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Dans un monde où la communication visuelle est om
phique jo es entiel dans la transmission d'informations. Les entreprises, les
les particuliers reconnaissent l'impact significatif d'un bon design sur l'engagement et la
du public. En effet, un visuel bien conCu peut captiver l'attention, susciter des Émotions et renfor

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National Interest

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Dr. Jakkrit Sirirn

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National Interest

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วารสารวิชาการผลประโยชน์แห่งชาติ
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Ukraine's foreign trade with EU countries in telecommunications, computer and information services: analytical studies

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ABSTRACT

At the current stage of development of society, there is a significant expansion of the service sector both in terms of assortment and geography of sales. The purpose of the study is to analyze Ukraine's foreign trade with EU countries in services in the field of telecommunications, computer and information services. To achieve the goal, the following methods were used: analysis; cluster analysis (K-means method). An analysis of the dynamics of export and import indicators of ICT services between Ukraine and EU countries showed a decrease in 2022 compared to 2021, which is associated with russia's full-scale invasion of Ukraine, and then an increase in 2023. An analysis of the structure of export and import indicators of ICT services showed that the largest share was occupied by computer services – over 82 and 62%, respectively; the next largest were information services – over 9 and 22%, respectively; the smallest share belonged to telecommunication services – less than 8 and 14%, respectively. Using a cluster analysis of EU countries by indicators of trade in ICT services with Ukraine, the largest trading partners of Ukraine in this area were identified: Malta (by Ukrainian exports), Germany, Cyprus, the Netherlands, Belgium, Denmark, France, Ireland, Sweden (by exports and imports). In the future, the research can be continued in the following directions: 1) analysis of Ukraine's foreign trade in ICT services with EU countries in 2022–2024; 2) study of current trends in Ukraine's foreign trade in ICT services with other countries of the world.

KEYWORDS: telecommunication services, computer and information services, foreign trade, Ukraine, EU countries

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1. Introduction. The Strategy for the Development of the Information Society in Ukraine states: "The global trend is the transformation of an industrial society into a post-industrial one, which occurs in the context of increasing globalization processes, the expansion of the service sector and intangible production as a result of scientific and technological progress, including large-scale, deep and dynamic

penetration of information and communication technologies into all spheres of life of an individual, society, business entities and the state" (Legislation of Ukraine, 2013). Given this trend, business entities of Ukraine can provide telecommunications, computer and information services not only to domestic but also to foreign business entities, as well as receive such services in the opposite direction. In the Classification of External Economic Services, Section 9, Services in the sphere of telecommunications, computer and information services (hereinafter referred to as ICT services), contains their list, which is shown in **Table 1**.

Table 1.

Types of foreign economic ICT services according to the Classification of External Economic Services (State Statistics Service of Ukraine, 2022a)

Subsection	Class	Service name
09.01		Telecommunications services
	09.01.01	Public network services
	09.01.02	Services of licensees
	09.01.03	Services of mobile operators
09.02		Computer services
	09.02.01	Software development services
	09.02.02	Data processing services
	09.02.03	Database services
	09.02.04	Other computer services
	09.02.05	Computer and office equipment maintenance and repair services
09.03		Information services
	09.03.01	Information agency services
	09.03.02	Informatization consulting services
	09.03.03	Other information services

Note that foreign economic services are goods that do not undergo customs control, since they do not take the form of material objects to which property rights apply (State Statistics Service of Ukraine, 2024a).

2. Literature Review. By studying the foreign economic activity of Ukraine in general, and in the services sector in particular, over the past five years, scientists have obtained the following results: quantitative and qualitative indicators were analyzed to assess trends in the volume and structure of trade between Ukraine and EU member states (Antoniuk et al., 2021); an economic analysis of the dynamics of export-import of services in the economy of Ukraine and the geographical structure of service exports was carried out, the main features of foreign trade in services in the world and in Ukraine were highlighted (Bulyk & Havrylyuk, 2021); the influence of the main factors on the dynamics of exports of regions of Ukraine in the pre-conflict and conflict periods was studied (Horská et al., 2023); the dynamics of exports and imports of goods and services for the period 2016–2020 were analyzed, the commodity

structure of exports and imports of goods and services and the most influential partner countries were determined (Iziumtseva & Korobka, 2021); it was substantiated that trade policy should be formulated and implemented in such a way that Ukraine's foreign economic activity was more oriented towards services and a scientific and technical basis (Radziyevska, 2023); a comprehensive analysis and forecasting of export and import indicators of services between Ukraine and neighboring countries: Poland, Romania, Slovakia, the Republic of Moldova were carried out (Totska, 2022); the dynamics of financial indicators of export-import of tourist services between Ukraine and the EU were analyzed, their favorable trends in the short term were identified (Totska, 2023a); a comprehensive analytical assessment of international trade in services between Ukraine and the EU countries was carried out (Totska, 2023b); the contribution of cities of regional significance located in the western part of Ukraine to the development of export-import activities of the relevant regions was assessed, structural transformations in the export of goods and services in Ivano-Frankivsk, Chernivtsi and Rivne were analyzed (Zhabynets, 2020).

In addition, scientists have also investigated the field of information and communication technologies: the features of the use of ICT at Ukrainian enterprises in terms of types of economic activity were analyzed (Totska, 2024); the possibilities of using the Lardi-Trans transport exchange in the activities of road freight transport participants were studied (Totska & Prosvirnikov, 2024).

Given the insufficient study of Ukraine's export-import operations with EU countries in the field of telecommunications, we consider it appropriate to fill this gap.

3. Methodology. The purpose of the study is to analyze Ukraine's foreign trade with EU countries in telecommunications, computer and information services. To achieve this goal, the following methods were used:

1) analysis – to study the dynamics and structure of export/import indicators of ICT services in 2021–2023;

2) cluster analysis (K-means method) – to group EU countries by indicators of trade in ICT services with Ukraine in 2021.

The information base of the study is data from the State Statistics Service of Ukraine for 2021–2023.

It should be noted that after the start of the full-scale russian invasion of Ukraine in 2022, new data on the geographical structure of Ukraine's foreign trade in services with countries of the world are not published.

4. Results. In this article, we will focus on the following three indicators of Ukraine's foreign economic activity: exports of ICT services, imports of ICT services, and balance of ICT services. Note that exports of services are formed as the total value of transactions for the provision of services by a resident to a non-resident under agreements (contracts) or in the form of an oral agreement on the date of their actual provision on the basis of the accrual principle (based on invoices); imports of services are formed as the total value of transactions for the receipt of services by a resident from a non-resident under agreements (contracts) or in the form of an oral agreement on the date of their actual receipt on the basis of the accrual principle (based on invoices); the balance of services is formed as the difference

between exports and imports of services (State Statistics Service of Ukraine, 2024a). **Table 2** shows the dynamics of selected indicators for 2021–2023.

Table 2.

Structure of Ukraine's foreign trade in ICT services with EU countries (State Statistics Service of Ukraine, 2024b)

Service name	Exports		Imports		Balance
	thsd. USD	in % of total volume	thsd. USD	in % of total volume	thsd. USD
2021					
EU countries, total	4,494,202.7	100.0	3,232,785.0	100.0	1,261,417.7
Services in the sphere of telecommunications, computer and information services	1,254,682.6	27.9	375,212.5	11.6	879,470.1
Telecommunications services	54,654.7	4.4	34,708.2	9.3	19,946.5
Computer services	1,043,742.4	83.2	234,862.3	62.6	808,880.1
Information services	156,285.5	12.5	105,642.0	28.2	50,643.6
2022					
EU countries, total	3,438,343.4	100.0	1,717,598.7	100.0	1,720,744.7
Services in the sphere of telecommunications, computer and information services	1,177,340.7	34.2	231,743.5	13.5	945,597.2
Telecommunications services	87,518.7	7.4	31,406.1	13.6	56,112.6
Computer services	973,774.6	82.7	147,405.4	63.6	826,369.2
Information services	116,047.4	9.9	52,932.0	22.8	63,115.4
2023					
EU countries, total	3,618,105.7	100.0	2,340,600.0	100.0	1,277,505.7
Services in the sphere of telecommunications, computer and information services	1,254,986.5	34.7	274,529.6	11.7	980,456.9
Telecommunications services	69,782.6	5.6	24,712.8	9.0	45,069.9
Computer services	1,066,966.2	85.0	186,775.2	68.0	880,190.9
Information services	118,237.8	9.4	63,041.6	23.0	55,196.2

As we can see, ICT services account for a significant share of Ukraine's exports of services to the EU countries (approximately a third of the total), and this share has been growing annually. However, due to the war in the country, the amount of exports decreased from 4.5 billion USD in 2021 to 3.4 billion USD in 2022. Although a further increase in the amount of exports to 3.6 billion USD in 2023 is positive.

The import of ICT services had a similar dynamics: a decrease from 3.2 billion USD in 2021 to 1.7 billion USD in 2022 and an increase to 2.3 billion USD in 2023. The share of ICT services in the import of services to Ukraine from the EU countries fluctuated within 11.6–13.5%.

The balance during the analyzed period was positive and amounted to from 1.3 to 1.7 billion USD.

If we consider ICT services by division, then in both exports and imports, the largest share is occupied by computer services – over 82 and 62%, respectively. The next position is occupied by information services – over 9 and 22%, respectively. The smallest share belongs to telecommunication services – less than 8 and 14%, respectively.

Next, we turn to the cluster analysis of EU countries by indicators of ICT services trade with Ukraine. Cluster analysis is a set of methods for classifying multidimensional observations, the main goal of which is to divide input data into homogeneous groups so that objects within a group are similar to each other according to some criterion, and objects from different groups differ from each other. When using the K-means method, K random clusters are selected, located at the greatest possible distance from each other, and then the belonging of objects to them changes so as to: 1) minimize variability within clusters; 2) maximize variability between clusters. That is, it is necessary to specify in advance the number of clusters that we want to obtain (Totska, 2009). **Table 3** shows the necessary data for 2021.

Table 3.

Ukraine's foreign trade with EU countries in ICT services in 2021, thsd. USD (State Statistics Service of Ukraine, 2022b)

EU country	Exports	Imports	Balance (+/-)
Austria	16,175.9	22,399.5	-6,223.5
Belgium	42,090.0	17,838.8	24,251.2
Bulgaria	8,996.8	861.2	8,135.6
Croatia	1,051.2	315.8	735.4
Cyprus	166,608.1	13,930.8	152,677.3
Czechia	20,685.7	12,492.7	8,193.0
Denmark	63,543.7	3,288.7	60,255.0
Estonia	32,318.0	13,372.3	18,945.7
Finland	12,413.9	9,827.1	2,586.8
France	90,898.2	29,010.7	61,887.5
Germany	173,170.0	93,847.1	79,322.9

EU country	Exports	Imports	Balance (+/-)
Greece	305.0	1,212.2	-907.1
Hungary	13,793.8	13,177.2	616.6
Ireland	65,845.1	7,856.8	57,988.3
Italy	20,601.6	1,536.0	19,065.6
Latvia	2,964.0	10,034.8	-7,070.8
Lithuania	11,270.7	6,092.7	5,178.0
Luxembourg	19,290.0	5,398.7	13,891.4
Malta	229,970.9	5,854.1	224,116.8
Netherlands	131,984.9	36,455.3	95,529.7
Poland	38,680.1	19,914.9	18,765.2
Portugal	1,950.5	935.8	1,014.8
Romania	4,438.2	1,794.0	2,644.2
Slovakia	3,605.5	5,248.5	-1,643.0
Slovenia	1,254.5	1,972.0	-717.5
Spain	17,226.2	1,446.4	15,779.9
Sweden	63,549.9	39,098.5	24,451.4
Total	1,254,682.6	375,212.5	879,470.1

As we can see, in the analyzed period, the export of domestic ICT services to individual EU countries ranged from 305.0 thsd. USD (Greece) to 229,970.9 thsd. USD (Malta). Imports of similar types of services to Ukraine from individual EU countries ranged from 315.8 thsd. USD (Croatia) to 93,847.1 thsd. USD (Germany). In general, exports exceeded imports by 3.3 times. The balance was negative for only five EU countries (Austria, Greece, Latvia, Slovakia, Slovenia), and positive for 22 (all other EU countries), which confirms the high competitiveness of the domestic sphere of information and communication technologies in the EU market.

Next, we will apply the K-means cluster analysis method, dividing the EU countries into five groups. In our opinion, in this case, the positions of each cluster (from 1 to 5) can be given a concise name: high, above average, average, below average, low. The results obtained are displayed in **Fig. 1**.

Cluster 1	☐	Malta
Cluster 2	☐	Germany
Cluster 3	☐	Cyprus, Netherlands
Cluster 4	☐	Belgium, Denmark, France, Ireland, Sweden

Cluster 5		Austria, Bulgaria, Croatia, Czech Republic, Estonia, Finland, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Poland, Portugal, Romania, Slovakia, Slovenia, Spain

Figure 1. *Cluster structure by indicators of foreign trade in ICT services with Ukraine*

Note. Created by the author.

That is, the clusters were formed as follows: the first and second – one country each; the third – two countries; the fourth – five countries; the fifth – 18 countries. Note that the position of the cluster according to different indicators of the value of ICT services may differ, as can be seen in **Table 4** and **Fig. 2**.

Table 4.

Average values and positions of each cluster, thsd. USD (Created by the author)

Indicator	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Exports	229,970.9	173,170.0	149,296.5	65,185.38	12,612.32
	high	above average	average	below average	low
Imports	5,854.1	93,847.1	25,193.0	19,418.70	7,112.87
	low	high	above average	average	below average
Balance	224,116.8	79,322.9	124,103.5	45,766.68	5,499.45
	high	average	above average	below average	low

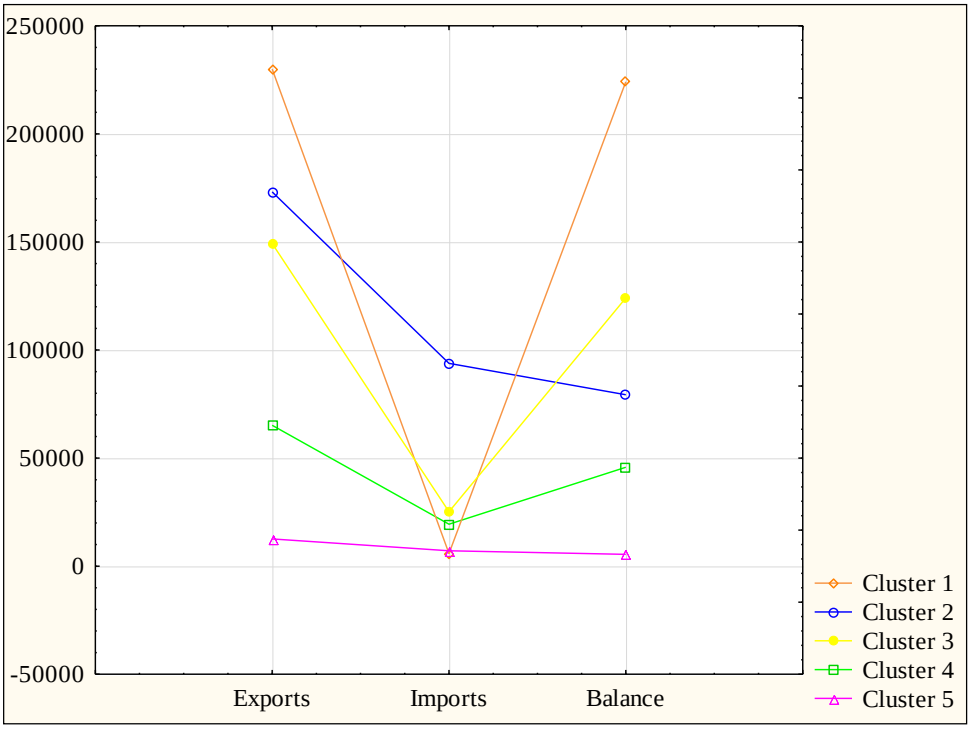

Figure 2. *Graph of average values for each cluster, thsd. USD*

Note. Created by the author.

Fig. 2 shows that the first cluster contains an object (Malta) in which the average values of two out of three ICT services indicators (exports from Ukraine and the balance) are significantly higher than in the other groups. The second cluster contains an object (Germany) in which the average value of one ICT services indicator (imports to Ukraine) is significantly higher than in the other groups.

5. Conclusions. In Ukraine's foreign trade in services with the EU countries, the sphere of telecommunications, computer and information services occupies a rather significant place. In particular, during 2021–2023, their shares in exports amounted to 27.9–34.7%, in imports – 11.6–13.5%. The balance of export-import indicators was positive and amounted to 1.3–1.7 billion USD. The structure of export and import indicators of ICT services was as follows: the largest share was occupied by computer services – over 82 and 62%, respectively; the next largest were information services – over 9 and 22%, respectively; the smallest share belonged to telecommunications services – less than 8 and 14%, respectively. The dynamics of export and import indicators of ICT services decreased in 2022, compared to 2021, and then increased in 2023, which is associated with russia's full-scale invasion of Ukraine.

The dynamics of ICT services exports and imports were as follows: a decrease in 2022 (3.4 billion USD and 1.7 billion USD, respectively), compared to 2021 (4.5 billion USD and 3.2 billion USD, respectively), associated with russia's full-scale invasion of Ukraine. In 2023, there was an increase (3.6 billion USD and 2.3 billion USD, respectively).

A cluster analysis of EU countries by indicators of trade in ICT services with Ukraine indicates that the following countries trade most actively with Ukraine: Malta (by Ukrainian exports), Germany, Cyprus, the Netherlands, Belgium, Denmark, France, Ireland, Sweden (by exports and imports).

Thus, Ukraine has good potential for expanding trade in ICT services with EU countries. The main obstacle to the revival of export-import operations with European partners is the war in Ukraine, which is accompanied by the outflow of personnel abroad, the mobilization of workers in the Armed Forces of Ukraine, the closure of enterprises, etc. We believe that its completion will have a positive impact on the economic development of the state, in particular foreign economic operations. In addition, Ukraine can stimulate the training of information technology specialists by increasing the number of budget places in Ukrainian universities.

In the future, the research can be continued in the following areas:

1) analysis of Ukraine's foreign trade in ICT services with EU countries in 2022–2024 (after the publication of such information on the website of the State Statistics Service of Ukraine);

2) study of current trends in Ukraine's foreign trade in ICT services with other countries of the world, in particular G7 members – the USA, Canada, Great Britain, Japan.

6. Funding. The research was funded by the French Research Center in Humanities and Social Sciences CEFRES, UAR 3138 CNRS–MEAE, within the framework of the topic "Foreign Economic Cooperation of Ukraine and EU Countries: Modern Trends".

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Smart Management Planning for Urban Development to Enhance Social Well-being: Cases of Ukrainian Cities During Wartime

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ABSTRACT

The article examines case studies of Ukrainian cities in developing smart city management concepts focused on sustainable development and the reintegration of veterans into civil society. It outlines the characteristics of smart cities based on indicators proposed by experts, including Smart Governance, Smart Communication and Decision-Making, Smart Administrative Services, Smart Utilities, Smart Transportation, Smart Urban Planning, Smart Healthcare and Education, Smart Energy, and Smart Tourism.

The budgets of urban territorial communities such as Vinnytsia UTC, Lutsk UTC, Kyiv, Lviv UTC, Dnipro UTC, Kharkiv UTC, and Chernivtsi UTC are presented. A step-by-step development plan for smart cities is provided, along with an assessment of city maturity levels in achieving "smartization." The article includes examples of sustainability criteria and indicators for Lutsk Urban Territorial Community based on ISO 37123. The use of blockchain technology is proposed to enhance urban smartization and foster development.

KEYWORDS: smart management, urban development, social well-being, veterans' reintegration, planning, blockchain.

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1 Introduction. The popularity of the SmartCity concept in Ukraine is growing. This trend emerges in response to decentralization, increased powers of local authorities, advancements in technology, and the rising number of IT professionals. Ukrainian society is becoming more open to change, and public administration employees are enhancing their innovation management skills.

The development of SmartCity initiatives during wartime and peacetime differs significantly. In times of danger, well-developed urban infrastructure can greatly benefit residents, serving as the foundation of the human-centered approach of a "smart city." This approach uses technology and data to improve the quality of life for citizens. On the other hand, the techno-centric approach emphasizes the functioning of cities through advanced information and communication technologies.

Projects aimed at enhancing security, such as the construction or modernization of shelters, gain particular importance during wartime. Additionally, with damage to the energy infrastructure, energy-saving measures become critical. The defining challenge for SmartCity initiatives during wartime is finding ways to balance the safety of residents with the efficient use of resources.

The article was written as part of the project "European Values and the Implementation of Best Practices for Urban and Territorial Development Towards Sustainable Development," supported by the European Union's Erasmus+ Jean Monnet Module EVDOC – ERASMUS-JMO-2024-HEI-TCH-RSCH No. 101174676.

2 Literature Review. The authors' research on smart management gains significant importance, especially in the context of ensuring social well-being and reintegrating veterans into civilian life.

R.V. Sevastianov notes that a "Smart City" is an innovative system utilizing technologies such as sensors, the Internet of Things (IoT), network solutions, and big data analytics to enhance the efficiency and competitiveness of urban services. To ensure the sustainable development of a "Smart City," it is essential to consider economic, social, and environmental factors while addressing the needs of both current and future generations.

The creation of "Smart Cities" involves the integration and coordination of urban services, as well as enabling opportunities for citizens to remotely participate in city management processes. The author has systematized electronic smart services in Zaporizhzhia, including "EasyWay," "Waze," and services in transportation, housing and utilities, healthcare and medicine, cultural and entertainment sectors, socio-economic activities, and administrative-social services (Sevastianov, 2021).

E. Jacques, A. N. Júnior, S. De Paris, M. Francescatto, and J. Siluk highlighted that poorly planned urbanization exacerbates the imbalance between the needs of the population and the organized development of urban spaces. Their studies emphasize the role of Smart Cities and the Internet of Things (IoT). IoT technologies are beneficial for human life, providing intelligent services essential for urban development. Technological innovations play a crucial role in advancing Smart Cities. The use of technological resources and the development of applied tools foster collaboration and communication among various Smart City stakeholders, driving innovation and enabling the creation of shared and creative applied solutions in sectors such as education, healthcare, energy, industry, the environment, and public safety. Smart Cities must design and implement innovative solutions and comprehensive approaches, leveraging advanced technologies and scientific knowledge to enhance sustainability, efficiency, resilience, equity, and citizens' quality of life. Managing Smart Cities requires adapting processes and implementing strategic planning while integrating technological advancements. This strategy should align with the collaborative efforts of educational institutions, researchers, companies, public agencies, and self-governance bodies (Jacques at all, 2024).

M. Zaman, N. Puryear, Sh. Abdelwahed, and N. Zohrabi emphasized that Smart City initiatives aim to enhance urban domains such as healthcare, transportation, energy, education, the environment, and logistics through the use of advanced information and communication technologies, particularly the Internet of Things (IoT). In a Smart City, technology acts as a facilitator rather than an end in itself. It is employed to collect and analyze data, which is then used for decision-making, optimizing resource

allocation, and improving service delivery. The primary goal of a Smart City is to promote an economically vibrant, socially inclusive, and environmentally sustainable environment. This involves a holistic approach in which smart technologies are intertwined with strategic urban planning. Key components include developing intelligent infrastructure, ensuring sustainable resource management, and delivering effective public services aimed at enhancing residents' quality of life. Smart Cities emerge as solutions to modern urban challenges, with technology at the forefront of their transformation. Three types of standards are associated with Smart Cities: strategic, procedural, and technical specifications, all of which play crucial roles in building a solid foundation for Smart Cities. Strategic standards are the most essential for city leadership, helping to design a comprehensive pathway toward achieving Smart City objectives. Procedural standards are highly beneficial for defining effective management strategies in established cities. Technical standards apply to all aspects of a Smart City, guiding governance and management decisions for creating a more connected urban environment. To assess the success of a Smart City, a comprehensive set of indicators should be developed to evaluate the effectiveness of policies and efforts implemented to achieve smart objectives (Zaman, 2024).

A. F. Pashchenko explored the latest Smart City concepts. He presented the Integrated Operational Center — a new concept of operational intelligence capable of digitizing, controlling, forecasting, acting, making better and faster decisions, and interacting with its citizens. The proposed concept for managing a Smart City (or Smart Region, Smart Country) would, if implemented, bring breakthrough changes, improving the efficiency of city or regional management and operations (Pashchenko, 2021).

T.A. Pushkar, D.O. Seryohina, and K.V. Mykhailova determined that modern approaches to formulating Smart City strategies are based on a balanced combination of economic, social, and environmental factors of urban development. According to them, the main goal of implementing Smart City strategies is to ensure a comfortable living environment for all groups of urban residents, while combining sustainable development with innovation (Pushkar, 2021).

I.A. Ostrovskyi and H.V. Stadnyk analyzed the experiences of cities in EU countries (Ghent, Seville, Bologna, Poznan, Czech Republic) in the field of sustainable development management. They grouped typical policies identified by the Global Smart Cities Alliance G20 for effective management of Smart City development. They concluded that during the implementation of Smart City strategies, there was a gradual shift from individual digital tools to comprehensive urban digital systems that integrate various aspects of city life and their management (Ostrovsky & Stadnyk, 2023).

O.L. Yershova and L.I. Bazhan concluded that the development of Smart Cities in Ukraine is hindered by the lack of technical infrastructure for creating information technology platforms, as well as the absence of a roadmap for the digital transformation of the national economy. The main obstacles to the digital transformation of cities in Ukraine include barriers to the development of new technological solutions due to unresolved issues in the field of technology standardization and working with big data (Yershova & Bazhan, 2020).

O. Polinkevych, O. Kuzmak, and R. Kaminski noted that Smart Cities will help address issues of social well-being and social inequality in Ukraine, transform businesses in line with societal changes, and

assist in the reintegration of war veterans into civilian life (Polinkevych at all, 2023; Polinkevych, 2023; Polinkevych, 2024a; Glonti at all, 2024; Polinkevych, 2024b).

P. Pontrandolfo, O. Polinkevych, B. Scozzi, and O. Kuzmak described examples of Smart City development in Poland and Ukraine. They conducted an assessment of Smart City programs using the Benessere equo e sostenibile dei Territori (BESdT) methodology for the city of Lublin and cities in the Volyn region (Pontrandolfo at all, 2023).

3 Methodology

The study employs a descriptive-review approach, along with methods of analysis, synthesis, abstraction, and comparison, to investigate the planning of smart management for urban development in Ukraine. In examining the characteristics of Smart Cities based on indicators such as Smart Governance, Smart Communication and Decision-Making, Smart Administrative Services, Smart Utilities, Smart Transportation, Smart Urban Planning, Smart Healthcare and Education, Smart Energy, and Smart Tourism, the method of generalization was used.

Through the use of a tabular method, the main indicators for smart management in cities such as Vinnytsia, Dnipro, Kyiv, Lviv, Kharkiv, Chernivtsi, and Lutsk were identified, along with an analysis of the budgets of urban territorial communities, the cities' maturity levels in achieving "smartization," and the criteria and indicators for the sustainability of Lutsk Urban Territorial Community according to ISO 37122. The methodology for studying the communication interaction of smart cities is based on a scoring system in the following areas: Smart Government, Smart Communication and Solutions, Smart Administrative Services, Smart Utilities, Smart Transportation, Smart Landscaping, Smart Healthcare and Education, Smart Energy, and Smart Tourism. The city's maturity level in terms of achieving its "smartization" state was set based on the fulfillment of 50% of the indicators defined in ISO 37123.

4 Results. Conceptual approaches division into periods

The aim of this article is to examine case studies of Ukrainian cities in shaping the concept of Smart City governance, focusing on sustainable development and the reintegration of veterans into civilian society.

In Ukraine, the formation of smart cities is taking place in a time of war. Military operations cause cataclysms in society, instability of the internal and external environment. Military operations have led to the emergence of a new socially vulnerable population - war veterans. Smart cities should create conditions for the reintegration of veterans into society. As of July 25, 2024, there are 1 million 300 thousand veterans in Ukraine (Burtseva & Zolin, 2025). This number is constantly growing. War veterans are mostly young people, both with and without education. Therefore, their reintegration into society is extremely important. This can be achieved through the formation of the concept of smart cities, where the main role is given to creating a safe and inclusive space for interaction between the government, business, and the public sector.

Drawing on global experience, Ukraine began implementing the Smart City concept in 2015. Currently, the SmartCity system operates in various forms in cities such as Kyiv, Ivano-Frankivsk, Lviv, Mukachevo, Drohobych, Zaporizhzhia, Poltava, Ternopil, and Kharkiv. Additionally, the "Safe City" system has been implemented in Mariupol and Lutsk. According to 2021 data, Kyiv ranks 82nd in the global Smart City Index (“Smart City Ukraine”).

Table 1 summarizes the characteristics of a Smart City based on indicators proposed by experts: Smart Governance, Smart Communication and Decision-Making, Smart Administrative Services, Smart Utilities, Smart Transportation, Smart Urban Development, Smart Healthcare and Education, Smart Energy, and Smart Tourism (“Smart innovations”).

Table 1.

Characteristics of smart cities by indicators

Indicator	Vinnytsia	Dnipro	Kyiv	Lviv	Kharkiv	Chernivtsi	Lutsk
Smart government							
Electronic document management	1	1	1	1	1	1	1
Electronic bidding	1	1	1	1	1	1	1
Property management system	1	1	1	2	1	2	1
Map of MAFs	3	1	1	3	1	2	2
Map of advertising structures	2	2	1	2	1	1	1
Smart communication and solutions							
Electronic communication on the mayor’s website	1	1	1	1	1	1	1
Electronic appointment for government officials	1	1	2	1	1	1	1
Open budget	1	1	1	1	3	2	1
Participatory budget	1	1	1	1	1	1	1
Budget on the map	1	1	2	1	3	2	2
Smart admin services							
Electronic administrative services	1	1	1	1	1	1	1
Electronic record in the TsNAP	1	1	1	1	1	2	1
MVD center in the TsNAP	1	1	2	1	3	3	1
Resident’s office on the city hall website	1	2	1	1	1	2	1
Resident’s card	1	2	1	1	3	2	2
Smart utilities							
Unified call center	1	1	1	1	1	1	1
Road condition map	2	1	2	3	3	3	1

Smart utilities							
Housing and utilities application map	1	2	1	2	1	2	1
Online selection of utility contractors	1	3	2	3	3	3	2
Smart transport							
GPS monitoring of public transport	1	2	1	1	2	2	2
GPS monitoring of municipal transport	1	1	1	1	2	2	1
Transport and traffic light control center	1	2	2	1	2	2	1
Electronic ticket	2	2	2	2	2	2	1
Electronic traffic display at stops	1	2	2	1	3	3	2
Payment for parking spaces with contactless bank cards	3	3	1	1	3	3	1
Payment for public transport with contactless bank cards	3	3	1	3	3	3	1
Smart landscaping							
Street CCTV	1	1	1	1	1	1	1
Face Recognition CCTV	1	2	2	1	2	2	1
Online Police Call	1	2	2	3	3	3	2
Chargers on Streets or Bus Stops	1	2	1	2	3	3	2
Cycle Lanes	1	2	2	2	2	2	1
Disabled Paths	2	2	2	2	2	2	2
Garbage Bins with Fill Sensors	3	2	2	3	3	2	2
Smart medicine and education							
Electronic registration	1	1	1	1	1	1	1
Electronic patient card	2	1	2	3	3	3	1
Electronic queue for kindergarten	1	1	1	2	1	2	1
Innovations in education	1	3	2	3	3	3	2
Smart energy							
Energy monitoring	2	2	2	1	2	2	2
Automatic regulation of coolants	1	2	2	1	1	2	2
Smart tourism							
Electronic guides for tourists	1	2	2	1	2	1	2
QR codes for tourists	1	2	1	2	1	1	2

Notes: 1 – option available; 2 – option in progress; 3 – not available. From "Smart innovations of Ukrainian cities", 2025 (http://www.urbanua.org/dosvid/ukrayinski-pryklady/340) In the public domain. From "Smart cities in Ukraine: comparative assessment and trends", by L.I.Tsymbal, I.M. Uninets, 2022 (http://doi.org/10.32702/2307-2105.2022.9.2) In the public domain and own research Table 1 provides a scoring assessment across various levels, including Smart Governance, Smart Communication and Decision-Making, Smart Administrative Services, Smart Utilities, Smart Transportation, Smart Urban Development, Smart Healthcare and Education, Smart Energy, and Smart Tourism. Each level comprises multiple indicators.

Overall, the leading positions in the rankings for Smart City development and smart urban management are held by Vinnytsia (1st place), Lutsk (2nd place), Kyiv (3rd place), Lviv (4th place), Dnipro (5th place), Kharkiv (6th place), and Chernivtsi (6th place).

Budgets of the urban communities of Lviv, Vinnytsia, Dnipro, Chernivtsi, Lutsk and Kyiv are analyzed in Figure 2.

Table 2.

Budgets of urban territorial communities

Indicator	**Year**					**Deviation 2024/2020**	
	2020	**2021**	**2022**	**2023**	**2024**	**+ /-**	**%**
Lviv MTG							
Deficit/ surplus	7561348,6	9645378,9	958360,3	-2775216	756313,7	-6805034,9	-90,00
Revenue, thousand UAH	9070425,4	11649659,6	13432025,8	15277806,8	15258460,9	6188035,5	68,22
Expenses, thousand UAH	1509076,8	2004280,7	12473665,5	18053022,8	14502147,2	12993070,4	860,99
Kyiv							
Deficit/ surplus	272764	1859474,4	7822626,6	-2797419,5	-13480268	-13753031	-5042
Revenue, thousand UAH	58121754,1	71255170	68332257,5	80170891,5	71762709,4	13640955,6	23,47
Expenses, thousand UAH	57848990,1	69395695,6	60509630,9	82968311	85242977	27393986,9	47,35
Vinnytsia MTG							
Deficit/ surplus	-2002801	2775418,39	1472574,76	-6175984,8	-197054,29	1805746,7	-90,16

Vinnytsia MTG							
Revenue, thousand UAH	3016523,03	3623668,84	6497784,08	762638,943	6354678,04	3338155,0	110,66
Expenses, thousand UAH	5019324	848250,446	5025209,32	6938623,79	6551732,33	1532408,3	30,53
Dnipro MTG							
Deficit/ surplus	-1164114	1766711	7556475	-1997702	7235177	8399291	-721,5
Revenue, thousand UAH	45821703	61741492	58619859	68543900	64128041	18306338	39,95
Expenses, thousand UAH	46985817	59974781	51063384	70541602	56892864	9907047	21,09
Chernivtsi MTG							
Deficit/ surplus	-34343	-188642	200640	395864	776746	811089	-2361
Revenue, thousand UAH	2275303	2767205	3384412	3891517	4240383	1965080	86,37
Expenses, thousand UAH	2309646	2955847	3183772	3495653	3463637	1153991	49,96
Lutsk MTG							
Deficit/ surplus	-127669	8141	492607	-114709	228051	355720	-278,6
Revenue, thousand UAH	2229117	2858760	3121808	3588384	3741044	1511927	67,83
Expenses, thousand UAH	2356786	2850619	2629201	3703093	3512993	1156207	49,06

Note: From "*Lviv MTG budget*", 2025(*https://city-adm.lviv.ua/public-information/budget/lviv*) In the public domain. From "Official portal of Kyiv", 2025 (http://surl.li/seuipd) In the public domain. From "Budget of the Dnipropetrovsk Urban Territorial Community", 2025 (https://openbudget.gov.ua/local-budget/0400000000/info/) In the public domain. From "Budget of Chernivtsi urban territorial community", 2025 (https://openbudget.gov.ua/local-

budget/2455200000/info/indicators) In the public domain. From "Lutsk City Council", 2025 (https://www.lutskrada.gov.ua/digital-city) In the public domain. From "Open budget", 2025 (https://openbudget.gov.ua/local-budget/0355100000/info/indicators) In the public domain.

From Table 2, it can be concluded that both revenues and expenditures increased across all urban territorial communities and Kyiv in 2024 compared to 2020. This growth in revenues and expenditures indicates the development and capacity of these communities to implement Smart City management projects.

The revenues of the Vinnytsia Urban Territorial Community showed the highest growth, increasing by 110%, while Kyiv experienced the smallest growth. In terms of expenditures, the most significant increase was observed in the Lviv Urban Territorial Community, with the smallest growth recorded in the Dnipro Urban Territorial Community.

The smartification of cities is guided by ISO 37120, ISO 37122, and ISO 37123 standards [23; 24; 25]. These standards outline 18 components of smart development: city economy, energy, environment and climate change, finance, governance, healthcare, housing, population and social conditions, safety, waste management, sports and culture, telecommunications, transport, urban agriculture, urban planning, wastewater management, and drinking water. Each component is accompanied by specific indicators and criteria for urban sustainability.

The step-by-step plan for city development can be represented as a series of actions:

Step 1: Alignment of Vision and Conceptualization of Terms. At this stage, the concept of "smart city" is defined and clarified within the framework of a city's sustainable development strategy or specific smart city strategy.

Step 2: Adherence to Standards. Optimal city resource management is ensured through commonly accepted rules and methods based on established standards.

Step 3: Identification of Gaps. Achieved results are analyzed and compared against the vision and initial plan, with adjustments made to refine future actions.

Step 4: Efficiency Analysis. Needs are assessed from three perspectives: residents, local authorities, and the environmental context.

Step 5: The "Happy" District. Smart residential neighborhoods are developed as prototypes for future urban transformations.

Effectiveness is evaluated using 75 indicators grouped according to the standard. Notably, cities aiming to meet ISO 37122 must achieve at least 50% of the standard's indicators.

These proposed frameworks serve as valuable tools for assessing Ukrainian cities, regardless of their size or level of damage. Key indicators of smart development include the maturity of civil society and the quality and accessibility of public services.

The readiness of Ukrainian cities can be determined by monitoring outcomes and comparing them to the standard. The level of sustainable development ranges from 10% to 100%, progressing from an initial stage (10–20%) to the optimization of existing systems (90–100% compliance with the standard).

After the war ends, such an evaluation will become crucial, as any actions undertaken without a clear "diagnosis" may prove ineffective due to poorly defined priorities. In contrast, preliminary analysis enables the identification of weaknesses and potential imbalances.

At the next stage, it will be possible to develop a "smart city" strategy and create an action plan for its gradual implementation. This will be achieved through technological solutions and initiatives proposed by the community and local authorities.

Table 3.

Levels of City Maturity in Achieving "Smartification"

Achieved level / % of implementation of ISO 37122	**Indicators**	**Description Positioning of large cities in Ukraine**
1. Initial 10 – 20%	At this stage, the processes of digital transformation within the city begin. Cities plan and develop information systems designed to integrate their "smart" management solutions.	All cities of Ukraine, except occupied ones
2. Quantitatively managed 30 – 40%	At this stage, the city's management systems reach a new level of efficiency. Local governments actively seek innovative solutions, implement information technologies, and place greater emphasis on collaborative decision-making processes with citizens. This is primarily achieved by leveraging data from diverse sources, rather than relying solely on official statistics.	Zhytomyr, Rivne, Sumy, Zaporizhia, Poltava, Chernivtsi
3. Established 50 – 60%	At this stage, the data has already been collected and is accessible to the public through information and communication technologies (ICT). They are effectively utilized, with cloud computing technologies integrated into the public service delivery system. This ensures access to information for both citizens and other stakeholders	Kharkiv, Chernihiv, Khmelnytskyi, Ternopil, Cherkasy, Odesa
4. Qualitatively managed 70 – 80%	At this stage, cities can combine resources to make public services accessible to citizens. The use of computing technology at this level focuses on ensuring universal access.	Kyiv, Lviv, Dnipro, Vinnytsia, Ivano-Frankivsk, Lutsk
5. In the process of optimization 90 – 100%	At this stage, cities are recognized as highly efficient, actively pursuing innovations and becoming leaders in implementing technological solutions	none

Notes: Lutsk is classified as Managed qualitatively due to the calculation of the indicator in Table 4. From *"Implementation of the "Smart City" concept in the management of large cities of Ukraine: monograph".* by *A.O. Andrienko*, 2023 *Vinnytsia, Ukraine: NGO "European Scientific Platform", 196 p.,* In the public domain.

Table 4.

Criteria and indicators of sustainability of the Lutsk urban territorial community according to ISO 37123

Criteria	**Indicators**	**% of indicator fulfillment**
1) city economy:	1.1. Historical losses from disasters as a percentage of the city's product. 1.2. Average annual losses from disasters as a percentage of the city's product. 1.3. Share of objects that have insurance coverage for high-risk events. 1.4. Percentage of total insurance value to the total risk value for the city. 1.5. Employment concentration. 1.6. Percentage of the workforce in the informal employment sector. 1.7. Average available income of households.	1.1. 70% 1.2. 80% 1.3. 65% 1.4. 90% 1.5. 80% 1.6. 95% 1.7. 78% General 79 %
2) education:	2.1. Percentage of schools teaching emergency preparedness and disaster risk reduction. 2.2. Percentage of the population trained in emergency response and disaster risk reduction. 2.3. Percentage of publications on emergency behavior and disaster risk reduction in alternative languages. 2.4. Disruptions in education.	2.1. 70% 2.2. 80% 2.3. 65% 2.4. 90% General 76,25 %
3) energy:	3.1. Number of different energy sources that provide at least 5% of the total energy supply. 3.2. Power supply capacity as a percentage of peak energy demand. 3.3. Percentage of critical infrastructure served by off-grid energy services.	3.1. 70% 3.2. 80% 3.3. 90% General 80 %
4) environment and climate change:	4.1. Urban heat island effect magnitude. 4.2. Percentage of natural areas in the city that have undergone environmental assessment regarding their protective functions. 4.3. Area restored by ecosystems as a percentage of the total city area. 4.4. Annual frequency of extreme rainfall events. 4.5. Annual frequency of extremely hot days. 4.6. Annual frequency of extreme cold events. 4.7. Annual frequency of floods. 4.8. Percentage of urban land covered by tree canopy. 4.9. Percentage of city area covered by materials with high albedo that contribute to mitigating the effects of urban heat islands.	4.1. 74% 4.2. 83% 4.3. 69% 4.4. 91% 4.5. 83% 4.6. 92% 4.7. 88% 4.9. 83 % General 73,66 %

5) finance:	5.1. Annual expenditures on modernization and maintenance of urban services as a percentage of the city budget. 5.2. Annual expenditures on maintaining stormwater infrastructure as a percentage of the city budget. 5.3. Expenditures on ecosystem restoration within the city as a percentage of the city budget. 5.4. Annual expenditures on green-blue infrastructure as a percentage of the city budget. 5.5. Annual expenditures on emergency management planning as a percentage of the city budget. 5.6. Annual expenditures on social and public services as a percentage of the city budget. 5.7. Total reserve funds allocated for disaster preparedness as a percentage of the city budget.	5.1. 56% 5.2. 70% 5.3. 69% 5.4. 70% 5.5. 60% 5.6. 75% 5.7. 71% General 67,3 %
6) governance:	6.1. Frequency of updates to disaster recovery plans. 6.2. Percentage of essential city services with a sustainable documented plan. 6.3. Percentage of city's electronic data with secure and remote backup storage. 6.4. Percentage of public meetings dedicated to city resilience. 6.5. Number of intergovernmental agreements focused on planning for "shocks" as a percentage of total intergovernmental agreements. 6.6. Percentage of essential service providers with a documented business continuity plan.	6.1. 63% 6.2. 68% 6.3. 65% 6.4. 80% 6.5. 70% 6.6. 95% General 73,5 %
7) health care:	7.1. Percentage of hospitals equipped with backup power supply. 7.2. Percentage of the population covered by basic health insurance. 7.3. Percentage of the population fully immunized. 7.4. Number of infectious disease outbreaks per year.	7.1. 50% 7.2. 70% 7.3. 65% 7.4. 60% General 61,25 %
8) housing:	8.1. Capacity of designated emergency shelters and refuges per 100,000 population. 8.2. Percentage of buildings structurally vulnerable to high-risk hazards. 8.3. Percentage of residential buildings not meeting building codes and standards. 8.4. Percentage of damaged infrastructure that has been better restored after a disaster/damage. 8.5. Annual number of flooded residential buildings as a percentage of the total residential real estate in the city. 8.6. Percentage of residential real estate located in high-risk areas.	8.1. 69% 8.2. 83% 8.3. 75% 8.4. 80% 8.5. 85% 8.6. 75% General 77,8 %

9) population and social conditions:	9.1. Proportion of vulnerable population in the total population of the city. 9.2. Percentage of the population covered by social assistance programs. 9.3. Percentage of the population exposed to high natural hazard risks. 9.4. Percentage of neighborhoods with regular and open meetings for residents. 9.5. Annual percentage of the city's population directly affected by natural disasters.	1.1. 70% 1.2. 80% 1.3. 65% 1.4. 90% 1.5. 80% 1.6. 95% 1.7. 78% General 79 %
10) security:	10.1. Percentage of the city's population covered by the early warning system for various hazards. 10.2. Percentage of rescuers who have undergone disaster response training. 10.3. Percentage of local hazard warnings issued annually by national authorities that are received in a timely manner by the city. 10.4. Number of hospital beds in the city, destroyed or damaged by natural disasters, per 100,000 population.	10.1. 75% 10.2. 70% 10.3. 85% 10.4. 89% General 79,75 %
11) waste:	11.1. The number of active and temporary waste management sites available for garbage and rubble per square kilometer	11.1 95 %
12) sports and culture;	12.1. The proportion of the population of different age groups involved in sports activities. 12.2. The availability of sports infrastructure in neighborhoods.	12.1 89 % 12.2 91 % General 90 %
13) telecommunications:	13.1. The percentage of firefighters in the city equipped with specialized communication technologies capable of reliably functioning during natural disasters or emergencies.	13.1. 95 %
14) transport:	14.1. Available evacuation routes per 100,000 population..	14.1 89 %
15) urban agriculture and food security:	15.1. The percentage of the city's population that can be served by municipal food reserves for 72 hours. 15.2. The percentage of the city's population living within one kilometer of a grocery store	15.1 79 % 15.2 95 % General 87 %
16) urban planning:	16.1. The percentage of the city's area covered by publicly available hazard maps. 16.2. Land plots, public spaces, and sidewalks built with permeable drainage, as a percentage of the city's land area. 16.3. The percentage of city land in high-risk areas where risk reduction measures are being implemented. 16.4. The percentage of city administrations and public services conducting risk assessments in their planning and investment management. 16.5. The annual number of flooded critical infrastructure objects as a percentage of the city's critical infrastructure. 16.6. Annual expenditure on water retention measures as a percentage of the city's preventive measures budget.	16.1. 73% 16.2. 84% 16.3. 69% 16.4. 92% 16.5. 88% 16.6. 91% General 82,8 %

17) wastewater:	17.1. The availability and quality of drainage structures	17.1 72 %
18) drinking water:	18.1. The number of different sources that provide at least 5% of the total water supply capacity. 18.2. The percentage of the city's population that can be supplied with drinking water through alternative methods for 72 hours.	18.1 68 % 18.2 73 % General 70,5 %
General		79,38 %

Note: built by the author

When implementing smart city solutions in the context of active conflict (military and humanitarian), there are limitations that impede their implementation. Among them are the following risk groups:

1. Security risks. These are the risks of cyberattacks on infrastructure, destruction of physical objects, and compromise of public data.

2. Funding restrictions, which involve redirecting resources to defense, humanitarian needs and recovery, and an unstable investment environment. As a result, interest in Smart City projects is low.

3. Problems with energy supply and communication, including power outages, lack of stable functioning of smart devices and IT systems.

4. Irregular work of municipal authorities means loss of control over certain areas, evacuation of employees and loss of databases.

5. Decreased trust and participation of citizens arises from the fear of losing personal data, which leads to a decrease in interest in Smart City due to the focus on survival.

6. Population migration due to destructive impacts on infrastructure, changes in social structure, and loss of labor.

7. Legal and ethical barriers related to the dilemmas of using technology in conflict, lack of regulations governing crisis situations.

The smartification level of the Lutsk urban territorial community is quite high. In the future, the "SmartCity" concept aims to create an environment where technology is fully integrated into city life, uniting various aspects (social, economic, organizational) for efficient resource distribution, providing essential administrative services, and improving citizens' quality of life. Blockchain technology can be practically implemented in the Ukrainian context in various areas, including wartime challenges, the need for transparency, digitalization, and restoring trust in institutions. It is facilitate the rapid implementation of the "SmartCity" concept by ensuring high levels of interaction among various stakeholders and participants. The degree of "smartification" will depend on many factors. In particular, structural elements of the "SmartCity," such as infrastructure and services, should adhere to the principles of "smart" urban design. Blockchain technology is a concept that covers a broad range of issues related to modernizing key aspects of city development, from basic infrastructure (such as utility systems, roads, and transportation) to additional elements (public–private partnerships, quality public services, socially responsible business, circular economy, and active communities). As mentioned earlier, all of these components work together to create conditions for integrating technology into all areas of "smart" urban management, aiming to better meet citizens' needs for a quality, safe, and productive space for living and working, all for the benefit of the city. Blockchain technology is considered an effective solution for this integration, as it is an evolutionary choice for a management system that can help cities overcome

numerous challenges related to integrating infrastructure elements and improving the technological, social, and financial environment.

Blockchain technology is an excellent choice for the development of "SmartCity," as it helps cities address numerous issues related to the integration of infrastructure elements and improves technological, social, and financial conditions in urban communities. In the process of rebuilding Ukrainian cities after the war, the creation of such an environment with the involvement of a wide range of participants becomes especially important. Since blockchain technology was initially developed to ensure the security and integrity of documents, it holds particular value for Ukrainian document management systems and the organization of internal management processes in general. The approach proposed in this paper optimizes the data structure, enabling information to be stored in the form of a transaction list.

The resulting blockchain of data blocks is decentralized, distributed, permanent, chronologically ordered, and protected from tampering. Blocks will be created and added to the blockchain system in such a way that all valid network actions can be easily traced, starting from the initial block. One of the main advantages of using this technology is achieving the highest level of transparency.

The concept of "SmartCity" and blockchain technology share two main common characteristics. First, both concepts are broad and describe an ideal functional environment that provides more comfortable living conditions for people compared to traditional systems. Blockchain, in turn, is a technical platform capable of expanding the capabilities of government bodies and all participants in the urban development process. Both concepts are currently in the active development stage, promising significant practical progress in the near future. Regarding blockchain, there are numerous ideas that promote the implementation of more efficient solutions capable of ensuring the scalability of transactions without the need for energy-intensive mechanisms to reach consensus between parties. Thus, technological progress creates new opportunities for the realization of the "SmartCity" concept, with blockchain becoming an important component. This opens up prospects for further research and innovative solutions in traditional management issues.

In practical terms, blockchain makes it possible to create decentralized registers of utility use (water, electricity, transportation, living space), which allows residents and regulatory authorities to track consumption, optimize costs, and prevent corruption or abuse. Blockchain provides full transparency of the budget process: from budgeting to spending on specific projects. This allows citizens to control how their taxes are spent and increases government accountability. Smart contracts can automate the provision of public or municipal services, such as renting municipal property, paying fees, and applying for administrative services, without the involvement of intermediaries and with instant fulfillment of conditions. Blockchain can serve as a basis for creating decentralized digital identification systems for citizens who retain control over their personal data but can quickly and securely confirm their identity to receive services. In Smart Cities, blockchain can ensure that local elections or public polls are held online, guarantee the protection of votes from forgery and fraud, and reduce the cost of electoral processes. The use of blockchain makes it possible to integrate all public transport services into one system, provide one-click fare payment, track movements and loads, and create a system of rewards for environmental behavior (for example, using bicycles or public transport). The use of blockchain technology makes it possible to create systems for accounting for waste collection, recycling, and disposal, where each step is

recorded, and contractors are paid only for the confirmed scope of work. Blockchain allows for transparent distribution of social assistance, targeted subsidies, grants, and other resources for vulnerable groups, avoiding abuse and losses.

Thus, blockchain is the basis for creating an open and sustainable urban infrastructure that combines innovation, digital security, public trust, and effective governance in a smart city.

8 Discussion

It has been noted that smart city development planning in Ukraine began to evolve in 2015. Currently, the Smart City system operates in various forms in cities such as Kyiv, Ivano-Frankivsk, Lviv, Mukachevo, Drohobych, Zaporizhzhia, Poltava, Ternopil, and Kharkiv. The "Safe City" system was also implemented in Mariupol and Lutsk.

Examples of smart city management development are provided for cities like Vinnytsia, Kyiv, Kharkiv, Lutsk, Dnipro, and Chernivtsi. The cities were assessed based on the following categories: Smart Government, Smart Communication and Decision Making, Smart Administrative Services, Smart Utilities, Smart Transport, Smart Urban Planning, Smart Healthcare and Education, Smart Energy, and Smart Tourism. Each category has a set of indicators. Overall, the leading positions in the smart city development and smart management rankings are held by Vinnytsia (1st place), Lutsk (2nd place), Kyiv (3rd place), Lviv (4th place), Dnipro (5th place), Kharkiv (6th place), and Chernivtsi (6th place).

It is noted that smart community development, according to the standards ISO 37120, ISO 37122, and ISO 37123, is assessed using 18 groups of indicators: city economy, energy, environment and climate change, finance, governance, healthcare, housing, population and social conditions, safety, waste management, sports and culture, telecommunications, transport, urban agriculture, urban planning, wastewater, and drinking water. Each of these components has its own indicators and criteria for city sustainability. A level of at least 50% must be achieved in each group. This methodology has allowed for the development of a step-by-step city development plan: Alignment of development vision and conceptualization of ideas – Following the standard – Identifying gaps – Analyzing effectiveness – Creating a "happy" district.

This plan can be implemented using blockchain technology. Blockchain is understood as a technical platform capable of expanding the capabilities of government bodies and all participants in the urban development process. It can generate numerous ideas that will help implement more efficient solutions and ensure scalability of transactions without the need for energy-intensive mechanisms to achieve consensus among parties.

In the future, it would be important to develop measures within the five steps of smart city development, identify the main challenges in their implementation, and propose indicators for monitoring results. Additionally, the author of the work has not addressed the issue of regulating smart city governance development in line with the concept of social equality and the adaptation of veterans to civilian life. This will be the subject of further research.

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Innovative Approaches in Postgraduate Teacher Education: Current Trends and Challenges for Teacher Professional Development

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ABSTRACT

This article examines innovative approaches in postgraduate teacher education, focusing on current trends and challenges for teacher professional development in the context of rapid technological advancement and educational reform. The research analyzes the organizational and pedagogical conditions necessary for effective continuous professional development of educators, emphasizing the importance of digital competencies in the post-COVID educational landscape. The study draws on international experiences from countries including the United States, United Kingdom, Norway, and China to identify best practices in teacher education. Key findings highlight the need for more personalized, continuous, and practice-oriented professional development models that integrate digital tools, collaborative communities, and mentoring programs.

The research identifies significant challenges in postgraduate teacher education, including unequal access to resources, insufficient funding, traditional mindsets resistant to change, and the lack of systematic approaches to professional development. The paper emphasizes that effective teacher development must go

beyond technical skills to encompass ethical education, critical thinking, and adaptability to prepare educators for guiding students in a technology-driven world. Recommendations include creating national platforms for professional development, implementing effective monitoring mechanisms, ensuring equal access to learning resources, and adopting more flexible and accessible training programs. The integration of innovative approaches to postgraduate teacher education is essential for improving educational quality and preparing teachers to meet the demands of 21st-century education.

KEYWORDS: postgraduate teacher education, professional development, digital competencies, educational innovation, continuous learning, mentoring programs, pedagogical strategies.

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1. Formulation of the problem.

The problem in the field of postgraduate teacher education lies in identifying and implementing innovative approaches that effectively enhance the professional development of teachers in a rapidly changing educational landscape. While there is increasing emphasis on integrating new teaching methods, technologies, and pedagogies, many educators face challenges in adapting these innovations to meet the specific needs of diverse learning environments. The rapid evolution of educational technologies, alongside shifting expectations for teaching quality, calls for a rethinking of traditional teacher training programs.

In particular, the integration of modern digital tools, such as online learning platforms, virtual classrooms, and interactive content, presents both opportunities and challenges for educators. The question arises of how to best incorporate these tools into postgraduate programs while ensuring that they align with educational objectives and promote meaningful, long-term professional growth. Additionally, there is a need to balance these innovations with the essential principles of pedagogy, fostering critical thinking, creativity, and collaborative skills among teachers.

Another challenge is the professional development gap that exists between more experienced educators and those who are just beginning their careers. With new technologies emerging and global education trends constantly evolving, many educators struggle to stay up-to-date with the latest advancements. This issue is compounded by the varying levels of access to resources and training opportunities across different regions and institutions.

Thus, the focus of the problem is to identify effective pedagogical strategies that can bridge the gap between traditional teaching practices and emerging educational trends, ensuring that teachers are adequately prepared to navigate the challenges and opportunities of modern education. The integration of innovative approaches into postgraduate teacher education is essential for fostering a professional development model that is adaptive, inclusive, and capable of meeting the needs of today's dynamic educational environment.

The impact of these innovations in teacher education is of national significance, as they influence the quality of education, the preparedness of teachers, and ultimately, the educational outcomes of future generations. The ability of a country to stay competitive in the global educational landscape depends heavily on how well it equips its educators with the skills, knowledge, and tools necessary for success in the classroom. The development of a robust and adaptable teacher training system is key to ensuring educational excellence and societal progress.

2. Analysis of recent research and publications. Recent research on teacher professional development highlights the increasing need for educators to adapt to the digital age and evolving pedagogical practices. I. Nebelenchuk et al. (2024) focus on the organizational and pedagogical conditions necessary for the continuous professional development of teachers in postgraduate education, emphasizing the importance of a supportive environment for teachers' skill enhancement. M. Anis (2024) addresses the impact of digital technologies on teacher development, particularly post-COVID, and discusses strategies for meeting the evolving needs of educators.

O. Ventista and C. Brown (2023) systematically review the link between teachers' professional learning and students' outcomes, noting that continuous development is crucial for improving educational quality. A. Yermolenko, V. Kulishov, and S. Shevchuk (2020) examine how innovative competence in teachers can be developed to meet modern educational challenges, highlighting the need for educators to adopt new teaching strategies. B. De Wever, R. Vanderlinde, M. Tuytens, and A. Aelterman (2016) discuss the challenges faced by teacher educators and student teachers in the context of professional learning.

O. Voitovska and S. Tolochko (2018) investigate trends in the development of teachers' skills in the US, showing the importance of incorporating digital tools into professional development. T. Paska, I. Moiseenko, and I. Shapka (2022, 2024) discuss the integration of innovative teaching technologies into education, emphasizing the importance of fostering creativity and critical thinking in students through modern teaching methods. These studies reflect the growing focus on digital transformation and professional learning.

3. The purpose of the article. The purpose of this article is to explore innovative approaches in postgraduate teacher education, examining current trends and challenges in teacher professional development. The article aims to investigate the evolving needs of educators in the context of modern

educational reforms and digital transformations. It seeks to identify key factors that influence the effectiveness of professional development programs, with an emphasis on the importance of continuous learning and adaptation to new pedagogical methods. Additionally, the article provides recommendations for enhancing postgraduate teacher education to better prepare educators for the demands of the 21st century, promoting their professional growth and improving the overall quality of education.

4. Presenting main material. Modern challenges associated with rapid technological progress, globalization, and increased requirements for the quality of education are forcing us to rethink traditional approaches to postgraduate teacher education, which makes it important to study innovative methods of teacher professional development that meet the needs of the modern educational environment. In particular, researchers are studying the problem of continuous professional development of teachers in Ukraine and identifying key conditions for its effectiveness (Nebelenchuk, Skrypka, Fedirko, Burtovyi, & Drobin, 2024).

The researchers emphasize the need to modernize postgraduate teacher education in Ukraine to meet technological changes, globalization, and growing demands on the quality of education. Despite the reforms, the system remains ineffective in providing professional development for teachers due to unequal access to resources, poor adaptability of programs, and insufficient funding. Successful continuous development of teachers requires a support system that includes access to up-to-date resources, professional communities, mentoring, and reflection. The experience of countries such as the United Kingdom, Norway, Spain, and Australia emphasizes the importance of integrating ICT into the educational process. Key challenges include inequality in access to education between urban and rural areas, lack of a systematic approach, and imperfect assessment mechanisms. Recommendations include the creation of a national platform for professional development, mentoring support, ICT implementation, effective monitoring, and sufficient funding. Providing the right conditions will facilitate the continuous professional development of teachers and improve the quality of education.

I. Nebelenchuk, H. Skrypka, J. Fedirko, S. Burtovyi, and A. Drobin emphasize the importance of self-education, noting that self-education and knowledge acquisition by each teacher in a convenient mode play a significant role in obtaining education. Also, a modern teacher should have a number of professional qualities, such as awareness of the role in society, the ability to self-learn, knowledge of various pedagogical techniques, leadership skills, a positive attitude to work, and a focus on ways to acquire knowledge rather than on the transfer of ready-made knowledge. Scientists emphasize the importance of studying and implementing international experience in the system of postgraduate education in Ukraine, believing that familiarization with the best practices of other countries will help improve the quality of education in Ukraine. The researchers emphasize the important role of information and communication technologies in the

professional development of teachers. Also, knowledge of foreign languages and digital technologies are important for modern teachers, as they open up access to wider opportunities at the international level and contribute to improving the quality of education (Nebelenchuk, Skrypka, Fedirko, Burtovyi, & Drobin, 2024). Thus, the continuous professional development of teachers is one of the most important problems of modern education, and its solution requires systemic changes and reforms in the system of postgraduate teacher education in the world and in Ukraine.

In the context of current trends and challenges in the professional development of teachers, it is also important to consider the impact of digital technologies on the development of pedagogical skills (Bilous, Demianiuk, & Krychkivska, 2022). Changes in educational practices due to global challenges increase the importance of developing pedagogical skills in the digital era, which becomes the main topic of the study proposed by M. Anis (2014). Anis (Anis, 2024). This allows us to better understand how digital tools can support teachers' professional development, responding to the new needs that have emerged after the pandemic. The author focuses on the challenges and opportunities that have arisen as a result of technological progress and emphasizes the need to adapt pedagogical approaches to the requirements of the digital era.

M. Anis emphasizes the significant impact of the COVID-19 pandemic on education, which has led to a rapid transition to digital learning. The pandemic has become a catalyst for rethinking the role of technology in the educational process, emphasizing the importance of continuous professional development of teachers to ensure quality education in the new environment. Traditional models of professional development, such as seminars and conferences, have been criticized for their limited impact on the sustainable growth of teachers. The researcher emphasizes the need for more personalized and continuous approaches that would take into account the individual needs of teachers and ensure their continuous professional development. The digital era has had a significant impact on education, and teachers face challenges in adapting to digital learning, including the need to improve technological competencies, pedagogical changes, and the impact on emotional and mental well-being. The scientist emphasizes that in order to successfully integrate digital technologies into the educational process, teachers need not only to have technical skills, but also to have a deep understanding of how technology can be used to improve learning outcomes. Effective models of professional development for teachers include individualized learning plans, online courses, collaborative communities, and coaching and mentoring programs (Anis, 2014).

M. Anis emphasizes that successful examples of professional development in the digital age emphasize the importance of personalization, ongoing support, integration of technology and pedagogy, as well as collaboration and community building. Analyzing the trends in teacher professional development after COVID-19, which include the use of digital platforms and tools, the spread of microlearning, and the

integration of social and emotional learning, the scientist emphasizes that professional development should be a continuous process that takes into account the individual needs of teachers and provides them with support at every stage of their professional career. He notes that implementing effective professional development faces challenges such as limited resources, resistance to change, and time constraints. Therefore, the study emphasizes the importance of integrating digital tools, microlearning, incorporating social-emotional learning, and addressing implementation challenges for future professional development. It also identifies future directions for professional development, which include investment in resources, creating a culture of change, flexible and accessible professional development, and a holistic approach that combines technological skills with social and emotional learning. M. Anis emphasizes that successfully navigating the digital era in education requires a dynamic and adaptive approach to teacher professional development that includes technology integration, microlearning, socio-emotional aspects, and overcoming implementation challenges (Anis, 2014).

M. Anis emphasizes that successful adaptation to the digital era in education requires a dynamic and adaptive approach to teacher professional development. This involves the integration of technology, microlearning, consideration of social and emotional aspects, and overcoming implementation challenges. The author notes that professional development should be a continuous process that provides support to teachers at every stage of their professional activity and contributes to their successful adaptation to the requirements of the digital era (Anis, 2014).

Current trends in the development of teacher training in the United States in the system of postgraduate teacher education are driven by changes in the paradigms of social development, as well as new personal and social requirements for the professional education of teachers. O. Voitovska, & S. Tolochko note that continuous professional development of teachers is a prerequisite for their effective work. In this regard, the system of postgraduate teacher education is being modernized, including advanced training and professional retraining (Voitovska, Tolochko, 2018).

The main trends in the development of teacher education in the United States at the beginning of the twenty-first century include a focus on higher education as a key condition for mastering the profession of teacher, strengthening psychological and pedagogical training, expanding the range of specialized areas of study, improving the system of professional development of teaching staff and the possibility of simultaneous professional development in different educational institutions. According to scientists, the system of continuing teacher education in the United States is adapted to the country's socio-cultural conditions, which explains its active development in recent decades (Voitovska, Tolochko, 2018).

The scholars note that American society needs a teacher who is a subject of continuous professional development, a researcher and a creator responsible for the intellectual, social and physical development of his or her students, regardless of their socioeconomic status or ethnicity. In this regard, the teacher education system in the United tates has undergone transformations aimed at shaping pedagogical thinking, professional reflection, and the ability to apply new knowledge and skills throughout life. After all, the concept of postgraduate teacher education in the United States is interpreted broadly and covers not only professional development, but also the continuous professional and personal growth of teachers. The main goal of postgraduate teacher education in the United States is to familiarize teachers with the latest achievements in pedagogical theory and practice, improve their professional skills, and develop their ability to learn independently. According to scientists, the most effective forms of in-service training are individual training within the school, methodological seminars, conferences, curriculum development, participation in research projects, etc. (Voitovska, Tolochko, 2018).

The scientists emphasize that the system of postgraduate teacher education in the United States is a complex network of interaction between various organizations, including public and private institutions, NGOs, foundations, and teacher unions. Foundations such as the Carnegie Foundation, Kettering Foundation, and Ford Foundation play a significant role in financing and determining the direction of this system. It is important that organizations involved in postgraduate education are not subordinated to the US Department of Education, and their activities are autonomous (Voitovska, Tolochko, 2018).

Scientists note that there are two main organizational models in the American teacher training system: training at higher education institutions and directly in schools. The peculiarity of this system is the variety of short-term courses that are specialized in nature. Modern in-service training programs include flexible curricula, distance learning, the creation of special professional assessment boards, and the introduction of certification procedures. In the United States, the main responsibility for teacher development lies with professional commissions and committees that work to unify approaches to teacher professional development. At the same time, the absence of a single methodological center complicates the standardization of educational programs, which requires the development of more general approaches to teacher training. An important feature of the American system is its focus on preparing teachers to work with students from different ethnic and cultural communities. The introduction of the principles of multicultural education promotes tolerance of diversity and the development of humanistic approaches in the educational process (Voitovska, Tolochko, 2018).

Therefore, the study of trends in teacher training in the United States is important for improving the Ukrainian system of postgraduate teacher education, as it opens up new opportunities for improving the quality of qualifications and retraining of teaching staff.

O. Ventista, & C. Brown emphasize that modern teachers should become "high-level knowledge workers" and schools should become learning organizations. Effective professional development of teachers has a positive impact on teaching, although its impact on student achievement remains limited. An analysis of 125 research papers found that only 11 had an experimental design that directly assessed this impact. The most effective strategies are long-term training, mentoring, and professional communities (Ventista, Brown, 2023).

Modern challenges such as artificial intelligence, automation, and climate change require the development of critical thinking and creativity in education. Professional communities (PLCs, PLNs) play an important role in facilitating knowledge sharing and reducing teacher stress. Studies using the PRISMA methodology have found that the most common approaches are trainings, mentoring, on-the-job training, and peer observation. Most attention is paid to the development of STEM teachers.

A key factor in effective training is its duration and integration into pedagogical practice. Long-term programs with mentoring and coaching have a greater impact than one-time trainings. An important challenge is the lack of time for teachers and the mismatch of programs with their real needs (Ventista, Brown, 2023). The authors emphasize the need for further research to assess the effectiveness of professional development approaches. They conclude that schools should create conditions for continuous learning for teachers through long-term, interactive, and contextualized programs.

The development of innovative competence of vocational school teachers is a key condition for the modernization of education in Ukraine. They should not only master the latest technologies, but also effectively implement them in the educational process, adapting to economic and socio-cultural challenges.

A. Yermolenko, V. Kulishov, & S. Shevchuk emphasize that innovation competence includes information and methodological literacy, pedagogical skills and creativity. The main problems are traditional thinking, insufficient preparation for new technologies, and low motivation for self-development. Continuing professional development, critical evaluation of educational innovations, and their effective use are important. A teacher should not only be a carrier of knowledge, but also a mentor who promotes the development of critical thinking, creativity, and communication skills of students. An innovative culture in education implies openness to change, self-development, and willingness to cooperate (Yermolenko, Kulishov, Shevchuk, 2020).

The modernization of vocational education requires new strategies focused on the labor market, European standards, and the training of competitive professionals. The authors conclude that the success of the reforms depends on the readiness of teachers to change, continuous learning, and professional development.

L. Rebukha highlights modern approaches to the development of educational technologies in the context of global changes, the classification of pedagogical innovations, their patterns and stages of implementation. The author emphasizes that technological innovations have a significant impact on education, contributing to its efficiency and interactivity.

Considering various types of educational technologies (traditional, programmed, problem-based and interactive), the scholar notes that innovative teaching involves the development of creative thinking, adaptation to change and improvement of teaching activities. Analyzing foreign experience, the scholar emphasizes the role of distance learning.

L. Rebukha notes that successful management of innovation processes is based on forecasting, providing resources and motivating participants. An innovative approach is a key factor in the development of education and its competitiveness in the world (Innovative, 2022).

S. Smolina, N. Grytsyk, N. Antonenko highlight the importance of ethical education in preparing teachers for the challenges of the technological world. The scientists emphasize that critical thinking, empathy, and adaptability are key for teachers in modern society. Their research shows that future teachers face difficulties in fostering ethical values and critical thinking in students due to the excessive amount of information and rapid changes. The researchers emphasize that the teacher should be a moral guide in this process.

The central theme of the study is holistic education, which involves not only the transfer of knowledge but also the development of the student's personality. Teacher professional development (TPD) is also important, including professional development, innovation, and autonomy. Integrating ethical education, critical thinking, and adaptability into teacher training is essential to educate citizens capable of sustainable development in the face of technological change.

Therefore, a holistic approach to teacher professional development that combines ethical education, critical thinking, and adaptability is necessary to prepare students for life in today's technology-driven world. Pedagogy plays a crucial role in shaping civic ethics and ensuring sustainable development of society (Smolina, Grytsyk, Antonenko, 2023).

T. Paska, I. Moiseenko and I. Shapka analyze innovative approaches to teacher training that promote the introduction of modern educational technologies and the development of students' creative potential.

They note that technological progress requires new teaching methods from the educational system that would contribute to the harmonious development of the individual, critical thinking and independence of students (Paska, Moiseenko, Shapka, 2024).

The study examines such innovative technologies as mobile learning, AR/VR, interactive platforms, and artificial intelligence. They make the learning process flexible and accessible, adapted to the individual needs of students. Gamification and interactive methods increase motivation and interest in learning. The authors emphasize that teachers should not only impart knowledge, but also be mentors who help students develop their creativity.

The researchers also draw attention to the challenges of implementing innovations: insufficient training of teachers, lack of resources and methodological support. They emphasize the importance of support from management and the involvement of experts to assess the effectiveness of new technologies (Paska, Moiseenko, Shapka, 2024).

Thus, innovative approaches to teacher training are key to ensuring quality education that meets modern challenges. Further research should be aimed at adapting international experience to Ukrainian conditions and developing practical recommendations for the effective implementation of innovations in the educational process.

We are impressed by the position of O. Hudzenko and other scientists about the importance of innovations in modern education, which contribute to the development of critical thinking, the creative potential of students and the training of a new generation of teachers who can work effectively in the face of constant change and technological progress (Hudzenko, 2024), (Hudzenko, 2022), (Boychuk, Leybyk, Hudzenko, 2024).

H. Dadi analyzes the professional development of teachers in Tanzania, Ethiopia, and Sudan, emphasizing its importance for ensuring quality education and socio-economic development. The scientist emphasizes that professional development should be a continuous process that begins before the start of teaching (pre-service training) and continues throughout the teacher's professional life (in-service training). It should be based on a constructivist approach, where teachers are active participants in learning, and include collaborative methods such as group work, action research, and portfolios. The author identifies three key factors that influence professional development: contextual (organizational and social conditions that determine opportunities for teacher development), procedural (ways of organizing learning activities), and content (new knowledge, skills, and experiences that teachers acquire) (Dadi, 2015).

The study shows that in Tanzania, the professional development system includes pre-service and in-service training, but faces challenges such as shortened training duration and lack of effective supervision. In

Sudan, professional development is limited to short-term courses and workshops that are mostly theoretical, and a lack of funding makes them difficult to implement. In Ethiopia, the professional development system combines traditional approaches with cluster-based learning models that allow teachers to share experiences, but also faces challenges, including insufficient funding and low teacher motivation. H. Dadi also believes that the Chinese experience can be useful for African countries. The Chinese model involves study groups, lesson studies, and exchange programs between universities and schools, which makes professional development more effective and accessible. The researcher recommends improving teacher training in the countries studied, including expanding pedagogical courses, introducing induction programs for young teachers, and focusing seminars and workshops on practical aspects of teaching.

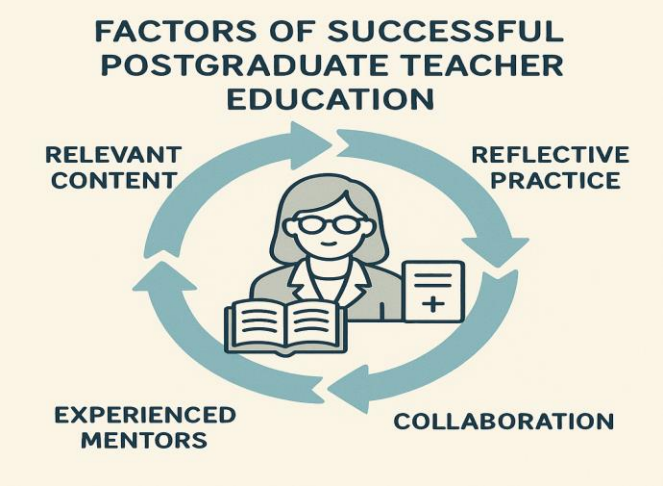
Thus, H. Dadi emphasizes the importance of high-quality professional development for the educational system and suggests ways to improve it, taking into account international experience and local characteristics (Dadi, 2015).

5. Conclusions.

For the successful development of teachers' professionalism, it is necessary to implement innovative approaches, integrating digital technologies, flexible training programs and international experience, which will allow teachers to better adapt to the modern requirements of the educational process:

Continuous professional development of teachers is critical to ensuring the quality of education in the face of rapid change, including through digital transformation, globalization, and technological advances. Modern educational reforms require a rethinking of traditional approaches to postgraduate teacher education, particularly in Ukraine, where there are significant problems in the organization and accessibility of professional development.

The successful integration of new pedagogical methods and technologies requires flexible and ongoing professional development programs that take into account the individual needs of teachers. Models that include mentoring, mentoring programs, and reflection significantly increase the effectiveness of teacher professional development:



The introduction of information and communication technologies is an important aspect for the development of pedagogical skills. Teachers must be prepared to adapt their approaches to digital learning, which has become relevant due to the COVID-19 pandemic, which has prompted a shift to distance learning.

An analysis of international approaches to teacher professional development, such as in the UK, Norway, and the US, confirms the importance of multicultural and inclusive approaches, the development of innovative competencies, and the implementation of practices that address the real needs of teachers and students.

Key innovative approaches to teacher professional development

Innovative approach	***Characteristics***	***Benefits***
Use of digital technologies	Online courses, platforms, virtual classrooms	Accessibility, flexibility, interactivity
Mentoring and mentoring	Support of experienced teachers for newcomers	Faster adaptation, exchange of practical experience
Integration of social and emotional learning	Development of emotional intelligence, empathy in teachers and students	Promotes mental health, teamwork
Personalised development programmes	Individual learning trajectories according to the needs of the teacher	Increases motivation and efficiency
Continuous self-study and micro-learning	Short intensive courses, training modules	Flexibility, adaptation to the pace of work

To improve the system of postgraduate education in Ukraine, it is necessary to create a national platform for professional development, implement effective monitoring and funding mechanisms, and ensure equal access to learning resources. It is important to create favorable conditions for the continuous professional development of teachers, which will improve the quality of education in general.

Therefore, the integration of innovative approaches, continuous professional development, digital technologies, and ethical education, along with the introduction of international experience, are necessary to modernize postgraduate teacher education. These efforts will not only improve the quality of education, but also provide teachers with the skills and competencies necessary to work effectively in the challenging conditions of the twenty-first century.

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The Role of China's Foreign Policy with Chinese Characteristics in Thailand

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ABSTRACT

China's growing interest in Southeast Asia focuses on preventing anti-China groups, increasing trade, building strategic relationships, and securing land claims. Since 2009, China has been more aggressive in controlling disputed areas in the South China Sea and uses politics, economy, and military efforts to keep the region's countries from reacting strongly. This article is a part of a doctoral dissertation in Politics and Development Strategy, titled "The Role of China's Foreign Policy with Chinese Characteristics in Southeast Asia". This article examines the role of China's foreign policy with Chinese characteristics in Thailand, consisting of two parts: the first part presents the relationship between internal factors, external factors and China's intentions in China's foreign policy. The second part discusses the roles of politics, geopolitics and economics in Thailand. The study employed a qualitative research approach. The research result of the role of China's foreign policy with Chinese characteristics in Thailand found that China's foreign policy, characterized by its unique attributes, is centered on the examination of its foreign policy that reflects distinctive features arising from the contributions of Chinese scholars to the theory of IR from a Chinese viewpoint. China's foreign policy concerning Thailand arises from a diverse mix of economic, strategic, and geopolitical influences. China's diplomatic strategies in Thailand have significantly benefited the region, motivated by a convergence of economic, political, and geopolitical roles.

KEYWORDS: China's foreign policy, Chinese characteristics, Thailand, Geopolitics
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1. Formulation of the problem. China's foreign policy toward Southeast Asia embodies a multifaceted strategy that integrates economic diplomacy with strategic alliances to promote national interests while navigating regional tensions. Following the 1997 Asian financial crisis, during which China opted not to devalue its currency to aid Thailand while the U.S. hesitated to provide support (Kurlantzick, 2007). China had established itself as ASEAN's foremost trading partner by 2009, outpacing significant economies (Meredith, 2015). The ASEAN-China Free Trade Area, launched in 2010, resulted in the formation of the world's largest free trade zone by population. At the heart of this strategy is the Belt and Road Initiative, aimed at enhancing China's economic sway through infrastructure investments (Liu, 2023). Nevertheless, China's assertive maneuvers in the South China Sea have sparked territorial disputes with neighboring nations (Liu & Zhou, 2018), while China has effectively thwarted a united ASEAN opposition through diplomatic tactics and economic incentives (Darmawan, et al., 2022).

To achieve its strategic developmental goals, Southeast Asia is of strategic significance to China because of its geographical closeness, economic prospects, and function as a vital energy supply corridor. Chinese security analysts perceive the region as susceptible to U.S. containment strategies (Ott, 2006), which has led China to pursue regional supremacy while diminishing American military presence (Banlaoi, 2003). The region's rich natural resources and favorable positioning bolster China's overarching ambition to attain global prestige by 2049 through initiatives like the Lancang-Mekong Cooperation (Swielande & Orinx, 2020). Despite China's attempts to portray itself as a responsible power advocating for harmony in Southeast Asian, the region's economic reliance on China complicates foreign policy choices amid the U.S.-China strategic rivalry, especially within the Indo-Pacific context, as countries continue to depend on the U.S. to counterbalance Chinese dominance (Cooney & Sato, 2009).

China-Thailand relations illustrate the broader evolution in China's engagement with Southeast Asia, shifting from discord to a strategic partnership shaped by geopolitical, economic, and historical elements. The bilateral relationship showcases mutual interests in economic cooperation, regional stability, and cultural exchange while being affected by wider geopolitical factors involving major powers like the U.S. China's role in Thailand fosters economic growth and strategic partnerships, but it also presents challenges such as managing competing superpower influences and addressing cultural perceptions that necessitate careful navigation by both nations. These changing Sino-Thai interactions reflect broader regional and global trends that define China's holistic approach to Southeast Asian foreign policy (Zhang, 2023).

2. Analysis of recent research and publications.

2.1 International Relations Theory. China's increasing impact on global politics is reshaping our perception of international relations, highlighting the need for fresh perspectives encompassing regions beyond the Western world. The ascent of China in global politics marks a significant development, prompting academics to reconsider International Relations (IR) frameworks by incorporating viewpoints from both Asia and the West, to foster a more comprehensive and worldwide

understanding. This transition towards a post-Western IR framework recognizes China's escalating influence and posits that conventional Western-centric theories may not fully grasp the intricacies of modern global politics(Pan & Kavalski, 2022). Winston's study initiates an opportunity for the simultaneous existence of varied standards in overseeing global politics and international governance (Peng, 2018).

2.2 Chinese Characteristics and Theories of International Relations. Since the 21st century began, China's growth has led to increased interest in how Chinese scholars view international relations, with research showing the evolution of Chinese IR studies since 1949 and the development of distinctly Chinese approaches that offer valuable contributions for understanding global interactions from a new perspective (Hwang, 2022). Nevertheless, the field of Chinese scholarship in International Relations encounters considerable obstacles, such as a largely Sinocentric viewpoint, critical assessments of Western ideologies, presuppositions regarding the benevolence of Chinese leadership, and idealized interpretations of East-West relations, all while endeavoring to establish its distinctiveness by invoking so-called Chinese conditions without engaging in a critical evaluation of their exclusivity to the Chinese context. The limitations imposed on academic freedom in China significantly exacerbate the complexities surrounding Chinese International Relations scholarship, as the endeavors of notable scholars are inextricably intertwined with the positions of the Chinese Communist Party, rather than being driven solely by scholarly pursuits.

2.3 The Motivational Factors of China's Foreign Policy with Chinese Characteristics. When conceptualizing China's foreign policy, numerous academics have devoted to upholding the pluralist perspectives on the importance of internal influences and non-governmental bodies towards China's external strategies. To examine the literature on the impact of these variables on China's external relations, the researcher will focus towards assessing the influence of primary domestic elements including History and Culture traditions, ideology, governmental leadership and political structure, economic modernization, and soft power efforts on China's foreign policy (Huwaidin & Antwi-Boateng, 2021).

2.3.1 History and Culture Traditions. China's foreign policy is profoundly shaped by its rich cultural heritage and historical experiences, with philosophical frameworks emphasizing harmony and hierarchy rather than Western-style confrontation (Veres, 2022). This orientation manifests practically through soft power strategies like Confucius Institutes that promote Chinese culture globally, while historical memories of past invasions reinforce China's emphasis on sovereignty and cautious diplomatic approaches (Madani et al., 2020). The distinctive blend of traditional cultural values with Communist Party influence creates unique diplomatic practices that combine professionalization with particularities rooted in China's political and cultural history (Ptácková et al., 2021).

2.3.2 Ideology. Ideology has been a paramount factor in shaping Chinese foreign policy since the founding of the PRC in 1949, serving as the rationale for the legitimacy of the ruling Chinese Communist Party and evolving significantly over time (Zha, 2023). Chinese foreign policy is

influenced by a symbiotic neorealist–constructivist approach, where ideological principles interact with conditioning factors like geographical environment, power, and historical experience alongside determining factors such as national interests and leadership traits (Warmerdam & Haan, 2015). The practical application of ideological principles in foreign policy remains complex and conditional, reflecting the CCP's adaptive and strategic approach that uses ideology as both a tool for domestic legitimacy and a strategic asset in international relations (Cai, 2020).

2.3.3 Governmental Leadership and Political Structure. The structure of the Chinese government has significantly influenced the formulation and implementation of its foreign policy, reflecting a complex interplay of historical legacy, bureaucratic dynamics, and leadership vision. Since the era of Deng Xiaoping, the implementation of reforms has engendered a multifaceted foreign policy environment characterized by an excess of stakeholders and their corresponding obligations, which often dissolves in disputes regarding jurisdiction (Duggan, 2020). Concurrently, the influence of global frameworks on China's foreign policy determinations underscores the intricate relationship between domestic identities and the evolving international norms (Johnston, 2018). Under Xi Jinping, China has striven for achievements and maximizing influence through economic interactions and multilateral frameworks, aiming to reshape global rules to its benefit (Chang-Liao, 2016), demonstrating how the combination of historical development, complex bureaucratic processes, and leadership approaches shapes the course of China's foreign policy.

2.3.4 Economic Modernization. In the post-Mao era, China's foreign policy, headed by Deng Xiaoping and subsequent successors, shifted from engaging in armed conflict and promoting global revolution to adopting the Five Principles of Peaceful Coexistence. (Huwaidin, 2001). By 2035, China aims to significantly enhance its economic, scientific, technological, and overall national strength, positioning itself among the top innovative countries globally and reaching the development level of medium-developed countries. China plans to maintain rapid growth in labor productivity, leveraging its large labor force and continuous improvement in human capital, which is crucial for sustaining medium-to-high-speed economic growth and strengthening its position in agriculture and Intellectual Property Rights (Hu, 2023).

2.3.5 Soft Power. Soft power, rooted in the ability to attract and co-opt rather than coerce, has been embraced by China's foreign policy as a key component of its peaceful rise on the global stage by shaping its international relations and diplomatic strategies. It is evident in the establishment of Confucius Institutes worldwide to promote Chinese language and culture as a means of positive image of China (Nye, 2023) and the BRI as a foundation seeking to expand influence through economic partnerships and infrastructure development (Duarte & Ferreira-Pereira, 2021).These initiatives demonstrate China's desire to portray itself as a generous contributor on the international platform, striving to nurture understanding, respect, and endorsement for its political systems and policies (Schultz, 2022).

2.4 The Context. Context is that external factors have a profound impact on the foreign policy of China, molding its strategies and reactions on the global platform. The international security landscape, marked by instability and delicacy, demands a well-rounded stance from China to safeguard

its interests while avoiding yielding to internal demands for more aggressive measures (Liu & He, 2023). The existence of the United States in the Asia-Pacific area and its approach towards China are factors that contribute to a perception of containment, thus adding complexity to China's foreign policy choices (Darmawan, 2018).

2.4.1 Regional Multilateralism. Regional multilateralism has held considerable significance in influencing China's foreign policy and strategy following the Cold War period, involving four crucial dimensions: the quest for maximizing material power, the appeasement of neighboring regions, the safeguarding of fundamental interests, and the elevation of global standing, which have distinctly impacted China's foreign policy tendencies towards engaging actively in regional multilateral cooperation and organizations (Blackwill & Tellis, 2015). China's active participation in regional multilateral partnerships facilitates its integration into the East Asian production network and global economic system, contributing to economic prosperity and national strength enhancement while helping Beijing alleviate regional tensions and maintain a peaceful international atmosphere. Overall, China's approach to regional multilateralism in its foreign policy is heavily shaped by an evolving overarching strategy focused on security and the achievement of a prominent position as a great power (Zhou, 2018).

2.4.2 Geopolitical Factors. Chinese foreign policy actors and theorists reject both the conventional Chinese notion of a universal leader and the concept of great power hegemony, with supporting the existing order and preferring cooperation over conflict through engagement in international groups like the WTO and ASEAN, seeking to reshape China's portrayal as a prominent player on the global stage (Huma, 2014). Southeast Asia's location has historically attracted the attention of larger powers, emphasizing its strategic importance in global geopolitics and trade routes (Zhang, 2023), with China aiming to maintain friendly or neutral relationships to enhance trade and investment opportunities. Establishing strong connections with Southeast Asian nations is significant for China as it contributes to realizing its broader strategic and security goals (Heginbotham, 2018).

2.4.3 Global Economic Trends. China requires a favorable global environment to uphold domestic economic stability and increasingly pursues entry into overseas markets (Li, 2009). The rise of China from a weak and low-income country to one gaining global recognition has been driven by significant capital investment, productivity improvements, and competitive advantages from its sizable population and low-cost labor, with foreign direct investment contributing through nearly half a million registered foreign-owned enterprises. China's international engagement includes regional collaborations, the initiation of the Silk Road Belt and Maritime Silk Road Belt, and noticeable restrictions on U.S. trade capabilities evident in Trans-Pacific Partnership discussions (Li, 2009). The "Go Global" initiative introduced in 2000 motivated Chinese companies to venture into foreign investments, frequently obtaining natural resources to support domestic expansion (Leon, 2016), while China's economic reforms emphasized the strategic value of the South China Sea and BRI for national interests and global positioning in the 21st century (Nugraha et al., 2022).

2.5 China's Intention. China's foreign policy intentions toward Southeast Asia are multifaceted, influenced by strategic, economic, and geopolitical factors. The region's strategic positioning, economic prospects, and geopolitical importance render it central to China's overarching foreign policy aims. In its strategy, China weaves together elements of economic diplomacy, diplomatic connections, and significant undertakings like the BRI to amplify its sway and respond to the leadership of other nations, particularly the U.S. The subsequent sections explore the principal facets of China's foreign policy intentions towards Southeast Asia by strategic and economic imperatives; it concurrently encounters considerable obstacles. The nations within the region exhibit a degree of caution regarding China's intentions, as they strive to balance collaboration with apprehensions surrounding sovereignty and autonomy. These dynamics underscore the delicate equilibrium that China must sustain in its diplomatic approach towards the region.

2.6 China's Foreign Policy with Chinese Characteristics. China's international relations scholars are 'Sinicizing' the concepts of power, harmony, and order, broadening the notion of power to encompass not only the ability to compel others but also the promotion of good governance and the observance of ethics towards weaker nations, guided by the principle of 'humane authority' (Smith, 2020). China's foreign policy, distinguished by a distinctive combination of historical, cultural, and ideological components, illustrates "Chinese characteristics" through partnership diplomacy aimed at establishing worldwide partnerships to cultivate a secure global atmosphere, deeply entrenched in traditional Chinese ideologies such as Tianxia and Guanxi that emphasize harmonious global structure and interpersonal connections (Letiaev & Wang, 2022). China's foreign policy demonstrates a combination of tangible interests and non-materialistic goals, including prestige and global reputation, essential to its self-perception as a prominent civilization that establishes worldwide norms, with the development of foreign policy theories embodying Chinese characteristics motivated by national identity and global recognition (Zhang & Yang, 2020).

In conclusion, the theoretical foundations and motivational factors underlying China's foreign policy create a comprehensive framework that directly shapes the distinctive characteristics of China's international engagement. The evolution of international relations theory has necessitated a post-Western approach that incorporates Chinese perspectives, as China's increasing global influence challenges conventional Western-centric frameworks. This theoretical shift provides the intellectual foundation for understanding how Chinese characteristics manifest in foreign policy practice.

Chinese theories of international relations, despite their Sinocentric perspective and alignment with Communist Party objectives, have developed unique interpretations that integrate cultural, political, and diplomatic elements specific to the Chinese context. These theoretical underpinnings are reinforced by the motivational factors that drive China's foreign policy, beginning with deeply rooted historical experiences and cultural traditions that emphasize harmony, hierarchy, and conflict avoidance rather than confrontation.

The governmental structure under Xi Jinping's leadership has introduced new diplomatic concepts that emphasize economic interactions and multilateral frameworks designed to reshape global

rules to China's advantage. Economic modernization goals demonstrate how domestic development priorities inform foreign policy strategies. Soft power initiatives, particularly through Confucius Institutes and the Belt and Road Initiative, represent practical applications of China's cultural and economic influence strategies.

The contextual factors surrounding China's foreign policy further illuminate how these motivational elements translate into practice. Regional multilateralism serves multiple strategic purposes, , while geopolitical considerations focus on countering perceived containment efforts and maintaining favorable relationships with neighboring countries. Global economic trends, particularly China's "Go Global" initiative and the strategic importance of international markets for domestic stability, underscore the economic imperatives driving foreign policy decisions.

These interconnected theoretical foundations, motivational factors, and contextual considerations culminate in China's foreign policy with Chinese characteristics, which represents a distinctive blend of hierarchical pluralism and traditional Chinese concepts such as Tianxia and Guanxi. The resulting foreign policy approach demonstrates how China seeks to establish a multipolar world order that reflects its historical and philosophical roots while advancing its material interests and non-materialistic goals, including global prestige and recognition as a civilization that sets international standards.

3. Conceptual Framework and Methodology.

3.1 Conceptual Framework. China's foreign policy with Chinese characteristics focuses on studying China's foreign policy that possessed its unique characteristics retaining from the influences of Chinese scholars on international relations theory in Chinese perspectives. Internal motives play a vital role in shaping China's foreign policy, impelled by an intricate interplay of history and cultural tradition, ideology, governmental leadership and political structure, economic modernization, and soft power. China's foreign policy is markedly shaped by an intricate interaction of external factors, encompassing regional multilateralism, global economic trends, and geopolitical factors. The nations within the region exhibit a degree of caution regarding China's intentions, as they strive to balance collaboration with apprehensions surrounding sovereignty and autonomy. The delicate and uncertain global security landscape mandates a nuanced strategy in China's foreign policy to steer clear of yielding to domestic demands for more aggressive international measures. China's foreign policy in Thailand has produced various regional advantages, driven by a blend of economic, political, and geopolitical roles.

3.2 Methodology. The research utilizes qualitative research to deliver an overall understanding of China's foreign policy towards Thailand. I hypothesize that China's foreign policy towards Thailand can be explained by several factors, including China's "Internal motives" and "External motives". To demonstrate the hypothesis, the researcher will analyze the data from many secondary sources, including articles, books, and journals. The researcher will use both Chinese language and English language literature regarding China's foreign policy towards Thailand. To answer the research questions, this study first draws on academic literature, semi-academic magazines, policy papers, and national and international media outlets on China's foreign policy objectives, its Thailand strategy, and Sino-Thailand relations. It presents the role of China's foreign policy with Chinese characteristics in

Thailand. The research aims to interpret the underlying reasons and motivations in relation to explaining China's foreign policy towards Thailand.

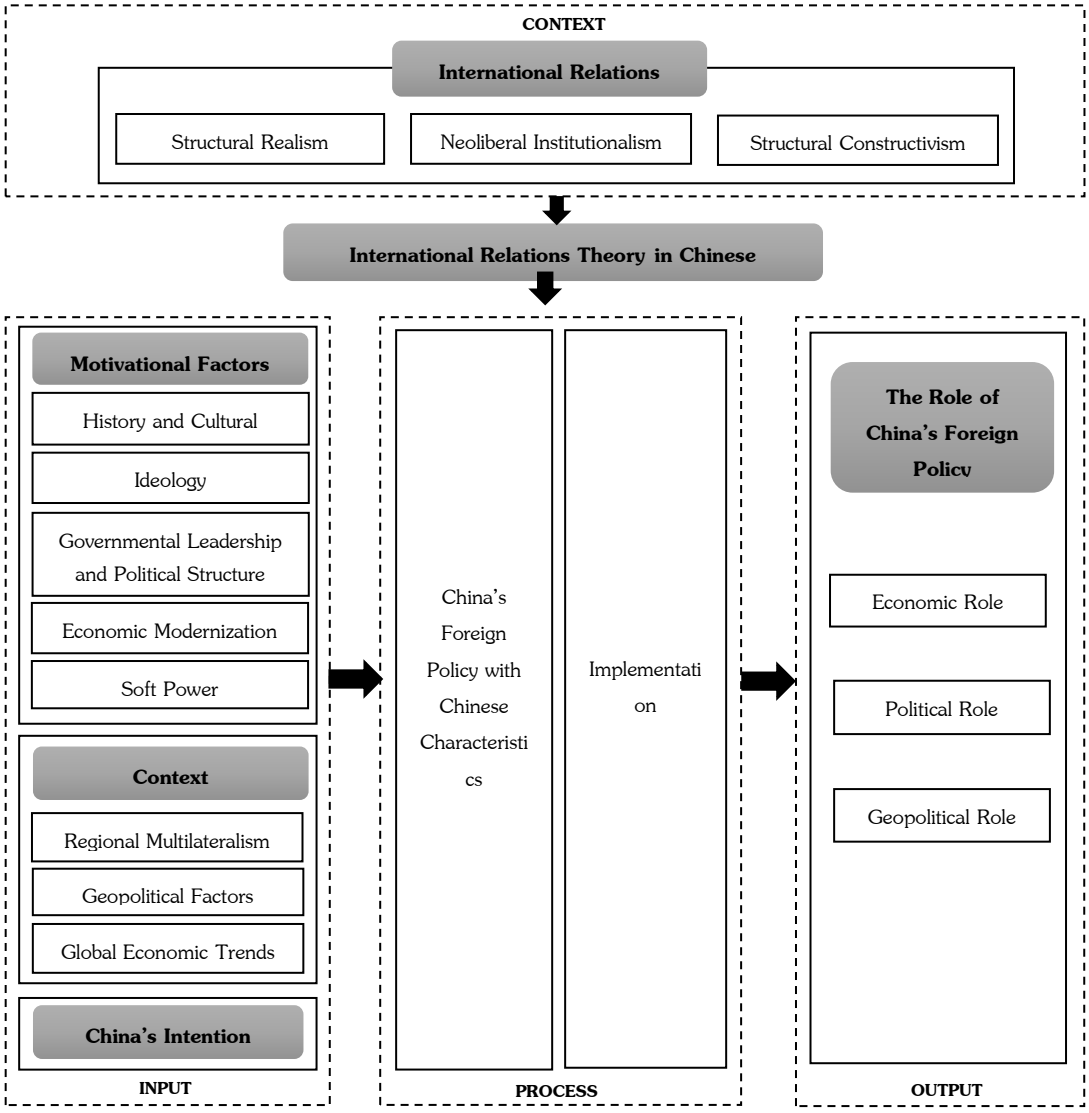

Figure 1. Conceptual Framework

4. Results.

4.1 The internal and external motives of China's foreign policy with Chinese characteristics formulation.

The concept of "IR theory with Chinese characteristics" is deemed to be more credible and relevant than the concept of "Chinese IR theory," when taking into account the subsequent features of "uniqueness" that pertain to the rise of China. China's foreign policy, distinguished by its singular

Chinese characteristics, embodies a strategic framework that integrates the nation's unique political ideology, historical context, and global aspirations.

The principal theoretical frameworks within the realm of international relations that underscore the significance of motivational factors as a crucial component of states' foreign policy are the state-level approach and pluralism. The researcher found the impact of internal motives, including history and culture traditions, ideology, governmental leadership and political structure, economic modernization, and soft power efforts on China's foreign policy.

The context is that external factors significantly shape the foreign policy of China, thereby informing its strategies and responses on the international stage. These external influences collectively exert a considerable effect on China's foreign policy, necessitating the nation to navigate complex global landscapes while balancing both domestic and international pressures and China's intention significantly impact the formulation of China's foreign policy.

4.2 China's Foreign Policy with Chinese characteristics in Thailand

The historical relationship between China and Thailand can be traced back to the tributary system, wherein Siam engaged in tribute missions primarily to secure economic advantages rather than to attain political domination. The phrase "China and Thailand are brothers" has emerged as a diplomatic narrative facilitating the normalization of Sino-Thai relations during the Cold War era. The strategic alliance between Thailand and China has witnessed significant expansion following the coup d'état of 2014, characterized by enhanced military cooperation and joint exercises. Thailand's foreign policy is frequently described as "Bending with the wind," signifying its strategy of maintaining a delicate balance in relations with major powers.

The dynamics between China and Thailand have appreciably altered over the years, evolving from a phase of discord to a context influenced by strategic coalitions. This metamorphosis has been shaped by a multitude of geopolitical, economic, and historical determinants. The bilateral relations are distinguished by shared interests in economic collaboration, regional stability, and cultural interchange, while simultaneously being influenced by the overarching geopolitical dynamics involving principal powers such as the U.S. China's participation in Thailand through multiple perspectives, including economic collaborations, strategic partnerships, cultural impact, and migratory trends.

4.2.1 Economic Partnerships

China assumes a crucial position in the economic advancement of Thailand, serving as a significant trading associate and a principal investor, thereby facilitating progress in both technology and infrastructure. The strategic alliance has intensified, especially following the coup in Thailand in 2014, resulting in augmented military collaboration, which encompasses the provision of Chinese military apparatus and collaborative exercises. Furthermore, the establishment of the China–Laos–Thailand transportation corridor as part of the BRI amplifies logistical opportunities, notwithstanding Thailand's adherence to a policy of economic autonomy, which has implications for project timelines and deliberations. The BRI constitutes a fundamental element of China's economic interaction with Thailand. The China–Laos–Thailand transportation corridor represents a prominent

endeavor under the BRI, significantly augmenting logistics and trade interconnectedness among the nations. (Vinogradov, 2024).

China constitutes a significant trading associate and investor in Thailand. The creation of the Thai Chinese Industrial Zone in Rayong foster overseas investment and economic collaboration. This zone functions as a paradigm for Chinese enterprises aspiring to broaden their global reach, capitalizing on Thailand's advantageous geographic positioning and economic prospects.

4.2.2 Strategic Alliances

After the military coup in Thailand during 2014, the nation has fortified its strategic ties with China, particularly in military domains. This development encompasses an augmented acquisition of military apparatus from China and the conduct of joint military exercises, signifying a notable shift in Thailand's foreign policy towards establishing closer relations with China considering the increasingly fraught relations with the U.S. (Vinogradov, 2024).

The foreign relations strategy of Thailand reflects a thoughtful balancing act involving China and the U.S. Historically, Thailand has upheld a position of neutrality, functioning as a "buffer state" to mitigate the influence exerted by both superpowers. In the economic and political realms, China holds a notable position in Thailand, particularly as Thailand aims to strike a balance between its connections with the U.S. and China. As an integral component of its hedging strategy, this bilateral relationship establishes Thailand as a pivotal geopolitical conduit between the two superpowers, enabling it to exploit its position for economic advancement while preserving a stance of neutrality. Nevertheless, this intricate balancing act poses challenges as Thailand navigates the multifaceted dynamics of the rivalry between the U.S. and China.

4.2.3 Cultural Influence

China's engagement in Thailand is profoundly influenced by historical connections, economic motivations, and the impact of ethnic Chinese populations. Thailand's vital role in Southeast Asia and its ties with the U.S. mold China's diplomatic efforts, creating a layered interaction that boosts China's impact and visibility in the region. The manifestation of China's soft power in Thailand is distinctly observable through initiatives such as the Confucius Institutes, which endeavor to advance the appreciation of Chinese culture and language. These endeavors are bolstered by the longstanding historical relations between China and Thailand, alongside the presence of ethnic Chinese communities within Thailand, which serve to enhance both cultural and economic exchanges (Tungkeunkunt, 2016).

China assumes a pivotal position in Thailand through the influx of new Chinese migrants, who are classified as investors, entrepreneurs, highly skilled professionals, unskilled laborers, and students. These migrants significantly enhance Thailand's economy by initiating businesses, addressing labor shortages, and promoting educational exchanges. The presence of Chinese communities not only encourages cultural exchange but also reinforces bilateral relations, while the Thai government can strategically utilize these dynamics for economic advancement and development.

China adopts a comprehensive strategy in its diplomatic relations with Thailand, emphasizing tourism, education, and cultural diplomacy. This tactic not only reinforces the connections shared by the two countries but also aligns with the dreams and goals of both sides. (Raymond, 2019). The escalating economic dependence of Thailand on China, notably through initiatives such as the BRI, raises concerns regarding the potential risks associated with becoming excessively reliant on a singular foreign power (Yang, 2024).

The concept of a "positive shared future" is advanced through Sino-Thai folk diplomacy, wherein transnational Chinese entities contribute significantly to the development of both nations, thereby cultivating goodwill and mutual understanding (Lee, 2024). Thailand's interaction with China is layered, covering various economic, political, and cultural territories. Thereby, this discourse examines China's participation in Thailand through multiple perspectives, including economic role, political role, and geopolitical role.

4.3 Economic Role of China in Thailand. In 2023, the economic exchanges involving China and Thailand culminated in a significant U.S.$126.3 billion, as China recorded a trade surplus of U.S.$25.1 billion. The manufacturing industry is the principal emphasis of China's exports to Thailand, particularly in providing raw materials and essential components. In 2023, a considerable segment of these exports consisted of silicon wafers, which are utilized in the production of solar cells, aggregating a total value of U.S.$1.29 billion.

The primary role, termed 'Thailand consumer market'. China assumes a pivotal position in influencing Thailand's consumer market trends through many economic, cultural, and infrastructural factors. The bilateral relationship between these two nations has engendered substantial growth prospects, particularly within sectors such as processed food and consumer durables. This dynamic is further augmented by Chinese investments and the involvement of Chinese intermediaries in Thailand, facilitating market accessibility and cultural interchange.

The second referenced economic role in Thailand, termed 'Thailand resources'. China occupies a complex and significant position within Thailand's resource framework, principally through FDI, infrastructure enhancement, and environmental initiatives. This engagement is propelled by China's strategic objectives aimed at broadening its economic dominance and securing vital resources within Southeast Asia.

The third referenced economic role in Thailand, termed 'leverage economic incentives'. China also assumes a pivotal role in the facilitation of economic incentives within Thailand through a multitude of mechanisms, encompassing investment policies, infrastructure undertakings, and environmental initiatives.

The fourth referenced economic role in Thailand, termed 'economic engagement'. The economic relationship between Thailand and China is vital, majorly driven by FDI, trade agreements, and partnerships in strategic initiatives. Endeavors like the BRI and ASEAN+1 underscore the strategic alliance between China and Thailand, concentrating on mutual interests and regional collaboration.

The fifth referenced economic role in Thailand, termed 'BRI boost China influence in Thailand'. The BRI significantly enhances the sway of China in Thailand via partnerships in economic, infrastructural, and ecological areas.

The sixth referenced economic role in Thailand, termed 'China's capital in Thailand'. The capital of China in Thailand predominantly denotes the substantial presence and influence of Chinese investments and communities within Bangkok, the capital city of Thailand. This partnership is defined by a merging of financial, cultural, and diplomatic exchanges that have evolved continuously over the years, especially via projects like the BRI.

The last one referenced the economic role in Thailand, termed 'Thailand-China trade agreements'. The bonds between Thailand and China, prominently through the ACFTA and the BRI, notably shape the economic advancement and dynamics evolving in both countries. These agreements serve to enhance trade relations, promote investment, and generate opportunities for economic collaboration.

The economic structure of Thailand hinges heavily on international commerce, where the total of exports and imports makes up over 70% of its GDP (Chirathivat, 1995). The ACFTA has markedly enhanced bilateral commerce, establishing China as Thailand's preeminent trading partner (Shen, 2013). A deficiency in cooperation could precipitate diminished access to Chinese markets, thereby hindering economic growth and constraining export possibilities. Thailand's geographical proximity to China confers a strategic advantage for trade with the southwestern provinces of China (Phanishsarn, 2006). The absence of collaboration may culminate in Thailand forfeiting its competitive advantage to neighboring nations that actively pursue engagement with China.

The substantial influx of commodities originating from China has exerted a profound influence on various industries within Thailand, resulting in insolvency across multiple sectors. This occurrence can be primarily ascribed to the ACFTA, which has engendered heightened competition from Chinese imports. Therefore, it has concurrently afforded opportunities for others to adapt and innovate, potentially culminating in a more competitive market landscape in the long term.

The involvement of China in Thailand is delineated by the circulation of 'Grey capital', which encompasses both lawful and unlawful commercial activities. This cross-border engagement is enabled by informal affiliations that obscure the distinctions between governmental and business entities, as well as between legal and illicit undertakings. China's economic influence in Thailand is accompanied by notable controversy. (Raymond, 2024). Chinese entrepreneurs operating business in Thailand, especially within the context of Gray China, encounter substantial concerns regarding safety and hygiene. These challenges arise from a confluence of socio-political dynamics, health-related crises, and operational hurdles that may adversely affect their business sustainability and personal safety. Some entrepreneurs may identify opportunities in adapting to local circumstances and utilizing community support to enhance their business resilience.

4.4 Political Role of China in Thailand. China's political role in Thailand is delineated by a sophisticated interplay of collaboration and rivalry, particularly in the framework of the prevailing Sino-American competition. Thailand's foreign policy embodies a strategically nuanced hedging strategy,

facilitating its navigation through the influences exerted by both superpowers while safeguarding its national interests. This intricate relationship is molded by historical connections, economic dependencies, and considerations on regional security.

The primary role, termed 'building influence in Thailand', the influence exerted by China in Thailand has transformed considerably, especially across economic, cultural, and diplomatic spheres. In historical context, the bilateral connection has changed from being adversarial in the Cold War times to becoming one that emphasizes cooperation, driven by aligned interests and transformations in the geopolitical framework (Cai et al., 2024). This advancement has made it feasible to carry out China's soft power frameworks, evident in the setup of Confucius Institutes, which are created to strengthen cultural bonds and elevate the Chinese language and cultural norms throughout Thailand (Tungkeunkunt, 2016).

The second referenced political role in Thailand, termed 'military capability'. China's military capacity in Thailand is defined by an expanding collaboration that epitomizes Thailand's strategic maneuvering amidst global power dynamics. This association has undergone substantial transformation, with Thailand progressively seeking assistance from China for military advancement and procurement, while concurrently preserving its affiliations with the United States.

The third political role is 'financial dependence and environmental impact'. The BRI of China has increasingly oriented itself towards environmentally sustainable development, thereby fostering eco-friendly tourism and tackling ecological challenges within Thailand (Hung, 2024). The BRI serves as a catalyst for investments in renewable energy and sustainable urban design, which are vital for the ecological integrity of Thailand (Zhang et al., 2023).

The last role is 'China's national interest in Thailand'. China's national interest in Thailand encompasses a diverse array of dimensions, influenced by economic, geopolitical, and historical determinants. Although bilateral relationships are frequently characterized as a fraternal bond, they are predominantly governed by pragmatic assessments of national interests on both sides. China perceives Thailand as an indispensable ally within its BRI, which seeks to augment trade routes and economic connections throughout Southeast Asia (Rappa, 2016). Thailand functions as a pivotal channel for Chinese commodities entering ASEAN markets, thus rendering it strategically vital for China's economic proliferation.

The researcher's comprehension of the PRC's political assessment pertaining to Thailand elucidates a multifaceted interaction of historical circumstances, national prerogatives, and changing viewpoints. During World War II, China worked to assert its power in Thailand, intending to combat the anti-Chinese regime. Nevertheless, these initiatives were impeded by Thailand's hesitance and the external resistance from Western powers. Thailand's diplomatic strategy concerning China was chiefly driven by national interests, perceiving China's expanding influence as a prospective menace to its security. The perception of China as a potential long-term adversary has significantly influenced diplomatic strategies, underscoring the necessity for a prudent approach to engagement.

4.5 Geopolitical Role of China in Thailand. Thailand's advantageous geographical positioning as the center of ASEAN significantly amplifies its geopolitical influence in relation to China by functioning as a central hub for commerce, investment, and logistics. Its local benefits enhance the connectivity between China and other ASEAN countries, establishing it as an essential foundation for FDI. This strategic placement empowers Thailand to capitalize on its relationship with China while judiciously preserving its associations with other ASEAN members, thereby achieving a balance in regional dynamics and promoting economic advancement through initiatives such as the BRI.

The primary role, termed 'Thailand's strategic location', substantially contributes to the geographical location of Thailand within Southeast Asia, significantly influencing China's strategic interests, especially concerning economic and geopolitical factors. Located centrally within the Mekong area, Thailand acts as an essential link for China's BRI, boosting commerce and connectivity throughout Southeast Asia.

The second referenced geopolitical role, termed 'Thailand's natural resources,' is marked by considerable mineral abundance, especially in antimony, potassium, and tin; however, the nation encounters obstacles in the sustainable governance and utilization of these resources. The diplomatic strategies of Thailand about resources are gradually merging with China's goals, notably via efforts like the Eastern Economic Corridor (EEC) and the BRI. This affiliation underscores both opportunities and frictions in resource management and regional collaboration.

The third geopolitical role is 'stability of Thailand', influencing various economic, political, and security factors. As Thailand navigates its relationships with both China and the United States, it endeavors to sustain a delicate equilibrium that advances national interests while circumventing excessive dependence on either power. This relationship is marked by both collaboration and tension, manifesting the complexities inherent in regional geopolitics.

The last one referenced the geopolitical role in Thailand, termed 'Thailand is a battleground between the U.S.–China'. Thailand's role on the geopolitical front has rendered it a vital scene in the enduring clash between the U.S. and China. As both global powers strive for dominance, Thailand has implemented a hedging strategy, meticulously balancing its affiliations to sustain stability and foster economic development. This methodology enables Thailand to adeptly maneuver through the intricacies of international relations while circumventing the risks associated with taking definitive sides.

China's geopolitical analysis of Thailand is profoundly influenced by historical affiliations, economic interests, and the strategic complexities inherent in the U.S.–China rivalry. Thailand's distinctive role as a regional buffer state enables it to navigate complex relationships with both superpowers, whilst China endeavors to augment its influence via economic initiatives and military presence in Southeast Asia. To maintain its foreign relations, Thailand utilizes a strategy that balances its ties with both the U.S. and China which allows Thailand to sustain domestic stability and foster inclusive economic development, while navigating the prevailing geopolitical tensions. Thailand's strategic position in connection to China's landscape is profoundly affected by its geographical indicators, which promote economic and geopolitical engagements. These indicators encompass

nearness to China's western provinces, maritime passages, and regional development initiatives that correspond with China's BRI.

5. Conclusion. China's foreign policy with Chinese characteristics represents a strategic framework that integrates the nation's unique political ideology, historical context, and global aspirations, driven by both internal motives including cultural traditions, governmental leadership, and economic modernization, as well as external factors that shape China's international strategies. This comprehensive approach manifests distinctly in China's relationship with Thailand, where historical ties dating back to the tributary system have evolved into a modern strategic partnership characterized by the diplomatic narrative of "China and Thailand are brothers." The relationship has significantly strengthened since Thailand's 2014 coup, with enhanced military cooperation, joint exercises, and increased Chinese military equipment procurement, while Thailand maintains its traditional "bending with the wind" foreign policy strategy to balance relations with major powers.

The economic dimension of China-Thailand relations demonstrates remarkable depth and complexity, with bilateral trade reaching $126.3 billion in 2023 and China maintaining a $25.1 billion trade surplus. China's economic engagement encompasses multiple roles: as Thailand's primary consumer market influencer, a major investor in Thai resources through foreign direct investment, and a key partner in infrastructure development under the Belt and Road Initiative (BRI). The China-Laos-Thailand transportation corridor exemplifies this cooperation, enhancing logistics and trade connectivity while respecting Thailand's economic autonomy policies. Chinese investments, including the Thai Chinese Industrial Zone in Rayong, demonstrate China's strategy to foster overseas investment, though concerns exist regarding "grey capital" involving both legal and illegal commercial activities that complicate the economic relationship.

China's political and geopolitical roles in Thailand reflect sophisticated power dynamics within the broader Sino-American competition framework. China has successfully built influence through cultural diplomacy, including Confucius Institutes, soft power initiatives, and leveraging the substantial Chinese diaspora in Thailand to enhance bilateral relations and economic exchanges. Thailand's strategic geographic position as ASEAN's center amplifies China's geopolitical interests, serving as a crucial hub for the BRI and facilitating China's economic expansion throughout Southeast Asia. However, this relationship exists within Thailand's careful hedging strategy, where the nation functions as a buffer state navigating between Chinese and American influences while maintaining neutrality and domestic stability.

In summary, China's multifaceted engagement with Thailand represents a comprehensive manifestation of Chinese foreign policy with Chinese characteristics, encompassing economic partnerships worth over $126 billion annually, strategic military cooperation, cultural influence through soft power and diaspora networks, and geopolitical positioning within ASEAN. This relationship exemplifies China's broader regional strategy while accommodating Thailand's balancing act between major powers, creating a complex but mutually beneficial partnership that serves both nations' strategic interests within the evolving global power structure.

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Southern Thailand Land Bridge Project: Strategic Choices and Risk Assessment under International Attention

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ABSTRACT

Recently, the Southern Thailand Land Bridge Project, a proposed alternative to the Kra Canal, has drawn significant attention. This project aims to optimize regional logistics through a "land + port" composite model. Its advancement has sparked widespread domestic and international reactions, and it also faces multiple domestic and international risks. Research reveals that the project faces multiple challenges, including domestic political instability, high investment costs and long payback periods, impacts on residents' lives and ecological damage, as well as the threat of separatism and terrorism in the southern region. Internationally, the intensification of the strategic competition between China and the United States has complicated the investment environment, compounded by the impacts of the Russia-Ukraine conflict and the Red Sea crisis on the global energy, trade, and transportation systems. Despite the numerous risks and challenges, The Thai government still advocates for the continued advancement of this project, which is currently in the market research phase. For China, investing in this project will face multiple challenges in terms of politics, economy, and security. This article aims to comprehensively analyze the reactions of Thailand and abroad to the Southern Thailand Land Bridge Project, clarify Thailand's strategic choice of the project, and further explore the current domestic and foreign risks of China's investment in the Southern Thailand Land Bridge Project, so as to avoid suffering major losses in the process of investing in the land bridge project and affecting the implementation progress of the "Belt and Road" initiative and other interests related to China.

KEYWORDS: Southern Thailand; Land Bridge Project; Strategic Choice; Risk Assessment; Trans-Asian Railway

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1. Formulation of the problem. The Kra Isthmus is located at the boundary between southern Thailand and the northern Malay Peninsula. Chumphon Province in the east faces the Gulf of Thailand in the west of the Pacific Ocean, while Ranong Province on its western side provides direct access to the Indian Ocean via the Andaman Sea. This narrow strip of land connecting the Gulf of Thailand and the Andaman Sea, with the narrowest point being only 25-30 miles (Encyclopedia Britannica, 1998). In Thailand, the idea of connecting the Kra Isthmus to bypassing the Strait of Malacca has a long history. As early as the reign of King Ayutthaya Narai (1656-1688), Thailand first proposed constructing a canal across the Kra Isthmus in the south, and the Kra Canal plan has been mentioned many times in the past three hundred years. According to the 2005 survey report by the Thai Senate's Ad Hoc Committee on the Kra Canal Project, the Kra Canal project would take 10 years to build, and it can provide 20,000 direct jobs and 200,000 indirect jobs during the construction phase (The senate ad-hoc committee on kra canal project kingdom of Thailand, 2004). Once the Kra Canal is successfully built, it will not only greatly boost the Thai economy, create a large number of employment opportunities, enhance Thailand's economic and strategic position in Asia, but also drive the economic and trade development of neighboring and regional countries. At the same time, it will also connect important channels in the Indian Ocean and the Pacific Ocean, provide a new trade channel bypassing the Strait of Malacca, save 2-5 days of transportation time, and positioning the Indo-Pacific region as a key global economic engine to promote regional cooperation and economic integration (Yang Lijuan, 2018, pp.34-41). However, the canal project has been shelved many times due to frequent regime changes in Thailand, serious corruption, active separatism in the south, the economic benefits of the project itself, ecological damage, funds and technology, and other factors (Sun Haiyong, 2014, pp.92-94).

In October 2023, the Thai Cabinet approved the Chumphon-Ranong Land Bridge Project, proposed as an alternative to the Kra Canal initiative. This strategic infrastructure plan involves the construction of two deep-sea ports in Chumphon and Ranong provinces in southern Thailand, connected by approximately 90 kilometers of integrated rail networks, highways, pipelines, and associated infrastructure facilities (Carlisle, 2023). The project will adopt a Public-Private Partnership (PPP) international bidding model with a total investment of 1,001.207 billion Thai Baht (THB), comprising government-funded land acquisition costs of 6.212 billion THB and private-sector investment of 994.995 billion THB, and implementation will be divided into four phases. The project plans to issue the investors invitation announcement in the fourth quarter of 2025, start bidding and land acquisition procedures in 2026, followed by the initiation of construction activities within the same year. It is expected that the first operational phase is anticipated to launch in October 2030, and the entire project is scheduled to be completed in 2039 (The Office of Transport and Traffic Policy and Planning, 2024).

In the Southeast Asian region, the Strait of Malacca is the shortest route connecting trade and transportation between countries in the Indian Ocean and the Pacific Ocean, handling 25% of global trade transportation (Khalid, M. A. et al., 2025). However, according to forecasts by the World Bank, 122,500 ships will pass through the Strait of Malacca in 2025, reaching the limit of its passage capacity (The Office of Transport and Traffic Policy and Planning, 2024). Once the Landbridge Project is completed, it can reduce the freight transportation time between the Pacific Ocean and the Indian Ocean by 2-4 days and lower transportation costs by 5-10% compared to the traditional route via

the Strait of Malacca (The Office of Transport and Traffic Policy and Planning, 2024). The Southern Thailand Landbridge Project can be seen as a strategic alternative to absorb the freight volume that the Strait of Malacca cannot handle and reduce dependence on the Strait of Malacca by optimizing the regional logistics system. It provides a safer and more efficient alternative route for trade from the Persian Gulf to the South China Sea, enhancing the resilience and stability of the regional economy. With the active roadshow promotion by former Thai Prime Minister Srettha Thavisin, the project has now entered the market research stage and has received positive responses from investors in the United States, Japan, Germany, China, Saudi Arabia and some Southeast Asian countries.

Amidst the complex transformations of the contemporary global landscape, the Southern Thailand Land Bridge Project faces a dual reality of opportunities and risks. How to make strategic choices in the unpredictable international environment has emerged as a critical challenge for the Thai government. For China, the Thai Southern Land Bridge project constitutes a vital component of the Trans-Asian Railway's Southeast Asian section under the Belt and Road Initiative, carrying significant geopolitical, economic, and security implications. To this end, this study seeks to undertake a systematic examination of the Thai government's strategic decision-making regarding the Southern Thailand Land Bridge Project against the backdrop of shifting global political-economic dynamics, and systematically evaluate the multi-dimensional risks that the project may encounter during its investment and construction in China.

2. Analysis of recent research and publications. Regional logistics and transportation infrastructure is a key factor in promoting regional economic integration and cross-border trade. In recent years, with the acceleration of global economic integration, the construction of logistics and transportation infrastructure in the Southeast Asian region has made significant progress. According to the research by Marek Minárik and Denisa Čiderová (2021), the major ports and transport corridors in the Southeast Asian region play an important role in global trade. In particular, the ports of countries such as Thailand, Malaysia, and Singapore have become important global logistics hubs. These ports not only promote trade within the region but also strengthen the economic connections between Southeast Asia and other regions of the world.

However, the development of regional logistics and transportation infrastructure still faces many challenges. Hal Hill and Jayant Menon (2020) pointed out that despite the large investment in infrastructure construction in the Southeast Asian region, the uneven distribution and quality differences of infrastructure are still significant. For example, the Eastern Economic Corridor (EEC) and the Southern Economic Corridor (SEC) in Thailand have made significant progress in infrastructure construction, but other regions still face the problem of insufficient infrastructure. The second challenge facing the construction of regional logistics and transportation infrastructure is the lack of funding. Rini Suryati Sulong (2012) mentioned that the Kra Canal project in Thailand has been shelved several times due to funding issues. In addition, the implementation of the project also needs to consider various factors such as environmental impact, social culture, and geopolitics. For example, the construction of the Kra Canal may exacerbate the separatist issues in southern Thailand and affect regional stability. The third challenge is the need to coordinate policies and regulations among countries. Nucharee Supatn (2012) pointed out that there are still many obstacles in the cooperation between Thailand and neighboring

countries in cross-border trade and transportation. For example, although border trade between Thailand and countries such as Laos, Cambodia, and Myanmar has increased, it is still restricted by complex customs procedures and inconsistent traffic rules. These problems not only increase trade costs but also reduce logistics efficiency. The fourth challenge is that the competition for infrastructure between major powers in the Southeast Asian region is becoming more and more intense. According to the research by Jiayi Zhou (2024), China and the United States have engaged in fierce competition for infrastructure in the Southeast Asian region. China's Belt and Road Initiative has gained widespread support by providing financial support to developing countries to build transportation, energy, and other infrastructure projects. However, the United States criticizes China's Belt and Road Initiative, arguing that China coerces other countries through "predatory economics."

Overall, existing research posits that the development of logistics and transportation infrastructure in Southeast Asia acts as an engine for regional economic integration. However, it is also confronted with challenges from regional cooperation and various domestic aspects within individual countries. Additionally, it has become a focal point for great power competition and geopolitical risks. Therefore, this article focuses on the Southern Thailand Land Bridge project, and specifically analyzes the domestic and international risks it faces under the context of the Thai government's diversified strategy and the attention from multiple countries.

3. Domestic Decision-Making and Multinational Attention

Despite facing domestic opposition from certain political factions, civil scholars, environmental activists, and southern residents, coupled with the international community's complex stance, the Thai government has strategically resolved to advance the Southern Thailand Land Bridge Project both domestically and internationally, driven by multifaceted political, economic, and security considerations. At the international level, the Thai Prime Minister and Minister of Transport have conducted extensive global roadshows over the past two years to promote the project and attract foreign investors. Domestically, the government has proactively pursued legislative reforms, organized public hearings, and implemented measures to mitigate obstacles to project advancement.

Domestic attitude in Thailand

Thai Government's Strategic Considerations

The Thai government has repeatedly proposed the construction of a canal connecting the Pacific Ocean and the Indian Ocean in southern Thailand. As early as 1677, King Narai of the Ayutthaya Dynasty cooperated with the French government to plan to build a canal at Songkhla Lake to facilitate military operations, but the plan was abandoned due to technical and financial limitations. Since Prime Minister Srettha Thavisin's inauguration in 2023, he actively promoted the Southern Thailand Land Bridge Project. From the Kra Canal to the Southern Thailand Land Bridge Project, it can be seen that the Thai government's proposal to build a land bridge project has taken into account the political, economic and security benefits that the project can bring to a certain extent.

From the perspective of domestic political competition, the Thai land bridge project holds significant political value. In the domestic political ecology, the successful implementation and efficient promotion of the land bridge project will become a major demonstration of the governing party's administrative capabilities. By providing the public with high-quality infrastructure construction and meeting the needs of social development, the ruling party can effectively enhance its public credibility in the hearts of the people, gain wider public support in party competition. From the perspective of regional geopolitics, Thailand can leverage its unique geographical advantages to become a bridge connecting continental markets across continents. The land bridge project will position Thailand as a critical node in global production and transportation networks, significantly strengthening its political voice in Southeast Asia. With this strategic status, Thailand can play a greater role in regional affairs decision-making, international rule-making, and other aspects, deeply participate in global economic and political cooperation, and enhance its influence on the international stage.

In terms of economy, the Thai land bridge project has a strong driving effect on the national economy. According to relevant estimates, upon completion, the land bridge project will enhance transportation efficiency in southern Thailand. By constructing a modern and intelligent transportation hub, it can drive the construction of the southern economic corridor in Thailand and promote regional connectivity and high-efficient development. Leveraging the Kra Isthmus' unique advantage as a link between Asia and the rest of the world, Thailand can become an attractive trade gateway. This will greatly promote the development of Thailand's foreign trade. The expansion of exports will strongly promote economic growth and is expected to directly drive GDP growth by 1.5%. At the same time, the land bridge project can drive the coordinated development of upstream and downstream related industries, including construction, logistics, trade services and other fields. According to the Thai government's estimate, the expansion of these industries can create about 280,000 jobs, which can effectively alleviate employment pressure, improve residents' income level, promote the optimization and upgrading of economic structure, and inject strong impetus into the long-term and stable growth of Thailand's economy (The Working Group of the Committee on Transport, 2024).

In terms of security, the Southern Thailand Land Bridge Project can also play a role in multiple guarantees. At the military strategic level, the land bridge project can optimize the strategic layout of the Thai Navy and facilitate the mobilization and deployment of naval vessels. At the same time, it can leave a passable road in non-peaceful times to improve maritime combat capabilities and emergency response capabilities (The Working Group of the Committee on Transport, 2024). In the area of social stability, the land bridge project will drive economic development in the southern region and improve the living standards of residents. To a certain extent, it can mitigate the problems of separatism and terrorism in the south region, and maintain social security and stability in the southern region; in the field of energy security, the land bridge project intends to attract countries like Saudi Arabia to build refineries and related factories, which can not only promote the development of Thailand's energy industry and enhance the country's competitiveness in the energy field, but also optimize the energy supply structure, reduce energy supply risks, enhance the country's energy security capabilities, and provide solid energy support for Thailand's national security and social stability.

Opinions of major political parties

Since 2002, Thailand has formed a political pattern of "red-yellow confrontation", characterized by the "red shirts" who support Thaksin and represent the Thai Rak Thai Party and the "yellow shirts" who represent the anti-Thaksin camp. In 2019, a new far-left political force advocating political reconciliation emerged-the New Future Party (predecessor of the Forward Party). The party's radical reform platform gained significant support from young voters in the 2023 general election, propelling it to become the largest party in parliament. This electoral outcome triggered a structural shift in Thailand's political landscape, transforming the previous two-party rivalry into a tripartite power balance (Zhou Fangye, 2023, pp.54-60). On the Thai Southern Land Bridge project, the views of major political parties in Thailand are sharply divided.

A Member of Parliament (MP) from the United Thai Nation Party (UTN) in Chumphon Province believes that the project will strengthen connectivity between land and maritime infrastructure and bring economic prosperity to the southern region, but the project has high investment costs and a certain risk of stagnation (Supoj Wancharoen, 2023). Anuthin Chanwirakun, chairman of the Thai Pride Party, described the large-scale initiative as a pivotal measure to integrate regional resources and will make Thailand and ASEAN a target for global investment, and Thailand can become the logistics and distribution center of Southeast Asia and the gateway to ASEAN. He believes that after the completion of the project, it will connect the Gulf of Thailand and the Andaman Sea, greatly shorten the transportation time, improve transportation efficiency. This would enhance Thailand's competitiveness in the global supply chain, promote economic activities such as trade, transportation, import and export, and help Thailand seize the opportunity of economic development (Daily News, 2023).

The main opposition party, the Thai Move Forward Party, argues that the project still faces significant unresolved issues, including unclear oil pipeline planning, changes to environmental research plans, unreliable demand assessments from shipping companies, overly optimistic cargo transportation projections, congestion in the Strait of Malacca, unclear transportation cost savings, and missing financial and economic return calculation data. In addition, four members of the Move Forward Party pointed out that the project evaluation was deceptive, and the conclusions of the study report by the Ministry of Transportation contradicted the summary of the research report commissioned by the National Economic and Social Development Office from Chulalongkorn University. The latter believes that the project is not worth investing in, while the former shows a return on investment of up to 17%. They believe that this may mislead foreign investors and undermine the credibility of the Thai government's research and decision-making (Thairath, 2024). Furthermore, the Move Forward Party contends that the project would not only harm ecological conservation, low-carbon economic goals, and tourism but also exacerbate public financial pressures. The party insists the government should redirect public budgets toward other people-centric initiatives.

Civil society attitude

The overall attitude of Thai civil society towards the Southern Thailand Land Bridge project is polarized, but generally there are more supporters than opponents. According to the results of the citizen hearing held from August 16 to 18, 2023 published on the Land Bridge website, 176 people (61.5%)

in Ranong Province agreed to implement the project, 50 people (17.5%) opposed it, and the hearing results in Chumphon Province were 290 people (58.4%) agreed to implement it, and 137 people (27.6%) disagreed with it (The Office of Transport and Traffic Policy and Planning, 2023). However, judging from the results of the hearing, the proportion of people who disagreed with the implementation of the project was high, and the opposition of Thai civil society cannot be ignored. Residents who hold opposing opinions in Chumphon and Ranong Province formed opposition groups and staged protests outside government departments many times. They criticize the government for lacking transparency and question whether the government will honor promises made to the public. Additionally, the Thai government has not yet conducted a comprehensive environmental and feasibility study, resulting in key issues not being resolved (Eugene Mark, 2025, p.4).

In addition to the southern residents, some Thai scholars, environmentalists and other social elites have also raised objections. The main reasons for opposition from various civil society groups include: (1) **Economic Impacts**: the construction of ports and railway pipelines affects the development of agriculture, fisheries and tourism; (2) **Environmental Degradation**: The project threatens marine resources, water supplies, protected areas for flora and fauna, and ecological diversity (Pipope Panitchpakdi, 2024); (3) **Health and Livelihood Risks**: The project will infringe of farmers' land rights. The toxic waste and gases produced by industry will have an impact on human health. The lack of water resources will increase people's water costs and trigger competition for water resources, and may also affect traditional festivals, cultural customs and activities in both places and damage local tourism resources; (4) **Project Flaws**: The route selection is not appropriate, the project is opaque and unfair, and public participation is not high. As a part of the Southern Economic Corridor (SEC), the Thai Southern Land Bridge Project is connected to the Eastern Economic Corridor (EEC), and the special privileges granted to investors may be inequitable. At the same time, the project is hindered by domestic political turmoil and southern security challenges, and there is a possibility of embroil Thailand in the South China Sea dispute (Pichayada Promchertchoo & Rhea Yasmine Alis Haizan, 2023).

International Community Reactions

The construction of the Southern Thailand Land Bridge, which offers both regional and global benefits, is expected to advance regional economic integration, enhance political trust, and reshape global trade and geopolitical dynamics. Countries in different regions have responded differently to the project based on their respective interests. Except for Malacca and Malaysia, which originally benefited from the Strait of Malacca, the attitudes of other Southeast Asian countries, China, Japan, India, West Asian nations like Saudi Arabia, European and American countries such as the United States and Germany have expressed significant interested in the land bridge project.

Asian countries

The Asia-Pacific region is one of the core areas of global political and economic activities, gathering many major countries and emerging economies, and has complex geopolitical relations. The Southern Thailand Land Bridge is located in this key area, at the connecting node of the two important seas of the Indian Ocean and the Pacific Ocean. Given its geographical location, the land bridge project

has caused the greatest response in the Asia-Pacific region, and countries in Southeast Asia, East Asia, South Asia and West Asia have all expressed different opinions based on different interests.

(1) Southeast Asian countries

Among Southeast Asian countries, Singapore and Malaysia, which benefit from the Strait of Malacca, will face potential economic shocks to their status and growth due to the land bridge project (Sri Ayu Kartika Amri, 2023), especially Singapore's dominant position as a financial center, and may reduce Singapore's international investment. Singapore has leveraged its strategic location along the Strait of Malacca to become a global shipping hub, with port-related industries serving as a critical economic pillar. The land bridge's opening could divert cargo traffic, reduce port throughput and impacting revenue from port-dependent sectors. For Malaysia, which also relies on the shipping economy of the Strait of Malacca, the construction of the land bridge project may cause economic losses to Port Klang. However, some experts suggest that the Port of Penang in the north may benefit from the project. The government can strengthen the industrial and logistics industries in cities like Perlis, Kedah, and Penang to increase value added, so as to achieve the goal of benefiting from the land bridge project (Bernama, 2023). As part of the Southern Economic Corridor, Myanmar, Cambodia, Vietnam, Laos and other countries will benefit from the land bridge project. Coastal cities in Myanmar and Thailand currently provide strategic maritime passage to the Strait of Malacca. The construction of the land bridge will support the development of deep-sea ports in southern Myanmar's industrial zones. Shipping routes to and from the land bridge's ports will pass through the southern Vietnamese coast, creating significant momentum for Vietnam to expand its southern port infrastructure. As a part of the Southern Economic Corridor, the increase in international trade activities brought about by the land bridge and the surrounding shipping, commerce and services will also benefit the economic development of neighboring countries such as Cambodia, Vietnam and Laos (Sau Sisovann, 2012).

(2) East Asian countries

Among East Asian countries, China is one of the most likely countries to participate in the land bridge project. At present, China Harbor Engineering Company (CHEC) and more than 30 companies in other industries in China have shown great interest, and domestic delegations from Kunming and Chengdu have visited southern Thailand for on-site inspections in May 2025 (Khaosod English, 2024). On February 6, 2025, Thai Prime Minister Paetongtarn Shinawatra visited China. During her talks with Chinese leaders and entrepreneurs, China reiterated to Thailand its commitment to the China-Thailand railway project and showed great interest in the land bridge project.

The Southern Thailand Land Bridge Project has multiple strategic significances and far-reaching implications for China. On the one hand, the construction of the land bridge project will open up a new international logistics corridor, which can effectively shorten the transportation distance and optimize the transportation route, and significantly reduce the cost of maritime transportation and improving China's logistics efficiency and competitiveness in global trade. On the other hand, the land bridge project plays a critical role in alleviating the "Malacca Dilemma" faced by China. As a key channel for China's maritime energy transportation, the Malacca Strait has close to saturation in terms of transportation capacity. And China's energy imports are highly dependent on the Strait. Approximately 82% of China's oil imports

pass through the South China Sea and the Strait of Malacca, with over 70% originating from the Persian Gulf (U.S. Energy Information Administration, 2024). At the same time, the United States has established a Changi military base in the northeast corner of Singapore. This military presence poses a potential threat to China's energy transportation security. In addition, the frequent pirate activities and terrorist threats in the Strait of Malacca have seriously affected the safety and stability of China's maritime transportation. The completion of the Southern Thailand Land Bridge Project will provide a new strategic option for China's energy transportation. Crude oil from the Persian Gulf can be transshipped through ports in the Andaman Sea to the Gulf of Thailand, and then transported directly to southern China via pipelines or railways. This will reduce China's over-reliance on the Strait of Malacca and effectively enhance the security level of China's energy supply (Wenzhen Cao & Weizi Huang, 2015).

In terms of the implementation of the "Belt and Road" initiative, the land bridge project is part of the Southeast Asian segment of the Trans-Asian Railway. The construction of the land bridge project will expedite the construction progress of the central route of the Southeast Asian segment of the Trans-Asian Railway, and deepen the implementation of the "Belt and Road" initiative in Southeast Asia region. Regarding regional cooperation, the land bridge project could serve as a critical bridge to advance China-ASEAN collaboration. China and ASEAN countries already have extensive basis for cooperation in the fields of economy and culture. The promotion of the land bridge project will further strengthen the exchanges and cooperation between the two sides in trade, investment, personnel exchanges, etc. This will consolidate and develop the friendly relations between China and ASEAN countries. In terms of geopolitical risks, the land bridge project helps mitigate the risk of regional geopolitical tensions faced by China in Southeast Asia. Strengthening economic cooperation and connectivity with neighboring countries through the land bridge project can enhance the interdependence between countries, reduce the possibility of geopolitical conflicts, and create a more stable and harmonious surrounding security environment (Eugene Mark, 2025).

As a nation highly reliant on overseas markets and resources, Japan has shown considerable interest in the Southern Thailand Land Bridge Project. During the project roadshow in Tokyo in December 2023, 23 companies from 9 Japanese business conglomerates showed great willingness to invest. Former Thai Prime Minister Srettha Thavisin negotiated with the CEOs of MUFG Bank and Krung Thai Bank to attract investment for the land bridge project (Bangkokbiznews, 2023). Since the turn of the 21st century, Japan has regarded the export of overseas infrastructure as a vital measure to invigorate its economy. Southeast Asia, with its unique geographical location and abundant resource potential, has become a key area for Japan's foreign strategic deployment, and overseas infrastructure construction in Southeast Asia has also been incorporated in Japan's "Indo-Pacific Strategy" Once completed, the land bridge project will not only greatly shorten the transportation distance between Japan and regions such as Europe and the Middle East, cut down logistics costs, and improve trade efficiency, but also provide an opportunity for Japan to strengthen its relations with Thailand and other Southeast Asian countries, and enhance its political influence and strategic voice in the region. Moreover, as China's "Belt and Road" initiative steadily advances in Southeast Asia, Japan is increasingly nervous about China's growing regional influence. Countering China's "Belt and Road" initiative can be seen as an important external factor for Japan's plan to participate in the investment in the Southern Thailand Land Bridge project.

(3) South Asian countries

Among South Asian countries, as the largest economy, India has also expressed interest in the Southern Thailand Land Bridge Project, because it can provide more efficient and reliable import and export channels and strengthen its economic ties with the Asia-Pacific region. The Indian multinational conglomerate Adani Group expressed its interest in the large-scale land bridge project at the 2024 World Economic Forum (Thai Newsroom, 2024). From an economic perspective, India's economy has developed rapidly in recent years, and its demand for overseas markets and resources has continued to increase. The land bridge project will open up new trade routes for India, shorten the transportation distance to major markets such as East Asia and Europe, and enhance the competitiveness of its products. From a geopolitical perspective, India upgraded its "Look East Policy" to "Act East Policy" in 2014, and regards itself as the dominant force in the Indian Ocean region (Xiangjun Wu & Lu Yang, 2024). Participating in the Southern Thailand Land Bridge project will help India expand its influence between the two oceans and balance the power of other major powers' presence in the region. However, India is always wary of the threat posed by China's participation in this project, perceiving that the land bridge project is part of China's broader strategy of encirclement and Isolation. Since the early Cold War, India and China have been in fierce competition and China's support for Pakistan has exacerbated this competition. To monitor Chinese naval and submarine activities, India established a naval base in its maritime enclave of the Andaman and Nicobar Islands in 2019 (Lucas Myers, 2020).

(4) West Asian countries

Among the West Asian countries, Arab countries such as Saudi Arabia and Dubai have shown enthusiasm for the Southern Thailand Land Bridge Project. During former Thai Prime Minister Srettha Thavisin's 2023 visit to Saudi Arabia, Thailand discussed the signing of a free trade agreement with the Gulf Cooperation Council (GCC) member states and engaged Saudi investors such as the Public Investment Fund (PIF), Saudi Aramco and SABIC for energy investment (Post Reporters, 2023). In addition, Dubai Ports World (DP) went to southern Thailand for an on-site assessment and showed great interest in the land bridge project (Sarishti Arora, 2024). Countries such as Saudi Arabia and Dubai rely on the export of oil resources as their economic pillar, they have also been actively promoting economic diversification in recent years. As a global energy production and export hub, Saudi Arabia has implemented an oil-centric diversification strategy (Shangtao Gao, 2024). According to the U.S. Energy Information Administration's report (2024), in 2023, approximately 14.4 million barrels of crude oil per day (accounting for 52% of the total crude oil transported through the South China Sea) and 2.3 Tcf of liquefied natural gas (accounting for 35% of the total LNG transported through the South China Sea) were shipped from the Persian Gulf to East Asian markets via the South China Sea. Among these, Saudi Arabia (4.9 million barrels/day) and the United Arab Emirates (3.4 million barrels/day) were the largest sources. Participating in the land bridge project would reduce these nations' reliance on traditional shipping routes, enhance trade flexibility, and provide new transportation options for oil and gas. This will ensure that energy can be safely and stably delivered to the target market, and enhance the voice and influence in the global energy market.

European and American countries

Western countries such as Germany and the United States also have a strong interest in the land bridge project. Germany has expressed willingness to participate in a "limited" capacity (Srinivas Mazumdaru, 2023). In order to better arrange the Asia-Pacific strategy and strengthen its influence in the Asia-Pacific region, the United States has also actively participated in the land bridge project, Dozens of American companies, including the world's largest shipping logistics company SSA Marine, eBay, tech conglomerate Oracle, consultancy Jacobs, e-commerce leader Amazon and its Amazon Web Services (AWS), Long Beach Port, and digital solutions provider Wabtec, are optimistic about the project (Nongluck Ajanapanya, 2023). Of course, compared with East Asian and Southeast Asian countries, European and American countries mainly consider the economic benefits and political value that may be brought by investing in the project. From the perspective of economic benefits, as a major global trading country, the United States has many companies engaged in marine logistics, e-commerce and other industries in its country. The land bridge project will help it expand its market share in Asia and the world. At the same time, according to the U.S. Energy Information Administration's report (2024), over the past five years, the production and export of crude oil from the U.S. Gulf Coast have significantly increased, with a considerable portion flowing to East Asia and Southeast Asia. The construction of the Landbridge Project will be beneficial in reducing the voyage distance and lowering the transportation costs for U.S. oil and other energy products. From the perspective of political value, with the growing influence of China's "Belt and Road" initiative and the competition between China and the United States intensifies, the United States has incorporated infrastructure diplomacy into its strategy of building an Indo-Pacific economic order and has continuously increased its investment in the infrastructure sector (Ning Zhang & Weizhun Mao, 2023). The United States and its allies view participation in the land bridge project as a means to counter China's strategic influence in Southeast Asia and safeguard their own geopolitical standing in the Southeast Asia region.

Domestic Choices

It can be seen that the active promotion of the Thai government and leaders has produced good results. At present, there are many countries in the international community that are interested in the land bridge project. For Thailand, in the context of global economic integration and increasingly fierce regional competition, the land bridge project is undoubtedly a key opportunity for Thailand to integrate into the global economic system and enhance its international competitiveness. Moreover, the current economic situation in Thailand is not optimistic. According to the World Bank's forecast in 2025, Thailand's GDP growth for this year will be only 1.8%, lower than the global GDP growth of 2.8%. This indicates that Thailand's economy has fallen into a pronounced slump (Sommai Phasi Tax, 2025). Additionally, there has been political unrest in Thailand recently. A survey conducted by the Nida Poll Center of the National Institute of Development Administration (NIDA) from December 16 to 18, 2024, showed that 50.61% of respondents believed that the political situation in Thailand would continue to be chaotic in 2025, and 39.92% of respondents thought that the situation would further deteriorate (The nation, 2025). Therefore, in the face of many domestic oppositions, the Thai government still firmly chose to continue to promote the Southern Thailand Land Bridge Project.

Under the Srettha administration in 2024, the National Economic and Social Development Board (NESDB) was designated as the lead research body for the Southern Thailand Land Bridge Project. The development of the inter-port road project will be supervised by the Highway Department and the National Railway Administration respectively (The Office of Transport and Traffic Policy and Planning, 2024). In September 2024, Thailand's Minister of Transport Suriya Sorongruengkit announced that the new Paetongtarn government will continue to promote the land bridge project. The draft Southern Economic Corridor Act, which the Transportation Policy Planning Office participated in preparing and drafting, has now passed the review of the Special Economic Zone Development Policy Committee and the Cabinet meeting, and entered the agenda of the House of Representatives meeting. It is expected that the bill will officially take effect in September 2025. (Thaipost, 2024).

However, Thailand's geographical location makes it a key area where multiple geopolitical forces intersect and collide. The strategic game of neighboring powers, the advancement of regional integration, and the dynamic evolution of the global economic landscape have a profound impact on its domestic and international environment. Against this background, Thailand, which has long advocated a diversified and balanced diplomatic strategy, recognizes that over-reliance on a single source of investment may expose it to higher external risks and uncertainties, and it is vulnerable to shocks in international political and economic fluctuations. Therefore, from the Srettha government in 2023 to the current Paetongtarn government, both advocate the implementation of an investment diversification strategy. By widely attracting capital from different countries and regions and by building a diversified investment entity structure, Thailand aims to reduce dependence on investment in specific countries or regions, while enhancing investment stability and avoiding being involved in the vortex of great power competition.

4. Project Risk Assessment

As an important part of China's "Belt and Road" initiative, the smooth progress of the Southern Thailand Land Bridge project is not only crucial to the economic cooperation between China and Thailand, but also involves the regional and even global geopolitical and economic structure. Under the attention of relevant European, American and Asian countries, the Thai government has still made the decision to continue to promote the land bridge project and plans to adopt a diversified investment strategy. In this way, the extensive participation of many countries will bring more risks to China's investment in the Southern Thailand Land Bridge project, including multiple risks from the four dimensions of domestic and international: politics, economy, society and security.

Political risks

Thailand has frequent political transitions, intense partisan rivalries, and serious political corruption, which leads to unstable policies. In Thailand, regime changes are relatively frequent. After the 2023 general election, Thailand's political arena has been turbulent many times, and the struggle between the ruling Pheu Thai Party and the opposition has never ended. In terms of the opinions on the land bridge project, the ruling Pheu Thai Party and the main opposition party - the Move Forward Party, have different opinions and have not yet reached a consensus. On January 24, 2024, four members of the

Move Forward Party resigned due to problems with the project research report. They believed that the project report lacked comprehensiveness and the project evaluation was deceptive (Thairath, 2024). Frequent leadership changes and political infighting introduce uncertainty into project planning and approval processes, which can easily lead to delays in construction and increase the time and management costs of the project. Corruption remains a critical issue of Thailand. Rent-seeking also occurs frequently in Thailand in key areas such as public resource allocation, infrastructure construction project bidding, and administrative approval, which may breed unfair competition and illegal interference in the bidding and construction of the land bridge project, making it difficult to ensure the quality of project construction. The stability of Thailand's political situation has become a key variable in the advancement of the project, and will also affect the international community's long-term risk assessment of the project.

At a time when the global geopolitical landscape is undergoing profound changes, the attention of many countries has brought international investment opportunities to the project, but it also implies the risk that the project may become a battleground for geopolitical games among major powers. In recent years, with the enhancement of China's comprehensive national strength and the improvement of its international influence, the United States believes that China's rise threatens its world hegemony and regards China as a "strategic competitor", and the competition between China and the United States is increasing (Qiaorong Wang, 2020). In 2013, China proposed the "Belt and Road" initiative, which aims to build safe and efficient logistics routes with countries along the "Belt and Road" by strengthening infrastructure construction investment in developing and developed countries, and gradually forming an infrastructure network connecting Asia, Europe and Africa (Yiping Huang, 2016). The South Thailand Land Bridge Project belongs to the Southeast Asian section of the Trans-Asian High-speed Railway in the cross-border project of China's "Belt and Road" initiative, and is an important transportation infrastructure project of China's Silk Road Economic Belt in Southeast Asia. In response to China's "Belt and Road" initiative, the United States has promoted the "Indo-Pacific Strategy" in the Asia-Pacific region in an attempt to form an encirclement of China. The United States has strengthened cooperation with Japan, India, Australia and other countries in small multilateral mechanisms to contain and suppress China (Xiao Ren, 2024). China's participation in the Southern Thailand Land Bridge project will strengthen China's strategic power in the region, break the containment of China by the United States and strengthen China's influence in Southeast Asia. The United States will not be happy to see China benefit from the land bridge project and may interfere with China's investment in the land bridge project or make strategic arrangements through various conventional means such as smearing, suppression, and multilateral mechanisms. In addition, the United States' great interest in the land bridge project also shows its intention to strategically contain China's expansion of influence in Southeast Asia, strengthen its control over key channels militarily, and economically interfere with China's economic layout.

Economic risks

The land bridge project faces significant financial challenges due to its high investment costs and lengthy payback period. The net present value of the land bridge project is 257.453 billion baht, the benefit-cost ratio is 1.35%, the economic internal rate of return is 17.43%, the direct economic benefit is 9.52%, the fiscal internal rate of return is 8.62%, and the investment payback period is 24

years (The Working Group of the Committee on Transport, 2024). As a large-scale infrastructure construction project, the land bridge project requires continuous investment of huge funds in every link of the construction. And in the operation process after completion, it is necessary to continue to invest maintenance funds, which further prolongs the capital recovery cycle. Secondly, with the deepening of global economic integration, international financial markets fluctuate frequently, and exchange rate changes become more complex and difficult to accurately predict. In recent years, the Thai exchange rate has continued to fall, the exchange rate has fluctuated greatly, and there is a greater exchange rate risk. The land bridge project involves a large number of international business transactions. Once the exchange rate fluctuates sharply, it may cause a sharp increase in project costs, which in turn affects the overall economic benefits of the project. Finally, the country's domestic economic environment also faces potential risks. The results of the review meeting of the draft budget expenditure bill for 2024 in Thailand show that there is a problem of opacity in the Thai government's budget allocation. In addition, the current slowdown in Thailand's economic growth and domestic telecommunications fraud have greatly affected the development of the domestic pillar industry of tourism, and the macroeconomic situation is uncertain. In this case, the land bridge project may not only face the dilemma of insufficient capital supply, but also the operating income may be lower than expected due to shrinking market demand.

In terms of international economic risks, the global economy is in a downturn, the China-US trade war is intensifying, and the economic situation is complex and changeable. World geopolitical conflict events, especially the Russia-Ukraine conflict and the Red Sea crisis, have had a serious impact on key economic fields such as the global oil market and energy supply chain and other key economic sectors (Yangyang Chen et al., 2023). In order to maintain the its world hegemony, the United States has used Sino-US economic and trade issues as a breakthrough point to conduct strategic games against China in many aspects such as politics, economy, security and other aspects. Under the trend of global trade integration, the Russia-Ukraine conflict has caused multiple negative impacts on the world economy. One of the manifestations is that it has caused a serious blow to the global oil market. The United States, Britain, Canada and other countries have imposed comprehensive sanctions on Russian oil imports, and Russia has blocked the export of oil and gas from "unfriendly" countries such as Europe and the United States, resulting in soaring oil prices and energy shortages in many regions, Chaos in the energy market and changes in the global energy trade structure (Iliya Kusa, 2022). The Red Sea, one of the busiest trade routes in the world, chokes the traffic routes of Asia, Africa and Europe. In 2023, a new round of Palestinian-Israeli conflict spilled over. The Houthi armed forces in Yemen have continuously attacked "Israel-related" ships in the Red Sea under the pretext of "supporting Palestine." The Red Sea crisis has impacted the Asia-Europe supply chain, damaged the global shipping network and transportation routes, and had a huge impact on global trade (Yanan Li, 2024). Against the backdrop of the strengthening trend of economic integration, the deterioration of the global economic situation and the energy trade market environment may have a significant impact on the actual economic benefits of the Southern Thailand Land Bridge Project, which may not only lead to difficulties in raising funds for the project, but also increase the cost of materials during the construction process.

Social risks

The land bridge project has been greatly opposed by local residents and civil society due to its impact on the ecological environment, destruction of natural environment and resources, and affection on residents' lives. In terms of the ecological environment, the construction of the project will destroy the land and sea ecosystems, rare animal and plant protection areas, and destroy the water resources of the rivers along the route. In terms of residents' livelihoods, farmers' land rights and interests will be violated. The pollution caused by industrial development has a great impact on human health, and the destruction of agricultural production areas and tourism resources has hindered local economic development. On the issue of cultural heritage, the destruction of rivers may make it difficult to protect and inherit local customs and cultures such as boat racing. Local opposition groups have organized protests many times, but the government has not taken action on the concerns of the people, which has caused the people to question whether the government can fulfill its promises. They believe that the government's work lacks transparency, which has largely led to the lack of government credibility. Social risks will greatly affect the promotion and implementation of the entire project, so it is imperative for the Thai government to take active measures to fulfill its promises to the people to eliminate domestic opposition.

Security risks

Since the 1950s and 1960s, the separatist movement in southern Thailand has become an important factor hindering local development. The region's contemporary issues are characterized by a complex interplay of separatism and terrorism, with Malay Muslim separatist movements seeking an independent state as the primary driver of southern Thai terrorism (Pankhwan, 2022). In recent years, the connection between terrorist forces in southern Thailand and international terrorism has strengthened. Thailand's unique geographical location has made it a refuge for neighboring Southeast Asian countries, Chinese terrorists and international Islamic organizations, and a transit point for participating in jihad. In addition, the complex ethnic and religious conflicts in in Thailand have provided opportunities for foreign Islamic extremist organizations to expand their influence in the region. Under the influence of the infiltration of foreign Islamic extremist organizations, localized extremist organizations in Thailand have shown a tendency to become increasingly Islamic extremist, and the targets and methods of attack are more Islamic extremist (Guangsheng Lu & Jiangnan Li, 2019). The targets of extremists' attacks have expanded from government soldiers, police, and public officials to innocent civilians. They often destroy local social stability and weaken the foundation of economic development by means of bombings, assassinations, shootings, and destruction of factories and infrastructure, resulting in fierce separatist and terrorist movements in southern Thailand, frequent terrorist attacks and cross-border criminal activities. The local society is often in a state of turmoil, with a poor economic investment environment, and personal safety, transportation safety, and economic security are all facing great threats.

5. Conclusion. Since the idea of the Southern Thailand Land Bridge project was proposed as an alternative to the Kra Canal, it has aroused heated responses around the world. Despite opposition from segments of Thai civil society and elites, as well as complex international attitudes, the government remains to advancing the project to realize geopolitical and economic objectives. However, domestic political instability, separatist and terrorist threats in the southern region, high investment costs and long-

term return cycles, exchange rate risks, economic crises, as well as the potential damage of the project to the lives of southern residents, the ecological environment and natural resources, all pose challenges to the smooth progress of the project. Internationally, the game between China and the United States has made the investment environment of the project more complicated, and global geopolitical conflicts such as the Russia-Ukraine conflict and the Red Sea crisis have had a major impact on the global energy, trade markets and global transportation lines, leading to a deterioration in the global economic environment. The actual benefits and costs of the land bridge project need to be further considered.

For China, Southeast Asia is core to its "21st Century Maritime Silk Road"—key for breaking island chain blockades, building an all-round opening-up pattern, and serving as a fulcrum for its domestic-international dual circulation strategy. Under the Belt and Road, the China-Thailand Railway is pivotal for China-ASEAN connectivity. It links north to China's southwest via the China-Laos Railway and extends south through Malaysia and Singapore, traversing the Indochinese Peninsula as the Trans-Asian Railway's central line. In February 2025, Thailand approved Phase II of China-Thailand Railway Project (Nakhon Ratchasima-Nong Khai). Thai transport minister Suriya Sorongruengkit noted completed civil designs and approved environmental assessments (Economic and Commercial Office of the Embassy of the People's Republic of China in the Kingdom of Thailand, 2025). At present, China and Thailand have positioned the China-Thailand Railway as a key connection point between the "Belt and Road" Initiative and the construction of Thailand's "Eastern Economic Corridor". The approval of Phase II signals substantive construction. Against this background, the strategic value of the Southern Thailand Land Bridge Project has been further highlighted. If the China-Thailand Railway is connected to the Southern Thailand Land Bridge Project, a coordinated development pattern of "high-speed rail artery + land bridge hub" can be formed, which will boost regional cargo efficiency and the land bridge's operability. Thus, China should deeply participate in the land bridge's investment, construction, and operation. Yet it must remain prudent: assess Thailand's political, economic, social, ecological, and security environments to preempt risks. China should also guard against major powers' strategic interventions to hinder its involvement, avoid regional geopolitical games, and pursue win-win cooperation via interest-sharing mechanisms.

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All manuscripts accepted for publication in this journal have been subjected to a **double-blind peer review** process involving evaluation by three independent experts in the relevant field. The views and findings expressed in each article are solely those of the author(s), who assume full responsibility for any consequences resulting from their research and publication. Final proofs of the manuscripts have been reviewed and approved by the authors to ensure accuracy before inclusion in the published volume.

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APA 7th referencing guide

Purpose

When writing an assignment or a research project, you must cite a variety of sources to support your arguments, indicating where the ideas and quotations originated.

- Provide evidence that your research is based on a substantial background.
- Assist readers in finding relevant literature on the topic.

- Help authors avoid plagiarism.

Multiple works by the same author(s)

Published in the same year

Two or more than two publications of an author in the same year must be separated by the expansion of a, b, etc. (whether or not they were composed, altered, gathered or deciphered), and are recorded in order by titles. All work titles in the reference list order sequentially.

In-text citation	(Edkiy natr ZZ,2022a). Edkiy natr ZZ. (2022b)affirmed that...

Reference list	Edkiy natr ZZ.(2022a). *Who is stronger economically - Russia or the West?* https://dzen.ru/media/yedkiyy/ktosilnee-ekonomicheski-rossiia-ili-zapad 62dc6bb677825969566f15a7?&(In Russian). Edkiy natr ZZ.(2022b). *The explosive effect of Nord Stream.* https://dzen. ru/a/YzPrA0Yuwjj-7a7x?& (In Russian).

Published in different years: In the reference list, arrange the references in the chronological order.

In-text citation	Totska(2011)and Totska.(2017).state....
Reference list	Totska, O. (2011). Statistical waves of the budgetary financing of education and science in Ukraine. *The Annals of the "Stefan cel Mare" University of Suceava, Fascicle of the Faculty of Economics and Public Administration, 11*, 2 (14), 252–257. https://cutt.ly/owJOIXwD. Totska, O. (2017). ABC-analiz bakalavrskykh osvitnikh prohram Skhidnoievropeiskoho natsionalnoho universytetu imeni Lesi Ukrainky **[**ABC-analysis of the bachelor's educational programs of Lesya Ukrainka Eastern European National University**]**. *Economic journal of Lesia Ukrainka Eastern European National University*,4,114–122. https://www.echas.vnu.edu.ua/index.php/echas/ article/view/45/30 (In Ukrainian).

2. Author variations

☐ **Work without author**

With work without the author was given, check to see whether there is a corporate author for that work and consider the source is reliable if no personal author is indicated. if your source is reliable, follow the steps below:

- Replace the author by the article title in both the citation and reference list, abbreviate the work title if it is too long in the in-text citation.

- In every citation for a portion of a work, such as an article, a book chapter, or a webpage the title should place in quotation marks.

- For whole work, such as a book, brochure, or report, italicize the title in the in-text citation.

- For in-text citations and the text of your assignment, capitalize the source title in a headline style

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In-text citation	("Millions of Chinese students",2013). OR In the article "Millions of Chinese students" (2013) ...
Reference list	Millions of Chinese students brace themselves for joblessness.(2020,May 2). *The Economist.* https://www.economist.com/china/2020/05/02/millions-of-chinese-students-brace-themselves-for-joblessness

One – two authors

Every citation should include the name of all author(s).

In-text citation	(Fidas & Sylaiou, 2021). OR Fidas and Sylaiou (2020) found that...
Reference list	Fidas, Cristos., & Sylaiou ,Stella.(2021). *Editorial for Special Issue Virtual Reality and Its Application in Cultural Heritage*. https://www.mdpi.com/2076-3417/11/4/1530

Three – 20 authors

-To avoid confusion, provide as many names as necessary to identify the references, then abbreviate the additional names to et al. in cases when many publications with more than three contributors are shortened to the same in-text citation (et al.);

- All authors must be provided in the reference list.

In-text citation	(Sureda-Negre et al., 2021). OR Sureda-Negre et al. (2020) found that...
Reference list	Sureda-Negre, J., Comas-Forgas, R., & Oliver-Trobat, M. F. (2015). Academic plagiarism among secondary and high school students: Differences in gender and procrastination. *Comunicar, 22*(44), 103–111. https://doi.org/10.3916/C44 2015-11

Corporate author (Group author, Organisations, etc.)

- Organization names must be in full name in citation and the reference list.

- The initial in-text citation should include the full name of the organization, and then can be anonymized.

- When numerous departments are given, chose the unit that is most important for the work as the author.

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In-text citation	**First in-text citation** (World Intellectual Property [WIPO], 2020). OR The World Intellectual Property (WIPO, 2020) reports **Subsequent citations** (WIPO, 2020) OR WIPO (2020) states...
Reference list	World Intellectual Property. (2020). *What's new in WIPO's Internship Program?* https://www.wipo.int/jobs/en/internships/news/2020/news_0001.html

3. REFERENCING LIST EXAMPLE

No.	Reference sources	In-text citation	Reference list
1.	**Book/eBook**	**Structure:** (Author, Year) **Example:** (Bodie et al.,2015)	**Structure:** Author Surname, Initial(s). (Year). *Title of book: Subtitle* (#ed.). Publisher Name. https://doi.org... OR URL ☐ ***For printed books,*** *leave out DOI/URL* **Example:** Bodie, Z., Kane, A., & Marcus, A. (2017) *Investments* (11th ed.). McGraw-Hill Education
2.	**Chapter in an edited book**	**Structure:** (Author, Year) **Example:** (Cardona &Rey,2022)	**Structure:** Chapter Author Surname, Initial(s). (Year). Title of chapter. In Editor Initial(s). Editor Surname (Ed.), *Title of book* (# ed., pp. chapter page range). Publisher Name. https://doi.org... OR URL ☐ ***For printed books,*** *leave out DOI/URL* **Example:** Cardona, P., & Rey, C. (2022). The limits of management by objectives. In P. Cardona & C. Rey (Eds.), *Management by missions: Connecting people to strategy through purpose* (pp. 35–48). Springer International Publishing. https://doi.org/10.1007/978-3-030-83780-8_3.

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3	**Edited Book Chapters** Chapter in an edited book, republished in translation	**Structure:** (Author, Year) **Example:** (Sutch &Pierce,2023) **Example:** (Diadyk ,2021)	**Structure:** Author Surname, Initial. (Year). Title of entry. In Editor Initial, Surname (Eds.), *Title of dictionary or encyclopaedia* (Edition.). URL **Example:** Sutch, P., &Pierce, O. (2023). Practicing Humanity: Humanisation and Contemporary International Political Theory. In H.Williams, D. Boucher, P.Sutch, D.Reidy &A.Koutsoukis (Eds.), *The Palgrave Handbook of International Political Theory. International Political Theory.*(Vol.1,pp.303-320).https://doi.org/10.1007/978-3-031-36111-1_16 **Structure:** Author Surname, Initial. (Year). Title of entry. In Editor Initial, Surname (Eds.), *Title of book(edition, page numbers for whole chapter). Publisher.* **Example:** Diadyk, T. *(2021).* Global experience in the development of business education. In O.Kalashnyk, S. Moroz, & I. Yasnolob *(Eds), Quality and safety of products in domestic and foreign trade and trade entrepreneurship: modern vectors of development and prospects: collective monograph* (pp. 145-162). Poltava: "Astraya" Publishing House *(*In Ukrainian*).*
4.	**Journal article**	**Structure:** (Author, Year) **Example:** (Prima et al., 2019)	**Structure:** Author Surname, Initial(s). (Year). Title of article: Subtitle. *Title of Journal, volume*(issue), page range. https://doi.org... OR URL **Example:** Prima, R., Honcharuk, O., Prima, D., & Roslavets, R. (2023). Digitalization of education – Trend, strategy, and challenge of the time. *Pedagogical Sciences: Theory, History, Innovative Technologies, 3*(127),183-191. https://doi.org/10.24139/2312-5993/2023.03/183-191
5.	**Journal article in a language other than English (not in English)**	**Structure:** (Author, Year) **Example:** (Romakh, 2021)	**Structure:** Author Surname, Initial(s). (Year). Title of article[trans.] *Title of Journal, volume*(issue), page range. https://doi.org... OR URL ((In Language). **Example:** Romakh, O. (2021). Osoblyvosti ekspertyzy naukovykh robit shchodo vyiavlennia akademichnoi nedobrochesnosti [Specifics of research papers expertize regarding detection of academic dishonesty]. *Scientific Notes of the Institute of*

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			Journalism, 1(78), 11–29. https://doi.org/10 17721/2522-1272.2021.78.(In Ukrainian).
6.	**Newspaper or magazine article**	**Structure:** (Author, Year) **Example:** (Chongkittavorn ,2022)	**Structure:** Author Surname, Initial(s). (Year, Month Day). Title of article: Subtitle. *Newspaper or Magazine Title*. URL. **Example:** Chongkittavorn, Kava**.** **(**2022, November22**)** Three summits jointly boost centrality**.** *Bangkok Post* ,Opinion https://www.bangkokpost.com/opinion/opinion/2443139/three-summits-jointly-boost-centrality
7.	**Press release**	**Structure:** (Author, Year) **Example:** (Board of Investment, 2021)	**Structure:** Author Surname, Initial(s). (Year, Month Day). *Title of press release* [Press release]. URL. **Example:** Board of Investment of Thailand **(**2021**).** *Thailand's New Semiconductor Incentives Timed to Support Rising E&E Investment* **[**Press Release**].** https://www.boi.go.th/index.php?page=press_releases_detail&topic_id=129197.
8.	**Conference paper OR Poster**	**Structure:** (Author, Year) **Example:** (Gupta, 2009) (Suwan-achariya,2023)	**Structure:** Author Surname, Initial(s). (Year, Month Day). *Title of paper* [Type of presentation]. Title of Conference: Subtitle of Conference, Location. https://doi.org... OR URL ☐ ***For Poster,*** *use* [Poster presentation] Gupta, A. K. (2009). *Environment and disasters: Resources, systems and management* [Paper presentation]. Current Science Conference (00113891), New Delhi. http://search.ebscohost.com/login.aspx?direct=true&db=egs&AN=41529360&site=ehost-live. Author Surname, Initial. (Year). Title of paper. In Editor Initial, Surname (Ed.). *Title of book which paper appears in* (page numbers). Publisher. Suwan-achariya, S. (2023). Concept of economic development for prosperity. In G ..Y. Gulyaev (Ed.)*High-Tech, Science, and Education: Topical Concerns, Accomplishments, and Innovations. The proceedings of the XVIII All-Russian Scientific and Practical Conference* (pp. 52-55).Penza.
9.	**Thesis**	**Structure:**	**Structure:**

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		(Author, Year) **Example:** (Albor, 2011) (Harris, 2014)	Author Surname, Initial(s). (Year). *Title of dissertation or thesis* [Doctoral dissertation or Master's thesis, Name of Institution Awarding the Degree]. Source Name. URL. **Example:** Albor, C. (2011). *Are poor people healthier in rich or poor areas?: The psychosocial effects of socioeconomic incongruity in the neighbourhood* [PhD thesis, University of York]. White Rose eTheses. http://etheses.whiterose.ac.uk/1595/ Author Surname, Initial. (Year). *Title of dissertation or thesis* [Unpublished dissertation/thesis]. Name of university. Harris, L. (2014). *Instructional leadership perceptions and practices of elementary school leaders* [Unpublished doctoral dissertation]. University of Virginia.
10.	**Webpage**	**Structure:** (Author, Year) **Example:** (Hai Minh, 2019)	**Structure:** Author Surname, Initial(s) or Organisation Name. (Year). *Title of webpage*. Site Name. URL. ☐ ***Webpage – no date***, *replace the Year with* (n.d.) ☐ ***Webpage – no author***, *use the Organisation Name if available. If No, use the Webpage Title.* ☐ *If the Author Name and Site Name are the same, omit the Site Name* **Example:** Hai Minh. (2019). *New milestone in VN-EU relations*. Government News. http://news.chinhphu.vn/Home/New-milestone-in-VNEU-relations/20196/36969.vgp.
11.	**Dictionary or encyclopedia entry.**	**Structure:** (Author, Year) **Example:** (Downes, 2018)	**Structure:** Author Surname, Initial. (Year). Title of entry. In Editor Initial, Surname (Ed.), *Title of dictionary or encyclopaedia* (Edition.). URL Downes, S. M. (2018). Evolutionary psychology. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*. http://plato.stanford.edu/entries/evolutionarypsychology/
12.	**Blog post**	**Structure:** (Author, Year) **Example:** (Bak-Maier, 2019)	**Structure:** Author Surname, Initial. (Year, Month Date). Title of blog post. *Title of blog*. URL Bak-Maier, M. (2019, March 23). Practical tips for overcoming the fear of failure – and success. *Times Higher Education blog*. https://www.timeshighereducation.com/blog/practical-tips-overcoming-fear-failure-and-success
13.	**Reports/ Government**	**Structure:** (Author, Year)	**Structure:**

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	report/ Organisation report	**Example:** (WORLDBANK, 2022)	Author Surname, Initials. OR Organisation Name. (Year). *Title of report: Subtitle*. Publisher Name. URL. **Example:** WORLDBANK.(2022).*Annual report2022*. https://thedocs.worldbank.org/en/doc/811305cdbaf5310bc659f14b1e49f05c-0090012022/original/AR2022EN.pdf
14.	**Translated books**	**Structure:** (Author, Year) **Example:** (Reinert,2011)	**Structure:** Author Surname, Initial. (Year). *Title in English* (Translator Initial, Surname, Trans.). Publisher. **Example:** Reinert, Eriks.(2011). *How rich countries got rich ...and why poor countries stay poor.*(N.Avtonomova, trans.).Vysshey shkoly ekonomik. .
15	**Republished Or modern edition of a classic book**	**Structure:** (Author, Year) **Example:** (Heidegger, (1961/2008).	**Structure:** Author Surname, Initial. (Year). Title of entry. In Editor Initial, Surname (Eds.), *Title of book*(edition, page numbers for whole chapter). Publisher. (Original work published Year) Heidegger, M. (2008). On the essence of truth (J. Sallis, Trans.). In D. F. Krell (Ed.), *Basic writings* (pp. 111-138). Harper Perennial Modern Thought. (Original work published 1961)
15	**No date**	**Structure:** (Author, n.d.) **Example:** (Bo,n.d.)	**Structure:** Author Surname, Initial. (n.d). *Title of book*. Publisher Name. Bo, P. (Ed.). (n.d.). *Traditional Chinese internal medicine*. People's Medical Publishing House.
16	No page p. is used when the quotation is from one page only. Example: p. 23. pp. is used when the quotation runs on to the next page, with the page range separated with an en dash.	**Structure:** (Author,p) Example: (Stolyarova, 1993 ,pp.231-232). Wood (2018, **13:40**) Parker (2020, **Slide 4**) Frey (2019, **Research, para. 2**)	**Structure:** Author Surname, Initial. (n.d). *Title of book*. Publisher Name. Stolyarova,I.A.(Ed.)(1993). W. *Petty. A. Smith. D.Ricardo.Anthology of economic classics*. M: Econov Klyuch(In Russian). Wood, Z. R. (2018, April). *Why it's worth listening to people you disagree with* [Video]. TED Conferences. https://www.ted.com/talks/zachary_r_wood_why_it_s_worth_listening_to_people_you_disagree_with

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	Example: pp. 23-24. For electronic sources that do not provide page numbers, use the paragraph number. Use the abbreviation 'para.', and follow it with the number.		
17	Bills	**Structure:** (Author, Year) **Example:** Law and Justice Amendment Bill 2004 (Cth) (Law and Justice Amendment Bill 2004 (Cth) cl 22)	**Structure:** Law and Justice Amendment Bill 2004 (Cth).
18	Parliamentary debates (Hansard)	**Structure:** (Author, Year) **Example:** (Victoria, *Parliamentary Debates*, Legislative Council, 14 December 2017, 6854)	**Structure:** Jurisdiction, *Parliamentary Debates*, Chamber, Full Date of Debate, Page Number (Name of Speaker).

Table3.

The significant contribution of the Russian economy to global GDP

Draws attention to the upstream and midstream supply chain connectivity of food sourcing and products.	Over 30% of the "fertilizer basket" in Europe comes from Russian fertilizer exports.
It is the only country that can supply petroleum, gas, tungsten, titanium, aluminium, uranium, and rare earth minerals to any other country.	Approximately 19.5% of global grain exports are under Russian control.

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Russian gas is essential to the survival of European industry. It is an important player in the world of raw materials, and countries that consume it may face serious difficulties if there are supply disruptions	It exports more nickel than any other country (20.4%). Products made of semifinished steel (18.8%), 30% palladium and 40% enriched uranium
Nearly one-third of the natural resources currently in Russian reserves are used by the global economy as raw materials for transportation and industrial processing.	The country is well-positioned to provide low-cost raw materials, raw material processing, and transportation logistics benefits to China and Europe.

*Note.*The author's summary and collection.

unprogressive.

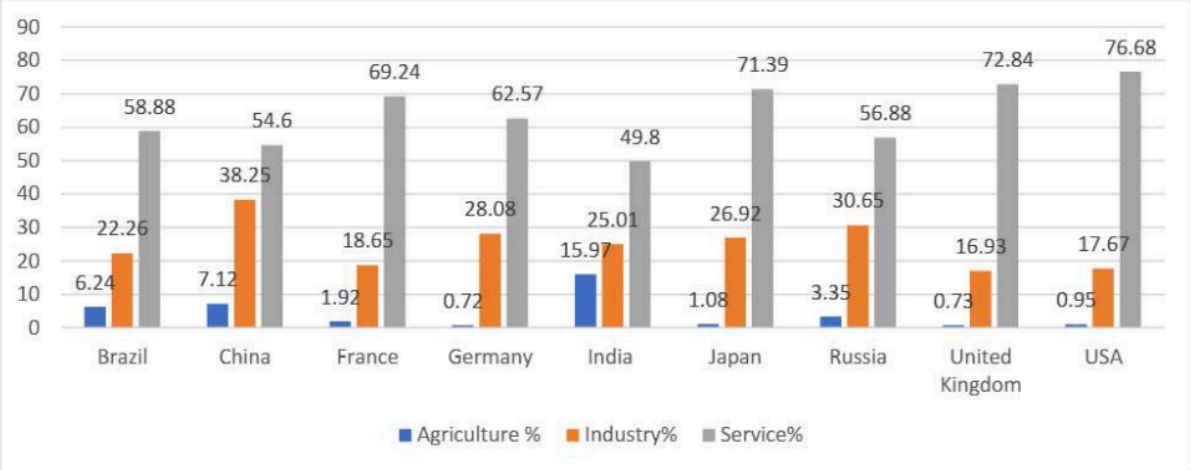

Figure 1.

Proportions of economic sectors in the gross domestic product (GDP) in selected countries in 2023

Note. From "*Proportions of economic sectors in GDP in selected countries 2023,*"by Aaron O'Neill, 2025(https://www.statista.com/statistics/264653/proportions-of-economic-sectors-in-gross-domestic-product-gdp-in-selected-countries/) In the public domain.

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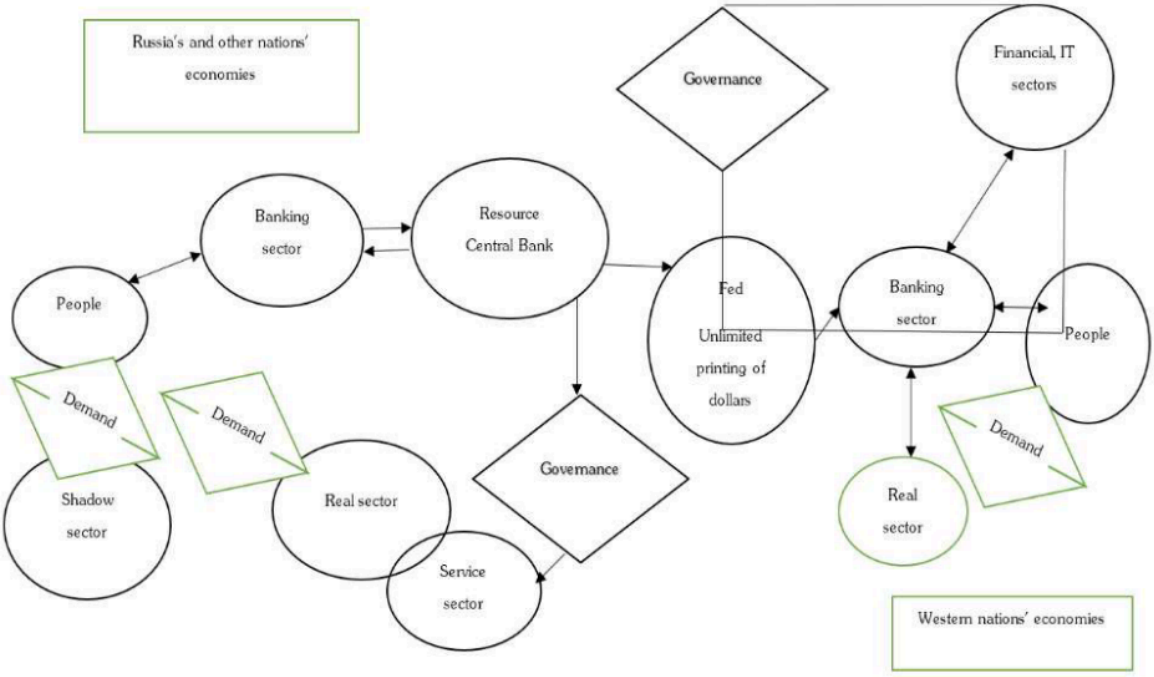

Figure2.

Gross Domestic Product of Bretton Woods

Note. The author adapted Divannyypolitikan's work(2022).

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☐ Leave one centimetre off the front edge.

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oderne** Le design graphique joue
mettre des messages de manière vi
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marché concurrentiel. Titre : L'Importance
Dans un monde où la communication visuelle est om
phique jo es entiel dans la transmission d'informations. Les entreprises, les
les particuliers reconnaissent l'impact significatif d'un bon design sur l'engagement et la
du public. En effet, un visuel bien conCu peut captiver l'attention, susciter des émotions et renfor