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Article

An impact of Starlink project on regulations and national security

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Abstract: This study rigorously investigates the Starlink Project's impact on Thailand's legal frameworks, regulatory policies, and national security concerns. Utilising a well-structured online questionnaire, we collected responses from 1378 Thai participants, meticulously selected to represent diverse demographics, technology usage patterns, and social media interactions. Our analytical approach integrated binary regression analysis to dissect the intricate relationships between various predictor variables and the project's potential effects. Notably, the study unveils critical insights into how factors such as age, gender, education level, income, as well as specific technology and social media usage (including laptop, smartphone, tablet, home and mobile Internet, and TikTok), influence perceptions of Starlink's impact. Intriguingly, certain variables like Twitter and YouTube usage emerged as non-significant. These nuanced findings offer a robust empirical basis for stakeholders to forge targeted strategies and policies, ensuring that the advent of the Starlink Project aligns with Thailand's national security, legal, and regulatory harmony.

Keywords: Starlink project; regulations; national security
JEL Classification codes: K23; L51; L96; L98

1. Introduction

Globalisation has entered a new phase of development with the advancement of information and communication technologies (ICTs), the Internet, and mobile communications. At the forefront of this stage are computers and emerging ICTs, which enable worldwide connectivity and establish a unified communication system, fostering an integrated financial and information space for the entire world (Limna et al., 2023). The Internet has become an indispensable part of our daily lives, representing the fastest-adopted technological advancement in human history. Its impact has revolutionised various aspects of our lives, including information retrieval, media consumption, entertainment, and social networking (Firth et al., 2019). Starlink is an Internet service provided by SpaceX, an aerospace company founded by Elon Musk in 2002. SpaceX specialises in the development, production, and launch of rockets and spacecraft. The primary objective of Starlink is to offer high-speed broadband Internet with low latency, particularly targeting underserved areas in remote and rural regions worldwide. Subscribers can access the service for a monthly fee starting at $110, along with a one-time hardware cost of $599. Through its extensive satellite constellation, Starlink has significantly expanded its coverage. Presently, the company maintains a fleet of over 3,000 operational satellites and continues to augment it through frequent launches. As of September 18, 2022, SpaceX successfully launched an additional 54 satellites into space (Shaengchart and Kraiwanit, 2023). In recent years, the economic prospects of space have grown considerably, driven by remarkable advancements in satellite manufacturing, launch

capabilities, and space asset operations. Companies like SpaceX have played a significant role in this transformation by actively investing in the development and commercialization of cutting-edge technologies. Notably, SpaceX achieved a substantial fundraising success in 2022, raising around US $2 billion. Looking ahead to 2023, the company has set forth an ambitious agenda, including plans for 87 rocket launches, the initiation of a sustained moon exploration project, and the expansion of its Starlink internet service. Moreover, SpaceX is expanding its reach by venturing into various sectors, such as satellite-based services, diversifying its operations to capitalise on emerging opportunities in the space industry (Coykendall et al., 2023). While the economic prospects of space have seen significant growth, it is essential to carefully examine and understand the implications of projects like Starlink on legal systems, regulations, and national security.

The Starlink project aims to create a global satellite internet network by deploying thousands of small satellites into orbit. The deployment and operation of a large-scale satellite network like Starlink raise questions about international regulations (Frąckiewicz, 2023a). Existing legal frameworks, such as the International Telecommunication Union (ITU) regulations, may need to be updated to accommodate the unique challenges posed by satellite constellations. Issues such as orbital debris mitigation, spectrum allocation, and interference prevention may require new guidelines or agreements between nations (Berry et al., 2022; Bhatia, 2022; Pultarova and Howell, 2022). Moreover, governments around the world will need to develop or revise their regulatory frameworks to address the activities of Starlink and other similar satellite networks. These regulations might cover areas such as licensing, spectrum management, data privacy, cybersecurity, and competition. Regulators will need to balance the promotion of innovation and competition with ensuring fair access, consumer protection, and national security (Logue and Pelton, 2019; State Service of Special Communications and Information Protection of Ukraine, 2022).

Starlink satellites communicate with each other and ground stations using radio frequency spectrum. Effective spectrum management is crucial to avoid interference between different satellite systems and existing terrestrial services. Coordinating spectrum usage and resolving conflicts will be essential to ensure the reliable and efficient operation of satellite networks like Starlink (eoPortal, 2019; Starlink, 2023). As Starlink provides internet connectivity, concerns over data privacy and security arise. Governments may need to establish regulations or agreements to safeguard user data and ensure compliance with data protection laws across borders. The storage, processing, and transmission of data by satellite networks may require specific rules to address potential vulnerabilities and protect national security interests. Furthermore, the global coverage and potential military applications of satellite networks like Starlink raise national security concerns. Governments will need to assess the implications of relying on foreign satellite infrastructure for critical communications and ensure safeguards against unauthorised access, cyberattacks, or hostile exploitation. National security agencies may need to collaborate closely with satellite operators to mitigate risks and protect sensitive information (Caudill, 2020; Frąckiewicz, 2023b; Frąckiewicz, 2023c; Frąckiewicz, 2023d).

The deployment of satellite networks can influence geopolitical dynamics. Geopolitics encompasses the strategic considerations and interactions between

different nations or groups, taking into account political, geographical, and economic factors. It typically relates to international relations, diplomacy, and foreign policy, aiming to advance the interests of a particular country or its people. While the fundamental principles of geopolitics have been present throughout human history, their precise origins cannot be attributed to a specific point in time (Ferguson and Jordan, 2021; Ndiaye et al., 2022). Countries with limited or no access to reliable internet connectivity might seek to rely on satellite networks like Starlink for their digital infrastructure, potentially reducing dependence on foreign providers. This could impact existing geopolitical relationships and influence regional power dynamics (Frąckiewicz, 2023e; Shaengchart and Kraiwanit, 2023).

In addition, satellite networks operate across national boundaries, making it challenging to determine legal jurisdiction and liability in case of disputes or accidents. Clarity is required to establish which laws apply to satellite operators, users, and potential damages caused by their activities. Legal frameworks need to address liability issues related to collisions in space, satellite re-entry, and other potential hazards (Housen-Couriel, 2016; Saboorian, 2019). The Starlink project involves launching thousands of satellites into space, increasing the number of objects in Earth's orbit. This raises concerns about orbital debris and its potential impact on space activities. International cooperation and regulation are necessary to mitigate the risks associated with debris and ensure sustainable space operations (Bernhard et al., 2023; Runnels, 2023).

The deployment of SpaceX's Starlink in Ukraine amidst the conflict with Russia has underscored complex challenges in the realms of regulations and national security. Initially provided as a humanitarian aid to support internet connectivity, Starlink quickly became integral to Ukraine's military communications and operations. This shift raised concerns about the reliance on a single, privately-owned satellite network for critical national defence infrastructure. Elon Musk's influence as SpaceX's CEO, evidenced by his public statements and actions, highlighted the risks of depending on a private company for such essential services. SpaceX's subsequent steps to limit Starlink's military use for controlling drones further illustrated the dilemmas in balancing humanitarian intentions with the realities of a conflict zone. The situation prompted discussions about international funding and oversight, reflecting the need for a structured approach to deploying advanced technology in sensitive geopolitical contexts. This case exemplifies the intricacies of integrating private sector innovation with national security objectives, emphasising the necessity for careful consideration of regulatory and ethical implications (Schwaller, 2022; Karaganis, 2023; Roulette, 2023).

In the context of SpaceX's Starlink in the Philippines, regulatory and national security concerns primarily revolve around the creation of a comprehensive legal framework to manage the new technology. This includes addressing potential environmental impacts, such as light pollution and interference with astronomical observations, and evaluating the impact on existing broadband infrastructure and market competition. There's also a significant focus on data privacy and security, given the sensitivity of personal and national data. The Philippines' government is tasked with balancing the benefits of advanced satellite internet technology with these potential risks, ensuring that Starlink's operation aligns with national interests and

security requirements (Frąckiewicz, 2023d).

In Japan, the launch of SpaceX's Starlink necessitates careful navigation of regulatory and national security concerns. Compliance with Japan's telecommunications regulations, data privacy laws, and cybersecurity standards is imperative. Starlink must also coordinate with Japanese authorities for spectrum management to avoid disrupting existing services and maintain infrastructure security against potential threats. As a global service, Starlink's adherence to international agreements is crucial, especially considering Japan's foreign policy. The impact on local telecom providers and market competition is another consideration for regulatory bodies. Additionally, given Japan's vulnerability to natural disasters, Starlink could play a significant role in emergency communications, necessitating regulations to integrate such capabilities. Overall, Starlink's operation in Japan represents a complex balance between introducing innovative technology and addressing security and regulatory imperatives (ISP, 2023; Frąckiewicz, 2023f).

The Starlink Project, spearheaded by SpaceX, has attracted considerable interest for its capacity to transform worldwide internet connectivity. Through the deployment of numerous satellites in low Earth orbit, Starlink strives to offer fast and low-latency internet access, extending its reach to even the most secluded regions. Nonetheless, this groundbreaking venture prompts crucial inquiries regarding its implications on established legal frameworks, regulatory policies, and national security. Limited research has addressed these concerns. To bridge this gap, the objective of this study is to investigate the potential impact of the Starlink project on legal systems, regulations, and national security in Thailand. This study may enhance understanding of the implications of the Starlink Project and provide valuable insights for policymakers, regulatory bodies, and other stakeholders involved in shaping the future of global internet connectivity.

2. Methodology

In this study, a comprehensive quantitative methodology was adopted to examine the Starlink Project's influence on Thailand's legal and regulatory landscape and national security concerns. The core instrument of this research was an intricately designed closed-ended questionnaire, which was meticulously designed based on reliable and validated research data sources. The questionnaire comprises 4 sections: demographics (6 items), technology usage (9 items), social media interactions (5 items), and impact on legal systems, regulations, and national security (4 items). To enhance the questionnaire's effectiveness, a pre-test was conducted involving 30 participants. This pre-test aimed to refine and finalise the questionnaire, adhering to the guidance provided by Limsangpetch et al. (2022) and Sitthipon et al. (2022). In order to ensure the quality of the measurement instruments, the researchers rigorously assessed the validity, dependability, and accuracy of the questionnaires. This process involved a comprehensive evaluation of the questions and their ability to capture the intended data accurately. Before administering the online questionnaires, the study's objectives were clearly elucidated to the potential respondents. They were requested to participate voluntarily, emphasising the importance of their contribution to the research. The ethical aspect of informed consent was a crucial part of the data

collection process. Data collection for this study occurred between November 2022 and February 2023, spanning a four-month period. During this time, the researchers gathered responses through the online survey platform.

A convenience sampling method, a non-probability sampling technique, involves selecting participants who are readily available and easily accessible, as per the approach described by Doungpitak et al. (2023) and Shaengchart and Kraiwanit (2023). While this technique may not ensure a fully representative sample, it was chosen for its practicality and feasibility in gathering data within the given timeframe and resource constraints. The researchers carefully considered the potential biases associated with this sampling method when analysing and interpreting the study's findings. The sample consisted of Thai individuals aged 18 years and above, residing in Thailand. Convenience sampling was employed to select a diverse and accessible group of 2036 Thai residents aged 18 and above. This approach was designed to ensure representation across various demographics, technological habits, and social media usage patterns. Subsequently, a data cleansing technique was utilised, reducing the number of participants to 1378. This dual strategy aimed to balance practical feasibility with a representative cross-section of the population. The decision on the sample size was influenced by the necessity for a sufficiently large and diverse group to facilitate robust statistical analysis, while considering resource limitations and the study's scope. **Figure 1** presents the study's methodology flow.

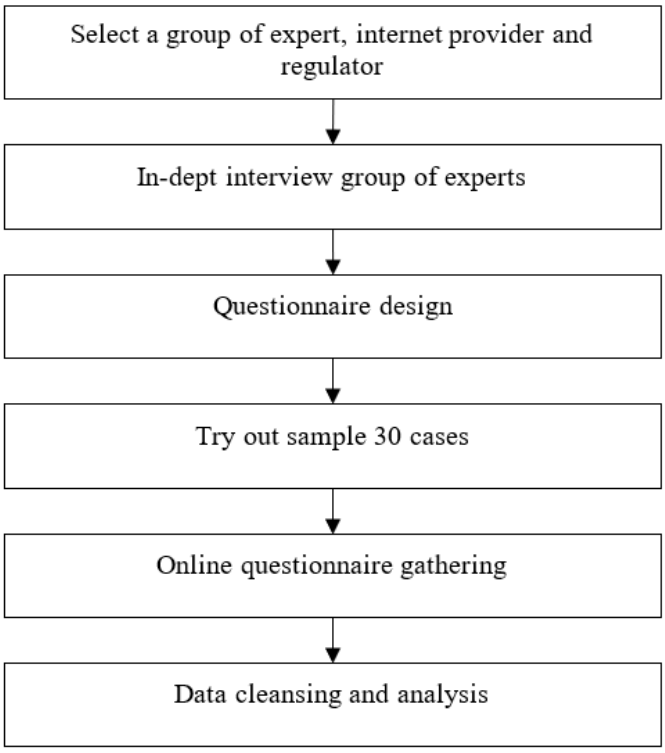

Figure 1. Methodology flow (Source: Author).

The independent variables in the study encompassed demographic variables (such as gender, age, education, status, and income), user behaviour variables (including computer, laptop, smartphone, tablet, wearable device usage, time spent on the Internet, Internet duration, home Internet, and mobile Internet), and social media

variables (namely Facebook, Instagram, Twitter, TikTok, and YouTube). The dependent variable was the potential Starlink's impact on legal systems, regulations, and national security. According to Jangjarat et al. (2023), binary regression is a statistical method used to examine the relationship between one or more explanatory variables and a single binary output variable. Therefore, binary regression was employed to analyse the collected data.

3. Result

This study initiated with a comprehensive description of the data collection process, elucidating how the responses were gathered and processed. Each table in the results section was accompanied by a thorough discussion, where we dissected the implications of the statistical findings in the context of the Starlink Project's potential impact on Thailand's legal, regulatory, and national security frameworks. For each significant variable—spanning demographics, technology usage, and social media interactions—an in-depth analysis was provided, interpreting how these factors individually and collectively shaped perceptions and potential impacts. Non-significant variables were also discussed, providing insight into areas where the Starlink Project may have limited influence.

3.1. Demographic variables

In statistical analysis, the chi-square statistic is commonly used to test the independence or association between categorical variables. It measures how observed data deviates from expected data under the assumption of independence between variables. "df" stands for degrees of freedom. In a chi-square test, the degrees of freedom are related to the number of categories or levels in the variables being analysed. When the p-value associated with a statistical test (such as the chi-square test) is less than or equal to the chosen significance level (in this case, 0.05), it is considered statistically significant. This suggests that the observed results are unlikely to have occurred by chance alone. **Table 1** indicates that a chi-square test with 6 degrees of freedom yielded a chi-square statistic of 121.213. This statistic is significant at the 0.05 significance level, suggesting a statistically significant relationship between a dependent variable and one or more independent variables. In other words, the independent variables (demographic variables) explanatory power in understanding the variation in the dependent variable (the potential Starlink's impact on legal systems, regulations, and national security).

Table 1. Omnibus test of the model's performance using all the independent variables.

		Chi-square	**df**	**Sig.**
Step 1	Step	121.213	6	0.000
	Block	121.213	6	0.000
	Model	121.213	6	0.000

Cox & Snell R-Square and Nagelkerke R-Square are two pseudo-R^2 statistics used in logistic regression to measure the goodness-of-fit of a model. They estimate the proportion of variance in the dependent variable explained by the independent

variables. Cox & Snell R-Square tends to be lower and may underestimate the model's explanatory power, while Nagelkerke R-Square is an improved version that provides a better approximation of this proportion and has a range from 0 to 1. Both measures are considered when assessing the performance of logistic regression models. A statistical model (possibly regression) presented in **Table 2**. The model has an R-squared value of 0.240, indicating that it explains approximately 24% of the variation in the dependent variable. Additionally, the significance value of 0.05 suggests that the relationships between the independent variables and the dependent variable are statistically significant at the 5% level, meaning that the model's findings are unlikely to be the result of chance.

Table 2. The model summary using all the independent variables.

Step	−2 log likelihood	Cox & Snell R-square	Nagelkerke R-square
1	696.497[a]	0.174	0.240

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001.

A classification table is a tool used in the evaluation of classification models, like logistic regression. Back-testing is the process of evaluating the performance of a predictive model on historical data to assess its ability to make accurate predictions. **Table 3** presents the evaluation of a predictive model using a classification table. The model, which includes all independent variables, is used to predict the impact of the Starlink project on legal systems, regulations, and national security in Thailand. It achieved an accuracy rate of 69.5% when a 50% cut-off value was used, meaning it correctly predicted the outcome for approximately 69.5% of the cases in the back-testing dataset. This indicates the model's predictive performance on this specific task.

Table 3. Classification table for back-testing (including all the independent variables).

			Predicted		
	Observed		Impact on Legal Systems, Regulations, and National Security		Percentage correct
			No	Yes	
Step 1	Impact on Legal Systems, Regulations, and National Security	No	108	110	49.5%
		Yes	84	334	79.9%
	Overall percentage				69.5%

Note: The cut-off value is 0.500.

The predictive regression equation of Model 1 using the coefficients from **Table 4** can be described by the following Equation (1):

$$P1 = \frac{1}{1 + e^{-z1}} \quad (1)$$

where P_1 is the impact of the Starlink project on legal systems, regulations, and national security in Thailand, and Z_1 = 2.301 – 0.478(gender) + 1.095(age) – 1.488(education) – 0.401(income).

The significance level of each independent variable is presented in **Table 4**. It shows that the dependent variable (the impact of the Starlink project on legal systems, regulations, and national security in Thailand) could be described by gender, age,

education, and income. Conversely, status and residence were not significant. When the gender changed from female (coded as 0) to male (coded as 1), there was a noticeable reduction in the effect or influence of the Starlink project on the legal systems, regulations, and national security of Thailand. The impact was quantified using a rate that decreased from 1 to 0.620, indicating a decrease of 0.380. In other words, the study found that males were less affected by the Starlink project in terms of its impact on the mentioned aspects compared to females. When there was an increase of one unit in age, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 2.988. When there was an increase of one unit in education, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.226, indicating a decrease of 0.774. When there was an increase of one unit in income, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.670, indicating a decrease of 0.330.

Table 4. Variables in the model using all the independent variables to predict the impact of the Starlink project on legal systems, regulations, and national security in Thailand.

		B	**S.E.**	**Wald**	**df**	**Sig.**	**Exp(B)**
Step 1[a]	Gender	−0.478	0.190	6.320	1	0.012	0.620
	Age	1.095	0.182	36.065	1	0.000	2.988
	Education	−1.488	0.200	55.112	1	0.000	0.226
	Status	0.367	0.341	1.160	1	0.282	1.443
	Income	−0.401	0.152	6.987	1	0.008	0.670
	Residence	−0.163	0.219	0.550	1	0.459	0.850
	Constant	2.301	0.591	15.170	1	0.000	9.987

a. Variable(s) entered in step 1: gender, age, education, status, income, residence.

3.2. User behaviour variables

Table 5 is describing the results of a chi-square test with 9 degrees of freedom, and it suggests that there is a statistically significant relationship between a dependent variable and one or more independent variables. This relationship is significant at the 0.05 significance level, indicating that the independent variables (user behaviour variables) collectively explain some of the variation observed in the dependent variable (the potential Starlink's impact on legal systems, regulations, and national security).

Table 5. Omnibus test of the model's performance using all the independent variables.

		Chi-square	**df**	**Sig.**
Step 1	Step	182.075	9	0.000
	Block	182.075	9	0.000
	Model	182.075	9	0.000

The evaluation of a statistical model presented in **Table 6**. The model has an R-squared value of 0.344, indicating that it explains approximately 34.4% of the variation in the dependent variable. Additionally, the significance value of 0.05

suggests that the relationships between the independent variables and the dependent variable are statistically significant at the 5% level, further supporting the model's validity and explanatory power in explaining the variation observed in the dependent variable.

Table 6. The model summary using all the independent variables.

Step	−2 log likelihood	Cox & Snell R-square	Nagelkerke R-square
1	635.636[a]	0.249	0.344

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001.

The evaluation of a classification model is presented in **Table 7**. The model, which includes all independent variables, is used to predict the impact of the Starlink project on legal systems, regulations, and national security in Thailand. It achieved an accuracy rate of 72.3% when a 50% cut-off value was used. This indicates that the model's predictions were correct for approximately 72.3% of the cases in the dataset, demonstrating its ability to predict the impact category effectively.

Table 7. Classification table for back-testing (including all the independent variables).

			Predicted		
	Observed		Impact on Legal Systems, Regulations, and National Security		Percentage correct
			No	Yes	
Step 1	Impact on Legal Systems, Regulations, and National Security	No	108	110	49.5%
		Yes	66	352	84.2%
	Overall percentage				72.3%

Note: The cut-off value is 0.500.

The predictive regression equation of Model 2 using the coefficients from **Table 8** can be described by the following Equation (2):

$$P2 = \frac{1}{1 + e^{-z2}} \quad (2)$$

where P_2 is the impact of the Starlink project on legal systems, regulations, and national security in Thailand, and Z_2= 0.268 + 1.972(laptop) – 2.130(smartphone) – 1.402(tablet) – 0.627(time) + 0.428(duration) + 1.017(home Internet) + 0.371(mobile Internet).

The significance level of each independent variable is presented in **Table 8**. It shows that the dependent variable (the impact of the Starlink project on legal systems, regulations, and national security in Thailand) could be described by laptop, smartphone, tablet, time, duration, home Internet, and mobile Internet. Conversely, a computer and a wearable device were not significant. When using a laptop, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 7.186. When using a smartphone, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.119, indicating a decrease of 0.881. When using a tablet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.246, indicating a decrease of 0.754. When there was an increase of one unit in time

spent on the Internet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.534, indicating a decrease of 0.466. When there was an increase of one unit in duration spent on the Internet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 1.535. When using home Internet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 2.764. When using mobile Internet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 1.449.

Table 8. Variables in the model using all the independent variables to predict the impact of the Starlink project on legal systems, regulations, and national security in Thailand.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Computer	0.265	0.254	1.085	1	0.298	1.303
	Laptop	1.972	0.359	30.203	1	0.000	7.186
	Smartphone	−2.130	0.934	5.206	1	0.023	0.119
	Tablet	−1.402	0.340	17.011	1	0.000	0.246
	Wearable device	0.448	0.256	3.073	1	0.080	1.565
	Time	−0.627	0.135	21.457	1	0.000	0.534
	Duration	0.428	0.136	9.907	1	0.002	1.535
	Home Internet	1.017	0.203	25.053	1	0.000	2.764
	Mobile Internet	0.371	0.162	5.208	1	0.022	1.449
	Constant	0.268	1.091	0.060	1	0.806	1.307

a: Variable(s) entered in step 1: computer, laptop, smartphone, tablet, wearable device, time, duration, home Internet, mobile Internet.

3.3. Social media variables

Table 9 is describing the results of a chi-square test with 5 degrees of freedom, and it suggests that there is a statistically significant relationship between a dependent variable and one or more independent variables. This relationship is significant at the 0.05 significance level, indicating that the independent variables (social media variables) collectively explain some of the variation observed in the dependent variable (the potential Starlink's impact on legal systems, regulations, and national security).

Table 9. Omnibus test of the model's performance using all the independent variables.

		Chi-square	df	Sig.
Step 1	Step	33.501	5	0.000
	Block	33.501	5	0.000
	Model	33.501	5	0.000

The evaluation of a statistical model is presented in **Table 10**. The model has an R-squared value of 0.071, indicating that it explains approximately 7.1% of the variation in the dependent variable. The significance value of 0.05 suggests that the relationships between the independent variables and the dependent variable are

statistically significant at the 5% level, further supporting the model's validity and explanatory power in explaining the variation observed in the dependent variable.

Table 10. The model summary using all the independent variables.

Step	−2 log likelihood	Cox & Snell R-square	Nagelkerke R-square
1	783.369[a]	0.051	0.071

a: Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001.

The evaluation of a classification model is presented in **Table 11**. The model, which includes all independent variables, is used to predict the impact of the Starlink project on legal systems, regulations, and national security in Thailand. It achieved an accuracy rate of 68.2% when a 50% cut-off value was used. This indicates that the model's predictions were correct for approximately 68.2% of the cases in the dataset, demonstrating its ability to predict the impact category effectively.

Table 11. Classification table for back-testing (including all the independent variables).

			Predicted		
	Observed		Impact on Legal Systems, Regulations, and National Security		Percentage correct
			No	Yes	
Step 1	Impact on Legal Systems, Regulations, and National Security	No	44	174	20.2%
		Yes	28	389	93.3%
	Overall percentage				68.2%

Note: The cut-off value is 0.500.

The predictive regression equation of Model 3 using the coefficients from **Table 12** can be described by the following Equation (3):

$$P3 = \frac{1}{1 + e^{-z3}} \quad (3)$$

where P_3 is the impact of the Starlink project on legal systems, regulations, and national security in Thailand, and Z_3 = 0.584 + 0.783(Twitter) + 1.386(TikTok) – 2.808(YouTube).

The significance level of each independent variable is presented in **Table 12**. It shows that the dependent variable (the impact of the Starlink project on legal systems, regulations, and national security in Thailand) could be described by Twitter, TikTok, and YouTube. Conversely, Facebook and Instagram were not significant. When using Twitter, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 2.187. When using TikTok, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 3.999. When using YouTube, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.060, indicating a decrease of 0.940.

Table 12. Variables in the model using all the independent variables to predict the impact of the Starlink project on legal systems, regulations, and national security in Thailand.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Facebook	−0.575	0.541	1.128	1	0.288	0.563
	Instagram	1.390	0.934	2.214	1	0.137	4.013
	Twitter	0.783	0.322	5.923	1	0.015	2.187
	TikTok	1.386	0.399	12.044	1	0.001	3.999
	YouTube	−2.808	1.026	7.484	1	0.006	0.060
	Constant	0.584	0.698	0.700	1	0.403	1.794

a: Variable(s) entered in step 1: Facebook, Instagram, Twitter, TikTok, YouTube.

3.4. All significant variables

Table 13 is describing the results of a chi-square test with 5 degrees of freedom, and it suggests that there is a statistically significant relationship between a dependent variable and one or more independent variables. This relationship is significant at the 0.05 significance level, indicating that the independent variables collectively explain some of the variation observed in the dependent variable.

Table 13. Omnibus test of the model's performance using all the independent variables.

		Chi-square	df	Sig.
Step 1	Step	271.147	5	0.000
	Block	271.147	5	0.000
	Model	271.147	5	0.000

The evaluation of a statistical model presented is in **Table 14**. The model has an R-squared value of 0.480, indicating that it explains approximately 48% of the variation in the dependent variable. Additionally, the significance value of 0.05 suggests that the relationships between the independent variables and the dependent variable are statistically significant at the 5% level, further supporting the model's validity and explanatory power in explaining the variation observed in the dependent variable.

Table 14. The model summary using all the independent variables.

Step	−2 log likelihood	Cox & Snell R-square	Nagelkerke R-square
1	545.723[a]	0.348	0.480

a: Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001.

The evaluation of a classification model is presented in **Table 15**. The model, which includes all independent variables, is used to predict the impact of the Starlink project on legal systems, regulations, and national security in Thailand. It achieved an accuracy rate of 80.2% when a 50% cut-off value was used. This indicates that the model's predictions were correct for approximately 80.2% of the cases in the dataset, demonstrating its ability to predict the impact category effectively.

Table 15. Classification table for back-testing (including all the independent variables).

			Predicted		
	Observed		**Impact on Legal Systems, Regulations, and National Security**		**Percentage correct**
			No	**Yes**	
Step 1	Impact on Legal Systems, Regulations, and National Security	No	149	69	68.3%
		Yes	57	360	86.3%
	Overall percentage				80.2%

Note: The cut-off value is 0.500.

The predictive regression equation of Model 4 using the coefficients from **Table 16** can be described by the following Equation (4):

$$P4 = \frac{1}{1 + e^{-z4}} \quad (4)$$

where P_4 is the impact of the Starlink project on legal systems, regulations, and national security in Thailand, and Z_4 = 2.692 – 0.646(gender) + 0.979(age) – 1.338(education) – 0.542(income) + 2.170(laptop) – 2.079(smartphone) – 1.620(tablet) – 0.546(time) + 0.560(home Internet) + 0.623(mobile Internet) + 2.094(TikTok).

The significance level of each independent variable is presented in **Table 16**. It shows that the dependent variable (the impact of the Starlink project on legal systems, regulations, and national security in Thailand) could be described by gender, age, education, income, laptop, smartphone, tablet, time, home Internet, mobile Internet, and TikTok. Conversely, duration, Twitter, and YouTube were not significant. When the gender changed from female (coded as 0) to male (coded as 1), there was a noticeable reduction in the effect or influence of the Starlink project on the legal systems, regulations, and national security of Thailand. The impact was quantified using a rate that decreased from 1 to 0.524, indicating a decrease of 0.476. In other words, the study found that males were less affected by the Starlink project in terms of its impact on the mentioned aspects compared to females. When there was an increase of one unit in age, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 2.662. When there was an increase of one unit in education, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.262, indicating a decrease of 0.738. When there was an increase of one unit in income, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.581, indicating a decrease of 0.419. When using a laptop, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 8.759. When using a smartphone, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.125, indicating a decrease of 0.875. When using a tablet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.198, indicating a decrease of 0.802. When there was an increase of one unit in time spent on the Internet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand decreased from 1 to 0.579, indicating a decrease of 0.421. When using home Internet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by

1.750. When using mobile Internet, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 1.865. When using TikTok, the impact of the Starlink project on legal systems, regulations, and national security in Thailand increased by 8.117.

Table 16. Variables in the model using all the independent variables to predict the impact of the Starlink project on legal systems, regulations, and national security in Thailand.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Gender	−0.646	0.256	6.386	1	0.012	0.524
	Age	0.979	0.206	22.531	1	0.000	2.662
	Education	−1.338	0.205	42.774	1	0.000	0.262
	Income	−0.542	0.173	9.835	1	0.002	0.581
	Laptop	2.170	0.385	31.751	1	0.000	8.759
	Smartphone	−2.079	0.923	5.077	1	0.024	0.125
	Tablet	−1.620	0.453	12.766	1	0.000	0.198
	Time	−0.546	0.134	16.643	1	0.000	0.579
	Duration	0.286	0.150	3.625	1	0.057	1.331
	Home Internet	0.560	0.204	7.554	1	0.006	1.750
	Mobile Internet	0.623	0.179	12.083	1	0.001	1.865
	Twitter	0.702	0.426	2.716	1	0.099	2.018
	TikTok	2.094	0.501	17.492	1	0.000	8.117
	YouTube	−1.487	0.856	3.017	1	0.082	0.226
	Constant	2.692	1.398	3.707	1	0.054	14.754

a: Variable(s) entered in step 1: gender, age, education, income, laptop, smartphone, tablet, time, duration, home Internet, mobile Internet, Twitter, TikTok, YouTube.

4. Discussion

The discussion outlines the study's findings, which investigated the potential impact of the Starlink project on legal systems, regulations, and national security in Thailand. The dependent variable was influenced by various independent variables, including gender, age, education, income, technology usage (laptop, smartphone, tablet), time spent on the internet, and the use of specific platforms like TikTok. The results indicate significant relationships between these variables and the impact of the Starlink project.

Gender played a notable role, with a reduction in the effect of the Starlink project observed when the gender changed from female to male. The impact rate decreased from 1 to 0.524, indicating that males were less affected by the project in terms of its influence on legal systems, regulations, and national security compared to females. The findings were consistent with a study conducted by Prachayanant et al. (2023), which confirmed gender (male) had a positive influence on the intention to play a cryptocurrency game. This suggests that males tend to have a higher intention to engage in cryptocurrency gaming activities. Age demonstrated a positive relationship, as an increase of one unit in age led to a significant increase in the impact of the Starlink project on the mentioned aspects in Thailand by 2.662. The alignment with the study by Shaengchart et al. (2023) reinforces the findings of the present study. It

suggests that age is a significant factor in determining the effects of the Starlink project on the competitive structure of the Internet service provider market in Thailand. This indicates that different age groups may experience distinct impacts on the competitive dynamics within the market as a result of the Starlink project. Education showed a negative relationship, where an increase of one unit in education resulted in a decrease in the impact from 1 to 0.262, indicating a decrease of 0.738. This suggests that higher education levels were associated with a lesser impact of the Starlink project on the studied domains. The findings were in agreement with a study conducted Thetlek et al. (2023), indicating that an individual's education level had a statistically significant positive relationship to the token economy. Shaengchart et al. (2023) also confirmed that the effects of the Starlink project on the competitive structure of the Internet service provider market in Thailand can be described by education; it suggests that education level plays a significant role in determining how the project impacts competition among internet service providers in the country. This indicates that individuals with different educational backgrounds may experience varying effects on the competitive landscape within the market as a result of the Starlink project. Furthermore, income exhibited a similar negative relationship. With an increase of one unit in income, the impact decreased from 1 to 0.581, indicating a decrease of 0.419. Thus, higher income levels were associated with a relatively lower impact of the Starlink project. Shaengchart et al. (2023) also confirmed that the effects of the Starlink project on the competitive structure of the Internet service provider market in Thailand can be described by income, it suggests that income plays a significant role in determining how the project impacts the competition among internet service providers in the country. This implies that individuals with different income levels may experience varying effects on the competitive landscape within the market as a result of the Starlink project.

In terms of technology usage, the study revealed that utilising a laptop had a notable positive effect on the impact of the Starlink project, resulting in an increase of 8.759. However, the use of a smartphone and tablet showed a decrease in impact, with reductions of 0.875 and 0.802, respectively. Contrary to these findings, a study conducted by Shaengchart and Kraiwanit (2023) in the context of the Starlink satellite project's impact on the Internet service provider market in emerging economies did not find significant associations with the use of a computer, laptop, or smartphone. Time spent on the internet showed a negative relationship. An increase of one unit in internet usage time led to a decrease in the impact from 1 to 0.579, indicating a decrease of 0.421. This suggests that spending more time on the internet was associated with a lesser impact of the Starlink project. The findings were consistent with a study conducted by Shaengchart and Kraiwanit (2023), which confirmed that the impact of the Starlink satellite project on Internet service providers in emerging economies could be described by Internet time. The use of home internet and mobile internet both had positive relationships with the impact of the Starlink project, with increases of 1.750 and 1.865, respectively. The findings were in agreement with a study conducted by Shaengchart et al. (2023), which confirmed that the effects of the Starlink project on the competitive structure of the Internet service provider market in Thailand can be attributed to the utilisation of home internet.

Jangjarat et al. (2023) showed that ChatGPT awareness and usage were

influenced by variables like social media usage. In this study, using TikTok was strongly associated with an increased impact of the Starlink project on legal systems, regulations, and national security in Thailand, with an increase of 8.117. The results were in line with a study conducted by Kraiwanit et al. (2023), which examined the factors influencing the online activities of older Thai adults. The findings revealed that participation in online activities is influenced by various factors, including the choice of online media platform. Moreover, Shaengchart et al. (2023) confirmed the influence of TikTok on the competitive structure of the Internet service provider market in Thailand regarding the Starlink project, it suggests that TikTok usage plays a significant role in shaping the effects of the project on the competition among internet service providers.

These findings provide insights into the various factors that influence the potential impact of the Starlink project in the specific context of legal systems, regulations, and national security in Thailand. The implications of the study's findings provide valuable insights for policymakers, regulators, and stakeholders involved in shaping the legal, regulatory, and security frameworks impacted by the Starlink project in Thailand. By understanding the influential factors, decision-makers can develop more targeted and effective strategies to address potential challenges and leverage opportunities arising from the project's implementation.

The study's academic implications lie in its contribution to the existing literature, its robust methodological approach, its consideration of a diverse range of independent variables, and its exploration of platform-specific dynamics. These implications advance our understanding of the Starlink project's impact on legal systems, regulations, and national security in Thailand and provide a foundation for further research in this field.

5. Conclusion

This study sheds light on the factors that influence the potential disruptions and challenges posed by the Starlink Project, specifically within the realms of legal systems, regulations, and national security. By utilising a quantitative methodology and conducting an online questionnaire with a sample of 1378 participants in Thailand, the study identified several significant variables that contribute to the impact of the Starlink project in these areas. The findings highlight the importance of various factors, including gender, age, education, income, technology usage (laptop, smartphone, tablet), time spent online, home Internet usage, mobile Internet usage, and TikTok usage. Gender was found to play a significant role, with males demonstrating a relatively lower impact compared to females. Age was positively associated with the impact of the Starlink project, suggesting that different age groups may experience distinct effects on legal systems, regulations, and national security. Education and income levels were inversely related to the impact, indicating that higher education and income are associated with lesser effects of the project. The study also revealed that laptop usage had a positive influence, while smartphone and tablet usage showed a negative impact. Time spent online was associated with a lower impact, and the use of home Internet and mobile Internet had positive relationships with the project's effects. Notably, TikTok usage had a strong positive association with the impact of the

Starlink Project. These findings have significant implications for decision-making and policy development regarding the Starlink Project. Stakeholders can utilise the identified factors to make informed choices and develop strategies that effectively address the challenges and opportunities associated with the project. Policymakers and regulators can take these findings into account to shape legal frameworks, regulations, and security measures that mitigate potential disruptions and maximise the project's benefits.

In Ukraine, amid the conflict, Starlink has played a vital role in preserving internet connectivity as traditional communication infrastructure suffered damage or disruption due to military activities. Starlink's satellite internet became indispensable, serving as a resilient alternative to maintain internet functionality. This enabled emergency services, government communications, and civilian access to crucial information and outside world contact. In Japan, prone to frequent earthquakes and tsunamis, Starlink offers a dependable communication backup. When natural disasters compromise terrestrial networks, Starlink's satellite system swiftly restores internet access, aiding in coordinating rescue efforts, disseminating information to the public, and facilitating survivors' connection with family and support services. In the Philippines, regularly affected by typhoons and other calamities, Starlink's services can provide significant benefits. After such events, when ground-based communication infrastructure is often damaged or destroyed, Starlink promptly offers vital internet connectivity. This assists in coordinating relief endeavours, monitoring weather patterns, and ensuring that disaster-affected individuals remain connected to essential services and loved ones. In each of these scenarios, Starlink's key advantage lies in its ability to rapidly deploy and deliver stable, high-speed internet connectivity in situations where traditional communication infrastructure is unavailable or severely impaired. This is particularly critical in disaster response and recovery efforts, where effective communication is essential for coordinating rescue and relief operations, as well as for providing support and information to those affected. Conversely, in Thailand, where serious disasters like those mentioned above are uncommon, regulators tend to favour local internet providers. However, using services like Starlink could prove beneficial in rural areas by narrowing the internet access gap.

It is important to acknowledge the limitations of this research paper. Firstly, the study relied on a convenient sample of participants from Thailand, which may limit the generalizability of the findings to other populations or regions. Researchers could consider expanding the scope of investigation to include a more diverse sample of participants from different regions and backgrounds to enhance the generalizability of the findings. Additionally, the research used a quantitative methodology based on an online questionnaire, which may introduce biases and limitations related to self-reporting and response validity. Incorporating qualitative research methods such as interviews or focus group discussions could provide a deeper understanding of the factors influencing the impact of the Starlink Project. The study's scope focused specifically on legal systems, regulations, and national security, and other aspects of the Starlink Project's impact may not have been fully explored. Future studies could explore additional variables or factors that were not included in this research, such as cultural or social factors, technological infrastructure, or government policies. By considering a broader range of variables, a more comprehensive understanding of the

Starlink Project's impact on legal systems, regulations, and national security can be achieved. By addressing the limitations and pursuing the recommended avenues for future research, we can continue to advance our knowledge and inform decision-making regarding the Starlink Project and its implications.

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