Research Article

Proposed Model Relating Smart City Characteristics and Territorial Business Competitiveness in the Lenses of Business Owners in Lipa City

Honorato A. Sebulino[1], Gemar G. Perez[2]

[1]National University, Philippines

[1,2]Batangas State University

ARTICLE INFO	ABSTRACT
	This study explored the effect of smart city characteristics on territorial business competitiveness using descriptive-correlational research design. The objective of the study is to assess the level of manifestation of smart city and territorial business competitiveness of Lipa City among respondents, derive constructs and to come up with a model relating the two variables. A survey questionnaire was administered among 375 business owners from Lipa City. Principal Component Analysis (PCA) was used to derived constructs from the two variables. Structural Equation Modeling (SEM) was utilized to investigate the effects of the determinants of territorial business competitiveness. Two constructs emerged from smart city characteristics and four from territorial business competitiveness. Smart city has the following characteristics: smart governance and smart environment. Meanwhile, territorial business competitiveness has the following dimensions: innovativeness, resource-efficient environment, enterprise-friendly policies and government support. The result of the SEM indicates that smart governance significantly influences innovativeness, resource-efficient resources, enterprise-friendly policies and government support. Meanwhile, smart environment significantly affects innovativeness and resource-efficient environment. **Keywords:** smart cities, digital technologies, IoT, business competitiveness, CMCI

INTRODUCTION

The urbanization scene in the Philippines can be considered in a critical state already having the concentration of most of its 116 million people in the urban areas based on the recent figures of the Philippine Statistics Authority (PSA)[1]. Moreover, experts estimate that in the year 2050, close to 102 million Filipinos will live in cities which is alarmingly double than what we have today [2]. Similar stories are being seen around the world as the 21st century has been inching an upward trend to urbanization which is one of the effects of overpopulation where more and more members of the population flock to cities in search for better opportunities. In some Asian countries alone, more and more population live in cities especially in rapidly growing ones. For example, in the capital city of United Arab Emirates, Abu Dhabi, there are more migrant Indians than the natives. On a positive note, large and densely populated cities can be highly productive, innovative and hence very potent to contribute to the economic development not just to one city or country of the world, but also to other countries that benefit globalization. Moreover, there is a relationship between the urbanization level and the economic growth of the country on a positive note evident to the good economic status of some of populous countries in the world like China and India.

However, it may cause unprecedented rise in migration, and overcrowding in cities, which can foster political instability, social unrest, and social inequality [3]. To wit, these social imbalances are the root causes of numerous crimes, as well as terrorist attacks. True enough, the rapid population growth rate has already created an adverse domino effect to socio-economic aspect, when these problems either hamper the sustainability of businesses or pose risks to its overall security and its profitability to say the least.

Some of the problems associated with urbanization more especially in a developing country like the Philippines include high transaction costs, inefficiency, and slowness; expensive telecommunication services; unreliable and

expensive access to electricity and water; traffic problems; and a lack of innovative capacity. Rapid urbanization has also caused a series of urban diseases, such as traffic congestion, environmental pollution, contradiction between supply and demand of resources, among others. The metropolis, which is home to over 12 million people, is plagued by gridlock on its roads. This results to a very long commuting time which prods not just inconvenience to the residents [5], but also offers repercussion to businesses, and impacts the national economy at large. The country is losing an estimated 3.5billion pesos daily due to traffic congestion. With this, investors would be very reluctant to take a chance in reaping the benefits of conducting their businesses at the capital city.

While the large population in the country's urban areas gives the local governments with an opportunity to take advantage of its rich human resource, it can also pose threat in the efficiency of the governance more so in the provision of aspects deemed necessary for a specific city to become more competitive in terms of business operations. True enough, for an economy to progress, rapid urbanization rate is not enough, there should also be an effective system which can capitalize and leverage the opportunity of the country in tapping its populace.

The growing role of technology is seen to be one of the solutions to these societal maladies and smart cityhood can qualify as one of the potent forces to mitigate if not eliminate the repercussions of these problems. Smart cities are defined as regions with a strong capacity for learning and innovation, driven by the creativity of their population, their institutions dedicated to knowledge creation, and their digital communication infrastructure [4]. For example, a smart city may improve the transportation systems and accessibility, thereby improving services to the society. It cans also promote sustainability and gives voice to its citizens. The development of smart cities in some of the cities has becoming increasingly recognized as a possible response to problems caused by rapid urbanization, more especially in the business side. Smart city can mitigate problems of investors shifting from one country to another due to unprecedented challenges linked with urbanization and overpopulation.

In Lipa City, Batangas, the urbanization is also occuring in an exponential rate, which is brought about by several factors. The city, being strategically located near Metro Manila has been already developed into a commercial and industrial hub. The presence of various businesses, including manufacturing, retail, and tourism, attracts individuals seeking employment and better livelihoods, leading to an influx of people to the city. This is backed up by the recent number of registered businesses in Lipa City and the population figure of the city. To date, there are more than 14,000 registered businesses in the city and more than 420,000 people surpassing Batangas City as the previous most populous city in the province.

While urbanization leads to economic stability which is one of the indicators of territorial business competitiveness, however, this could also present various challenges that affects overall competitiveness. The resulting population growth adds pressure to urban areas and demands expansion of urban facilities. Progressive urban planning must be considered to accommodate the population which has been increasing exponentially without sacrificing the quality and life and safety of not just individuals, but also the ease of doing business and competitiveness of the business environment in the city. In fact, according to the CMCI report, Lipa City's territorial business competitiveness declined this year as compared to last year. Territorial business competitiveness is important for businesses to thrive since it may potentially attract not just local investors but also foreign investors.

The advancement in technology has shaped cities and territories to become competitive, and more and more studies have related it to territorial competitiveness. For example, some smart city initiatives have becoming very evident has in the city which in due time, it is expected to follow the footsteps of other smart cities in the Philippines like Metro Manila, Metro Cebu and Metro Davao[6]. Smart city initiatives involve integration of multitude of technologies to enhance the services to urban residents not just to help improve the quality of their lives, but also give them security and peaceful living.

Smart city adoption of Lipa City could be a smart solution to solve problems such as traffic congestion which also disrupts business activities. A smart city is a technologically modern urban area that uses different types of electronic methods and sensors to collect specific data. Thru digital connectivity gathering, it may help cities in the province to improve quality of life through better management and administration. With better management of cities, it would not just benefit the people, but it could also have a significant impact to the safety, operational stability and sound management of firms and business which would lead to profitability and sustainability.

Moreover, smart city adoption can lead to a much crucial deciding factors to investors: territorial competitiveness. Territorial competitiveness is a part of the regional economy in which local economic activity competes with other

areas. An area becomes competitive if it can face up to market competition whilst at the same time ensuring environmental, social, and cultural sustainability based on networking and inter-territorial relationships. In other words, the concept of territorial competitiveness involves, considering area resource, the role of actors and institutions, innovation and cooperating with other areas.

The problem lies within the importance of having a unified and a single model that covers both the business and technological aspects of adopting a smart city. The model shall encompass various aspects and dimensions such as infrastructure, innovation, regulatory environment and collaboration among stakeholders. However, there is a lack of study that relates territorial business competitiveness to smart city specifically in the context of Lipa City. There is a dire need for a model that can effectively measure and explain the effect or impact of smart city characteristics on territorial business competitiveness.

OBJECTIVES

In general, the study aimed to develop a model that illustrate the relationship between smart city readiness and territorial competitiveness of Lipa City, Batangas, Philippines. Specifically, it sought to derive the construct of territorical competitiveness and maifestations of smart city characteristics. Further, this study also aimed to determine the respondents' assessment towards the derived constructs of two mentioned variables. Lastly, the study developed a structural equation model that establishes a strong relationship between smart city readiness and territorial business competitiveness.

METHODS

The study employed descriptive-correlational research design. This design was used to examine the relationship between smart city characteristics and territorial business competitiveness. The respondents of the study were the owners and managers of registered businesses in Lipa City. According to Lipa City Business Permits and Licensing Office, there are a total of 14,782 registered businesses distributed throughout its 72 barangays. By using a Raosoft calculator, with a confidence level of 95% and an error margin of 5%, the researchers targeted 375 respondents from Lipa City.The respondents were selected to multi-stage sampling. This is to ensure representativeness of the entire population and give all businesses in Lipa City equal chances to get picked as respondents of the study. Three hundred seventy-five (375) respondents were distributed to all barangays of the city.

Questionnaire was the primary instrument to generate the data. The questionnaire is composed of three parts. The first part is the profile of respondents, second part consists of items measuring the territorial business competitiveness of the city and last part is composed of statements indicating the smart city characteristics. The instrument was validated by experts in the field and the dry-run was also conducted. Cronbach's alpha was calculated and has a value of 0.915 which revealed that there is a strong internal consistency among the statements used in the instrument. The researcher used a non-ordinal rating scale to ascertain the respondents' perspective on Lipa City's territorial business competitiveness and smart city characteristics. In the self-constructed questionnaire, the respondents were requested to rate each statement from 1 to 7, 1 being the lowest and 7 being the highest, their perception of each of the variables being measured in the study. The respondents also had a freedom to give any rating including a rating between two integers (i.e., 1.1, 4.2, 3.7, etc.) which is also included in the instructions provided in the instrument. The interpretation of result of its mean per derived construct was interpreted based on the following:

Mean Range	Perceived Level of Competitiveness	Perceived Level of Manifestation
6.50-7.00	Extremely Competitive	Extremely Manifested
5.50-6.49	Highly Competitive	Highly Manifested
4.50-5.49	Competitive	Manifested
3.50-4.49.	Moderately Competitive	Moderately Manifested
2.50-3.49	Uncompetitive	Unmanifested
1.50-2.49	Highly Uncompetitive	Highly Unmanifested
1.00-1.49	Extremely Uncompetitive	Extremely Unmanifested

Data was analtzed through principal factor analysis to derived the construct of territorial business competitiveness and smart city characterisitcs. Mean and standard deviation were used to determine the level of territorial business

competitiveness and readiness of Lipa to become smart city. Lastly, Structural Equation Model was used through path analysis to construct a model that relates territorial business competitiveness and smart city characteristics.

RESULTS

The aim of the study is to derive constructs both for smart city characteristics and territorial business competitiveness. It also described the manifested characteristics of smart city systems and competitiveness levels of the business environment of Lipa City among owners and managers of businesses. Lastly, using the constructs that emerged, a model relating the two variables was developed.

Table 1 reveals the factor loadings for Innovativeness as one of the derived factors under territorial business competitiveness. The high factor loadings of constructs under this factor are "Innovative Business Environment" (0.837), "Competitive and Innovative Local Market" (0.706) and "Accelerated Technology Diffusion Driving Innovation and Growth" (0.607) signifies that the latter is a good fit to measure the former. The high factor loadings of each of the derived construct from the "Innovativeness" factor may mean that for businesses to be innovative, the three practices or steps can be considered to attain business competitiveness.

Table 1
Indicators of Innovativeness

Items	Factor Loading
1.High quality of life which contributes to employees' innovation	0.529
2. Harnesses community support to fuel business innovation and growth.	0.704
3. Competitive and innovative local market	0.706
4. Adequate access to digital tools enhancing business innovation.	0.501
5. Adaptable workforces open to skill development	0.460
6. Recreational activities that enhance employee's quality of life and innovativeness	0.541
7. Innovative business environment	0.837
8. Small and medium sized business are equally important	0.768
9. Effective and innovative local disaster reduction plan	0.818
10. Accelerated technology diffusion driving innovation and growth.	0.607

Taken together, these high factor loadings suggest that for businesses to successfully achieve and maintain innovation, they must focus on these three key practices: fostering an innovative business environment, engaging with a competitive and innovative local market, and leveraging accelerated technology diffusion. These elements are integral to business competitiveness, as they enable companies to adapt, grow, and thrive in an increasingly dynamic and technologically advanced market.

Table 2 Indicators of Resource-Efficient Environment

Items	Factor Loading
1. Suitable cost and reliable energy resources	0.491
2. Easy and efficient access to customers, suppliers and markets	0.804
3. Adequate and sufficient commercial spaces	0.529
4. Locality's safety and low crime rates support a resource-efficient business environment.	0.405
5. Reliable local suppliers	0.726
6. Cost-efficient goods and services transport	0.680
7. Local consumers' purchasing power	0.799

Meanwhile the derived factor "resource-efficient environment" has constructs with also significantly high factor loadings which depicts that the former is significantly related to the latter as depicted in Table 2. For instance, the

derived construct "Easy and Efficient Access to Customers, Suppliers and Markets" has a factor loading of 0.804, "Local Consumers' Purchasing Power" has a factor loading of 0.799 and "Reliable Local Suppliers" has a factor loading of 0.726. The factor loading coefficients indicate the extent to which each original variable contributes to or "loads onto" a given principal component. This means that the three constructs mentioned are components and are significantly related to the principal component.

The high factor loadings for these constructs underscore their critical role in fostering a resource-efficient environment. Each of the three components plays a significant part in ensuring that businesses can optimize their operations, reduce waste, and use resources more effectively. By contributing to a more efficient use of resources, these factors enhance the sustainability and competitiveness of businesses in the region, thereby strengthening the overall territorial business competitiveness.

The constructs derived from "Enterprise-friendly policies" factors as gleaned from the table above (Table 3) also exhibited high factor loadings which indicate that they are highly correlated to the assigned principal component. "Simple and Quick to Start Business" obtained the highest factor loading value with 0.683, followed by "Straightforward and Cost-effective Compliance" with a factor loading value of 0.680 and lastly "Favorable Taxes and Regulations" with a factor loading value of 0.621. These three constructs provide a clear description of a business or enterprise-friendly locality which will form part as one of the indicators of a city's territorial business competitiveness.

Table 3
Indicators of Enterprise-Friendly Policies

Items	Factor Loading
1.Reasonable cost of hiring employees	0.529
2. Favorable taxes and regulations	0.621
3. Straightforward and cost-effective compliance	0.680
4. Simple and quick to start business	0.683
5. High-quality physical infrastructure that creates a conducive environment for business growth.	0.537
6. Provide policies to ensure reliable and high-speed internet access to support business operations	0.641
7. Business policies stimulate strong demand for goods and services	0.576
8. Reasonable environmental regulations	0.497
9. Local public services are reliable	0.598
10. Ensures political stability supporting a secure business environment.	0.470

These high factor loadings suggest that the three constructs together provide a clear and cohesive description of what constitutes an enterprise-friendly locality. They highlight the importance of reducing bureaucratic hurdles, simplifying compliance, and creating favorable tax and regulatory conditions to foster business growth. When these factors are in place, they create a conducive environment for businesses to flourish, thus enhancing the overall territorial business competitiveness of the city.

In essence, the presence of "Simple and Quick to Start Business," "Straightforward and Cost-effective Compliance," and "Favorable Taxes and Regulations" indicates that the city is nurturing a business-friendly environment that encourages entrepreneurship, supports business expansion, and enhances competitiveness within the local economy. These constructs are fundamental to improving the ease of doing business, which directly influences the attractiveness and competitiveness of the city in the broader business landscape.

Table 4 Indicators of Government Support

Items	Factor Loading
1. Provision of subsidies and incentives	0.726
2. The government provides opportunities for networking and collaboration	0.584

3. Supports a skilled workforce through local education programs	0.647
4. Accessible and high-quality healthcare services	0.520

Finally, the researchers came up with the last factor under territorial business competitiveness in Lipa City as gleaned in Table 4. The constructs under the factor "Government Support" also revealed high factor loadings which state that they are good fit to be component of the principal factor as stated. This further shows that the three constructs under the assigned principal components can be justifiably used as an indicator of territorial business competitiveness of a city focusing on the support coming from the government in all facets of its services to the locality or city. a significant relationship to the

The factor loadings of the constructs—Provision of Subsidies and Incentives, Government Networking Opportunities, Skilled Workforce through Education Programs, and Accessible Healthcare Services—indicate their strong contribution to the territorial business competitiveness. Subsidies and incentives are the most influential, highlighting the critical role of financial support in enhancing business competitiveness. Skilled workforce development through education is also significant, emphasizing the importance of a well-trained labor force. Networking opportunities show that government-facilitated collaboration and partnerships are essential for business growth. Finally, accessible healthcare plays a supporting role, reinforcing the idea that a healthy population contributes to a more competitive business environment. Together, these constructs reflect a comprehensive approach where government policies and services foster a competitive and sustainable business landscape.

Table 5 Indicators of Smart Governance

Items	Factor Loadings
1.Promotes smart governance by enabling collaboration in smart city initiatives	0.703
2. Easily accessible online government service	0.800
3. Encourages efficient energy consumption through innovative governance solutions	0.806
4.Smart and innovative waste management policies	0.829
5.Data-driven approach urban planning	0.753
6. Leverages IoT to enhance business efficiency through supportive governance frameworks.	0.864
7. Implements policies to support the monitoring of the digital business environment."	0.673
8. Supports the growth of technology incubators and hubs through enabling governance policies.	0.817
9.Smart city initiatives for easier business transactions	0.791
10. Facilitates the adoption of digital payment systems through enabling policies	0.599
11.Well-communicated smart city projects	0.744
12. Implementation of contactless payment methods	0.538

The factor loading values in Table 5 indicates the relationship between individual smart city characteristics and the derived constructs. Firstly, the smart city characteristics indicators under smart governance such as "Smart and Innovative Waste Management Policies" (0.829), "Leverages IoT to enhance business efficiency through supportive governance frameworks" (0.864) and "Supports the growth of technology incubators and hubs through enabling governance policies." (0.817) exhibit high factor loadings which indicates that the constructs are apt to describe the derived principal component. The high factor loadings of the three constructs stated above only goes to show these constructs can be used to measure the smart and digital government services being offered in a city like Lipa City.

These findings also imply that these constructs can serve as reliable indicators of the smart governance services provided in the city. Their high factor loadings confirm that they are crucial elements in measuring the effectiveness and progress of Lipa City's transformation into a smart city. By leveraging such technologies, the city can enhance its efficiency, sustainability, and the quality of life for its residents, positioning itself as a model for digital governance.

Table 6
Indicators of Smart Environment

Items	Factor Loadings
1.Consistent and reliable internet connection	0.734
2. Presence of smart solutions for efficient traffic management	0.763
3. Enhanced and smart public safety	0.767
4. Well-integrated and smart transportation	0.689
5. Presence of smart parking solutions	0.670
6. Public spaces equipped with smart technology	0.649
7. Presence of real-time data and analytics for better decision making	0.680
8.Availability of smart healthcare services	0.724
9. Strong emphasis of cybersecurity	0.787
10. Conducive physical environment that supports start-ups and tech-driven businesses.	0.721
11. Presence of smart lighting solutions	0.587
12. Promotion of digital literacy programs	0.635
13. Presence of automated systems	0.729
14. Accessible digital platforms to promote businesses	0.787

There is also a significant strength of association between the smart city characteristics constructs and "Smart Environment" as gleaned from Table 13. The indicators of smart city characteristics in Lipa such as "Strong Emphasis on Cybersecurity" (0.787), "Presence of Automated Systems" (0.787) and "Enhanced and Smart Public Safety" (0.767) exhibits a very high factor loadings which justify that it describes the "Smart Environment". These smart city characteristics benefit the business in all facets of operations. Further, these constructs also describe how the city's smart infrastructure, services, and policies enhance both the quality of life for residents and the operational efficiency of businesses. Policy makers can capitalize or leverage on these indicators to contribute to the cityhood of Lipa City since majority talks about digital safety and it is one of the solid foundations of an effective smart city.

The high factor loadings of the three constructs collectively demonstrate that cybersecurity, automation, and smart public safety are essential components of a smart environment. Each of these elements contributes to creating a city that is not only technologically advanced but also secure, efficient, and conducive to business operations. By implementing strong cybersecurity measures, automating key processes, and enhancing public safety through smart technologies, Lipa City is fostering an environment that supports both the daily lives of its residents and the operational needs of businesses.

Table 7
Respondents' Assessment towards Territorial Competitiveness

Items	Mean	Std. Deviation	Interpretation
Innovativeness	5.74	1.17	Highly Competitive
Resource-efficient Environment	5.57	1.07	Highly Competitive
Enterprise-friendly Policies	5.55	1.38	Highly Competitive
Government Support	5.23	1.19	Highly Competitive

As revealed in Table 7, The overall mean score of 5.74 with a standard deviation of 1.171 perceived levels of territorial business competitiveness in terms of innovativeness among Lipa City businesses has a verbal interpretation of highly competitive. This depicts that Lipa City's business environment exhibits innovativeness in some aspect used in this study. This also reveals that in Lipa City, the business environment is characterized by a thriving ecosystem where businesses continuously adopt new technologies, strategies, and processes to stay competitive.

The resulting overall mean level of territorial business competitiveness of Lipa City as perceived by business owners and managers in terms of resource-efficient environment is 5.57 with a verbal interpretation of Highly Competitive. The indicators of the factors include easy and efficient access to markets, purchasing capability of local consumers, reliable local suppliers, adequate and sufficient commercial spaces to name a few. The resulting overall mean score

provides a comprehensive reflection of the collective responses from businesses in Lipa City, assessing the efficiency of the local business environment.

The descriptive statistics for the perceived level of territorial business competitiveness in terms of enterprise-friendly policies resulted to the overall mean score of 5.28 with a standard deviation of 1.096 and a verbal interpretation of Highly Competitive reveals insights on how competitive Lipa City's business environment is in terms of policies needed for easier and quicker starting up of businesses and other policies which helps businesses in their day-to-day operations which will lead to profitability and sustainability. The respondents' perception on Lipa City business environment's competitiveness level in terms of government support as the last factor derived under territorial business competitiveness has the overall mean score of 5.23 and a standard deviation of 1.189, Lipa City's business environment is deemed to be competitive as measured by four indicators namely provision of subsidies and incentives, provision of well-trained workforce thru local education, opportunities for networking and accessible and high-quality healthcare services.

Table 8
Respondents' Assessment towards Level of Readiness towards Smart City

Items	Mean	Std. Deviation	Interpretation
Smart Governance	5.23	1.23	Highly Manifested
Smart Environment	5.34	1.13	Highly Manifested

As gleaned from Table 8, for smart governance, the perceived level evidence of smart city characteristics of Lipa City has an overall mean of 5.23 with a verbal interpretation of Highly Evident which indicates that the business owners, representatives and managers in Lipa City perceives that there is an evident government services done in digital platforms and initiatives which are "smart". These government services include digital tools for businesses, support to digital or e-wallets, smart urban planning, among others.

Finally for smart environment, the overall mean score of 5.34 with the verbal interpretation of Highly Evident describes the respondent's perception towards the smart city readiness of Lipa City in terms of built smart environment where their businesses are in. Smart city readiness in terms of the physical environment may be brought about by presence of digital infrastructures and the accompanying infrastructure support like internet connectivity among other. Moreover, it could also be in the form of other smart city characteristics like smart lighting solutions, cybersecurity measures and presence of smart solutions to efficiently manage the traffic flow (i.e., central monitoring of traffic and use of Information and Communication Technology to monitor, control and manage traffic flows in real time).
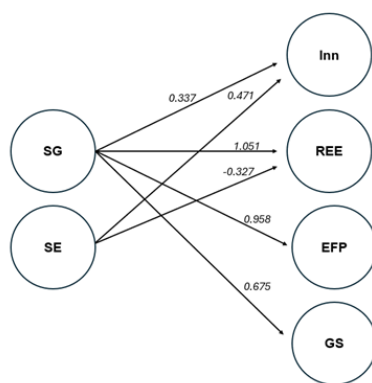
Legend:
SG-Smart Governance
SE-Smart Environment
Inn-Innovativeness
REE-Resource-efficient Environment
EFP-Enterprise-friendly Policies
GS-Government Support

Figure 1
Path Diagram of the Relationship Between Smart City Characteristics and Territorial Business Competitiveness (The SCC-TBC Unified Model)

Table 9

Result of Model Fitness Model

Label					X²	df	p	Decision to Ho		Interpretation	
Baseline Model					560	14	<.001	Reject		Not Significant	

CFI	TLI	RNI	GFI	Adj. GFI	Pars. GFI	SRMR	RMSEA	RMSEA 95% CI		RMSEA p	Interpretation
								Lower	Upper		
1.000	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.000	<.001	Significant

R²	Inn = .600		REE = 0.637		EFP = .669		GS = .634	
	p-value (Wald X²⁾ = <.001		p-value (Wald X²⁾ = <.001		p-value (Wald X²⁾ = <.001		p-value (Wald X²⁾ = <.001	

From the findings, it is witnessing, therefore a chi-square value of 560 with 14 degrees of freedom (df) and a p-value of <.001 led to the rejection of the null hypothesis, indicating that the basic model does not conform to the data. This in turn shows that the model falls outside of the "perfect fit" category by a pretty large margin. Nevertheless, the ultimate model is excellent, proven to be virtually perfect by both the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Relative Noncentrality Index (RNI), Goodness-of-Fit Index (GFI), and Adjusted GFI, all of which have a value of 1.000. Another example is Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA) which are each 0.000 with the RMSEA confidence interval 0.000 to 0.000, and they both have a p-value of <.001, making the model fit firmer.

The R²-values show that the model provides a significant amount of information about the main factors, which Innovation (Inn) takes the first place with 60%, Resource Efficiency (REE), which comes second, has 63.7%, Environmental Footprint (EFP) was next, with 66.9%, and Green Strategy (GS) finished the list at 63.4%. It can be concluded that the model is suitable for explaining the variations between the study variables. The Wald test statistics all around came out of the statistical procedure as significant ((p < .001) such that it was confirmed that the relationships in the model are meaningful. In sum, although the baseline model fit was not satisfying, the final model fit was extremely high, and the variance in the model rose highly, thus, it can be interpreted that the model was robust, and that it faithfully covered the underlying constructs.

Table 10

Path Estimates from Antecedent-Derived Constructs to Consequence-Derived Constructs in the Context of Smart City Characteristics and Territorial Business Competitiveness

Path	DV	IV	Estimate	SE	β	z	p-value	Decision to Ho	Interpretation
Path 1	Inn	SG	0.265	0.0853	0.337	3.11	0.002	Reject	Significant
Path 2	Inn	SE	0.403	0.0927	0.471	4.35	<.001	Reject	Significant
Path 3	REE	SG	0.915	0.0898	1.051	10.19	<.001	Reject	Significant
Path 4	REE	SE	-0.310	0.0976	-0.327	-3.17	0.002	Reject	Significant
Path 5	EFP	SG	0.856	0.0880	0.958	9.72	<.001	Reject	Significant
Path 6	EFP	SE	-0.170	0.0957	-0.175	-1.78	0.076	Failed to Reject	Not Significant
Path 7	GS	SG	0.654	0.1004	0.675	6.51	<.001	Reject	Significant

Path 8	GS	SE	0.148	0.1091	0.141	1.36	0.174	Failed to Reject	Not Significant

The p-value for Path 1, which represents the relationship between innovativeness and smart governance, is 0.002. Since this p-value is less than the commonly accepted significance threshold of 0.05, it indicates that the relationship between innovativeness and smart governance is statistically significant. The β value of 0.337 suggests a positive relationship between the two variables. Specifically, for every one-point increase in respondents' perceptions of smart governance, there is a corresponding increase of 0.337 points in innovativeness. This indicates that higher levels of smart governance (SG) are associated with greater innovativeness (Inn), suggesting that improvements in governance practices may encourage or foster greater innovation among respondents.

The β value of 0.471 in Path 2 indicates a moderate positive relationship between the innovativeness of the business environment and the smart environment in Lipa. This means that for every one-unit increase in the innovativeness of the business environment, the smart environment is expected to increase by 0.471 units, assuming other factors remain constant. The positive β value suggests that as businesses become more innovative, the smart environment also improves. With a p-value of less than 0.001, this relationship is statistically significant, providing strong evidence that the observed effect is unlikely to be due to chance. The effect size and significant p-value together emphasize that the smart environment in Lipa plays a meaningful role in enhancing the innovativeness of the business environment.

Path 3 reveals a strong positive relationship between smart governance and a resource-efficient business environment in Lipa, with a β value of 1.051 and a p-value of less than 0.001. The β value of 1.051 indicates that for every one-unit increase in smart governance, the resource-efficient business environment is expected to increase by 1.051 units, suggesting a strong and direct effect.

Similarly, path 4 shows a moderate negative relationship between the smart environment and the resource-efficient business environment in Lipa, with a β value of -0.327 and a p-value of 0.002, indicating statistical significance. The negative β value suggests that as the smart environment improves—through advancements such as digital technologies, smart infrastructure, or data-driven systems—there may be a decrease in the resource efficiency of businesses. A one-unit increase in the smart environment is associated with a 0.327-unit decrease in resource efficiency.

It was also revealed that in Path 5 there is a strong positive relationship between smart governance and enterprise-friendly policies, with a β value of 0.958 and a p-value of less than 0.001. The β value of 0.958 suggests that for every one-unit increase in smart governance, enterprise-friendly policies are expected to increase by 0.958 units, indicating a nearly one-to-one relationship between the two variables.

Path 7 reveals a positive relationship between smart governance and government support to businesses in Lipa City, with a β value of 0.675 and a p-value of less than 0.001. The β value of 0.675 suggests that for every one-unit increase in smart governance, government support to businesses is expected to increase by 0.675 units, indicating a moderate positive effect. This means that improvements in smart governance practices, such as the use of technology, efficient decision-making, and transparency in government actions, are strongly associated with enhanced support for businesses.

Among other, only path 6 and 8 poised non-significant result on the relationship between smart city characteristics and territorical business competitiveness. In terms of effect of smart environment to enterprise friendly policy, it has a p-value of 0.076. This connotes that smart environment characteristics does not significantly affect enterprise friendly characteristics. Similarly, smart environment does not significantly affect government support as manifested by its p-value of 0.174. Both of the p-values for two paths exceed the 5% level of significance thus the researchers failed to reject the null hypothesis.

DISCUSSION

The results of this research underscore the significant impact of smart governance on business competitiveness in Lipa City, especially in driving innovation, resource efficiency, enterprise-friendly policies, and government support. This implies that when governance frameworks facilitate digital transformation, transparent regulations, and technology adoption, businesses are more likely to succeed in a dynamic setting. The availability of digital platforms for government services, policy incentives, and innovation hub-promoting initiatives likely have a positive effect. The

smart environment was also found to have a significant effect on innovativeness and resource efficiency, suggesting that companies gain from improvements in digital connectivity, automation, and smart infrastructure. But the research also indicated that intelligent environmental features have no fundamental effect on business-friendly policies or government favor, which means that though tech advances improve the efficiency of operations, commercial regulations and incentives remain largely the responsibility of governance instead of environmental considerations.

In case these favorable trends prevail, Lipa City will enjoy expanded investments, a more progressive business environment, and better job opportunities. A robust business environment will draw local and external investors, propelling long-term economic growth. Additionally, a smart governance system will ensure better public services, minimize bureaucratic inefficiencies, and create a smooth business environment where organizations can conduct their operations with ease. The use of intelligent technologies will also enhance the management of the city, guaranteeing improved infrastructure, traffic flow, and public safety, finally bringing a superior standard of life for citizens and a more efficient economy. The speedy urbanization and growing dependency on digital technology have challenges, too. If proper urban planning, infrastructure growth, and cyber defense are not applied, the city could develop into congested places, infrastructural bottlenecks, and open doors for cyber attacks. Small and medium-sized enterprises might not be able to cope with digitalization, hence there will be a difference between organizations that are capable of harnessing technology and those that are not.

On the flip side, if adverse implications of the results persist then the business scenario in Lipa City will be derailed. Failure of smart city integration and poor governance may reflect in the form of reduced business competitiveness and fail to attract investors. Inconsistent policies and weak infrastructure development may hinder business operations, resulting in economic stagnation. Moreover, without strong government support, businesses may struggle to access financial assistance, digital resources, and workforce training, further limiting their growth. Poorly managed urbanization could also contribute to increased traffic congestion, unreliable utilities, and inefficient public services, all of which can deter business activities and reduce the city's attractiveness as an investment hub. The city could also be vulnerable to technology lag should it fail to continually invest in technological advancements, becoming less competitive with other urban cities that implement smart city strategies.

To continue to benefit from the positive trends, it is also important that Lipa City fortify its smart governance by extending digital government services, streamlining regulations, and building greater coordination between the public and private sectors. Investments in smart infrastructure, like high-speed data networks, digital payment platforms, and smart transport networks, will have to continue so that companies are able to operate effectively. Cybersecurity features will also need to be enhanced to safeguard businesses and public utilities from cyberattacks. Targeted subsidies and monetary incentives will have to be provided by the government to companies making investments in digitalization so that small and medium enterprises are also able to remain abreast of technology. Prioritize inclusive growth through the support of digital literacy schemes and making every business, large or small, benefit from Lipa City's smart initiatives.

In case problems occur, it should be followed by immediate measures to mitigate such. Closing gaps in enterprise-conducive policy in regulations will be crucial to ensuring that Lipa City continues to be good for business. The local government must regularly re-evaluate taxations and regulations to keep a business-friendly stance. Further investments in smart urban planning will be necessary to manage urbanization effectively and prevent congestion, infrastructure strain, and environmental degradation. Strengthening government support for businesses by expanding education and training programs will help create a highly skilled workforce aligned with the needs of a smart economy. Moreover, involving business owners in policy-making and decision-making will ensure that governance initiatives are aligned with the real needs of the business sector so that regulatory measures are relevant and effective.

REFERENCES

[1] Philippine Statistics Authority (PSA). (2021). *Philippine population statistics*. https://psa.gov.ph
[2] National Economic and Development Authority (NEDA). (2020). *Philippine development plan 2017-2022*. https://www.neda.gov.ph

[3] Ahouzi, K. & Assyakh, Hicham & Haddou, L. & Messaoudi, A.. (2020). TERRITORIAL COMPETITIVENESS AND SMART CITY: BENCHMARKING ANALYSIS OF DUBAI, ABU DHABI, RIYADH, CAIRO, AND RABAT. ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences.

[4] Fernandez, A. E., & Smith, S. L. (2019). The Impact of Urbanization and Globalization on Peace and Security. *Global Security Review, 12*(4), 205-220. https://doi.org/10.1234/gsr.2019.0112

[5] https://map.org.ph/content/uploads/2023/03/MAP-MEMO-March-21.pdf

[6] "Davao's Smart City Strategy." *SunStar Davao*, August 2021.