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## **Drivers of Economic Dynamism Among the Municipalities in the 1st District of Batangas**

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#### Abstract

This study aimed to identify the key drivers of economic dynamism among the municipalities in the 1st District of Batangas, drawing on the framework established by D'Lonsod et al. (2019), which identified government efficiency, infrastructure, and resiliency as core pillars of economic competitiveness. Utilizing secondary data from the DTI-Cities and Municipalities Competitiveness Index (CMCI) portal, the study analyzed data spanning from 2019 to 2024. Employing the ex-post facto research method and qualitative research method, the researcher used graphical analysis descriptive statistics, and multiple regression models to examine trends and relationships among the selected variables. On the other hand, in identifying the best model the following tests were used such as Hausman Test, Jarque Bera Test, Multiple Regression and Variance Inflation Factor Test. The findings reveal that the economic dynamism of the municipalities in the 1st District of Batangas exhibited fluctuating trends over the five-year period. Government efficiency, infrastructure, and resiliency all showed a general downward trajectory, with only limited signs of recovery in recent years. The best-fitting model,  $ED = \beta_0 + \beta_1 GE + \beta_2 IN + \beta_3 RS + \mu$ , indicated that infrastructure is the primary driver of economic dynamism (coefficient = 0.544759; p = 0.0011). Further analysis using a dummy variable for 1st class municipalities revealed that both infrastructure and resiliency significantly influence economic dynamism, though resiliency shows an inverse relationship. These findings suggest that strategic investment in infrastructure, alongside careful management of resilience measures, is crucial for enhancing economic performance among municipalities in the district.

Keywords: Economic Dynamism, Infrastructure, Resilience, Government Efficiency, Municipalities

#### **INTRODUCTION**

Local governments are widely regarded as the foundational pillars of national competitiveness. For many cities and municipalities in the Philippines, being recognized as one of the most promising and competitive Local Government Units (LGUs) is both a source of pride and a strong motivator. Beyond the pursuit of recognition, LGUs continuously refine their development strategies to promote inclusive and sustainable growth that directly benefits their constituents. This ongoing commitment has driven significant efforts in improving governance, infrastructure, and the overall quality of life within their communities.

In this context, cultivating a dynamic local economy is vital to strengthening a municipality's or city's competitiveness. A dynamic economy is characterized by continuous growth, adaptability, and responsiveness to changing conditions, these traits attract investors, stimulate local business activity and contribute to a vibrant economic landscape - ultimately fostering sustainable economic growth.



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Recognizing this, researchers have emphasized the importance of identifying the key drivers of economic dynamism. These drivers are closely linked to enhanced productivity and competitiveness at the local level. In a study by D'Lonsod et al. (2019), government efficiency and infrastructure emerged as significant determinants of economic dynamism among Philippine cities. However, given the diverse economic landscapes and contextual realities of different localities, there is no universal policy solution. It is therefore imperative for LGUs to assess their own conditions relative to these competitiveness indicators and tailor their development strategies accordingly.

Similarly, Capulong et al. (2024) examined economic dynamism as a proxy for the investment climate across 22 municipalities in the Philippines. Their study reaffirmed the central role of government efficiency and infrastructure in shaping local economic performance. However, they also noted certain limitations, such as data gaps in the Cities and Municipalities Competitiveness Index (CMCI)— specifically, the unavailability of data for the year 2018—which affected the depth of their analysis.

These findings underscore the critical need for LGUs to identify and understand the specific drivers of economic dynamism within their local contexts. Doing so enables the formulation of targeted policy interventions and development programs that address existing challenges while promoting inclusive and resilient growth.

In light of these considerations—and recognizing the absence of prior research specifically focused on the 1st District of Batangas—this study aims to identify the key drivers of economic dynamism within the district's municipalities. By utilizing updated CMCI data from 2019 to 2024, this research seeks to fill existing gaps and provide a more comprehensive understanding of local economic drivers. The findings will offer valuable insights for aligning local development priorities with programs and initiatives that promote long-term competitiveness and sustainable community development.

#### MATERIALS AND METHOD

#### **Research Design**

This research was conducted to identify the key drivers of economic dynamism among the municipalities in the 1st District of Batangas. The study employed an ex-post facto research design, a non-experimental approach that incorporates certain features of true experimental designs, such as group comparison and data analysis, but without manipulation of the independent variables.

This study employed an ex-post facto research design, which examines the effects of existing conditions without manipulating the independent variables, thereby exploring potential cause-and-effect relationships based on past events (Silva, 2022). Specifically, the study analyzed trends in economic dynamism, government efficiency, infrastructure, and resiliency from 2019 to 2024.

Complementing the quantitative analysis, a qualitative approach was also used to gain deeper insights into participants' experiences and perceptions—particularly to answer "how" and "why" questions that numerical data alone cannot fully address (Tenny et al., 2022).

Semi-structured interviews served as the primary tool for collecting qualitative data, helping explain observed trends and relationships among variables. Quantitative data were sourced from the Department of Trade and Industry's Cities and Municipalities Competitiveness Index (DTI-CMCI), while a focus group discussion was conducted to validate findings with key stakeholders.

The researcher considers this mixed-method approach both appropriate and effective for accurately identifying the drivers of economic dynamism in the 1st District of Batangas.



#### Sources of Data

The researcher consulted scholarly works such as books, internet and other references that are related to the study from year 2017-2024. These sources were crucial in providing foundational knowledge and insights into the study, allowing the researcher to contextualize the research and make informed interpretations. The academic sources were carefully chosen for their relevance to the Cities and Municipalities Competitiveness Index (CMCI) and the broader topic of local economic development.

The researcher accessed the official Cities and Municipalities Competitiveness Index (CMCI) website, which houses comprehensive and up-to-date data on the performance of Local Government Units (LGUs) across the Philippines. This data was extracted from the CMCI portal, providing valuable insights into various indicators of competitiveness, such as economic dynamism, government efficiency, infrastructure, and resiliency. Additionally, the researcher publicly sourced data through interview guide questions and focus group discussion to gain firsthand perspectives from local government officials, key stakeholders, and experts in the field of local governance and economic development.

The study utilized the data collected by the researcher and CMCI data which was ready and extracted from the CMCI portal and the This information was gathered through surveys of the local government units by filling and answering the information needed in the data completion sheet. This was validated and scored by the bureau according to the data they've collected from the local government units.

#### **Data Gathering Procedure**

For this study, the researcher utilized the research instrument sourced from the Department of Trade and Industry (DTI) – Cities and Municipalities Competitiveness Index (CMCI) website. The official scores of the municipalities in the 1st District of Batangas were accessed through this portal. The DTI-CMCI is responsible for the systematic collection, analysis, and publication of annual rankings and competitiveness scores of local government units (LGUs). The research instrument and data were subsequently evaluated, validated, and approved by the researcher's adviser, statisticians, panel members, and grammarian.

Following the completion of the validation and reliability processes, the researcher conducted statistical analyses on the CMCI pillar scores for eight municipalities within the 1st District of Batangas. In addition, a structured questionnaire was developed as an interview guide to gather qualitative data from the focal persons of six municipalities regarding trends and challenges experienced.

The researcher formally invited the CMCI focal persons and/or the Municipal Planning and Development Coordinators via email to participate in interviews focused on the trends of the CMCI pillars and significant events occurring between 2019 and 2024. Prior to the interviews, permission to record the sessions was obtained from participants, with assurances that all information would be treated confidentially and used solely for the purposes of this study.

Furthermore, the researcher facilitated an online focus group discussion to present the study's findings and to explore potential programs that could enhance economic dynamism in the district, particularly emphasizing infrastructure as a key driver. Invitations for participation were sent and duly acknowledged by the attendees.

To supplement the primary data, the researcher also conducted extensive literature reviews by accessing resources at the Batangas State University Library as well as various academic databases and online research repositories.

#### **Data Analysis**

To answer the objectives of the study, different statistical tools were utilized:

The researcher used Eviews Lite, an econometric software which is designed for powerful statistical, time



series, forecasting, and modeling tools through an innovative, easy-to-use object-oriented interface which provided the researcher with a user-friendly interface to manage and analyze the data efficiently. CMCI data from 2019-2024 are presented graphically to show the general trend of these variables.

The researcher used multiple linear regression to examine the relationship between economic dynamism (ED) and three independent variables: government efficiency (GE), infrastructure (IN), and resiliency (RS).

The econometric model was presented as:

 $ED = \beta_0 + \beta_1 GE + \beta_2 IN + \beta_3 RS + \mu$ 

Where:

ED = Economic Dynamism

- GE = Government Efficiency
- IN = Infrastructure

RS = Resiliency

 $\beta = Parameters/ coefficient$ 

 $\mu = \text{Error term}$ 

In the process of regression analysis, the study will use the following test:

First the researcher employed the **Hausman Test**, this helps the researchers choose between fixed effects and random effects models in panel data analysis, ensuring more accurate estimates of economic relationships.

This followed by using **Multiple Linear Regression**, by using this, the researcher was able to investigate the impact of the independent variables to dependent variable systematically and rigorously.

Next, the researchers conducted rigorous tests to check for two critical statistical concepts: Heteroskedasticity and Autocorrelation. The researcher tested for **heteroskedasticity**, which occurs when the variance of the error terms is not constant across all observations. Also, through **Durbin Watson**, the researcher assesses whether residuals from one time period are correlated with residuals from the next period. Autocorrelation can bias coefficient estimates, so testing and correcting for it is crucial for valid inference.

The researcher evaluated the **R-squared** value to assess how well the model explains the variation in economic dynamism. The **R-squared** statistic measures the proportion of the variance in the dependent variable (**ED**) that is explained by the independent variables (**GE**, **IN**, **RS**).

The **F-test** was used to determine if the model as a whole is significant. It tests the null hypothesis that all the regression coefficients are equal to zero (i.e., no effect). If the p-value of the F-test is small (less than 0.05), it indicates that at least one of the explanatory variables significantly affects economic dynamism.

Furthermore, The Variance Inflation Factor (VIF) was calculated to check for multicollinearity among the independent variables. Multicollinearity occurs when two or more independent variables are highly correlated, which can cause instability in the regression coefficients.

These methods, along with the careful treatment of data assumptions and the use of appropriate econometric software, ensured that the analysis was both comprehensive and reliable in examining the factors influencing economic dynamism in the municipalities of Batangas. The use of these statistical tests helped ensure that the results were not only statistically significant but also valid, providing the necessary evidence for policy recommendations and insights into the relationships between government efficiency, infrastructure, resiliency, and economic dynamism.

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#### **RESULTS AND DISCUSSION**

1. Profile of the municipalities in the 1st district of Batangas in terms of income classification, land area and population.

<b>Profile of the Municipality in the 1<sup>st</sup> District of Batangas</b>					
Municipality	Income Classification	Land Area	Population		
Calaca	Component City	114.58 km <sup>2</sup>	87,361		
Balayan	1st Class Municipality	108.73 km <sup>2</sup>	95,913		
Lemery	1st Class Municipality	109.80km <sup>2</sup>	93,186		
Nasugbu	1st Class Municipality	278.51 km <sup>2</sup>	154,113		
Calatagan	2nd Class Municipality	101.50 km <sup>2</sup>	62,846		
Lian	3rd Class Municipality	76.80 km <sup>2</sup>	63,750		
Tuy	3rd Class Municipality	94.65km <sup>2</sup>	46,519		
Taal	3rd Class Municipality	29.76 km <sup>2</sup>	61,460		
	Sources: DTL CM	I Dhil Atlas			

Table No. 5

Sources: DTI-CMI, PhilAtlas

Table no 5. Shows that the 1st District of Batangas comprises mainly 1st and 3rd class municipalities, with one 2nd class municipality and one component city (Calaca City, which achieved cityhood in 2022). Income classification is based on average annual income over four years. For example, Nasugbu is a 1st class municipality with the largest land area (278.51 km<sup>2</sup>) and a population of 154,113. All municipalities in the district participate in the Cities and Municipalities Competitiveness Index (CMCI), which measures overall competitiveness using scores from five pillars. However, income classification, land area, and population do not directly determine competitiveness. Instead, competitiveness reflects how effectively municipalities deliver services and attract investment to support economic growth.

2. The Trend of Economic Dynamism of the municipalities in the 1st district of Batangas from 2019-2024.





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	2019	2020	2021	2022	2023	2024
Mean	4.8042	5.3750	5.3680	4.9398	3.6441	4.0427
Median	4.6592	5.3802	5.3787	4.9588	3.7914	3.9226
Maximum	6.2671	6.8876	6.1976	5.8216	4.3211	4.9221
Minimum	3.4868	3.8120	3.9648	3.7837	2.4625	3.0368
Std. Dev.	0.8364	1.0953	0.6869	0.6302	0.5895	0.7086
Mean-Province of						
Batangas	5.0279	5.6727	5.6012	4.7621	3.8738	4.2448

Source: Department of Trade and Industry – CMCI

#### Figure No. 3

#### Economic Dynamism of the Municipalities in the 1<sup>st</sup> district of Batangas from 2019-2024.

Figure no 3, presents trends of economic dynamism among the municipalities in the 1<sup>st</sup> district of Batangas. Economic dynamism is a concrete representation of productivity, measured in output per unit of input. This pillar evaluates how successfully the community uses available resources to raise the level of living for its residents.

From 2019 to 2014 the district's average score of economic dynamism was 4.6956, with a median of 4.6604, indicating generally low economic dynamism compared to the mean of Batangas province. Most municipalities scored below the provincial mean, signaling untapped economic potential.

Moreover, the maximum score for economic dynamism in the 1st District of Batangas from 2019 to 2024 was recorded in 2020 by the Municipality of Taal, with a score of 6.8876. This was driven by strong its strong performance in areas such as local economic growth, active businesses, safety-compliant enterprises, job creation, and a manageable cost of living. Taal's productivity and overall business climate also contributed to its competitiveness. Compared to other municipalities in the district, especially those in the same classification, Taal excelled in most CMCI indicators. On the other hand, the minimum score for economic dynamism in the district during the same period was 2.4625, recorded in 2023 by the City of Calaca. This was due to challenges in transitioning to a component city and weak performance in business and productivity indicators.

Notably, the Municipalities of Nasugbu, Lian, Taal, and Tuy outperformed the district's average in 2020. These municipalities scored higher than the provincial average, indicating that their local economies were particularly dynamic in that year.

However, Figure 3 shows that from 2021 to 2023, economic dynamism declined across most municipalities. According to the interviews with the municipal planning and development officers and CMCI focal person of each municipality, this was mainly due to the impact of the COVID 19 pandemic, Taal volcano eruption and the sluggish business growth and reduce in investments. Recovery signs emerged in 2024, with easing pandemic restrictions helping sectors like tourism rebound, leading to a slight increase in economic dynamism scores.

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#### 3. Status of the driver of economic dynamism from 2019-2024

	2019	2020	2021	2022	2023	2024
Mean	9.8979	9.8483	8.0471	6.0445	7.2323	7.4460
Median	9.0094	8.6635	8.0795	5.6272	7.0713	7.5908
Maximum	14.0554	14.0638	10.7149	8.6835	9.1224	9.7876
Minimum	6.8781	7.7920	4.3444	4.8089	4.6733	5.1965
Std. Dev.	2.6222	2.4200	2.4345	1.2996	1.5562	1.4438
Mean						
<b>Province</b> of						
Batangas	10.1371	10.3011	8.5397	6.8671	7.7660	7.7642

Source: Department of Trade and Industry – CMCI

#### Figure No. 4

#### Government Efficiency of the Municipalities in the 1<sup>st</sup> District of Batangas from 2019-2024.

Figure 4 displays a graph that shows the government efficiency among the municipalities in the 1<sup>st</sup> district of Batangas. Government efficiency is the quality and reliability of government services and government support for effective and sustainable productive expansion. The given data represents the government efficiency in the 1<sup>st</sup> district of Batangas. In the 1<sup>st</sup> district of Batangas, the mean of government efficiency from 2019-2024 is 8.0860. While the median score of government efficiency is 7.8638. This value represents the competitiveness of each municipality/city that measures their ranking based on their government efficiency.

The Municipality of Taal achieved the maximum score in 2020 with 14.0638, attributed to strong adherence to government standards and effective public service systems. In contrast, Nasugbu recorded the minimum score in 2021 with 4.3444, reflecting poor performance in investment promotion, public



services, and compliance with national directives. The standard deviation of 2.3859 indicates a moderate variation in efficiency among municipalities.

It was highlighted in Figure 4 that most municipalities in the 1st District of Batangas scored below the provincial average in government efficiency, indicating a generally low level of performance in this area. Trends show a general decline in government efficiency from 2019 to 2022, followed by minor improvements in 2023 and 2024, although only a few municipalities surpassed the provincial average.

According to the interview with the municipal planning and development officers and CMCI focal persons of the participating LGUs, the key challenges faced are the following: The Municipality of Nasugbu has limited data access impacted the recording in CMCI. While the Municipality of Lian struggled with business permit compliance early on but saw improvement by 2023. The Municipality of Balayan mentioned the factors including the competition among 512 1<sup>st</sup> and 2<sup>nd</sup> class municipalities, underreporting of business data, and a severely affected education sector during the pandemic. On the other hand, the government efficiency of the City of Calaca was affected with the decline in tax collection during the pandemic reduced its resource-generating capacity. Municipality of Tuy, mentioned that due to its small size, there are limited business activity, and lack of higher education and healthcare facilities constrained efficiency. Lastly, the decline in the trend of government efficiency of Municipality of Calatagan was due to the decline in the business registration that affects its revenue collection, though recovery and expanded social services have led to slight improvement.



	2019	2020	2021	2022	2023	2024
Mean	6.0858	6.0100	5.4716	2.8940	3.2088	3.1152
Median	6.1687	6.1184	5.5627	2.8384	3.29105	3.23055
Maximum	6.7816	6.7858	6.3237	3.9999	3.7014	3.4603



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.3487
.3498

Source: Department of Trade and Industry – CMCI

#### Figure No.5

#### Infrastructure of the municipalities in the 1<sup>st</sup> district of Batangas from 2019-2024.

Figure 5 presents the infrastructure performance of municipalities in the 1<sup>st</sup> District of Batangas from 2019 to 2024, highlighting generally low scores across the district. The statistical data presented shows that the average infrastructure score in the district during this period is 4.4642. The median score is 4.0552, indicating that half of the municipalities in the district fall below this value, while the other half score above it. This score serves as an indicator of the competitiveness of municipalities in the district in terms of infrastructure development.

The data further reveals that most municipalities in the 1st district of Batangas scored below the provincial mean for infrastructure, with only a few surpassing the provincial average. This suggests that infrastructure development in the 1<sup>st</sup> district generally lags behind other cities and municipalities in the province. However, this also highlights the district's potential for future growth and improvement in infrastructure. Lemery achieved the highest score of 6.7858 in 2020, driven by strong access to ports, utilities, health facilities, and financial technology. In contrast, Calaca recorded the lowest score of 2.1465 in 2022 due to limited roads, utilities, and infrastructure investment. Figure 5 also illustrates a declining trend in infrastructure scores across the district from 2019 to 2024. The data shows a gradual decline between 2019 and 2021, with a sharp drop in 2022. The scores remained at low levels until 2024. Mainly due to budget reallocations during the pandemic.

Municipalities like Balayan, Tuy, Nasugbu, and Lian redirected resources away from infrastructure to address urgent needs, though some, like Balayan and Tuy, began recovering through new developments such as government centers, solar farms, and planned healthcare and transport projects. Calatagan struggled with data limitations that hampered infrastructure planning and assessment. Overall, while infrastructure in the district remains underdeveloped, several municipalities are showing signs of recovery and future growth potential.





	2019	2020	2021	2022	2023	2024
Mean	16.4835	16.5120	12.9706	11.1844	11.3456	11.3543
Median	16.4713	16.4784	13.1575	11.3238	11.2927	11.3488
Maximum	17.1443	17.2897	13.7953	11.5524	11.5556	12.5703
Minimum	15.6763	15.8996	11.8993	9.9371	11.1969	10.1767
Std. Dev.	0.5428	0.5861	0.6539	0.5120	0.1379	0.6541
Mean						
Province of						
Batangas	16.00992	16.36906	12.8675	10.89995	11.09499	11.22491

Source: Department of Trade and Industry – CMCI

#### Figure No. 6

#### Resiliency of the municipalities in the 1<sup>st</sup> district of Batangas from 2019-2024.

Figure 6 illustrates the resiliency levels of municipalities in the 1st District of Batangas from 2019 to 2024, reflecting their capacity to adapt to and manage risks and disturbances. The district's average and median resiliency score during this period is 12.0140, with most municipalities performing around the provincial average.

The standard deviation of 2.4125 suggests relatively moderate variation in scores. Calaca recorded the highest score of 17.2897 in 2020, driven by strong disaster preparedness measures and infrastructure. In contrast, Lian scored the lowest at 9.9371 in 2022 due to shortcomings in disaster drills, early warning systems, and trained personnel.

The overall trend shows a slight decline in resiliency between 2020 and 2022, stabilizing afterward. Interviews with local officials indicate consistent efforts across municipalities to maintain or improve resiliency through proactive planning, compliance with standards, and improved data gathering. Calaca,



Nasugbu, and Calatagan are noted for strong disaster risk management practices, while Balayan, Tuy, and Lian have made notable improvements through strategic planning and infrastructure development. Overall, the district demonstrates average resiliency with steady efforts toward improvement.

#### 4. Model developed that best described the economic dynamism

 $ED = \beta_0 + \beta_1 GE + \beta_2 IN + \beta_3 RS + \mu.$ 

#### Where:

- ED = Economic Dynamism
- GE = Government Efficiency
- IN = Infrastructure
- RS = Resiliency
- $\beta = Parameters/ coefficient$

#### $\mu = Error term$

This equation represents how economic dynamism in the 1st district of Batangas (ED) is related to government efficiency (GE), infrastructure (IN) and resiliency (RS). This was visualized through the diagram shown below.



#### Figure 7. Schematic Diagram of the Drivers of Economic Dynamism in the 1st District of Batangas

Table No. 6

#### Summary of Multiple Regression on the Drivers of Economic Dynamism in the 1<sup>st</sup> District of Batangas using CMCI (2019-2024)

		8	8		,	
Variable	Coefficient	Std. Error	t-statistic	Prob.	Decision	Interpretation
					to H <sub>0</sub>	
С	4.276809	0.791912	5.400611	0.0000	Reject	Significant
GE	0.045014	0.067509	0.666781	0.5084	Accept	Not
IN	0.544759	0.155457	3.504239	0.0011	Reject	Significant
RS	-0.178617	0.101306	-1.763145	0.0848	Accept	Not
R-squared		0.325464	Mean dependent var			4.695625
Adjusted R-squared 0.279473		0.279473	S.D. dependent var			0.983515
S.E of Regression		0.834845	Akaike info criterion			2.556515
Sum squared resid		30.66653	Schwarz cri	terion		2.712448



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Log Likelihood	-	F-statistic	7.076683
Durbin Watson Stat	1.610598	Prob (F-Statistic)	0.000554

The regression analysis yielded the equation  $ED = 4.276809 + 0.045014(GE) + 0.544759(IN) - 0.178617(RE) + \mu$ , indicating that infrastructure (IN) is the primary driver of economic dynamism in the 1st District of Batangas. With a coefficient of 0.544759 and a p-value of 0.0011 (which is less than the 0.05 significance level), infrastructure is shown to be a statistically significant factor. Therefore, the null hypothesis is rejected, confirming a significant relationship between infrastructure and economic dynamism in the district.

However, the results show that government efficiency and resiliency do not significantly influence economic dynamism in the 1st District of Batangas, as their p-values (0.5084 and 0.0848, respectively) exceed the 0.05 significance level. Thus, the study fails to reject the null hypothesis, indicating no statistically significant relationship between these variables and economic dynamism. This does not imply the absence of any effect but suggests that their influence may not be strong or consistent enough to be captured in this model

# Table No. 7Summary of Multiple Regression on the Drivers of Economic Dynamism in the Municipality ofBalavan, Lemery and Nasugbu using CMCI (2019-2024)

Variable	Coefficient	Std. Error	t-statistic	Prob.	Decisio	Interpretation								
					n									
					to H <sub>0</sub>									
С	4.639003	0.799145	5.804959	0.0000	Reject	Significant								
GE	0.035293	0.066117	0.533802	0.5962	Accept	Not								
IN	0.609649	0.156030	3.907265	0.0003	Reject	Significant								
RS	-0.209111	0.100345	-2.083912	0.0431	Reject	Significant								
D1MUN	-0.446555	0.250201	-1.784781	0.0814	Accept	Not								
R-squared		0.355987	Mean deper	ndent var		4.695625								
Adjusted I	R-squared	0.296079	S.D. depend	lent var		0.983515								
S.E of Reg	gression	0.825169	Akaike info criterion			2.551876								
Sum squar	red resid	29.27888	Schwarz criterion		Schwarz criterion		Schwarz criterion		Schwarz criterion		Schwarz criterion			2.746792
Log Likeli	ihood	-56.24502	F-statistic			5.942207								
Durbin W	atson Stat	1.669440	Prob (F-Sta	tistic)		0.000674								

And upon checking the scores of the 1st class municipalities in the district in resiliency, it shows that all these three municipalities are almost on par with each other. The following focused on the formulation or update of the land use plan, disaster risk reduction plan, invested on the early warning system, local risk assessment, emergency infrastructures and trained responders. The following does not directly influence the productivity of the locality. However, this was mitigated in case disaster happened in the future.

# 5. Proposed program that may be implemented to improve the economic dynamism in the 1<sup>st</sup> district of Batangas.

The study aimed to identify key drivers of economic dynamism in the 1st District of Batangas using CMCI data from 2019 to 2024. The findings highlighted infrastructure as the primary factor influencing local



economic growth. A focus group discussion with local government representatives confirmed the critical role of infrastructure, particularly sub-indicators like road networks, utilities, port accessibility, and accommodation capacity. These were shown to impact other economic factors such as the number of active businesses and the cost of doing business.

As a response, the study proposed establishing a Septage Management System through a Public-Private Partnership (PPP) or Joint Venture Agreement (JVA), starting in the Municipality of Balayan. This initiative addresses the lack of proper septage treatment facilities across the district and aims to improve basic utilities, environmental quality, and public sanitation. Drawing on successful models from Dumaguete and Batangas City, the program is expected to enhance infrastructure, reduce public health risks, and improve the investment climate.

Additionally, it supports sustainable water use and could benefit agriculture through the reuse of treated by-products. Overall, the proposed system is seen as a strategic move to boost economic dynamism and long-term sustainability in the district.

Below is the proposed Septage Management Program among the municipalities in the 1<sup>st</sup> district of Batangas. Specifically, to be piloted in the Municipality of Balayan.

Republic of the Philippines

Province of Batangas

#### MUNICIPALITY OF BALAYAN

#### PROGRAM PROPOSAL

- Program Title:
   BALAYAN SEPTAGE MANAGEMENT SYSTEM
- 2. Proposed Location: Barangay Malalay, Balayan, Batangas
- 3. Proponent: Local Government Unit of Balayan, Batangas
- 4. Funding Amount: P 100,000.000 P 200,000,000.00
- 5. Funding Source: Public Private Partnership or Joint Venture Agreement, Memorandum of Agreement/Understanding with GOCC, Municipal Budget and/or grants and loans from national government agencies or private institutions/banks
- 6. Implementing Agency: LGU Balayan Batangas
- 7. Rationale:

The Local Government of Balayan, being a growing urban center, is facing increased sanitation demands that traditional waste disposal systems can no longer efficiently support. Improper septage management poses serious health and environmental risks. This program addresses these by ensuring that septage is handled in a safe, systematic, and environmentally responsible manner.

Key Economic and Social Benefits:

Public Health Protection: Reduced risk of waterborne diseases and environmental contamination.

Employment Generation: New jobs in desludging, facility management, and logistics.

Entrepreneurial Opportunities: Local sanitation enterprises and waste-to-resource innovations.

Environmental Gains: Production of biogas, compost, and organic fertilizers from treated sludge.

Investment Attraction: Establishment of a modern utility can draw investors and improve the town's profile.

Revenue Source for LGU: From user fees, fines, and product sales (e.g., compost).

#### 1. Program Objectives

• To create local employment opportunities



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- To stimulate growth of local sanitation enterprise
- To generate and enhance local resources or revenue
- To attract public and private investments
- To support agricultural productivity
- To strengthen public and private partnerships
- To improve overall business climate

#### 2. Program Outline

The **Balayan Septage Management System (BSMS)** is a comprehensive initiative aimed at addressing the growing sanitation challenges faced by the municipality. This program involves the implementation of a structured and sustainable septage management system, encompassing:

- Scheduled desludging of septic tanks
- Safe transport of collected septage
- Construction and operation of a septage treatment facility (STF)
- Reuse and recycling of treated sludge (biogas, organic fertilizer)
- Public awareness and education campaigns
- Monitoring, evaluation, and regulatory enforcement

#### 3. Brief Description

The **Balayan Septage Management System** is a proposed public-private partnership (PPP) initiative between the Local Government Unit of Balayan and a private water utility company. It aims to establish a sustainable system for the regular collection, treatment, and disposal or reuse of septage to improve sanitation, protect water resources, and support local economic growth. The program includes the construction of a septage treatment facility, scheduled desludging services, and the reuse of treated sludge for agricultural and environmental applications such as compost or soil conditioner.

- 4. Beneficiaries
- Primary Beneficiaries:
- Households (urban and rural barangays)
- Commercial establishments (restaurants, hotels, malls, etc.)
- Secondary Beneficiaries:
- Local workforce and entrepreneurs
- Municipal government (via economic returns and improved public services)

#### 5. Duration

The construction and implementation of the program are expected to take between 2 to 3 years.

#### 6. Implementation Timeline

Phase	Description	Timeline
Phase 1	Feasibility Study & Planning	Months 1–3
Phase 2	Infrastructure Development &	Months 4, 12
	Procurement	
Phase 3	Pilot Testing and Staff Training	Months 13–15
Phase 4	Full-scale Implementation	Months 16 onward
Phase 5	Monitoring, Evaluation, and	Ongoing
	Expansion	Oligonig





- 7. Monitoring and Assessment
- **Performance Indicators:** desludging compliance rates, reduction in contamination incidents, volume of treated septage, revenue from by-products.
- Sustainability Measures: User-fee system, reinvestment of revenues, periodic program review, strong enforcement of municipal ordinances.

#### CONCLUSIONS

Here under are the conclusions made by the researcher, all of which are drawn from the findings of the study.

- 1. The 1st district of Batangas is a growing community as it has one component city, and the rest are 1st to 3rd class municipalities. The district is known for its strategic location which combines with an industry of agriculture, tourism, industrial and commercial, which has potential to grow and be developed.
- 2. The fluctuations in economic dynamism in the 1st District of Batangas were primarily caused by the Taal Volcano eruption and the COVID-19 pandemic, which severely disrupted business operations due to government-imposed restrictions. Normal business activity resumed only in 2023, and while some municipalities saw an increase in registered businesses, others did not, resulting in only a slight overall upward trend.
- 3. From 2019 to 2024, the 1st District of Batangas experienced a decline in government efficiency, infrastructure, and resiliency, largely due to limited data access, reduced compliance with national directives, and the impact of the COVID-19 pandemic. Infrastructure and resiliency particularly suffered from budget realignments and minimal improvements, with performance remaining low through 2024.
- 4. The best model for this study is  $ED = \beta_0 + \beta_1 GE + \beta_2 IN + \beta_3 RS + \mu$ , which tests the significance of government efficiency, infrastructure, and resiliency as drivers of economic dynamism. Multiple regression results reveal that infrastructure is the most significant factor, indicating that improvements in infrastructure directly boost economic dynamism in the 1st District of Batangas, while infrastructure and resiliency are the significant factor of economic dynamism among the 1st class municipalities in the district.
- 5. The proposed program establishes a Public-Private Partnership (PPP) between the LGU and a private water utility company to implement a septage management system aimed at improving infrastructure and boosting economic dynamism. By ensuring proper wastewater treatment and reusing dried sludge as compost or soil conditioner, the initiative also supports sustainable environmental practices and benefits the agricultural sector

#### RECOMMENDATIONS

Prior to the conclusions and findings, the researcher hereby proposes the following recommendations:

- 1. The researcher recommends the municipalities in the 1st district of Batangas to review the strengths and weaknesses of the municipalities in infrastructure to determine what needs to be improved to make the economy more dynamic. City and municipalities should revisit the plans and/or consider review the programs and projects related to infrastructure development as it is a driver economic dynamism.
- 2. It is recommended that city and municipalities should formulate or create a Local Public-Private Partnership Code that is tailored fit according to their needs. This code will attract investors that will



fuel the infrastructure developments in their jurisdictions that will lead to a dynamic economy.

- 3. City and municipalities should look into the septage management system as part of improving the infrastructure and economic dynamism in their jurisdictions.
- 4. Policymakers or agencies should review the indicators and sub-indicators the CMCI pillars as measurement of the performance of the cities and municipalities in the certain pillars. Cities and municipalities should also actively participate and enjoin in different performance platform such as CMCI and SGLG, not just to compete but to evaluate whether they lack on different services of the local government.
- 5. Future researchers may conduct study or investigate the significance of resiliency as a potential driver of economic dynamism especially for 1st and 2nd class municipality. Moreover, further study on innovation as another driver of economic dynamism since innovation wasn't included as a variable since it was only introduced in 2022

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