power that reduced the revenues of restaurants and Micro, Small and Medium Enterprises (MSMEs), as people were reluctant to leave home for dining or recreation (Amin, 2023; Latifah & Muradi, 2024; Saturwa et al., 2021). Beyond the economic sphere, the pandemic also influenced lifestyles in education (Nissa & Haryanto, 2020) and healthy living practices (M. C. Anwar et al., 2022).Extensive study has previously been undertaken to identify prominent business sectors. Numerous research have been conducted in Central Java Province about the impact of Covid-19 as evidenced by its GRDP. Tegal Regency exclusively concentrates on the analysis of its key business sectors. The reference (Aida & Alvaro, 2021) examines business field analysis to identify sectoral movements across five provinces.

This research is distinguished by the innovative observation year and the more localized focus at the district level. This study analyzes the predominant business sectors in Tegal Regency prior to and following the Covid-19 pandemic. The lack of a regional development analysis based on leading sectors in Tegal Regency distinguishes it from others, despite the existence of similar analyses in other regencies or cities, such as Rembang Regency, which use Location Quotient analysis (Kamal, 2024). Although Dewanti & Yusuf (2023) investigated spatial circumstances in Tegal Regency, no research has specifically linked the identification of leading sectors to regional development in this regency.

This constitutes a clear gap, the absence of an analysis connecting Tegal Regency's leading sectors with regional development, particularly in the context of structural change before and after Covid-19. Despite prior investigations into spatial circumstances revealing no association patterns among districts or cities in Central Java concerning leading sectors (Fikri & Fafurida, 2018), that research primarily concentrated on the adjacency of leading sectors across areas. The objective of this research is to identify the predominant business sectors in Tegal Regency and examine their correlation with regional development, particularly the spatial dimension in fostering economic growth, assessed in relation to the leading sectors before and after Covid-19.

## 2. RESEARCH METHODS

Descriptive research with a quantitative approach is utilized for the identification and analysis of prominent economic sectors in Tegal Regency. The quantitative method is employed to process and interpret numerical data. The processing results are subsequently interpreted descriptively concerning the regional development in Tegal Regency. Secondary data sources were acquired from the Central Bureau of Statistics of Central Java Province and Tegal Regency. The collected data pertains to GDP at Constant Prices (ADHK) categorized by economic activity sector over the past eight years, segmented into two periods: prior to Covid-19 (2016 to 2019) and subsequent to Covid-19 (2020 to 2023) (Badan Pusat Statistik Kabupaten Tegal, 2024b; Badan Pusat Statistik Provinsi Jawa Tengah, 2024b). The research variables are categorized into 17 economic activity sectors based on the 2010 Indonesian input-output table's 17-sector classification (Badan Pusat Statistik, 2016), specifically: 1) A: Agriculture, Forestry, and Fishing; 2) B: Mining and Quarrying; 3) C: Manufacturing; 4) D: Electricity and Gas; 5) E: Water supply, Sewerage, Waste Management and Remediation Activities n; 6) F: Construction; 7) G: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles; 8) H: Transportation and Storage; 9) I: Accommodation and Food Service Activities; 10) J: Information and Communication; 11) K: Financial and Insurance Activities; 12) L: Real Estate; 13) M, N: Bussines Services; 14) O: Public Administration and Defence; Compulsory Social Security; 15) P:Education; 16) Q: Human Health and Social Work Activities; dan 17) R,S,T,U: Other Services.

The employed data analysis methodologies are Location Quotient (LQ), Shift-Share (SS), and Klassen Typology technique. Location Quotient (LQ) and Shift-Share (SS) analyses are frequently employed to identify dominant economic sectors within an area (Novandaya et al., 2022; Prats & Ramirez, 2013). The analysis of LQ is divided into two components: Static Location Quotient (SLQ) and Dynamic Location Quotient (DLQ) analysis. A comparative examination of the components of economic growth in Tegal Regency and Central Java Province was undertaken using SS analysis. The analyses were organized into a matrix to identify the predominant business sectors in Tegal Regency. The connections between these prominent sectors and regional development in Tegal Regency were then examined. The Klassen Typology technique is also employed to reinforce LQ and SS analysis. This technique is based on the sector's PDRB growth rate ($g_i$) and its contribution to the PDRB ($s_i$) compared to the national average (Tarigan, 2005; Widodo, 2006; Yuwono, 2000).

Location Quotient (LQ) research was employed to ascertain the predominant economic sectors of a region by evaluating their contribution to the local economy (Basuki & Mujiraharjo, 2017). The sectors are classified into two categories: basic and non-basic sectors. The fundamental economic theory posits that a region's economic growth is significantly affected by external demand for its goods and services (Arsyad, 1999). The base sector refers to the sector that may export products beyond its territory, influenced by characteristics such as geographical conditions, land availability, labor, and other elements that facilitate the region's economic development (Awalliyah, 2018). Conversely, the non-basic sector is the sector that solely satisfies the internal need of the region without engaging in exports. SLQ analysis is employed through the value-added methodology for GRDP and the labor force approach for each sector.

This study concentrates on the value-added methodology of GRDP. SLQ can be transformed into DLQ. DLQ estimates take into account the economic output growth rate of each sector over time in the site of the activity, specifically Tegal Regency. The distinction between DLQ and SLQ is rooted in the incorporation of economic growth elements, which are excluded from SLQ calculations (Dinan & Setijawan, 2022; Kamal, 2024).

$$\mathrm{SLQ} = \frac{\frac{S_i}{S}}{\frac{N_i}{N}} \quad (1)$$

$$DLQ_{ij} = \frac{\left[\frac{1+g_{ij}}{1+g_j}\right]}{\left[\frac{1+G_i}{1+G}\right]} \quad (2)$$

Description :
$S_i$ : GRDP of business sector i in Tegal Regency
S : Total GRDP of Tegal Regency
$N_i$ : GRDP of business sector i in Central Java Prov.
N : Total GRDP of Central Java Province
$g_{ij}$ : Growth rate of sector i in Tegal Regency
$g_j$ : Growth rate in Tegal Regency
$G_i$ : Growth rate of sector i in Central Java Prov.
G : Growth rate in Central Java Province

The SLQ analysis shows that sectors with a value of SLQ > 1 are classified as basic sectors, as they exhibit a higher level of specialization in Tegal Regency compared to Central Java Province. A value of SLQ = 1 indicates equal specialization, while SLQ < 1 reflects non-basic sectors with lower specialization. Meanwhile, the DLQ analysis measures growth performance. A value of DLQ > 1 indicates that the growth rate of a sector in Tegal Regency is higher than the average growth of the same sector at the provincial level. A value of DLQ = 1 represents equal growth, whereas DLQ < 1 suggests that the sector's growth is lower. Next, SLQ and DLQ analysis classifies sectors into four categories (Hartarto, 2016; Pribadi & Nurbiyanto, 2021; Tarigan, 2005; Widodo, 2006; Yuwono, 2000). First, sectors with SLQ > 1 and DLQ > 1 are classified as leading sectors that will remain as basic sectors both at present and in the future. Second, sectors with SLQ > 1 and DLQ < 1 are considered prospective (potential) sectors, which may shift from basic to non-basic. Third, sectors with SLQ < 1 and DLQ > 1 are identified as mainstay (developing) sectors, with the potential to shift from non-basic to basic. Fourth, sectors with SLQ < 1 and DLQ < 1 are categorized as lagging sectors, which will continue to remain non-basic both now and in the future.

SS analysis is employed to assess and evaluate the economic framework of a region in relation to the national economy (Arsyad, 1999; Soepono, 1993). SS analysis categorizes regional growth into three components: 1) Comprehensive regional economic expansion or national growth ($N_{ij}$), utilized to assess the impact of growth in the comparative region on the regional economy; 2) Proportional shift ($M_{ij}$), employed to evaluate the relative alteration of a sector inside the area in relation to the same sector in the comparative base region. A region may experience growth at a rate that exceeds or falls short of the average of a comparative region if it possesses sectors or industries that expand or contract at differing rates. Additionally, 3) Differential shift ($C_{ij}$) is employed to assess the competitiveness of an economic sector within a region relative to the same sector in the comparative base region. The elements of economic growth in Tegal Regency are juxtaposed with those in Central Java Province.

$$D_{ij} = N_{ij} + M_{ij} + C_{ij} \quad (3)$$
$$D_{ij} = E_{ij} * + E_{ij} \quad (4)$$
$$N_{ij} = E_{ij} \,.\, r_n \quad (5)$$
$$M_{ij} = E_{ij}\,(r_{in} - r_n) \quad (6)$$
$$C_{ij} = E_{ij}\,(r_{ij} - r_{in}) \quad (7)$$

Description :
$D_{ij}$ : Regional growth (shift-share)
$N_{ij}$ : Broader regional economic growth
$M_{ij}$ : Proportional shift
$C_{ij}$ : Differential (competitive) shift
$E_{ij}$ : Value added of sector i in Tegal Regency
$r_{ij}$ : Growth rate of sector i in Tegal Regency
$r_{in}$ : Growth rate of sector i in Central Java Province
$r_n$ : Central Java Province's economic growth rate
* : Central Java Province's economic growth rate

The SS analysis for business field in Tegal Regency is formulated in a mathematical model as the sum of these three components (Dewanti & Yusuf, 2023; Soepono, 1993). The results of the Shift Share (SS) analysis indicate that sectors with SS > 0 are categorized as progressive, as their growth is positively influenced by the growth of Central Java Province, while sectors with SS < 0 are considered conservative due to relatively constrained growth (Aida & Alvaro, 2021; Manullang et al., 2018). The indicator $M_{ij}$ reflects the growth rate of a sector in Tegal Regency, whereas $C_{ij}$ measures its competitiveness relative to other regencies or cities (Pribadi & Nurbiyanto, 2021). Based on the SS result, sectors are classified into four categories: (1) sectors with $M_{ij} > 1$ and $C_{ij} > 1$, characterized by rapid and competitive growth; (2) sectors with $M_{ij} > 1$ and $C_{ij} < 1$, categorized as developing, with rapid growth but low competitiveness; (3) sectors with $M_{ij} < 1$ and $C_{ij} > 1$, considered potentially competitive, as they grow slowly but remain competitive; and (4) sectors with $M_{ij} < 1$ and $C_{ij} < 1$, identified as lagging sectors with both slow growth and low competitiveness.

The Klassen Typology is an analytical method used to identify a region's economic growth structure by classifying its sectors into 4 (four) (Widodo, 2006). Quadrant I represents advanced and fast-growing sectors ($g_i \geq g$ and $s_i \geq s$). In contrast, Quadrant II identifies advanced but under pressure sectors ($g_i < g$ and $s_i \geq s$). Meanwhile, Quadrant III comprises potential or fast-developing sectors ($g_i \geq g$ and $s_i < s$), which show high growth despite a small contribution. Finally, Quadrant IV groups lagging sectors that have a growth rate and contribution below the average ($g_i < g$ and $s_i < s$).

Identifying leading business fields is necessary to stimulate the growth of business fields and their interconnectedness with other business fields, as well as the aggregate impact of leading business fields on the economic growth of a region and its surrounding areas (Nazipawati, 2007). After obtaining the superior business field, a descriptive analysis was conducted using online library sources to determine the regional development in Tegal Regency.

## 3. RESULTS AND DISCUSSION

### 3.1. RESULTS

The results of collecting data on the Gross Regional Domestic Product (GRDP) of Central Java Province and Tegal Regency at Constant 2010 Prices (Million Rupiah) for the period 2016 to 2023 were analyzed using the Location Quotient (LQ) and Shift-Share (SS) methods. The results of the LQ calculations are presented in a table divided into pre-COVID and post-COVID periods, as shown in Table 1.

Table 1. Results of SLQ and DLQ Analysis

| Code | Field of Business | Before Covid-19 | | | After Covid-19 | | |
|---|---|---|---|---|---|---|---|
| | | SLQ | DLQ | Typologies | SLQ | DLQ | Typologies |
| 1 | Agriculture, Forestry … | 0.995 | 0.916 | Underperform | 0.962 | 0.781 | Underperform |
| 2 | Mining and Quarrying | **1.794** | **1.034** | Leading | **1.856** | 0.262 | Prospective |
| 3 | Manufacturing | 0.932 | 0.998 | Underperform | 0.976 | **1.130** | Mainstay |
| 4 | Electricity and Gas | 0.676 | **1.000** | Mainstay | 0.656 | 0.945 | Underperform |
| 5 | Water supply, Sewerage, … | 0.631 | **1.014** | Mainstay | 0.622 | **2.017** | Mainstay |
| 6 | Construction | 0.763 | 0.998 | Underperform | 0.761 | **2.353** | Mainstay |
| 7 | Wholesale and Retail Trade … | **1.186** | 1.000 | Prospective | **1.142** | 0.991 | Prospective |
| 8 | Transportation and Storage | 0.904 | **1.006** | Mainstay | 0.921 | 0.893 | Underperform |
| 9 | Accommodation and Food … | **1.450** | 1.000 | Prospective | **1.422** | **1.086** | Leading |
| 10 | Information and Communi… | 0.826 | **1.003** | Mainstay | 0.810 | **1.026** | Mainstay |
| 11 | Financial and Insurance … | 0.797 | **1.013** | Mainstay | 0.788 | **1.152** | Mainstay |
| 12 | Real Estate Activities | 0.984 | **1.009** | Mainstay | 0.952 | **1.064** | Mainstay |
| 13 | Business Activities | **1.163** | 0.992 | Prospective | **1.111** | 0.971 | Prospective |
| 14 | Public Administration … | 0.789 | 0.994 | Underperform | 0.779 | **5.755** | Mainstay |
| 15 | Education Services | **1.147** | 0.998 | Prospective | **1.133** | **2.210** | Leading |
| 16 | Human Health and Social … | 0.958 | **1.002** | Mainstay | 0.896 | **3.801** | Mainstay |
| 17 | Other Services | **1.423** | 1.000 | Prospective | **1.398** | **2.117** | Leading |

Source: Processed data (2024)

According to these calculations and identifications, it is clear that there are 8 (eight) business fields that remain unchanged, 6 (six) business fields that have ascended to become prominent or staple sectors, and 3 (three) sectors that have regressed or decreased from their previous status as leading sectors. Prior to the Covid-19 pandemic, the leading sector was Mining and Quarrying. Nonetheless, in the aftermath of Covid-19, the sector regressed to a less promising state as it had no greater opportunities than previously. Despite the sector's fall, the number of leading sectors in the post-Covid-19 period rose to three businesses. This is apparent from the transition from prospective sectors or a rise in growth rate to dominant sectors, specifically: Accommodation and Food Services; Education Services; and Other Services. Prior to Covid-19, two out of five potential sectors remained unchanged or continued to be considered prospective: Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles; and Business Services.

The mainstay sectors prior to the Covid-19 pandemic encompassed seven business domains. Moreover, in the post-Covid-19 era, five out of the seven economic sectors continued to be mainstay, while the remaining sectors regressed to become underperform. The mainstay sectors include: Water supply, Sewerage, Waste Management and Remediation Activities; Information and Communication; Financial and Insurance Activities; Real Estate; and Human Health and Social Work Activities. Currently, the underperforming sectors are Electricity and Gas, as well as Transportation and Storage. The remaining four business sectors were underperforming prior to the Covid-19 epidemic. Three business activities have emerged as leading sectors: Manufacturing, Construction, and Public Administration and Defence, Compulsory Social Security. Concurrently, the Agriculture, Forestry, and Fishing sectors continue to underperform.

The outcomes of the LQ analysis were succeeded by an SS analysis to assess the growth of business sectors throughout a broader territory, as illustrated in Table 2. Based on the results of the SS analysis calculation, there were 3 (three) business fields before the pandemic that grew rapidly, namely: Electricity and Gas; Construction; and Accommodation and Food Service Activities. Of these three business fields, Accommodation and Food Service Activities shifted from rapid to a developing sector after the Covid-19 pandemic. The other two sectors, namely Electricity and Gas and Construction, continued to grow rapidly. Meanwhile, there are 2 two) sectors that were developing sectors before the pandemic and grew rapidly after the pandemic: Transportation and Storage; and Information and Communication.

Table 2. Results of SS Analysis Calculation

| No. | Before Covid-19 (2016 s/d 2019) | | | | | After Covid-19 (2020 s/d 2023) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $N_{ij}$ | $M_{ij}$ | $C_{ij}$ | $D_{ij}$ | Typ | $N_{ij}$ | $M_{ij}$ | $C_{ij}$ | $D_{ij}$ | Typ |
| 1 | 489654 | (318533) | (79036) | 92085 | Lag | 437821 | (308851) | (56948) | 72022 | Lag |
| 2 | 142312 | (46392) | 39798 | 135719 | Pot | 142901 | (148627) | 11890 | 6164 | Pot |
| 3 | 1137616 | (163411) | 229118 | 1203323 | Pot | 1128752 | (264641) | 279939 | 1144051 | Pot |
| 4 | 2630 | 25 | 19 | 2673 | Rap | 2625 | 612 | 824 | 4061 | Rap |
| 5 | 1596 | (20) | (409) | 1166 | Lag | 1556 | (309) | 356 | 1604 | Pot |
| 6 | 276493 | 40931 | 7706 | 325129 | Rap | 273296 | 32685 | 55505 | 361486 | Rap |
| 7 | 611907 | 68825 | (21222) | 659509 | Dev | 587146 | 67789 | (151645) | 503290 | Dev |
| 8 | 107507 | 46512 | (18403) | 135616 | Dev | 78252 | 434239 | 5596 | 518086 | Rap |
| 9 | 161499 | 84655 | 5919 | 252073 | Rap | 163450 | 271192 | (83602) | 351040 | Dev |
| 10 | 125013 | 188755 | (10331) | 303437 | Dev | 171547 | 73112 | 873 | 245532 | Rap |
| 11 | 79062 | (18980) | (2283) | 57799 | Lag | 77041 | (53411) | 2337 | 25967 | Pot |
| 12 | 66084 | 7355 | (7041) | 66398 | Dev | 65030 | 2419 | (9887) | 57562 | Dev |
| 13 | 15271 | 13478 | (6424) | 22326 | Dev | 15051 | 3275 | (3013) | 15314 | Dev |
| 14 | 75489 | (29669) | (2901) | 42918 | Lag | 69504 | (44631) | (2952) | 21921 | Lag |
| 15 | 152847 | 66040 | (22509) | 196378 | Dev | 156936 | (71879) | 31502 | 116559 | Pot |
| 16 | 27969 | 15560 | (1640) | 41888 | Dev | 30584 | (11939) | (2374) | 16271 | Lag |
| 17 | 80006 | 63259 | (3124) | 140141 | Dev | 83404 | 37990 | (51914) | 69481 | Dev |

Note: Typology (Typ): Developing (dev), Potential (Pot), Lagging (lag), and Rapid (rap)
Source: Processed data (2024)

There are 8 (eight) business sectors that were developing before the pandemic, namely: Wholesale and Retail Trade; Real Estate; Transportation; and Information and Communication; Business Services; Education Services; Health and Social Activities Services; and Other Services. Of these eight business sectors, 2 (two) have grown rapidly since the pandemic, namely Transportation and Information and Communication. The business sectors of Wholesale and Retail Trade; Real Estate; Business Services; and Other Services have remained developing sectors since the pandemic. Meanwhile, the Education services is considered to have potential, while the Human Health and Social Work Activities sector has declined to become a lagging sector.

The sectors with potential before Covid-19 were 2 (two), namely: Mining and Quarrying; and Manufacturing, both of which remained sectors with potential after Covid-19. Then, there were 2 (two) sectors that increased from lagging sectors to sectors with potential after Covid-19, namely: Water Supply, Sewerage, Waste Management and Remediation Activities; and Financial and Insurance Services. The sector of Public Administration and Defence; Compulsory Social Security remained a lagging business activity both before and after the Covid-19 period. In identifying leading business fields, it is still necessary to consider the basic sector of a business field thru LQ analysis. The results of the calculation between LQ analysis and SS analysis are presented in Table 3.

Based on the result of Klassen Typology in Figure 1, before the Covid-19 pandemic, the economy of Tegal Regency was largely driven by Mining and Quarrying as well as Accommodation and Food Services, which were categorized as advanced and fast-growing sectors (Quadrant I). Meanwhile, industries such as Manufacturing; Electricity and Gas; and Construction were already developed but showed relatively stagnant growth (Quadrant II). In contrast, sectors like Wholesale and Retail Trade; Business Activities; Education; and Other Services were still developing (Quadrant III), while a wide range of important sectors, including Agriculture, Forestry and Fishing; Water Supply, Sewerage, Waste Management, and Remediation Activities; Transportation and Storage; Information and Communication; Financial Services; Real Estate Activities; Public Administration and Defence; and Human Health and Social Work Activities, lagged behind in competitiveness (Quadrant IV). This structure reflected a reliance on extractive industries and hospitality, while modern services and agriculture were underperforming.

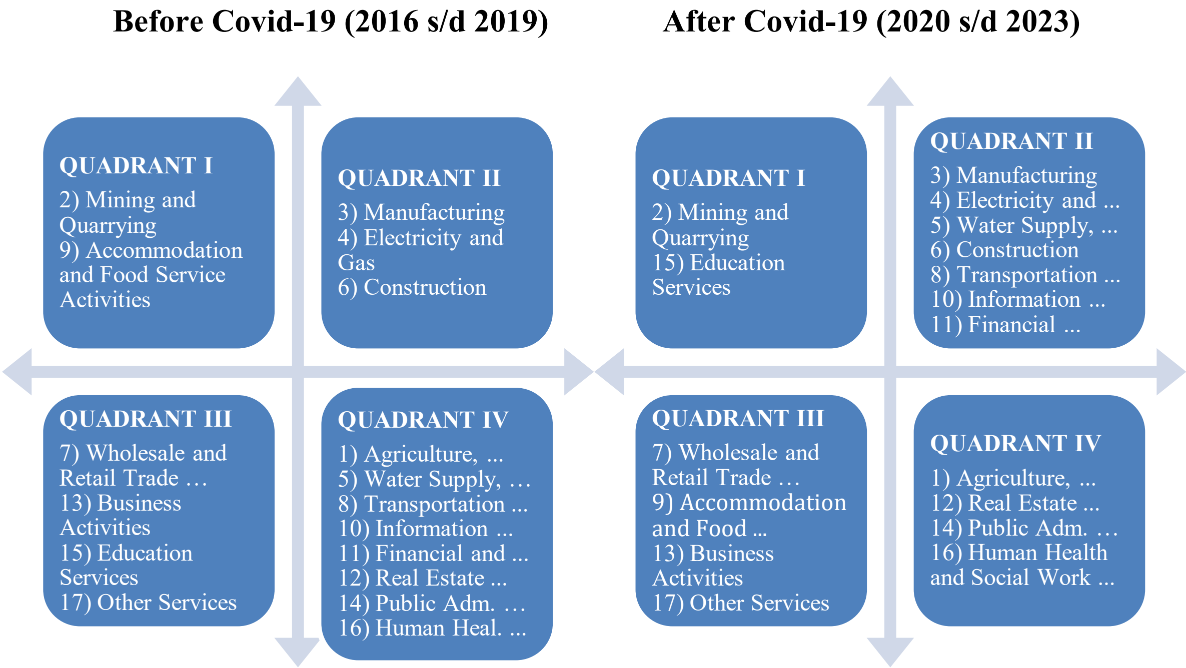


Figure 1. Klassen Typology of Bussiness Sectors in Tegal Regency
Source: Processed data (2024)

After the Covid-19 pandemic, there were notable structural shifts. Mining and Quarrying remained a leading sector, but Education Services rose dramatically into Quadrant I, highlighting the growing importance of human capital and digital-based education. Quadrant II became more populated, with Manufacturing; Electricity and Gas; Water Supply, Sewerage, Waste Management, and Remediation Activities; Construction; Transportation and Storage; Information and Communication; and Financial Services all placed here, showing that while these sectors were more advanced, their growth slowed or stagnated. The most significant decline was in Accommodation and Food Services, which dropped from Quadrant I to Quadrant III due to heavy restrictions on tourism and hospitality during the pandemic. The developing sectors (Quadrant III), including Wholesale and Retail Trade; Business Activities; and Other Services, remained important but faced challenges adapting to structural changes. The decline of hospitality highlighted vulnerability to external shocks, while retail trade and business services struggled to regain momentum. Meanwhile, lagging sectors (Quadrant IV) after Covid-19 consisted of Agriculture, Forestry and Fishing; Real Estate Activities; Public Administration and Defence, and Human Health and Social Work Activities. Despite their essential role during the pandemic, health services did not translate into significant economic growth, and agriculture continued to lag behind industrial and service sectors.

Overall, the comparison shows that Tegal Regency's economy has shifted from a dependence on extractive and hospitality sectors before the pandemic toward greater recognition of education and digital-related industries after Covid-19. However, the persistence of many sectors in Quadrants II, III, and IV indicates structural imbalances. This suggests the need for regional policies that not only strengthen knowledge-based and digital sectors but also revitalize traditional industries like agriculture and health to ensure more balanced and resilient economic growth.

Table 3. LQ Analysis and SS Analysis Result

| Code | Before Covid-19 (2016 s/d 2019) | | | | | After Covid-19 (2020 s/d 2023) | | | | | Typology |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SLQ | DLQ | $M_{ij}$ | $C_{ij}$ | Klas. | SLQ | DLQ | $M_{ij}$ | $C_{ij}$ | Klas. | |
| 1 | – | – | – | – | IV | – | – | – | – | IV | Non-Leading |
| 2 | + | + | – | + | I | + | – | – | + | I | **Leading** |
| 3 | – | – | – | + | II | – | + | – | + | II | Non-Leading |
| 4 | – | + | + | + | II | – | – | + | + | II | Non-Leading |
| 5 | – | + | – | – | IV | – | + | – | + | II | Non-Leading |
| 6 | – | – | + | + | II | – | + | + | + | II | Non-Leading |
| 7 | + | – | + | – | III | + | – | + | – | III | Non-Leading |
| 8 | – | + | + | – | IV | – | – | + | + | II | Non-Leading |
| 9 | + | – | + | + | I | + | + | + | – | III | **Leading** |
| 10 | – | + | + | – | IV | – | + | + | + | II | **Leading** |
| 11 | – | + | – | – | IV | – | + | – | + | II | Non-Leading |
| 12 | – | + | + | – | IV | – | + | + | – | IV | Non-Leading |
| 13 | + | – | + | – | III | + | – | + | – | III | Non-Leading |
| 14 | – | – | – | – | IV | – | + | – | – | IV | Non-Leading |
| 15 | + | – | + | – | III | + | + | – | + | I | **Leading** |
| 16 | – | + | + | – | IV | – | + | – | – | IV | Non-Leading |
| 17 | + | – | + | – | III | + | + | + | – | III | Non-Leading |

Note: SLQ: Base (+), Non Base (–); DLQ: Prospective (+), Non Prospective (–);
$M_{ij}$: rapid (+), Slow (–); $C_{ij}$: competitive (+), Non competitive (–)
Source: Processed data (2024)

Based on the Table 3, there is no business sector that is interpreted as basic, prospective, fast, and competitive. Therefore, the best business field is chosen based on a more superior positive interpretation compared to others. Four (4) leading sectors were identified or at least can be prioritized in Tegal Regency. First, Mining and Quarrying, although relatively slow, is competitive at the provincial level. This sector is also classified as an advanced and rapidly growing sector according to Klassen's Typology. This indicates that the sector not only makes a significant contribution to the regional economy but also has the potential to drive structural transformation in Tegal Regency. Second, the provision of accommodation, and Food Service Activitiesis a fundamental and promising sector both before and after Covid-19. Although it was a non-promising sector before Covid-19, the DLQ value was very close to 1. In contrast to Klassen's typology, this sector shifted from quadrant I to quadrant III. The expectation is that this sector can continue to grow rapidly in the post-Covid-19 period. Third, Information and Communication became a leading sector in the LQ analysis and experienced rapid growth after the pandemic. Klassen's Typology also shows a change from quadrant IV to quadrant II, meaning from a relatively lagging sector to an advanced but lagging sector. Last, Education Services was a base and prospective sector before and after the common era, although the DLQ value before the pandemic was also close to 1. This sector also became competitive after the pandemic. Similarly, Klassen's Typology indicates that this sector was considered a potential sector before the pandemic, then became an advanced and rapidly growing sector in the post-pandemic period.

## 3.2. DISCUSSION

The analysis of leading sectors in Tegal Regency, identified through the Location Quotient (LQ) and Shift Share (SS) methods, highlights four business sectors that hold strategic importance for regional development. One of these is the mining and quarrying sector, which encompasses a wide range of commodities such as oil and natural gas, coal and lignite, metal ores, as well as other types of mining and quarrying. In the context of Tegal Regency, the potential is mainly concentrated in the category of other mining and quarrying, with mineral resources such as diorite, calcite, phosphate, trass, clay, lakes, and limestone. Among these, limestone stands out as a significant resource with potential both as a mineral reserve and a contributor to local tax revenues (Abadi et al., 2018). Table 4 presents the number of Mining Business Permits in Tegal Regency.

Table 4. Mineral Resources in Tegal Regency

| Mineral Material | IUP | Area (ha) | Production ($m^3$) | Workforce |
|---|---|---|---|---|
| Andesite | 5 | 73,38 | 216.800 | 37 |
| Limestone | 2 | 16,16 | 10.800 | 7 |
| Limestone for Cement | 1 | 35,00 | 150.234 | - |
| Gravel | 2 | 21,00 | 140.000 | 8 |
| Fill Soil | 16 | 208,00 | 661.850 | 66 |

Source: Badan Pusat Statistik Provinsi Jawa Tengah (2024a)

A significant number of Mining Business Permits (IUP) have been granted in Tegal Regency. The predominant IUPs originate from backfill commodities in Pangkah District and andesite in Balapulang District (Kementerian Energi dan Sumber Daya Mineral, 2025). Despite the issuance of IUP and IUPK, and the PDRB study indicating it as a leading sector, local revenue (PAD) from the mineral mining sector has not experienced considerable growth. Restrictions on real investment in the mining sector are a contributing factor to this issue (Gobel & Rikumahu, 2016).

The prevalence of natural resources, particularly non-metallic varieties such sandstone, andesite, clay, tuff, diorite, and limestone in Tegal Regency, has prompted certain citizens and investors to partake in mining activities without assessing the area's eligibility for an IUP (Mining Business Permit). Consequently, the district government must implement oversight. For instance, the development of the Map for Identifying Non-Metallic Mineral and Rock Permitting Zones (Hidayat, 2016) and the enforcement of penalties in line with Tegal Regency Regional Regulation Number 5 of 2013 about the Management of Non-Metallic Mineral and Rock Mining. Mining activities, particularly in Pangkah District, result in significant environmental degradation characterized by severe erosion, alterations to the terrain, and a deterioration in water quality (Putra, 2018). Furthermore, the depletion of groundwater for everyday need is also identified as a consequence of mining activities.

From a regional development perspective, the existence of this sector can serve as one of the growth engines in areas with mineral resource potential. Mining and quarrying activities can increase the income of miners, mining sector workers, as well as the communities around the mining sites (Karunia & Yasmin, 2022). For example, this industry can augment revenue through the creation of new employment opportunities, including stone crushers, miners, and truck repair services, particularly in Pener Village, Pangkah District (Putra, 2018). Consequently, the essential strategy for mitigating the environmental impact of the mining region is the rehabilitation of former mining slopes, through technological, vegetative, and instructional methods, to mitigate erosion and landslide susceptibility, which may also yield indirect economic benefits. This business sector is currently underdeveloped in Central Java Province, particularly in Tegal Regency, which is anticipated to enhance this sector while also taking into account other business areas and the surrounding environment (Karunia & Faidah, 2017; Rini & Khoirudin, 2020).

The Tegal Regency Government has already accommodated this sector through Tegal Regency Regional Regulation Number 2 of 2023 concerning the Tegal Regency Regional Spatial Plan for the Years 2023-2043. The Mining and Energy area is included in the cultivation area, specifically the mineral mining area, which is a rock mining area with an area of ±663 ha. This area is located in 5 (five) sub-districts, namely: Balapulang Sub-district, Kedungbanteng Sub-district, Lebaksiu Sub-district, Margasari Sub-district, and Pangkah Sub-district.. Furthermore, this regulation includes specific provisions that govern the utilization of mineral and coal mining. Article 200 of the Regional Spatial Planning Regulation (RTRW) of Tegal Regency regulates various permitted, conditionally permitted, and prohibited land use activities. This indicates that the sector is a special priority for the Tegal Regency Government.

Accommodation and Food Services dropped from Quadrant I to Quadrant III based on Klassen Typology due to heavy restrictions on tourism and hospitality during the pandemic. Even so, the results of SLQ and DLQ indicate that this sector is a base and prospective sector after Covid-19, while the results of the SS analysis show that the sector is growing rapidly but not competitive. The accommodation provided refers to short-term lodging for visitors (travelers) and the provision of food and beverages that are ready for immediate consumption. The number and type of additional services offered in this category vary greatly. Excluding the provision of long-term accommodation such as primary residences, the preparation of food or beverages not for immediate consumption, or those that involve wholesale and retail trade activities. Therefore, this sector also depends on the development of tourism in Tegal Regency (Dewanti & Yusuf, 2023). The development of this accommodation is also part of the permitted land use activities, provided they are within the tourism area in accordance with the Tegal Regency Spatial Plan.

Community-based tourism development needs to be implemented in tourism in Tegal Regency. This is done with the hope of benefits and impact for the local community. For example, in Cempaka Tourism Village, tourism development is carried out by village managers and local communities with 4 (four) components of tourism development, namely community participation, community empowerment, benefits received by the community, and environmental conservation. This activity has an impact on the local community's economic improvement, including job creation and business opportunities, increased community income, and improved infrastructure development around the village (Mahanani & Listyorini, 2021). Table 5 shows the number of accommodations in the former Pekalongan Residency area. In the table, it can be seen that Tegal Regency has the highest number compared to the other 6 regencies/cities. This growth in accommodations not only caters to the rising tourism but also fosters greater cultural exchange and understanding among residents and visitors. As a result, local businesses are likely to thrive, further enhancing the overall quality of life in the region.

Table 5. Hotels and Other Accommodations in the Former Pekalongan Residency Area in 2023

| Regency/ City | Hotel Star | | | | | Other accomodation | Total |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | | |
| Tegal Regency | 2 | 1 | 2 | 0 | 1 | 41 | 47 |
| Pekalongan City | 1 | 1 | 7 | 1 | 0 | 26 | 36 |
| Tegal City | 2 | 6 | 7 | 0 | 0 | 20 | 35 |
| Pemalang Regency | 1 | 1 | 1 | 0 | 0 | 25 | 28 |
| Brebes Regency | 3 | 1 | 3 | 0 | 0 | 12 | 19 |
| Pekalongan Regency | 0 | 1 | 1 | 0 | 0 | 11 | 13 |
| Batang Regency | 1 | 0 | 1 | 0 | 0 | 11 | 13 |

Source: Badan Pusat Statistik Provinsi Jawa Tengah (2024a)

Given its geographical characteristics, Tegal Regency possesses distinctive tourist potential for both natural and retail experiences. Natural tourism ranges from mountainous elevations to coastal shores, with the topography ascending toward the south. The typical visitors to tourism attractions in Tegal originate from adjacent districts, including Brebes, Pemalang, and Pekalongan. Residents of Tegal City seeking to visit the elevated regions of Tegal Regency provide a potential market for this sector. This also generates the possibility for the establishment of temporary housing. This state is especially observable in the highlands, where several villas are commencing construction for diverse types and purposes. Tegal Regency holds the distinction of having the highest total number of hotels and accommodations at the residency level.

The culinary scene in Tegal Regency is notably popular in terms of food and beverage offering. The potential for cafes is flourishing, each exhibiting its distinct character. Urban residents seeking a café with a rice field, natural surroundings, or a mountainous theme readily venture to elevated regions. Residents of the district seeking urban amenities may visit Tegal

City. This pertains to physical condition, possibly to lodging arrangements, and to gastronomic experiences. Restaurants and food vendors are also encompassed within this predominant sector. In 2023, Tegal Regency had 71 restaurants or food stalls (Badan Pusat Statistik Provinsi Jawa Tengah, 2024a). In the former Pekalongan Residency region, this figure ranks second highest behind Pekalongan City. Certain establishments provide regional delicacies, such Tegal soto, young goat satay, nasi ponggol, and nasi lengko (Akhmad & Sarjanti, 2024). This customary dish from Tegal Regency is intended for rapid consumption. This enhances employment prospects in the culinary sector. This culinary introduction may also be conducted with cultural festivals hosted by local governments or other entities (Irawan et al., 2023).

This housing service activity can enhance local government revenue through tax income. In 2023, the tax money generated from restaurant taxes totaled Rp9,035,313,026.00. This tax ranks as the fourth greatest source of tax revenue, following the Street Lighting Tax, Land and Building Acquisition Tax (BPHTB), and Land and Building Tax (P-2). The hotel tax follows the restaurant tax and advertising tax, generating revenue of Rp2,943,553,568.00 (Badan Pusat Statistik Kabupaten Tegal, 2024a).

The information and communication industry in the digital era enables the dissemination of data and services that underpin diverse economic and social activities, such as trade, public services, and technical innovation (A. Anwar et al., 2020; Chatterjee & Chakraborty, 2020). This industry is classified among the flagship sectors in Tegal Regency, and according to SS research, it shifted from a developing status to a quickly increasing one following the commencement of Covid-19. The telecommunication infrastructure established in Tegal Regency enhances connectivity for local communities and enterprises, expedites information dissemination, and fosters technology-driven economic prospects.

The primary objectives of the Tegal Regency Spatial Plan (RTRW) concerning telecommunication networks include: formulating technical policies for public information and communication; developing and maintaining fixed and mobile cellular networks; organizing, regulating, supervising, and controlling shared telecommunication towers; and enhancing access to internet network services. Tegal Regency is creating a smart city concept as an implementation of information and communication technology. Through Tegal Regent Regulation Number 20 of 2024 regarding the 2024-2033 Smart City Masterplan, this concept serves as a strategy to enhance the quality of life for the community through the application of information technology and innovation. This project seeks to enhance efficiency and expedite public services, especially in the administration of permits and papers. The incorporation of technology enhances service efficacy, expedites processes, and aligns them more closely with community requirements. This masterplan functions as a strategic framework for development over the next decade, aligning with the regional vision and referencing the Regional Medium-Term Development Plan (RPJMD) and the development performance of Tegal Regency for the period 2019-2024, while also adhering to the international standards SNI ISO 37122:2019 concerning sustainable cities and communities – indicators for smart cities. This master plan aims to expedite the transition of Tegal Regency into a smart, sustainable, and competitive city to enhance community welfare.

The rapid advancement of digitization and internet utilization has resulted in heightened demand for communication services (Eldo & Inzana, 2022; Susilawati & Amalia, 2023).Tegal Regency comprises 60 websites from various departments and 42 village-level websites, in addition to 89 management information system apps (Badan Pusat Statistik Kabupaten Tegal, 2024a). The provision of these amenities is expected to enhance communication and information distribution in Tegal Regency, hence facilitating services and addressing citizens' expectations to the government (Banazi & Ummah, 2024).

According to the RTRW, nearly the entire region of Tegal Regency is encompassed within the telecommunications network development initiative. This network system comprises both fixed and mobile networks. Fixed networks comprise telephone wires and fiber optic systems, whilst mobile cellular networks consist of Base Transceiver Stations (BTS) operated through a communal telecommunications tower infrastructure. Certain regions devoid of network connectivity include forested areas across various sub-districts, specifically: Permanent Production Forest (HP) zones in Kedungbanteng, Jatinegara, Margasari, Balapulang, and Pagerbarang; Limited Production Forest (HPT) zones in Kedungbanteng, Jatinegara, Bojong, and Bumijawa; and Protected Forest (HL) zones in Bojong and Bumijawa.

Table 6. Villages/Sub-districts and Mobile Phone Internet Signal Reception in the Former Pekalongan Residency Area in 2023

| Regency/ City | 4G/LTE | 3G/H/H+/EVDO | 2,5G/E/GPRS | Do not have |
|---|---|---|---|---|
| Batang Regency | 225 | 17 | 6 | 0 |
| Pekalongan Regency | 262 | 21 | 2 | 0 |
| Pemalang Regency | 199 | 18 | 4 | 1 |
| Tegal Regency | 266 | 20 | 1 | 0 |
| Brebes Regency | 282 | 10 | 4 | 1 |
| Pekalongan City | 26 | 1 | 0 | 0 |
| Tegal City | 27 | 0 | 0 | 0 |

Source: Badan Pusat Statistik Provinsi Jawa Tengah (2024a)

From Table 6, it can be seen that every village/urban village in Tegal Regency has also received internet signals, although there is 1 (one) village that still receives 2.5G/E/GPRS signals. This access is considered better compared to the former Pekalongan Residency regencies, where there are still more than 2 (two) villages/urban villages that receive 2.5G/E/GPRS signals or have not even received internet signals.

Communication access in Tegal Regency is also considered good in terms of communication services provided thru post offices. A number of post offices are already distributed in every sub-district in Tegal Regency (Badan Pusat Statistik Kabupaten Tegal, 2024a). Unlike Pekalongan Regency, which has 19 sub-districts but only 13 post offices, Tegal Regency excels in the volume of communication thru post offices compared to surrounding areas. There is 1 (one) audit office and 18 branch offices, making a total of 19 post offices in Tegal Regency. This number is the highest in the former Pekalongan Residency, considering that Tegal Regency has 18 sub-districts. All of these post offices are also online offices.

In other words, the information and communication business sector in Tegal Regency has the potential to excel in the future, considering the inclusion of information and communication planning in the RTRW, the development of smart cities, and the good communication access for correspondence and internet signal reception conditions. The existence of planning and improvements in information and communication technology infrastructure is expected to support regional development and digital-based service innovation in Tegal Regency as well.

The education sector has become a leading industry despite facing challenges during and after the pandemic. After 2020, this sector in Tegal Regency showed slow growth but still maintained its competitive edge. Moreover, the population surge has led to an increased demand for various goods and services, resulting in land development, one of which is for education. (Mahendradhata et al., 2024). The education services sector plays a vital role in producing skilled workers and boosting community literacy rates. This is evident from the Literacy Development Index of Tegal Regency, which has a value of 70.65, making it the second highest ranking among regencies in Central Java after Kebumen Regency with a value of 71.80 (Badan Pusat Statistik Provinsi Jawa Tengah, 2024a). When combined with cities, Tegal Regency ranked sixth, with the order starting from highest to lowest: Salatiga City, Magelang City, Surakarta City, Pekalongan City, Kebumen Regency, and Tegal Regency.

Tegal Regency has various educational institutions, ranging from primary to higher education, under both the Ministry of Education, Culture, Research, and Technology and the Ministry of Religious Affairs. The hope is that the large number of these institutions will be able to provide a skilled workforce to support regional development. Furthermore, quality education is also a key pillar in achieving sustainable social and economic transformation.

In 2025, the Tegal Regency Education and Culture Office focuses on digitalization and equal access to education from early childhood (PAUD) to junior high school (Sekretariat Daerah Kabupaten Tegal, 2025). Its flagship programs include digitalizing administration and schools, teacher appreciation, scholarships for outstanding students from low-income families (Rp9 billion for over 17,000 students), and the "Yuh Sekolah Maning" program to reduce dropouts. The office has also adjusted to new policies such as the deep learning curriculum and a new student admission system. With a budget allocation of Rp86.7 billion (General Allocation Fund or DAU), Rp2.02 billion (physical Special Allocation Fund or DAK), and Rp456.1 billion (non-physical DAK), priorities are directed toward repairing school infrastructure, providing books and teaching aids, building integrated schools in remote areas, and expanding internet access through cooperation with providers.

According to Article 46 of the Tegal Regency Spatial Plan, Tegal Regency is developing a Strategic Area for the Regency, which is a strategic area from the perspective of economic growth. One of the strategic areas being developed is the Slawi – Adiwerna Urban Area, which includes several sub-districts: Slawi, Adiwerna, Pangkah, Talang, and Dukuhturi. The development direction for this area is as a center for government, offices, education, housing, healthcare, and social services, supported by sustainable trade and service activities.

The establishment of a smart city in Tegal Regency employs six foundational ideas, one of which is Smart Society. Smart Society comprises a variety of initiatives designed to enhance community engagement across diverse facets of life, educational frameworks, and public safety. Consequently, the prospects for regional growth in Tegal Regency lie in technology-driven education and workforce training aimed at enhancing human resource quality, fortifying partnerships between educational institutions and industry, and broadening access to learning opportunities.

## 4. CONCLUSION

The presence of Covid-19 provides an indication of several changes in the economic structure of a region. LQ and SS analysis provides an overview of which business sectors were able to survive during the Covid-19 pandemic. Based on the research findings and discussion, there are 4 (four) business fields in Tegal Regency that can be considered as leading or priority sectors for developing their potential, namely: Mining and Quarrying; Accommodation and Food and Beverage Services; Information and Communication; and Education Serviceseda. This business sector is also linked to regional development in Tegal Regency. The findings indicate that sectoral shifts after Covid-19 highlight the growing importance of education and digital-based industries, which are closely tied to human capital development and regional competitiveness. Conversely, the decline of accommodation and food services reflects structural vulnerabilities in tourism-related activities, requiring targeted resilience strategies. The mining sector remains important but needs sustainable management to ensure long-term benefits without compromising the environment. These sectors are not only contributors to GRDP but also have wider implications for employment opportunities, investment flows, and social welfare in the regency.

The recommendations provided by the author based on the results and discussion for relevant parties are to increase the GRDP of Tegal Regency. The local government should pay more attention to the growth of leading business sectors, but without neglecting the development of other business sectors. The local government should adopt sector-specific strategies, such as incentivizing digital innovation and infrastructure in the information and communication sector, expanding education services sector, and providing recovery packages and marketing support for tourism and hospitality. In addition, sustainable mining regulations and environmental safeguards must be enforced to balance income generation with ecological preservation. Potential business fields need to be further developed to become more optimal and capable of becoming a leading business field in Tegal Regency. The results of this identification can be considered when formulating economic development policies for the district level in the next fiscal year. For example, increasing the budget allocation for improving business performance by local governments to boost production and support private investment.

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