



## RESEARCH ARTICLE

## Evaluating Key Determinants of Balanced Development in Thailand's Eastern Economic Corridor of Rayong Province

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ARTICLE INFO	ABSTRACT
Received: May 22, 2024 Accepted: Aug 2, 2024	This study examines the factors influencing balanced development in Rayong Province, Thailand, focusing on infrastructure, local governance, and technology use. Using a questionnaire with Likert scales, data were collected from 400 respondents across 8 districts in Rayong Province. Results from the stepwise multiple linear regression analysis of the 11 hypotheses indicated that health and public health (X11) showed the highest regression coefficient, indicating the strongest influence on balanced development, followed by community participation (X8), and public policy (X10). These were followed by industry (X7), community and urbanization (X9), with a statistical significance at the .01 level. The study contributes to the literature by providing empirical evidence on the relative impact of different factors on balanced development, filling gaps in research regarding regional development in Thailand. The findings highlight the importance of targeted infrastructure investments and effective decentralization. This research offers practical insights for policymakers and planners, enhancing our understanding of regional development dynamics.
<b>Keywords</b>	
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## INTRODUCTION

The strategic plans at the national, regional, provincial, and district levels form the backbone of developmental planning in Thailand (City Data Platform, 2024; Equitable Education Fund, 2023). However, there is often a disconnect between these strategies and their implementation at the grassroots level (Ahmadzai, 2020; Stremersch et al., 2022). This disconnect presents a barrier to integrating these strategies into tangible development outcomes that can address local needs effectively. In response to this challenge, the Rayong Provincial Industrial Development Action Plan for 2023-2027 emphasizes the necessity of enhancing the capacity of small and medium enterprises (SMEs) in the province. By transforming SMEs into Smart SMEs (Saad et al., 2021), these enterprises will be equipped with the readiness and potential to embrace business advancements that align with the Eastern Economic Corridor (EEC) initiative and Thailand 4.0 (Ngampramuan, 2021; Nguyen et al., 2023; Tontisirin and Anantsuksomsri, 2021).

In addition to business readiness, the plan also focuses on promoting environmentally friendly industrial practices (Nguyen et al., 2023). This includes encouraging entrepreneurs to develop

socially and environmentally responsible products and production processes, and fostering local and community participation in sustainable environmental impact management (Tippichai and Lunsamrong, 2022). A network of stakeholders from all sectors—government, private, and community—will serve as the mechanism for driving these initiatives forward. Furthermore, enhancing the organizational and human resource capacities of the Rayong Provincial Industry Office is essential to keep pace with changes and improve service efficiency. Such efforts require collaboration across all sectors and aim to position Rayong as an eco-industrial city (City Data Platform, 2024).

### **Challenges and opportunities in rayong province**

Rayong, as a hub of Thai and regional industrial and business activity, faces several challenges that hinder its development. These include technological constraints in production, product standardization, management inefficiencies, marketing hurdles, human resource limitations, and financial management issues (Mongkolchairuek et al., 2020). Additionally, there is a lack of innovative thinking necessary for enhancing competitiveness in the global market, where competition is increasingly intense. The government's Thailand 4.0 policy seeks to address these challenges by fostering a strong economy with stable growth and sustainable development in goods and services (Ngampramuan, 2021). This policy promotes modern, agile management focusing on the global market.

Smart SMEs rapidly adapt by leveraging technology, creativity, and innovation to drive business success (Del Giudice et al., 2021). These enterprises also implement modern business management practices, integrating digital systems to improve operations and enhance customer satisfaction (Equitable Education Fund, 2023).

## **LITERATURE REVIEW**

Existing research underscores the multifaceted factors essential for urban and organizational development. For instance, Kodsuwan et al. (2022) examined sustainable eco-industrial city development, using Laem Chabang Municipality in Thailand's Eastern-Seaboard Chonburi Province as a case study. Their research highlighted the need for integrating environmental considerations into industrial planning to achieve sustainability.

Likewise, Sonpuing et al. (2022) focused on developing a comprehensive framework for monitoring and evaluating the implementation of Eco-Industrial Towns (EITs) in Thailand. The study utilized documentary research, expert surveys, and stakeholder focus groups to create an EIT framework consisting of six perspectives, 32 dimensions, and 54 indicators tailored to Thailand's context. The findings suggested that the framework and indicators were crucial for guiding the future development of EITs in Thailand and could be adapted for use in other countries.

Maolanont and Pochanart (2023) investigated the progress and challenges of developing Eco-Industrial Towns (EITs) in Thailand as part of the country's Smart City Madani vision. The study highlighted the significant role of environmental management systems and corporate social responsibility (CSR) initiatives in achieving EIT goals and recommended promoting circular economy practices and easing regulatory barriers to foster development towards eco-cities and low-carbon societies. The authors emphasized the alignment of EIT efforts with Thailand's national development goals, particularly the Bio-Circular-Green (BCG) economy model.

Meiksin (2020) discussed Thailand's adoption of the Bio-Circular-Green (BCG) economy model to transform its economy into a more sustainable and inclusive one, aiming to boost GDP by 1 trillion Thai Baht and create 20 million jobs in sectors like food, medicine, and tourism. The paper

highlighted the collaboration between Thailand and the European Union (EU) to promote green deal principles globally, with significant investments in research and innovation, including the development of the Eastern Economic Corridor of Innovation (EECi) as a hub for bioindustry development. The study underscored the importance of integrating new knowledge and technology to add value across various economic sectors.

Similarly, Rungsawang and Suthasupa (2018) explored the concepts and components of creative urban communities tailored to local characteristics in Thailand, emphasizing the role of creativity in community development. Teeravaraprug and Podcharathitikull (2017) focused on sustainable environmental management concepts for developing EITs in Thailand, highlighting strategies to balance industrial growth with environmental stewardship.

Research by Khounthip et al. (2016) on integrated urban development within the Bueng Kan community's master plan, under the smart growth concept (Sikora-Fernandez and Stawasz, 2016), emphasizes comprehensive planning approaches that integrate various development aspects. Likewise, Juito (2019) investigated models for transforming local government administrations into high-performance organizations, suggesting pathways to enhance administrative efficiency.

Freddy et al. (2022) on the island of Sumatra in Indonesia reported on a project attempting to implement the first smart city, which involved an attempt to transform public services through ICT innovations. The initiative attempted to achieve good governance by providing efficient, affordable, and high-quality public services through smart government practices. However, the authors' qualitative case study analysis revealed that the transformation was currently less effective due to challenges such as the complexity of the service management system, limited IT resources, insufficient smartphone access, and a lack of continuous and transparent data. The study recommended simplifying the public service system into a single comprehensive internet application tailored to community needs to improve satisfaction and effectiveness.

A more recent study by Thanapaet et al. (2023) analyzed the public services of Thai provincial government agencies, examining internal competency and environmental factors affecting service delivery. These studies collectively identify several critical factors impacting urban development, including infrastructure, management practices, local governance structures, information technology, and human resources.

The study by Stremersch et al. (2022) examined global grassroots innovation, where employees at any level voluntarily create and develop innovations, and identified key factors for its success. A survey of 3,728 managers from 14 countries showed that firms practicing grassroots innovation outperform those that do not, especially when they promote employee autonomy, competence development, and relatedness. The study also found that these benefits are influenced by the firm's leadership style and market orientation, suggesting that companies should align these initiatives with the right environment to maximize performance gains.

## **Problem statement**

This research aims to explore balanced development models for Thailand's Rayong Province, seeking to reduce urban issues such as industrial pollution and traffic congestion while optimizing public service delivery across the province. Additionally, the study addresses social inequalities and income disparities, advocating for citizens' rights and promoting public and private sector participation. The ultimate goal is to develop a comprehensive plan for Rayong that links strategic goals from the national to the local level, ensuring integrated development plans yield successful outcomes.

## Research objectives

The research objectives in part were to detail a comprehensive understanding of the factors influencing RPBD. By investigating these factors and their impacts, the study hoped to contribute valuable insights into sustainable urban development strategies. The specific research objectives are as follows:

**R01:** To investigate which factor influences RPBD. This objective seeks to identify and analyze the various factors that have a significant influence on RPBD. Understanding these factors will help to uncover the underlying dynamics that drive or hinder sustainable development efforts in the region.

**R02:** To assess the level of RPBD. This objective focuses on evaluating the current state of balanced development within Rayong Province. By assessing the progress made and identifying areas requiring improvement, the study will provide a clear picture of the province's development status, serving as a benchmark for future initiatives.

**R03:** To examine the impact of influencing factors on RPBD. This objective aims to analyze the specific impact of each influencing factor on the RPBD. By examining these influences, the study will identify which factors play a crucial role and how they interact with each other, offering strategic insights for policymakers and stakeholders.

## RESEARCH FRAMEWORK

The research framework provides a structured representation of the relationships between the independent variables (factors influencing development) and the dependent variable (Rayong Province's balanced development). This framework guides the research process, helping to identify and analyze the key elements that contribute to achieving the research objectives.

## Research hypotheses

The study posits that multiple factors influence the balanced development of Rayong Province. These factors encompass a wide range of domains, including infrastructure, governance, technology, community involvement, and public health. The combination of these factors (X1 to X11) collectively influences RPBD (Y).

### Independent Variables (factors influencing RPBD).

H1. *Infrastructure factors* (X1), such as transportation networks, utilities (electricity, water, etc.), and communication systems directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H2. *Local governance factors* (X2), such as local government operation efficiency, transparency and accountability, and policy implementation directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H3. *Information communication technology* (ICT) factors (X3), such as the adoption of digital technologies, ICT infrastructure and support, and technological innovation directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H4. *Resident factors* (X4), civic engagement and participation, community awareness and education, and social cohesion directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H5. *Government agency factors* (X5), such as government policies and regulations, public sector initiatives, and inter-agency collaboration directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H6. *Private sector factors* (X6), such as business innovation and entrepreneurship, private investment, and industry partnerships directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H7. *Industrial factors* (X7) such as industrial growth and development, environmental sustainability, and technological advancement directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H8. *Community participation factors* (X8), such as community involvement in decision-making, local leadership and empowerment, and volunteerism and social capital directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H9. *Community and urbanization factors* (X9), such as urban planning and zoning, housing and real estate development, and population density and growth directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H10. *Public policy factors* (X10), such as strategic planning and vision, policy coherence and consistency, and policy evaluation and feedback directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

H11. *Health and public health factors* (X11), such as healthcare infrastructure and services, public health initiatives, and access to health care directly influence *RPBD* (Y1) which includes economic growth and stability, environmental sustainability, and social equity and inclusion.

This framework demonstrates the hypothesized relationships between the independent variables (X1 to X11) and the dependent variable (Y). Each independent variable represents a factor that is believed to influence *RPBD*. The arrows indicate the direction of influence, suggesting that changes or improvements in the independent variables could positively impact the dependent variable.

## **MATERIALS AND METHODS**

The methodology section details how the study's authors collected and analyzed the data, including the selection of participants, sampling techniques, and data collection procedures. The target population consisted of residents of Rayong Province, Thailand, aged 18 and older, and eligible to vote in the fiscal year 2023. As of March 31, 2023, this population totaled 590,378 individuals, according to the Rayong Provincial Election Office. To determine a suitable sample size, Yamane's formula was applied, using a margin of error of 5%, which resulted in a sample size of 400 individuals. This sample size is considered sufficient to yield statistically significant and generalizable results for the entire population of Rayong Province.

### **Population and sample**

The sample size was determined using Yamane's formula. After which, multi-stage random sampling was used to select the sample.

### **Sample size calculation**

Using Yamane's formula for sample size determination:

$$n = N/(1+N(e)^2) \quad (1)$$

Calculation of sample size requirement:

$n$  = sample size

$N$  = Rayong Province's population size

$e$  = margin of error (5%)

$$n = 590,378/(1+590,378 (0.05)^2) \approx 400 \quad (2)$$

The sample size of 400 is deemed sufficient to provide statistically significant results and generalizable findings for the population of Rayong Province.

### Instrument development and quality enhancement

To ensure the questionnaire's validity and reliability, several steps were undertaken. Experts in urban development, regional planning, and public policy reviewed the questionnaire to ensure content validity, confirming it accurately reflects the research objectives. A pilot study was carried out with a small subset of the target population to uncover any potential problems related to question interpretation or survey flow. To evaluate the reliability of the questionnaire, Cronbach's Alpha was used, resulting in a score of 0.93, indicating a high level of internal consistency. This thorough process of developing and validating the instrument confirmed that the questionnaire was an effective tool for accurately measuring the factors influencing RPBD, instilling confidence that the data collected was both accurate and meaningful, and thereby supporting a reliable analysis of the research objectives.

### The structured questionnaire

The research employs a structured questionnaire as the primary data collection instrument. This questionnaire was composed of closed-ended questions, which were divided into three main sections, designed to gather comprehensive information relevant to the study's objectives.

**Section 1: General information of respondents.** This section collected demographic and personal information about the respondents, including gender, educational level, age, and residence. The questions were formatted as checklists, allowing respondents to select appropriate options that best describe their characteristics.

**Section 2: Factors influencing RPBD.** This section includes questions related to the 11 factors identified as influencing RPBD. Each factor is assessed using a Likert scale with five levels (Figure 2).



Figure 1

**Section 3: Balanced development framework of rayong province** This section focused on assessing the development of Rayong Province across seven dimensions, each assessed using a five-point Likert scale, where responses varied from Strongly Agree (5) to Strongly Disagree (1). These seven dimensions included:

- 1. Physical dimension:** Questions related to the physical infrastructure and spatial development of the province (Surya et al., 2020).
- 2. Economic dimension:** Assessment of economic growth, diversification, and resilience (Martin and Sunley, 2020).
- 3. Resource and environmental dimension:** Evaluation of natural resource management and environmental sustainability practices (Kothencz et al., 2017).
- 4. Social dimension:** Questions concerning social equity, community welfare, and quality of life (Norman-Major, 2023; Ramkissoon, 2023).
- 5. Management dimension:** Examining governance, administrative efficiency, and strategic planning (Bryson and George, 2020; Fuertes et al., 2020).
- 6. Political dimension:** Understanding the influence of political stability and policymaking on development (Chambers and Waitookiat, 2020).
- 7. Educational dimension:** Assessing educational opportunities, access, and impact on development (Pimdee, 2021)

#### **Instrument validation and reliability**

To ensure the questionnaire's validity and reliability, the following steps were undertaken:

**Content validity:** Experts in urban development, regional planning, and public policy reviewed the questionnaire to ensure it accurately reflects the research objectives and encompasses all relevant factors. The IOC method was used to evaluate each item's alignment with the research objectives. Items with an IOC score greater than 0.60 were retained or adjusted. The IOC values ranged between 0.60 and 1.00, indicating satisfactory content validity.

**Pilot testing:** The questionnaire was pre-tested with a 30-member sample from the target population who are not part of the main research sample to identify any ambiguities or issues in question interpretation. This trial helps identify any potential issues in question interpretation or survey flow.

**Reliability analysis:** Statistical measures, such as Cronbach's alpha, were used to assess the internal consistency of the questionnaire, ensuring that it provides reliable data for analysis. The reliability of the questionnaire is assessed using Cronbach's Alpha Coefficient. A Cronbach's Alpha value of 0.93 is obtained, indicating high internal consistency and reliability (values greater than or equal to 0.7 are considered acceptable).

#### **Multi-stage random sampling**

Multi-stage random sampling was used to select the sample, beginning with cluster random sampling to choose representative sub-districts (tambons) within each district of Rayong Province. Two tambons were randomly selected from each district, totaling 16 tambons as sample sub-districts. Subsequently, the same method was used to select representative villages within each selected tambon, resulting in a total of 32 sample villages (2 per tambon). Finally, systematic random sampling was utilized to select individual participants from each village, ensuring a proportional representation of eligible voters aged 18 and older. This sampling methodology ensured a comprehensive representation of the target population.

The data collection period spanned from January to March 2023, during which responses were collected until the sample size of 400 participants was achieved, ensuring the dataset's completeness for analysis. The sample distribution across selected districts, tambons, and villages is presented in Table 1, ensuring comprehensive coverage and proportional representation of the province's demographic diversity. This stratified sampling approach guarantees that the study accurately reflects the entire province, providing reliable insights into the factors affecting its balanced development.

**Table 1: Sample distribution across districts, tambons, and villages in Rayong Province**

Districts	Population	Tambons (sub-districts)	Selected Villages	Target	Actual
Mueang Rayong-District 1	124,960	Tambon 1/2	2 villages/Tambon	50	85
Ban Chang-District 2	46,947	Tambon 3/4	2 villages/Tambon	50	32
Klaeng-District 3	87,484	Tambon 5/6	2 villages/Tambon	50	59
Wang Chan-District 4	40,292	Tambon 7/8	2 villages/Tambon	50	27
Ban Khai-District 5	78,559	Tambon 9/10	2 villages/Tambon	50	53
Pluak Daeng-District 6	106,229	Tambon 11/12	2 villages/Tambon	50	72
Khao Chamao-District 7	53,548	Tambon 13/14	2 villages/Tambon	50	37
Nikhom Phatthana-District 8	52,359	Tambon 15/16	2 villages/Tambon	50	35
Totals	590,378	16	32	400	400

Source: Office of the Election Commission of Rayong Province as of March 31, 2023.

### Data Collection

The data collection process was conducted using a structured questionnaire via Google Forms, targeting citizens of Rayong Province, Thailand, who are 18 years of age or older and eligible to vote in the fiscal year 2023. The questionnaire aimed to gather opinions on factors influencing the balanced development of Rayong Province. A team of research assistants was deployed to various districts, sub-districts, and villages to ensure a comprehensive coverage of the population.

The questionnaire was composed of three sections: demographic information, factors influencing balanced development, and an assessment of Rayong Province's development across seven dimensions. The dimensions were physical, economic, resource and environmental, social, management, political, and educational. Each section included closed-ended questions formatted as checklists or Likert scale items, allowing for systematic data collection relevant to the study's objectives.

### Data analysis

The data collected underwent analysis using quantitative techniques, with statistical software utilized to enhance precision and accuracy. To summarize the data and offer insights into respondents' demographic profiles and opinions, descriptive statistics were applied, including frequency distributions, percentages, means, and standard deviations.



## Hypothesis testing

Hypothesis testing was conducted using multiple linear regression analysis with a stepwise approach (Kothencz et al., 2017), allowing for the identification of significant factors influencing RPBD by considering multiple independent variables simultaneously. Stepwise regression systematically adds or removes predictors based on specific criteria, ensuring only statistically significant factors are included in the final model (Cortés-Borda et al., 2022). This comprehensive data collection and analysis methodology ensures that the findings are robust, reliable, and reflective of the real-world dynamics in Rayong Province, offering valuable insights to policymakers and stakeholders regarding regional development.

## RESEARCH RESULT

Table 2 presents the demographic information of the 400 Rayong residents who were surveyed, highlighting their gender, education level, age, and occupation. Men represented the majority of the survey participants (60.75%). In terms of educational attainment, 34% of the participants had completed secondary education or its equivalent. The largest age group was 31-40 years old, comprising 39.50% of the respondents, followed by the 18-30 age group at 26.50%. The most common occupation among participants was entrepreneurship or business ownership, with 31.50% of the respondents falling into this category.

**Table 2: General information of Rayong Province resident respondents (n=400)**

Item	Residents	%
<b>Gender</b>		
Male	243	60.75
Female	157	39.25
<b>Education level</b>		
Primary	61	15.25
Secondary or equivalent	136	34.00
BA/BS degree or equivalent	93	23.25
Graduate degree	110	27.50
<b>Age</b>		
18-30 years of age	106	26.50
31-40 years of age	158	39.50
41-50 years of age	85	21.25
51 years of age or above	51	12.75
<b>Occupation</b>		
Civil servant/State enterprise	96	24.00

Item	Residents	%
Entrepreneur/Business owner	126	31.50
Employee	90	22.50
Agricultural sector	67	16.75
Student	21	5.25

### Analysis of factors influencing balanced development in Rayong province

The results from Table 3 show that the overall mean score for RPBD is high (mean = 4.12, SD = 0.23) indicating that respondents perceive the province to be developing in a balanced manner. The factors influencing development from highest to lowest are:

**Highest influence:** Infrastructure (X1) had the highest (4.25, SD = 0.29) influence indicating that infrastructure is perceived as the most influential factor in RPBD. Additionally, LAOs (X2) also rank high (mean = 4.23, SD = 0.34), suggesting that LAOs play a critical role in the province's development.

**High influence:** Factors such as private sector (X6) (mean=4.19), ICT (X3) (mean=4.15), community and urbanization (X9) (mean=4.13), health and public health (X11) (mean=4.13), residents (X4) (mean=4.11), industry (X7) (mean=4.11), community participation (X8) (mean=4.10), public policies (X10) (mean=4.10), with mean values from 4.19 to 4.10 indicating a strong positive influence on RPBD.

**Lowest influence:** The government agency factor (X5), while still rated high, has the lowest mean score among the factors, at 4.08. This suggests that government agencies are perceived to have a relatively lesser impact on development compared to other factors. Overall, these findings highlight the importance of infrastructure and local governance in driving RPBD, while also acknowledging the significant roles played by other sectors and factors.

**Table 3. Mean, SD, and results interpretation of factors influencing RPBD**

Variables	mean	SD	Opinion
Infrastructure (X1)	4.25	0.29	strongly agree
Local Administrative Organization (LAO) (X2)	4.23	0.34	strongly agree
Information communication technology (ICT) (X3)	4.15	0.33	agree
Residents (X4)	4.11	0.36	agree
Government agencies (X5)	4.08	0.38	agree
Private sector (X6)	4.19	0.29	agree
Industry (X7)	4.11	0.31	agree
Community participation (X8)	4.10	0.39	agree
Community and urbanization (X9)	4.13	0.30	agree

Public policies (X10)	4.10	0.33	agree
Health and public health (X11)	4.13	0.37	agree
Rayong Province's Balanced Development (RPBD) (Y)	4.12	0.23	agree

### Regression analysis

Table 4 shows the stepwise multiple linear regression analysis results (Montgomery et al., 2021), which identifies the factors significantly influencing RPBD. Findings show that the dependent variables X4, X6, X7, X8, X9, X10, and X11, all have a statistically significant impact on balanced development, with significance levels of .01 or .05. These factors together explain 93% of the variance in balanced development ( $R^2 = .930$ ), with an Adjusted  $R^2$  of .928, indicating a very strong model fit. Coefficients ( $\beta$ ) (e.g., 0.224, 0.225, etc.) represent the weights assigned to each predictor variable  $X$  in the equation. They indicate how much the dependent variable  $\hat{y}$  is expected to change when a particular independent variable increases by one unit, assuming all other variables are held constant. 0.288\*\* represents the intercept, or constant term, which is the expected value of  $\hat{y}$  when all  $X$  variables are zero. Positive coefficients (e.g., 0.225, 0.224) indicate a positive relationship between the predictor and the outcome variable. For instance, if  $X_{10}$  increases by 1 unit,  $\hat{y}$  is expected to increase by 0.225 units. Negative coefficients (e.g., -0.031, -0.027) indicate a negative relationship, meaning that as the predictor variable increases, the outcome variable  $\hat{y}$  decreases. For example, if  $X_6$  increases by 1 unit,  $\hat{y}$  is expected to decrease by 0.031 units.

Therefore, health and public health (X11) showed the highest regression coefficient, indicating the strongest influence on balanced development, followed by community participation (X8), and government policy (X10).

**Table 4: Stepwise regression analysis of factors influencing balanced development**

variables	Stepwise Regression Coefficient			
	$\beta$	beta	t	Sig
Constant	.288			
Infrastructure factors (X1)	-	-	-	-
Local Administrative Organization (LAO) factors (X2)	-	-	-	-
Information communication technology (ICT) factors (X3)	-	-	-	-
Resident factors (X4)	-.027	-.036 )6(	-.2168	.031*
Government agency factors (X5)	-	-	-	-
Private sector factors (X6)	-.031	-.033 (7(	-.2192	.029*

Industry factors (X7)	.215	.248 (4(	8.646	.000**
Community participation factors (X8)	.196	.281 (2(	16.084	.000**
Community and urbanization factors (X9)	.131	.174 (5(	9.443	.000**
Public policy factors (X10)	.225	.276 (3(	14.129	.000**
Health and public health factors (X11)	.224	.307 (1(	14.809	.000**
R=.964, R <sup>2</sup> =.930, Adjusted R <sup>2</sup> =.928, R <sup>2</sup> Change=.001, F=738.668				

Note. \*Sig.<0.05, \*\*Sig.<0.01

### results of hypothesis testing and forecasting equations

The equation for predicting balanced development in Rayong Province using unstandardized coefficients is:

Unstandardized

$$\hat{y} = .288 + .225X_{10} + .224X_{11} + .215X_7 + .196X_8 + .131X_9 - .031X_6 - .027X_4 \quad (3)$$

The equation allows the prediction of the dependent variable  $\hat{y}$  based on specific values of the independent variables (H4, H6, H7, H8, H9, H10, and H11). This is crucial in practical scenarios where forecasting outcomes is necessary. Unstandardized coefficients also give a straightforward interpretation of the effect size of each predictor in its original units. This is useful for understanding how changes in each independent variable impact the dependent variable directly. Finally, researchers can evaluate the model's fit by examining how well it predicts the actual data. The coefficients can provide insights into which variables are most influential in explaining variations in  $\hat{y}$ .

The equation for predicting balanced development using standardized coefficients is:

Standardized

$$\hat{Z} = .307Z_{11} + .281Z_8 + .276Z_3 + .248Z_7 + .174Z_9 - .036Z_4 - .033Z_6 \quad (4)$$

These equations help quantify the influence of various factors on balanced development, with the standardized coefficients showing the relative strength of each factor in standard deviation units. The equations presented are regression equations used for predicting an outcome variable  $\hat{y}$ , based on several predictor variables  $X_1, X_2, X_n$ .

In hypothesis testing, regression equations help determine the significance and strength of relationships between variables. Regression models test specific hypotheses about the relationships between the dependent and independent variables. For instance, a hypothesis might state that  $X_{10}$  has a significant positive effect on  $\hat{y}$ . The corresponding coefficient (0.225) is tested to see if it is statistically significantly different from zero. By examining the  $p$ -values associated with each coefficient, a determination can be made on the effects of the predictors and their statistical significance. A significant coefficient means that there is enough evidence to suggest a real effect of the predictor on the outcome variable.  $R^2$  indicates how well the model explains the variability in the dependent variable. A higher  $R^2$  suggests a better-fitting model.

The hypotheses concerning the influence of residents (H4), the private sector (H6), industry (H7), community participation (H8), community and urbanization (H9), government policy (H10), and

health and public health (H11) on balanced development are supported by the data, showing significant direct effects (Table 5).

However, hypotheses related to infrastructure (H1), local administrative organizations (H2), ICT (H3), and government agency factors (H5) did not show significant direct effects, indicating that these factors may not significantly influence balanced development in the context of Rayong Province.

**Table 5: Hypothesis testing and results**

Research Hypothesis	Hypothesis Test Results	Consistency
H1: X1 influences RPBD (Y1)	Direct influence, not statistically significant	inconsistent
H2: X2 influences RPBD (Y1)	Direct influence, not statistically significant	inconsistent
H3: X3 influences RPBD (Y1)	Direct influence, not statistically significant	inconsistent
H4: X4 influences RPBD (Y1)	Direct influence, statistically significant at .05	consistent
H5: X5 influences RPBD (Y1)	Direct influence, not statistically significant	inconsistent
H6: X6 influences RPBD (Y1)	Direct influence, statistically significant at .05	consistent
H7: X7 influences RPBD (Y1)	Direct influence, statistically significant at .01	consistent
H8: X8 influences RPBD (Y1)	Direct influence, statistically significant at .01	consistent
H9: X9 influences RPBD (Y1)	Direct influence, statistically significant at .01	consistent
H10: X10 influences RPBD (Y1)	Direct influence, statistically significant at .01	consistent
H11: X11 influences RPBD (Y1)	Direct influence, statistically significant at .01	consistent

## DISCUSSION

### Inconsistent hypotheses

Hypotheses H1, H2, H3, and H5's rejection despite having strong to good support from survey respondents, is an interesting and somewhat common occurrence in research. This is supported by multiple studies that discuss how the theoretical and empirical basis for understanding why strong survey support does not always translate to empirical validation in hypothesis testing, highlighting the complex interplay between perception and reality in research findings (Downey and Christensen, 2006). An example of this can be found in Table 3's results which showed that both infrastructure (X1) and LAOs (X2) received high mean scores, indicating that respondents strongly agree with these factors' importance to RPBD.

However, in Table 4's stepwise regression analysis, the statistical significance of each variable's impact on the dependent variable, RPBD (Y) was evaluated. In this analysis, both X1 and X2 were excluded from the final regression model because their effects were not statistically significant. Therefore, in Table 5's hypotheses testing, H1 and H2 were rejected based on the regression analysis, as these variables do not show a statistically significant direct influence on RPBD. This means that despite the survey respondents perceiving them as important, the statistical analysis did not find evidence that these factors significantly impact RPBD when other variables are controlled for.

However, it should be understood that respondents' perceptions or opinions about the importance of each factor are subjective and may not always align with empirical data as regression analysis assesses the actual impact of each variable on the outcome, controlling for the influence of other variables. Even if a factor is perceived as important, it might not have a measurable impact when considered alongside other factors.

### **Collinearity and overlapping effects**

Variables such as infrastructure (X1), LAOs (X2), and ICT (X3) might have high collinearity with other variables, meaning they share a lot of common variances (Shrestha, 2020). This can lead to a situation where their contributions are not statistically significant in the presence of other correlated predictors. It is also possible that other variables, such as community participation (X8) or public policy (X10), capture the effects of infrastructure and local administration better in the regression model, rendering X1, X2, X3, and H5 statistically insignificant.

Therefore, the model might include multiple variables that capture overlapping or redundant effects. The stepwise regression method automatically selects variables based on statistical criteria (Silva et al., 2021), potentially excluding those that don't add unique explanatory power (Gregorich et al., 2021). Including many predictors means that only the factors that independently explain variance in RPBD will appear significant. X1, X2, X3, and H5 may contribute to perceptions of development but don't explain unique variance in RPBD beyond what other factors capture.

Finally, despite being perceived as important by respondents, the regression results suggest that X1-X3 and H5 do not have a statistically significant independent effect on RPBD. This implies that while important, their effects are either mediated by other factors or not as impactful when considering other elements of development. In summary, the rejection of H1-H3 and H5 despite strong survey support can be attributed to the difference between perceived importance and empirical evidence. Survey results capture subjective opinions, while regression analysis tests the actual statistical impact of variables. The non-significant regression results for X1-X3 and H5 suggest that other factors may be more directly influential in achieving balanced development in Rayong Province, or that these factors' impacts are related to other factors in ways not captured in a direct linear relationship.

### **Consistent or supported hypotheses**

The hypotheses testing results in Table 5 show that most variables have a statistically significant influence on Rayong Province's Balanced Development (RPBD), while others do not. In this discussion, we'll explore why hypotheses H4, H6, H7, H8, H9, H10, and H11 are supported and considered consistent based on their statistical significance and potential impact on RPBD.

H4: Residents (X4) had a direct influence on RPBDE and was statistically significant at .05. Support for this finding suggests that residents' engagement, education, and socio-economic status of the local population a significant contributor to balanced development (Kothencz et al., 2017). Also, residents' active participation and investment in the community can lead to more sustainable development practices (Winston, 2022). The significance at the .05 level suggests that while the effect is not as strong as others, it is still a meaningful contributor to RPBD.

H6: The private sector (X6) also had a direct influence on RPBDE and was statistically significant at .05. Reasons for this may include the fact that the private sector often plays a crucial role in development by driving economic growth, creating jobs, and fostering innovation (Surya et al., 2021). Moreover, studies have shown that the private sector can provide substantial economic opportunities, contributing to the overall prosperity and development of Rayong Province (Gilfillan et al., 2019). Moreover, businesses offer technological advancements and investments that enhance infrastructure and local services, supporting balanced development (Meiksin, 2020).

H7: Industry (X7) also had a direct influence on RPBDE and was statistically significant at .01. Reasons for this may include industrial development is a major driver of economic growth and infrastructure development (Opoku and Yan, 2019). Industries can significantly influence RPBD through job creation, resource utilization, and technological advancements. Industries provide employment opportunities, which can improve the living standards of residents and contribute to economic stability. Industrial activities often necessitate improvements in infrastructure, such as transportation and utilities, which can benefit the wider community.

H8: Community participation (X8) also had a direct influence on RPBDE and was statistically significant at .01. Reasons for this include community participation is essential for sustainable development (Anthony, 2024; Winston, 2022), as it ensures that development initiatives align with the needs and priorities of local populations. The strong significance of X8 reflects the importance of involving community members in decision-making processes (Webler and Tuler, 2021). Engaging the community in development projects fosters a sense of ownership and responsibility, leading to more effective and sustainable outcomes. Community participation helps ensure that development efforts are tailored to the specific needs and circumstances of the region, enhancing their effectiveness.

H9: Community and urbanization Factors (X9) also had a direct influence on RPBDE and was statistically significant at .01. Reasons for this may include that the process of urbanization and the characteristics of the community, such as population density and urban infrastructure, can significantly affect development. The significance of X9 indicates that urban planning and community dynamics play a critical role in RPBD (Li et al., 2020). Effective urban planning can lead to well-organized and efficient cities that support economic growth and improve residents' quality of life (Nikoofam and Mobaraki, 2020). Urbanization requires the development of infrastructure and public services, which can enhance the overall development of Rayong Province.

H10: Public policy (X10) also had a direct influence on RPBDE and was statistically significant at .01. Reasons for this include public policies setting the framework for development activities, and influencing everything from economic growth to social welfare (Chugunov et al., 2021). The strong significance of X10 underscores the critical role that government policies play in shaping the balanced development of the region. Policies can facilitate or hinder development through regulations that impact businesses, industries, and community initiatives. Government decisions on the allocation of resources can directly affect infrastructure development, education, and healthcare, contributing to RPBD.

H11: Health and public health (X11) also had a direct influence on RPBDE and was statistically significant at .01. Reasons for this come from the vital importance of public health in maintaining a healthy population, which is a cornerstone of sustainable development. The high significance of X11 indicates that healthcare services and public health initiatives are crucial for RPBD. A healthy population is more productive and can contribute positively to economic and social development (Racioppi et al., 2020). Access to quality healthcare services improves residents' quality of life and supports overall community well-being. Examples of these statements can be found in countless studies concerning the need for public health maintenance during the recent COVID-19 global pandemic.

## CONCLUSION

The consistency of hypotheses H4, H6, H7, H8, H9, H10, and H11 can be attributed to the substantial influence these factors have on balanced development. Each of these factors contributes to RPBD in different ways, from economic growth and job creation to community engagement and health. Their statistical significance indicates that they are key components of development strategies in Rayong Province.

These supported hypotheses illustrate the complexity of regional development and highlight the importance of a multifaceted approach that considers various social, economic, and policy-related factors. Addressing these areas can lead to more effective and sustainable development outcomes. In conclusion, the analysis reveals that while various factors contribute to the balanced development of Rayong Province, those related to health, community engagement, and government policy play particularly crucial roles. The regression model effectively captures the majority of the variance in balanced development, highlighting the importance of these factors in fostering development in the province.

## Declarations

**Authors' individual contribution:** Conceptualization — R.N. and S.S.; Methodology — R.N. and S.B.; Software — R.N. and S.S.; Validation — R.N. and W.S.; Formal Analysis — R.N. and W.S.; Investigation — R.N. and W.S.; Resources — R.N. and R.S.; Data Curation — R.N. and R.S. ; Writing — Original Draft — R.N. and R.S.; Writing — Review & Editing — R.N. and R.S.; Visualization — R.N. and S.S.; Supervision — R.N. and S.B.; Project Administration — R.N. and W.S.; Funding acquisition— R.N. and R.S. All authors have read and agreed to the published version of the manuscript.

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