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The Impact Of The Trans Java Toll Road On Industry Micro Small Food And Beverage Sector

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Abstrak**:** *This study aims to evaluate the impact of the Trans Java Toll Road on the growth of small and micro enterprises (SMEs) in the food and beverage sector using the fixed-effect difference-in-difference method. The data used are sourced from the Village Potential Statistics (PODES) for the years 2008–2020, covering 70 districts/cities that are either traversed or not traversed by the Trans Java Toll Road. The findings reveal that, during the initial phase of operation, the toll road had a negative and statistically significant impact on the number of SMEs in the food and beverage sector. However, after operating for two periods, or approximately six years, the impact shifted to being positive and significant. This indicates that while the infrastructure initially posed challenges or disruptions to small-scale industries, in the long term, the Trans Java Toll Road serves as a stimulus for better growth in the sector. These findings are important for policymakers, as they highlight the need to not only focus on the long-term benefits of infrastructure development but also to design mitigation strategies to address potential short-term negative impacts, especially on small and micro businesses that are more vulnerable to economic shifts caused by large-scale infrastructure projects.*

Keywords*: Event Study, Fixed Effect Difference In Difference, Small-Micro Industries, Trans Java Toll Road.*

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INTRODUCTION

Infrastructure development, especially toll roads connecting regions, has a significant impact on economic growth in general. Good infrastructure allows smoother mobility of goods and people, improves connectivity between regions, and encourages investment in various economic sectors. Infrastructure development can have a positive causal effect on economic growth.Asher (1989) statethat increased investment in public infrastructure can generate significant economic growth.

Road infrastructure development has a positive impact on local economic growth and expands market potential due to reduced transportation costs (Zhang et al., 2020). In addition, road construction has an impact on productivity levels. This will have an impact on reducing production costs (Muljono et al, 2010)

One of the positive aspects expected from the construction of toll roads is improved access to markets and resources. Better access will open up opportunities for business expansion, create jobs and potentially increase competitiveness in Micro and Small Industries. By reducing production costs, income will increase and the sustainability of micro and small industries can be maintained.

The development of community economic business activities increases the demand for roads, and the expansion of the road network can support increased economic activity. The role of road infrastructure in Indonesia has a vital role in national transportation, serving 92% of passenger transportation and 90% of freight transportation. The high economic activity results in an increase in traffic volume on arterial/non-toll roads. This increase can cause congestion that hinders the smooth distribution of goods and services. The limited capacity of non-toll roads to accommodate the increase in traffic volume requires the construction of toll roads.

The construction of toll roads in Indonesia has begun since 40 years ago, by building the Jagorawi toll road (Jakarta-Bogor-Ciawi) with a length of 59 km. In its development, the government has built several toll roads to improve connectivity between regions and is expected to provide an economic impact on the community around the toll road.

One of the important toll roads built by the government is the Trans Java Toll Road. The Trans Java Toll Road is the longest toll road network that stretches from Merak Port, Cilegon in the West, to Ketapang Port, Banyuwangi in the East. The Trans Java Toll Road currently consists of 20 toll road sections with a length of around 1,056.38 km (BPJT, 2022). The operation of the Trans Java Toll Road has an impact on increasing traffic flow, especially during long holidays. Based on data from PT. Jasa Marga 2023, the volume of vehicles exiting the Cikampek toll gate (GT) increased by 30.58% compared to normal days. In the Central Java region, vehicles exiting from the direction of Semarang city via the Kalikangkung GT increased by 188%, and in the East Java region the volume of vehicles heading to Surabaya City via the Warugunung GT increased by 69%. The Trans Java toll road was built to improve connectivity and mobility in economic centers. With increased connectivity and traffic flow, toll roads will open up opportunities for increased economic activity in the areas they pass through.Local economic venturessuch as retail businesses,food,industrysmall, and tourismshould be able to develop.

Several studies on the existence of toll roads have been conducted. The operation of the Trans Java toll road and the Trans Sumatra toll road has resulted in an increasing trend in the number of minimarkets in villages passed by the toll road (Putra, 2019; Kusumaatmaja, 2022). However, in some areas the existence of toll roads has had a negative impact. The existence of the Trans Java toll road has had a negative impact on the decline in batik businesses and a decrease in hotel room rentals (Siswanto et al, 2019), while the Medan-Tebing Tinggi toll road has resulted in a decrease in MSME income at Pasar Bengkel (Samosir, 2019).

Based on the micro, small and medium business sector, there are three dominant sectors, namely trade, accommodation and food

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businesses, and processing industries. From these data, the construction of toll road infrastructure certainly affects the growth of these three sectors. In fact, almost 61% of micro and small industries (IMK) are in the Java Island region. So that the existence of the Trans Java Toll Road is an important infrastructure that can affect the growth of these micro and small industries.

The existence of the Trans Java Toll Road as an important infrastructure and can improve connectivity on Java Island, as well as the differences in research results on the impact of toll road operations on local economic growth, encourage the author to find out more about the influence of the Trans Java toll road on local economic growth, especially on Micro and Small Industries (IMK).

According to Law No. 38 of 2004, toll roads are public roads that are part of the road network system and as national roads whose users are required to pay tolls. The construction of toll roads aims to facilitate traffic in developed areas, improve distribution of goods and services to support economic growth, increase the distribution of development results and justice. Toll roads are included in primary arterial roads that connect national activity centers or national activity centers with regional activity centers.

The construction of toll roads in Indonesia has begun since 1978 with the operation of the Jagorawi Toll Road, and has now developed not only in Java, but has been built in Sumatra, Kalimantan, Sulawesi, and Bali. Until the end of 2022, the length of toll roads has reached around 2,599 km and around 65% is on Java. To manage and regulate toll roads in Indonesia, the Toll Road Management Agency (BPJT) was formed.

The Trans Java Toll Road is one of the national strategic projects and is the longest toll road covering 20 road sections with a length of approximately 1,056.38 km (BPJT, 2022). This toll road stretches from Serang Regency in the west of Java Island, and Probolinggo Regency in the east of Java Island. The construction and operation of the Trans Java toll road is carried out in stages, which finally in 2019 20 Trans Java toll road sections were connected which can improve connectivity and accelerate the flow of goods and residents between regions on Java Island.

Picture1Map of Trans Java Toll Roads That Are Already Operating
Source: BPJT, reprocessed 2023

One of the government's investments is the construction of toll road infrastructure that will increase mobility and can reduce transportation costs. The decrease in transportation costs has an impact on the price of goods and economies of scale and provides opportunities for industry to increase production so that it can increase income (Hayakawa and Tusbota, 2022). In addition, sstudyCalderon and Serven (2004)stated that the development of transportation infrastructure plays an important role in increasing productivity and reducing logistics costs, which can encourage the development of the sector.micro small business specificallyindustrial businesssmall micro tri.

Government investment through toll road construction is also expected to provide benefits to the local economy. Smooth distribution of goods can reduce transportation costs and affect the production sector (Glowin, 2000; Rodrigue, 2013 in Anas, 2017). Conversely, increasing transportation costs will cause an increase in production costs and result in an increase in the price of goods. This is evident in the Cipularang Toll Road which can reduce transportation costs in the processing industry around Bandung Regency by 1.1% of the total production costs (Anas et al., 2017).

In addition to influencing the economic aspect, the construction of toll roads influences the improvement of quality of life and welfare, as measured by the increase in consumption value, increase in labor productivity, and the labor market. At the construction stage, toll roads open up business opportunities and

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employment absorption and create a multiplier effect on the local economy around the toll road and adjacent areas. A positive effect occurs when the toll road has a positive impact on increasing income in other areas, and a negative effect when it causes a decrease in labor (Shatz et al., 2011).

Positive and negative effects or even no effect on the economy were also expressed by Fernald (1999). Investment in toll roads at a certain time produces zero or normal rate of return, meaning it does not have a major effect on productivity. In the industrial sector, the construction of toll roads outside metropolitan areas reduces income by around 1-3%. This will result in industrial relocation rather than the creation of new economic activities. In the retail sector, sales declines also occur in rural areas and small towns (Otto, 1993; Andersen et al., 1993). The decline occurred in the short term, but was not statistically significant or in the long term. The affected sectors were travel-oriented such as gas stations, restaurants, and hotels, as expressed by Srinivasan and Kockleman (2000). The negative impact in the form of decreased income also occurred on the Tebing Tinggi-Medan toll road and the Trans Java toll road section around Pekalongan Regency. On the Tebing Tinggi-Medan toll road, the decline in income was almost 50% (Manulang and Samosir, 2019), and in the Pekalongan area, the batik business experienced a decline of around 31.82% (Siswanto, 2019). On the Trans Java Brebes toll road, there was an increase in the number of salted egg businesses by 105%, but there was also a decrease in income between 20-50% in the West-South, West-North, and North East areas of the East Brebes toll gate (Utami et al., 2018). Meanwhile, in the research of Putra (2020) and Kusumaatmaja (2023), it was revealed that the operation of toll roads increased the addition of minimarkets by 0.53 times more in villages passed by the Trans Java toll road, and 0.30 times more in villages passed by the Trans Sumatra toll road.

According to Law No. 20 of 2008 concerning Micro, Small and Medium Enterprises (MSMEs), they are productive businesses owned by individuals and/or independent business entities that are not branches of other companies or businesses. The classification of micro, small and medium enterprises is based on assets and annual sales (turnover). Micro businesses have assets of less than IDR 50 million and a maximum turnover of IDR 300 million. While small businesses have assets of IDR 50 million - IDR 500 million. Meanwhile, according to BPS, industrial businesses are production activity units that process raw materials into finished or semi-finished goods. The type of industrial business is based on production activities associated with the products sold. The classification of micro, small and medium businesses is based on the use of labor. Micro businesses use less than 5 workers, while small businesses use between 5-19 workers.

In general, the largest contribution of MSME activities comes from trade, industry and service businesses. So that the Micro and Small Industries (IMK) related to MSMEs are only in the industrial sector and in micro and small businesses. Micro and small businesses aim to grow and develop businesses in order to build the national economy, create jobs, equalize income and eradicate poverty. Micro and small industries (IMK) experienced an average increase from 2015-2019 of 4.8% per year and the average growth rate of the IMK workforce was 2.91%.

The development of MSMEs is influenced by external and internal factors. External factors include the existence of road infrastructure and the existence of small industrial centers. The existence of industrial centers has a significant impact, especially on the food, craft and transportation industries (Maharani, 2020), especially in labor-intensive industries. Internal factors that influence the growth of micro and small businesses are capital and labor. Increasing manpower means increasing production and increasing GDP. Another factor is a decrease in production costs due to a decrease in transportation costs. This is obtained from the smooth delivery of goods, ease, and speed of access. Toll roads are one of

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the infrastructures that can reduce transportation costs

METHOD

One method used to evaluate the impact of a program or policy is to use the Difference in Difference (DiD) method. This method requires at least two time periods before and after the implementation of the policy, as well as two treatment groups and a control group. This study uses panel data consisting of cross-section data in the form of 70 districts/cities in Java that are passed and not passed by the Trans Java Toll Road, and time-series data for the years 2008, 2014, 2018 and 2020. The observation period was chosen considering the availability of PODES data, and is expected to capture variations in impacts caused after the toll road has been operating for several years. To facilitate data processing, 2008 was changed to period 1, 2014 to period 2, 2018 to period 3, and 2020 to period 4.

Regencies/cities that are passed by toll roads are grouped into treatment groups and those that are not passed by toll roads are grouped into control groups. The criteria for the control group are regencies/cities that are not passed by toll roads, but directly border the treatment group, and there is only one regencies/cities that are the control, even though they border two or three treatment groups.

The object of the study is the Micro and Small Industries (IMK) in the treatment and control groups. The basic method of this study uses fixed effect difference-in-difference. Considering that the operation of the Trans Java toll road is only in several districts/cities and is carried out in stages or based on a certain time period, this study also uses the multi-period difference-in-difference or staggered DiD method or event study as in the research of Wing et al., (2018), Goodman-Bacon (2018), Callaway and Santana (2020), Zhang et al., (2020), Karimah and Yudhistira (2020), Maharani (2020), and Arumadani (2020).

The basic model of this research is:

$$Yip = \beta_0 + \beta 1 Operation\ ip + \beta_2 X\ ip + \delta i + \delta T_p + \varepsilon_{ip} \quad (1)$$

Where Yip is the outcome or number of IMK in district i in period p; β0 is a constant value; β1 is the treatment coefficient value; Operasiip is a dummy variable for toll road operations or treatment (value 1 if the toll road has been operating in district/city i in period p, and value 0 for groups that have not been passed by the toll road in period p); β2 is the interaction coefficient between treatment and period; p is period p, p=1 in 2008, p=2 in 2014, p=3 in 2018, and p=4 in 2020; δi is the individual fixed effect; δTpis the fixed effect period; and εipis the error term; X is a time variant control variable. The control variables used are the number of workers, labor force participation rate (TPAK), GRDP, industry share in GRDP, retail hotel and restaurant share, APBD expenditure, percentage of good roads, and distance of district/city to the provincial capital. As for jTypes of IMK industries include: 1) leather industry;2) wood industry;3) industrymetal; 4) weaving/bamboo industry; 5) pottery/ceramic industry; 6) textile industry; 7) industryfood and drink; and,8) other industries (pharmaceutical,electricityk,paper,plastick,tobacco,etc.).

To determine the impact of toll roads in a certain period on the number of IMK in the treatment and control groups, the interaction between toll road operations (Dtol) and the time period is used by changing equation (1) to:

$$Yip = \beta_0 + \beta 1 Operationip + \varphi\ (Operationip\ xp) + \beta_2 Xip + \delta i + \delta T_p + \varepsilon_{ip} \quad (2)$$

where φ is the interaction coefficient between toll road operation and time period.

The use of the DiD method requires an assumption that must be met, namely the existence of a parallel trend, or the similarity of outcome trends before the operation of the toll road between the treatment group and the control group. The parallel trend test uses the event study method to analyze the dynamic effects of toll road operations by adapting the research of Autor (2003), Lie et al (2016), Karimah and Yudhistira (2020), Callaway and Santana (2020), Zhang et al (2020), Maharani (2020). The equation model used is as follows:

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$$Y_{it}=\beta+\sum_{p=0}^{-3}\beta_1 Operation_{ip}+\sum_{p=1}^{3}\beta_2 Operation_{ip}+\beta_3 X_{ip}+\delta i+\delta T_p+\varepsilon_{ip} \quad (3)$$

p-value = 0sd-3 represents efek difference period before (lead) and p value = 1sd-3 represents difference period after impact measurement(lag). The main concern in the equation (23) above is the change in coefficientβ_1Andβ_2. Null hypothesis for coefficientsβ_1; H0 = 0 is rejected, which means there is a general tendency or similarity in the number of trends.UMKM Industri IMKin the districttreatmenttreatmentand control districts in the period before the Trans Java toll road construction policy.

The second assumption that must be met is the Stable Unit Treatment Values Assumption (SUTVA), which is there is no relevant relationship between populations (Lenchner, 2011). The results obtained by one treatment group do not affect or are affected by other groups that receive treatment. The number of IMK in each region is not related to each other. The implication of the SUTVA assumption is that there are no spillovers. So only the Trans Java toll road can affect the number of IMK.

This study uses Village Potential (PODES) data from BPS, data from the Ministry of Cooperatives and SMEs, from the Ministry of Finance, and from the Toll Road Management Agency (BPJT). BPS PODES data is used to obtain information on the number of IMK, data from the Ministry of Finance to obtain data on district/city APBD expenditures, and from BPJT to obtain the location of toll road sections that have been operating since 2008 to 2020. Other BPS data used are Micro and Small Industry Profile data, district/city GRDP data.

Table1. Research Variables

Variables	Definition
IMK (lnimk)	Number of Micro and Small Industries (units)
Operation (Operation)	Dummy of toll road operation. Operating=1; not yet operating =0
Workforce (labor)	Number of workforce (people)
TPAK (tpak)	Labor force participation rate (%)
GRDP (lnpdrb)	GRDP Value (Billion Rp)
Share Industry (sharein)	Contribution value of the industrial sector to GRDP (%)
Share Retail (shareret)	Contribution value of the retail, hotel, restaurant and transportation sectors to GRDP (%)
Regional Budget (lnapbd)	Amount of APBD expenditure (Billion Rp)
Good road (good road)	Percentage of good roads (%)
Provincial distance (provincialdistance)	Distance from district/city to provincial capital (km)

The DKI Jakarta area was not included in the study, because of its status as the nation's capital, its relatively large influence on the surrounding areas, and its characteristics are not comparable when compared to the districts/cities along the Trans Java Toll Road

Table 2. Number of Treatment and Control Groups

Group	Period 1	Period 2	Period 3	Period 4
Treatment	16	21	33	37
Control	54	49	37	33
Amount	70	70	70	70

Source: Processing Results, 2023

RESULTS AND DISCUSSION

Descriptive Statistics

Until early 2023, the Trans Java Toll Road has been operating for 1056.38 km, from Merak Port, Cilegon City in the West, to Probolinggo Regency in the East of Java Island. It is planned that the Trans Java Toll Road will be connected to Ketapang Port, Banyuwangi Regency. By connecting the Trans Java toll road from the west to the east of Java Island, it is hoped that it can improve access and accelerate the mobilization of goods and people, as well as minimize transportation costs.

The existence of IMK between districts/cities in this study has a fairly large range. The number of IMK in the control group is greater than the treatment group even though the number of districts/cities in the control group is smaller

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Table 3 Descriptive Statistics of Each Group

Variables	Group					
	Ccontrol(Non-toll district/city)			*Treatment*(Toll Road)		
	obs	mean	Std Dev	obs	mean	Std Dev
AmountIMK	132	12992.48	9,667.14	148	8051.45	5,989.57
Work Number	132	657338	442781.7	148	696801.3	380583.2
Tpak (%)	132	68.26	4.25	148	66.93	4.74
PDRB(billion Rp)	132	25045.86	26432.83	148	49403.92	65059.95
Share (%)	132	21.12	15.33	148	33.11	18.51
Shareret (%)	132	25.31	11.65	148	23.59	9.09
Regional Budget (billion Rp)	132	2080.12	1301.20	148	2374.28	1520.30
Good road (%)	132	55.58	19.94	148	59.56	19.97
Jarakprov(km)	132	101.86	59.63	148	74.09	48.48

Source: Processing Results, 2023

The development of IMK in general tends to decline until 2018 or the 3rd period. However, after the 3rd period, both groups experienced an increase. When analyzed in each group, in the treatment group there has been an increase in IMK since 2008 or the 1st period. This difference strengthens the assumption that the existence of toll roads can cause IMK growth. However, these results need to be tested on the model to show whether toll roads have a significant effect on IMK.

Table 4 Statistics Description of IMK Development Per Period

Variables	Kel	Year											
		2008			2014			2018			2020		
		N	Mean	S.Dev.	N	Mean	S.Dev.	N	Mean	S.Dev.	N	Mean	S.Dev.
IMK	Control	54	13639	9646.4	49	12229	9715.73	37	10566	7238.23	33	12941	9405.43
	Treatment	16	5470	4887.04	21	5642	5029.28	33	7327	4881.25	37	8218	5594.37

Source: Processing Results, 2023

Impact of Toll Roads on the Number of IMK

The results of processing equation (1) show that the Trans Java Toll Road has a negative and insignificant effect on the number of IMK in the treatment group. By including several control variables, the operation of the toll road remains negative and insignificant. The estimated impact value may be too high (upward bias) because there is a control group that also benefits from the operation of the toll road.

Table 5 Estimation Results of the Impact of the Trans Java Toll Road on IMK

Variables	Dependent Variable lnimk			
	(1) lnimk	(2) lnimk	(3) lnimk	(4) lnimk
Operation (1 has been operating, 0 otherwise)	-0.0613 (0.0763)	-0.0823 (0.0803)	-0.0338 (0.0767)	-0.0208 (0.0794)
Ln work number		yes	yes	yes
TPAK		yes	yes	yes
Ln PDRB			yes*	yes
Industry share			yes	yes
Share retail			yes**	yes**
Ln APBD				yes
Percentage of good roads				yes
N	280	280	280	280
adj. R2	-0.000	0.039	0.081	0.083

Standard Errorsinparentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$
Source: Processing results, 2023

By conducting the interaction of toll road operations with the year period, the impact of the Trans Java toll road in a certain period can be known. The results of the estimated impact of the Trans Java Toll road with the interaction of toll road operations and the year period still show negative and insignificant values (Table 6). In the treatment group, from 2018 (period 3) the interaction coefficient value (Operation x period) began to show positive values and increased. This increase is likely to occur because after 2018 all sections of the Trans Java Toll road have been connected from the West to the East.

Table 6Estimation Results of the Impact of the Trans Java Toll Road on IMK with Interaction

Variables	Dependent Variable: lnimk			
	(1)	(2)	(3)	(4)
1.Operation (1 has been operating, 0 otherwise)	-0.255 (0.179)	-0.291 (0.195)	-0.264 (0.188)	-0.261 (0.191)
1.Operation #2014	-0.0318 (0.137)	0.0141 (0.138)	-0.0193 (0.149)	-0.0303 (0.151)
1.Operation #2018	0.346 (0.178)	0.363 (0.195)	0.319 (0.193)	0.317 (0.197)
1.Operation #2020	0.315 (0.167)	0.332 (0.186)	0.290 (0.185)	0.289 (0.188)
work		yes	yes	yes
tpak		yes	yes	yes
Ln PDRB			yes	yes
Industry share			yes	yes
Share retail			yes*	yes*
Ln APBD				yes
good road				yes
N	280	280	280	280
adj. R2	0.127	0.150	0.157	0.156

Standard Errorsinparentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$
Source: Processing results, 2023

Impact of Toll Roads on the Growth Rate of IMK

The operation of toll roads has a negative impact on the growth rate of IMK. Based on Table 7 by replacing the dependent variable with the growth rate and entering several control variables in models (1) to (4), the growth rate still shows a negative and insignificant coefficient. This means that the decreasing growth rate causes the number of IMK to also decrease, in accordance with the estimate of the number of IMK.

Table 7 Estimation of the Impact of the Trans Java Toll Road on the Growth Rate of IMK

Variables	Variablesdependent:Growth Rate IMK			
	(1)	(2)	(3)	(4)
1.Operation (1 has operated, 0 otherwise)	-0.241 (0.177)	-0.160 (0.194)	-0.199 (0.230)	-0.228 (0.239)
N	210	210	210	210
adj. R2	0.004	-0.005	-0.014	-0.020

Standard errors in parentheses
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$
Source: Processing Results, 2023

Dynamic Effects of Trans Java Toll Road Operation

The Trans Java Toll Road has been fully connected since around 2019. Its operation is carried out in stages and over a certain period of time. To determine the impact of gradual operation and long-term impact, the event study method and anticipatory effect or dynamic

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effect graphs are used. This method can also be used to verify the existence of a parallel trend before the toll road operates. Changes in coefficients and significance are indicators in parallel trend testing.

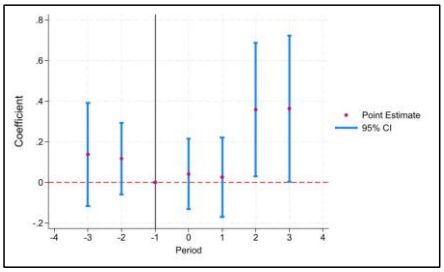

Figure 3*Dynamic Effect of Toll Road Impact on IMK*
Source: Processing Results, 2023

As seen in Figure 3, the operation of the Trans Java Toll Road has a positive and significant impact after operating for 2 periods or at least after 6 years. The coefficient value after 2 periods of operation shows a positive increase to 0.358, even in the next period it still shows a positive and significant value. While the coefficient values in lead3, and lead2 (the period before the toll road operated) are close to zero and statistically insignificant. In addition, the p-value shows that the H0 hypothesis is rejected. This proves that the parallel trend assumption is met.

	Dependent Variable: lnIMK
lead3	0.137
	(0.127)
lead2	0.117
	(0.0887)
lag0	0.0406
	(0.0866)
lag1	0.0253
	(0.0988)
lag2	0.358*
	(0.164)
lag3	0.363*
	(0.180)
_cons	10.10*
	(4.165)

*Standard Errors*in parentheses
*p<0.05, **p<0.001, ***p<0.001
Source: Processing Results, 2023

Analysis of the Distance of Regency/City to the Provincial Capital

Differences in geographical distance can affect access to raw materials and marketing of IMK products to regional activity centers. As provincial capitals, Serang, Bandung, Semarang, and Surabaya have an influence on the surrounding areas, and even play an important role in economic development on a provincial and national scale. The distance between the district/city and the province is used as a variable that reflects the impact of differences in location on activity centers. By adding the interaction variable between Dtol and District/City Distance, equation (1) becomes:

$$Yip = \beta_0 + \beta 1 Operation_{ip} + \beta_1 (Operation_{ip} \times Jarakprovi) + \beta_k X_{ip} + \delta i + \delta t_p + \varepsilon_{ip} \quad (4)$$

The distance of the district/city is measured based on the province where the district is located. The coefficient value that is of concern is β_1 namely the estimated coefficient of the impact of toll road operations along with changes in distance to the provincial capital.

The results of the coefficient value estimation β_1 shows a negative and significant value indicating that the further the treatment group is from the provincial capital, the smaller the number of IMK. This is in accordance with the research of Zhang et al., (2020) which states that the area passed by the highway, the further away from the city center, the smaller the influence on regional economic growth. The effect of the location of the Trans Java Toll Road on the provincial capital as the center of regional activities does not have a positive impact on the development of IMK in the district/city. This condition is in accordance with the SUTVA assumption, namely the absence of spillover.

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Analysis of the Impact of Toll Roads on Types of Micro and Small Industry Businesses

The existence of the Trans Java Toll Road has different impacts on several types of MSME businesses. The results of the estimated impact on the types of MSME businesses in Table 9 show that the Trans Java Toll Road has a positive and insignificant impact on the number of MSMEs in wood, pottery, and cloth/woven fabrics. Based on statistical data, regression estimates, and event studies, the three MSMEs have experienced growth since 2008, especially in the post-operational impact of the Trans Java Toll Road. The three MSMEs are likely to utilize the Trans Java Toll Road to speed up delivery so that shipping costs are cheaper, so that marketing costs are lower. Ease of delivery and marketing can accelerate product absorption by consumers. In the end, these MSMEs can survive and grow.

On the contrary, the operation of the Trans Java Toll Road has a negative impact on IMK leather, metal, woven and other industries. Even in the food and beverage industry, the Trans Java toll road has a negative and significant impact

Table 9 Estimation of the Impact of Toll Roads on Types of MSME Businesses

Variables	VariaDependent bell:Ln (TypeBusiness)IMK							
	lnInd1	lnInd2	lnInd3	lnInd4	lnInd5	lnInd6	lnInd7	lnInd8
Operation (1 has been operating, 0 otherwise)	-0.0668	0.142	-0.160	-0.343	0.0080 8	0.281	-0.160*	-0.170
	(0.178)	(0.074)	(0.231)	(0.192)	(0.191)	(0.300)	(0.076)	(0.161)
N	278	280	279	280	277	280	280	278
adj. R2	-0.004	0.137	0.032	0.152	0.327	0.209	0.243	0.209

Standard errors in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001.
Caption: Ind1:ileather industry; Ind2:wood industry; Ind3:metal industry; Ind4:weaving industry; Ind5:pottery industry; Ind6:intextile industry; Ind7:food and beverage industry; Ind8:other industries
Source: Author's Processing Results, 2024

In general, this negative impact causes a decrease in income. This impact is in line with the research of Andersen et.al (1993) and Srinivasan (2000) which showed a decrease in sales in the food and beverage business with the presence of highways. Reduced traffic flow on non-toll roads and the shift of road users via toll roads resulted in a decrease in income for the food and beverage industry. With a decrease in income, the food and beverage industry cannot survive or develop.

However, based on statistical data, the average growth of food IMK in the treatment group is greater than the control group. This indicates that the development of food and beverage IMK will be dominated by the treatment group. The results of the dynamic effect graph estimation in Figure 4 show that after the operation of the Trans Java toll road after 2 periods, on average the food and beverage IMK received a positive impact. This estimated value may be too high due to changes in other IMKs that also benefit from the toll road.

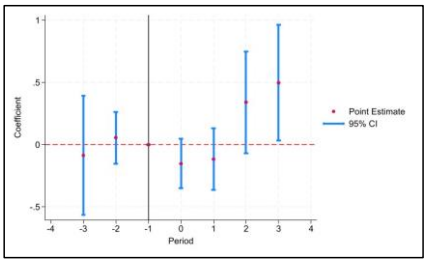

Figure 4*Dynamic Effect of Toll Road Impact on Food and Beverage IMK*
Source: Processing Results, 2023

The development of the average number of IMK can also be seen in the trend in each group or a combination of treatment and control groups. This is influenced by various external and internal factors. However, this study did not observe changes in these factors. To determine the existence of changes or shifts in certain types of businesses, qualitative research is needed, which can identify whether the IMK business comes from other IMK businesses. By setting the initial assumption of SUTVA and the absence of spillover, changes in IMK businesses do not affect or are affected by changes in other IMKs. The effect of changes on or from other IMKs is assumed to be relatively small or can be ignored. So that the operation of the Trans Java Toll Road is the only factor that affects the development of IMK businesses individually

CONCLUSIONS

The results of the regression estimation show that the operation of the Trans Java Toll

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Road has a negative and insignificant impact on the number and growth of IMK in the treatment group (passed by the toll road). The number of IMK in the treatment group is on average smaller than the control group (not passed by the toll road).

However, the difference in operating time of the toll road has a different impact on the number of IMK in a certain period. Using the event study method, the positive and significant impact of the Trans Java Toll Road occurred after operating for 2 periods or after 6 years. While in the previous period, the number of IMK tended to have no difference between the treatment group and the control group. This also meets the parallel trend assumption.

The operation of the Trans Java Toll Road also has different impacts on several types of MSME businesses. This is due to the characteristics of each type of business in responding to the toll road. Based on the results of statistical data calculations, regression estimates, and event studies, the operation of the Trans Java toll road has a positive impact on MSMEs in the wood industry, pottery industry, and fabric/woven industry. Ease of accessibility to obtain raw materials and product marketing is likely to be a factor that can reduce transportation costs so that overall production costs can be reduced and this business can grow. Meanwhile, MSMEs in the leather, metal, woven, and other industries have a negative impact, even MSMEs in food and beverages have a negative and significant impact.

As a follow-up to the results of this study, the government needs to prepare anticipatory policies to overcome the negative impacts on the growth of IMK. Coordination between governments and sectors needs to be carried out from the beginning of toll road construction. So that the policies of the central and regional governments and sectors in providing infrastructure in the regions can be more integrated.

In addition, to improve accessibility and connectivity between regions, the government needs to develop an integrated toll road network, provide and improve the quality of arterial roads connected to the toll road network and roads between districts/cities.

The government should encourage the development of labor-intensive small industries through capital assistance, mentoring and promotion of regional products. Tourism, culture and regional attractions are one way to attract people that can generate demand for regional products. The existence of toll roads provides convenience in expanding the market and developing MSMEs. Regional government expenditure through the APBD is directed to drive MSMEs in the regions. With the development of MSMEs, it is hoped that it can improve the regional economy.

Many factors influence the number and growth of MSMEs. This study uses several time periods and factors that may influence based on data availability, literature reviews, and existing research. Internal MSME factors such as the number of MSME workers, the amount of capital, assets, and sales turnover are not included in this study. In addition, this study does not take into account the distance of the toll gate to the district/city capital, the length of the toll road that passes through, the flow of toll road traffic, and the availability of intercity terminals. Further research on the impact of toll roads still needs to be done, not only the impact on the number of MSMEs, but also on MSME income, production costs, the number of workers, and transportation costs. It can even be done in other sectors such as hotels, restaurants, and tourism.

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