The Role of Digitalization, Natural Resources, and Trade Openness in Driving Economic Growth: Fresh Insights from East Asia-Pacific Countries

Bakari, Sayef

LIEI, Faculty of Economic Sciences and Management of Tunis, University of Tunis El Manar, Tunisia., Faculty of Legal, Economic and Management Sciences of Jendouba, University of Jendouba, Tunisia.

2024

The Role of Digitalization, Natural Resources, and Trade Openness in Driving Economic Growth: Fresh Insights from East Asia-Pacific Countries

Sayef Bakari[1,2]

[1]LIEI, Faculty of Economic Sciences and Management of Tunis, University of Tunis El Manar, Tunisia.

[2]Faculty of Legal, Economic and Management Sciences of Jendouba, University of Jendouba, Tunisia.

Email: bakari.sayef@yahoo.fr

Abstract:

This study explores the determinants of economic growth in 17 East Asia-Pacific countries from 2004 to 2023, analyzing the effects of capital, labor, digitalization, financial development, natural resources, and trade openness. Utilizing a suite of statistical and econometric techniques—including descriptive statistics, correlation analysis, Static Gravity Model, Generalized Method of Moments (GMM), and Two-Stage Least Squares (2SLS)—the research reveals significant insights into the region's economic dynamics. Descriptive statistics illustrate considerable variation in key economic indicators, with capital and financial development showing strong positive correlations with GDP. The Static Gravity Model and GMM results confirm the vital roles of capital, labor, financial development, and trade openness in driving economic performance, while digitalization and natural resources display limited or non-significant impacts. The 2SLS model further supports the robustness of these findings, highlighting the dominant influence of capital and labor despite the less pronounced effects of digitalization and natural resources. This study offers a comprehensive assessment of the factors shaping economic growth in the East Asia-Pacific region, providing valuable implications for policy and investment strategies.

Keywords: Digitalization, Natural Resources, Trade Openness, Economic Growth, Panel Data Analysis, East Asia-Pacific Countries.

JEL Classification : D83, F10, F13, F14, L63, L86, L96, N55, N70, N75, O13, O24, O47, P28, P33, P45, P48, Q26, Q27, Q34.

1. Introduction

The global economy has entered an era where digitalization, natural resources, and trade openness are increasingly recognized as critical drivers of economic growth. Understanding these factors is particularly vital for the East Asia-Pacific (EAP) region, which is home to some of the world's most dynamic and rapidly developing economies. This study aims to provide fresh insights into the intricate relationships between these elements and their collective impact on economic growth within EAP countries. By examining the role of digitalization, the exploitation and management of natural resources, and the degree of trade openness, this research seeks to offer a comprehensive analysis of how these factors interplay to drive economic progress.

Digitalization, which refers to the adoption and integration of digital technologies into all aspects of the economy and society, is a transformative force that has reshaped industries, governments, and daily life. In the EAP region, countries such as China, Japan, and South Korea have become global leaders in digital innovation. China's digital economy, for instance, is characterized by its rapid expansion in e-commerce, fintech, and digital infrastructure. As noted by the World Bank (2021), China's digital economy accounted for approximately 36.2% of its GDP in 2020. South Korea and Japan have similarly leveraged digitalization to enhance their manufacturing sectors and improve public services through smart technologies.

Digitalization enhances productivity by automating processes, reducing transaction costs, and enabling access to new markets. It also fosters innovation by creating a conducive environment for start-ups and tech-based enterprises. Moreover, digital technologies facilitate better data collection and analysis, which can improve decision-making processes in both the public and private sectors. For developing countries within the EAP region, digitalization offers a pathway to leapfrog traditional stages of development, enabling them to integrate more swiftly into the global economy (OECD, 2018).

Natural resources have historically been a cornerstone of economic development in many EAP countries. Indonesia, Malaysia, and Australia, for example, have substantial reserves of oil, gas, minerals, and agricultural products. These resources have not only fueled domestic industries but also generated significant export revenues. The effective management of natural resources is crucial for sustaining economic growth. However, reliance on these resources also poses risks such as price volatility in global markets, environmental degradation, and the so-called

‘resource curse,’ where resource-rich countries may experience slower economic growth due to factors like corruption and conflict over resource control (Auty, 1993).

The EAP region has seen varied approaches to managing natural resources. Australia has developed robust regulatory frameworks to ensure sustainable mining practices and mitigate environmental impacts. In contrast, countries like Indonesia are grappling with the challenges of deforestation and resource depletion. Sustainable management of natural resources, supported by digital technologies, can enhance efficiency and reduce negative environmental impacts. For instance, digital monitoring and management systems can optimize resource extraction processes, ensuring minimal waste and environmental harm (ADB, 2021).

Trade openness, defined by the liberalization of trade policies and the reduction of barriers to international trade, has been a pivotal factor in the economic success of many EAP countries. The region’s strategic geographic location and its proactive stance on trade agreements have facilitated deep integration into global value chains. Initiatives such as the ASEAN Free Trade Area (AFTA) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) have played significant roles in enhancing trade flows and economic cooperation among member countries.

Trade openness promotes economic growth by increasing access to foreign markets, attracting foreign direct investment (FDI), and facilitating the transfer of technology and knowledge. The inflow of FDI brings capital, expertise, and advanced technologies, which can boost domestic industries and enhance competitiveness. Furthermore, open trade policies reduce costs for consumers and businesses, leading to more efficient allocation of resources (Krugman, 1991). In the EAP region, trade openness has been particularly beneficial in sectors such as electronics, automotive, and textiles, where countries like Vietnam and Thailand have become major global players (IMF, 2020).

The relationship between digitalization, natural resources, and trade openness in driving economic growth is complex and multifaceted. Digitalization can significantly enhance the productivity and efficiency of resource-based industries. For example, digital technologies can improve supply chain management, optimize resource extraction, and reduce operational costs. The integration of digital solutions in logistics and transportation can streamline trade processes, reduce delays, and enhance the overall efficiency of cross-border transactions (UNCTAD, 2019).

Conversely, trade openness can stimulate the digital economy by attracting investments in technology-driven sectors and fostering innovation ecosystems. Open trade policies can also facilitate the import of advanced technologies and digital solutions, enabling countries to modernize their industries and improve their global competitiveness. Moreover, the sustainable management of natural resources, supported by digital tools, can ensure long-term economic stability and growth. For instance, digital monitoring systems can help in managing fisheries, forestry, and agricultural resources more sustainably, thus ensuring that these resources continue to contribute to economic prosperity (OECD, 2021).

This study aims to contribute to the existing body of literature by providing comprehensive insights into how digitalization, natural resources, and trade openness collectively influence economic growth in the EAP region. By employing advanced econometric models and analyzing extensive datasets, this research seeks to uncover the nuanced interactions between these factors. The findings are expected to inform policymakers, industry stakeholders, and researchers about the strategic importance of harmonizing digitalization efforts, sustainable resource management, and trade policies.

The study will provide evidence-based recommendations for enhancing the economic resilience and growth of EAP countries. By highlighting best practices and successful case studies from within the region, it will offer practical insights into how countries can leverage digitalization and trade openness to manage their natural resources more effectively. Additionally, the study will explore potential policy interventions that can support the integration of digital technologies into resource-based industries and trade sectors, thereby fostering inclusive and sustainable economic growth.

To comprehensively explore the relationships among digitalization, natural resources, trade openness, and economic growth in the East Asia-Pacific region, this study will be meticulously structured as follows: Section 2 will present a thorough literature review on crucial topics relevant to this study. First, we will investigate how digitalization influences economic growth by boosting productivity and fostering innovation. Second, we will analyze the effects of natural resources on economic development, focusing on aspects such as resource abundance and management practices. Third, we will evaluate the role of trade openness in promoting economic growth through liberalized trade policies and increased international integration. Following the literature review, Section 3 will detail the empirical methodology employed in this study, outlining the data sources, econometric models, and analytical techniques used to

examine the interplay of digitalization, natural resources, and trade openness on economic growth. Section 4 will present the empirical results, providing a comprehensive analysis of the findings and their implications for the EAP region. Finally, Section 5 will offer conclusions and recommendations, synthesizing the insights gained from the study and proposing policy measures and strategies to harness the potential of digitalization, optimize natural resource management, and enhance trade openness to foster sustainable and inclusive economic growth.

2. Literature Survey

The literature survey section aims to provide a comprehensive overview of existing research and theoretical frameworks relevant to understanding the multifaceted relationships among digitalization, natural resources, trade openness, and economic growth. In subsection 2.1, we will explore the link between digitalization and economic growth, examining how the integration of digital technologies across various sectors influences productivity, innovation, and overall economic performance. This will include an analysis of how digital advancements drive efficiency, enhance connectivity, and create new economic opportunities. Subsection 2.2 will delve into the connection between natural resources and economic growth, discussing the role of resource abundance, management practices, and sustainability issues in shaping economic outcomes. This part will highlight the dual nature of natural resources as both a catalyst for economic development and a potential source of economic vulnerability if not managed sustainably. Subsection 2.3 will investigate the relationship between trade openness and economic growth, focusing on how liberalized trade policies and international economic integration contribute to economic development and competitiveness. This will involve an examination of the benefits and challenges associated with trade openness, including increased market access, foreign direct investment, and technology transfer, as well as potential risks such as exposure to global economic fluctuations. Collectively, this literature survey will set the stage for the empirical analysis by providing a solid theoretical foundation and identifying key insights and gaps in the existing body of knowledge.

2.1.Link between digitalization and economic growth

Digitalization, the integration of digital technologies into everyday life by the digitization of everything that can be digitized, has been widely studied for its impact on economic growth. Numerous studies have provided evidence of the significant positive correlation between digitalization and economic growth. For instance, De Prato et al. (2015) argue that digital

technologies contribute to economic growth by enhancing productivity, fostering innovation, and facilitating the creation of new business models. These technologies enable more efficient processes and open up new markets, thus driving economic expansion.

One of the primary mechanisms through which digitalization influences economic growth is by improving productivity. As per Brynjolfsson and McAfee (2014), digital technologies enable firms to streamline operations, reduce costs, and improve the quality of goods and services. This increased efficiency translates into higher output and economic growth. Furthermore, digitalization leads to the accumulation of knowledge and skills, which are critical for innovation. According to Aghion et al. (2019), the adoption of digital technologies is closely linked to innovation activities within firms, which in turn spur economic growth by creating new products and services and enhancing existing ones.

Moreover, digitalization can significantly impact labor markets and education systems, which are crucial for economic development. According to Autor (2015), while digitalization may displace certain types of jobs, it also creates new opportunities in emerging sectors, thereby contributing to economic growth. Furthermore, digital platforms facilitate access to education and training, enhancing human capital development. This is supported by the work of Goldin and Katz (2008), who emphasize that technological advancements necessitate a more skilled workforce, leading to better job opportunities and higher incomes.

Additionally, digitalization plays a crucial role in enhancing trade and connectivity, which are vital for economic growth. The World Bank (2016) highlights that digital trade platforms and e-commerce enable businesses to reach global markets more efficiently, thus promoting international trade. This increased connectivity reduces transaction costs and barriers to entry for small and medium-sized enterprises (SMEs), fostering economic growth.

Empirical studies further corroborate the positive relationship between digitalization and economic growth. For example, Koutroumpis (2009) finds that broadband penetration significantly boosts GDP growth in OECD countries. Similarly, a study by the International Telecommunication Union (ITU, 2012) indicates that a 10% increase in mobile broadband penetration leads to a 0.6% to 2.8% increase in GDP, depending on the region. The impact of natural resources, CO2 emissions, energy use, domestic investment, innovation, trade, and digitalization on economic growth in 52 African countries was examined by Bakari (2022a). Using annual data from 1996 to 2021 and employing random effect and fixed effect models

along with the Hausman test, the study found positive impacts of domestic investment, exports, natural resources, and final consumption expenditure on economic growth, while labor force, imports, and energy use had negative effects. CO2 emissions, innovation, and internet use showed no significant impact. The study suggests policies to promote domestic investment, exports, and natural resources while managing labor force, imports, and energy use more effectively. In North Africa, Bakari and Tiba (2020) analyzed the impact of the Internet on economic growth from 1995 to 2017 using various econometric techniques. The findings indicated a negative impact of the Internet on economic growth in Algeria, Egypt, Morocco, and Tunisia. The authors recommend that these countries reorient Internet use towards more productive avenues to leverage its potential benefits. Bakari (2019) explored the relationship between economic growth and innovation, emphasizing the role of the internet. Using a panel ARDL model with data from 76 countries between 1995 and 2016, the study provided evidence of a positive role of innovation and internet in economic growth, and vice versa, suggesting policy measures to enhance innovation and internet infrastructure.

In Tunisia, Bakari et al (2022a) examined the impact of internet use and innovation on economic growth from 1985 to 2018. The ARDL bounds testing methodology revealed that in the short run, innovation had no significant effect on growth, while internet use positively influenced growth. In the long run, both internet use and innovation had negative impacts on growth, although internet use positively impacted innovation, indicating the need for strategic policy adjustments. Bakari (2022b) studied the effects of patents and digitalization on Romania's economic growth from 1990 to 2020. The findings highlighted a positive impact of both factors on economic growth, recommending that Romanian authorities harness digitalization and patenting to modernize and diversify the economy. In another study, Bakari et al (2022b) investigated the impact of digitalization and trade openness on economic growth in the ten richest Asian countries. Utilizing a Static Gravity Model and Generalized Method of Moments Model, they found significant positive effects, suggesting that trade openness and digitalization significantly contribute to economic growth in these countries.

Mwananziche et al. (2023) examined the role of digitalization in Tanzania's economic growth from 1994 to 2021, using an ARDL technique. The study established a causal relationship between ICT infrastructure and GDP growth, particularly highlighting the significant impact of mobile telephone subscriptions on growth in both the short and long run, emphasizing the early stages of digitalization's critical role in boosting economic growth. Arendt (2015) discussed the relationship between ICT, GDP growth, and productivity in Central and Eastern European

countries. The paper emphasized the role of complementary factors to ICT, such as technical progress, on economic growth, noting significant contributions of ICT capital, non-ICT capital, labor, and total factor productivity to GDP growth in the CEE and EU-15 countries. Nurdiana et al. (2023) assessed the impact of digitalization and economic openness on economic growth in ASEAN countries from 2001 to 2020. The study found significant positive effects of government expenditure on education, individual internet users, and foreign direct investment on economic growth, suggesting that digitalization improves access to public services and trade activities, contributing to economic growth. Cavallo and Ghezzi (2021) explored the combined impact of digitalization and entrepreneurship on economic growth. They found that digitalization mediates the positive relationship between entrepreneurship and economic growth, proposing an original process model for measuring entrepreneurial activity and its impact on economic growth.

Solomon and van Klyton (2020) analyzed the impact of digital technology usage on economic growth in 39 African countries from 2012 to 2016. Using a system GMM estimator, they found that individual ICT usage positively impacted economic growth, particularly highlighting the importance of social media and government ICT vision. Mishakov et al (2021) examined the impact of digitalization on economic sustainability in developed and developing countries. Their regression analysis showed that digitalization significantly promotes sustainable development in developing countries while having mixed effects in developed countries, suggesting differentiated management approaches for digitalization. Hao et al. (2023) studied the role of digitalization in promoting green economic growth in China from 2013 to 2019. They found that digitalization significantly promotes green economic growth through green technology innovation, advanced industrial structures, and spatial spillover effects, advocating for the construction of new digital infrastructures and green-energy consumption policies.

Lechman and Anacka (2022) investigated the impact of digital technologies on economic growth in developing countries from 1990 to 2019. Their findings indicated that digitalization positively affects economic growth and reduces cross-country inequalities, with significant positive relationships between ICT indicators and economic growth variables. Habibi and Zabardast (2020) compared the impact of ICT and education on economic growth in Middle Eastern and OECD countries from 2000 to 2017. They found that ICT positively influenced economic growth in both regions, with a higher impact of mobile subscriptions in the Middle East and a more significant role of internet users in OECD countries, recommending increased investment in ICT and education infrastructure. Myovella et al (2020) compared the impact of

digitalization on economic growth in Sub-Saharan Africa and OECD countries from 2006 to 2016. They found that digitalization positively contributed to economic growth in both regions, with mobile telecommunications having a higher impact in Sub-Saharan Africa, suggesting that SSA governments should invest in ICT infrastructure to maximize the benefits of digitalization.

The literature overwhelmingly supports the notion that digitalization is a powerful driver of economic growth. By enhancing productivity, fostering innovation, creating new job opportunities, and facilitating global trade, digital technologies play a crucial role in modern economic development. As nations continue to embrace digitalization, understanding its impact on economic growth remains critical for policymakers aiming to harness its full potential.

2.2.Link between natural resources and economic growth

The relationship between natural resources and economic growth has been a significant topic of research, revealing both positive and negative impacts. Natural resources, including minerals, oil, gas, and arable land, can drive economic growth through various mechanisms, but they also present challenges that can affect the growth trajectory.

A traditional view holds that natural resources are vital for economic development. Sachs and Warner (2001) highlight that resource-rich countries often experience faster economic growth due to the revenue generated from resource extraction. They argue that the influx of revenue can be used to invest in infrastructure, education, and healthcare, thereby fostering economic development. Additionally, resources can attract foreign investment, which contributes to economic growth by creating jobs and improving technology. However, the 'resource curse' or 'paradox of plenty' is a well-documented phenomenon where resource-rich countries experience slower economic growth compared to their less resource-rich counterparts. Auty (1993) explores this paradox, suggesting that resource wealth can lead to economic instability, corruption, and poor governance, which hinder economic growth. The volatility of resource prices can also lead to economic instability, as demonstrated by the work of Rosser (2006), who finds that dependence on resource revenues can lead to economic booms and busts that destabilize economies.

Moreover, natural resources can affect economic growth through their impact on institutional quality. According to Mehlum et al. (2006), the positive effects of resource wealth on growth are contingent upon the quality of institutions. In countries with strong institutions, resource wealth can lead to sustainable growth, while in countries with weak institutions, it often results

in poor governance and conflict, undermining growth. Environmental degradation is another critical factor linking natural resources and economic growth. The extraction and exploitation of natural resources can lead to environmental damage, which has long-term economic costs. Dasgupta and Mäler (2004) discuss how environmental degradation can reduce the stock of natural capital, which in turn affects economic growth. Sustainable management of natural resources is therefore essential to ensure that resource extraction does not undermine future growth.

Empirical studies provide mixed evidence on the relationship between natural resources and economic growth. A study by Lederman and Maloney (2007) shows that while natural resources can contribute to growth, the effect is heavily influenced by how the revenues are managed and the quality of institutions. Similarly, a meta-analysis by Haider and Stern (2018) confirms that the relationship between resource wealth and economic growth is complex, often mediated by factors such as governance, economic structure, and institutional quality. The study by Cui et al. (2023) focuses on the promotion of green economic development through fiscal policies and natural resource efficiency in China. The research utilizes the PMG-ARDL model to analyze data from 1990 to 2020, revealing that green economic development is significantly correlated with fiscal policy interventions and natural resource efficiency. This underscores the importance of strategic government spending and efficient resource management in fostering sustainable economic growth.

Cai and Le (2023) examine the role of corporate social responsibility (CSR) in the relationship between natural resources, financial development, and green economic growth in Vietnam. Using the PMG-ARDL model for data from 1990 to 2018, the study finds that CSR, financial development, and natural resources have a long-term positive impact on green economic growth, while in the short-term, overreliance on natural resource rents can jeopardize public debt sustainability. This highlights the need for efficient fiscal and financial management to ensure sustainable development. Ben-Salha et al. (2021) investigate the causal linkages between natural resource rents and economic growth in resource-abundant countries from 1970 to 2013. Their findings support the natural resource blessing hypothesis in the long run, while short-term analysis shows varied results across countries. This study emphasizes the complex nature of the resource rents-economic growth nexus and the importance of long-term strategic planning for sustainable growth. Qiang and Jian (2020) analyze the relationship between economic growth, natural resources, and institutional quality in China from 2005 to 2018. The study finds that low-quality market resource allocation systems and property rights systems exacerbate the

resource curse effect, while increased market openness can mitigate it. This suggests that improving institutional quality and market openness is crucial for leveraging natural resources for economic growth.

Yang and Khan (2021) explore the role of finance, natural resources, and governance on environmental degradation and economic growth in South Asian countries. Their study concludes that finance and governance play a mediating role in improving environmental quality and economic growth, supporting the natural resources curse theory. The study provides policy implications for balancing economic growth and environmental sustainability. Khan et al. (2023) investigate the aggregated and disaggregated impacts of natural resources on economic growth in G-7 economies from 1990 to 2020. Using the MMQR approach, they find that natural resources negatively impact economic growth, validating the resource curse hypothesis. The study emphasizes the need for strategic regional cooperation and technological advancements to mitigate the negative effects of resource dependence. Hayat and Tahir (2021) examine the impact of natural resource volatility on economic growth in UAE, Saudi Arabia, and Oman from 1970 to 2016. They find a positive relationship between natural resources and economic growth but a negative impact of resource volatility. This study challenges the traditional resource curse concept and highlights the importance of managing resource volatility for sustained economic growth.

Rahim et al. (2021) analyze the effects of natural resources, human capital, financial development, industrialization, technological progress, and international trade on economic growth in Next Eleven countries from 1990 to 2019. They find that natural resources inhibit economic growth, while human capital development and other factors promote it. The study suggests that investments in human capital can mitigate the resource curse in developing countries. Xie et al. (2024) examine the nonlinear relationship between natural resources and economic growth in developing countries from 2008 to 2019. They find an inverse-U-shaped relationship, where initial resource availability positively influences growth, but increased reliance hinders it. Frontier technology strengthens the positive effects of natural resources on growth, highlighting the need for strategic investments in emerging technologies. Arslan et al. (2022) explore the dynamics of natural resource rents, environmental sustainability, and economic growth in China from 1970 to 2016. They find that natural resources improve environmental sustainability at the expense of economic growth. The study underscores the importance of governance mechanisms to balance environmental and economic objectives.

Topcu et al. (2020) analyze the effects of natural resources, energy consumption, and gross capital formation on economic growth in 124 countries from 1980 to 2018. They find that natural resources positively impact GDP in middle and low-income countries, while energy consumption and gross capital formation have varied effects based on income levels. The study provides a global perspective on the resource-growth relationship. Xu et al. (2023) reassess the linkage between natural resources and economic growth in China from 1995 to 2017, incorporating variables like financial development and renewable energy. Their findings indicate that national resource taxes and renewable energy positively impact economic growth, emphasizing the need for policies focused on financial and technological advancements for sustainable growth. Kwakwa et al. (2022) examine the effect of natural resources and political regime on economic growth in Tunisia from 1970 to 2017. They find that democracy enhances the positive impact of natural resources on growth. The study highlights the role of political regime in effectively utilizing natural resources for long-term economic development. Haseeb et al. (2021) investigate the impact of natural resources on economic growth in top Asian economies from 1970 to 2018 using quantile-on-quantile regression. They find that natural resources positively impact economic growth in most countries, except India, where the effect is negative. The study provides insights into the varying impacts of natural resources on economic growth across different quantiles.

While natural resources have the potential to drive economic growth, their impact is not straightforward. The positive effects are contingent upon effective management and the quality of institutions, whereas poor governance and environmental degradation can counteract potential benefits. Understanding these dynamics is crucial for policymakers aiming to harness natural resources for sustainable economic development.

2.3.Link between trade openness and economic growth

The relationship between trade openness and economic growth has been extensively studied, with considerable evidence suggesting that increased trade openness can significantly stimulate economic growth. Trade openness, defined as the extent to which a country allows foreign goods and services to enter its economy, can enhance growth through various channels, including increased market access, competition, and technology transfer.

A fundamental perspective is that trade openness promotes economic growth by providing access to larger markets. According to Frankel and Romer (1999), countries that engage more

extensively in international trade benefit from economies of scale and the specialization of production. This specialization allows for more efficient resource allocation, which can drive economic growth. Moreover, trade openness enables countries to import capital goods and technologies that may not be available domestically, thereby facilitating technological progress and boosting productivity. Edwards (1998) supports this view, demonstrating that trade liberalization often leads to higher growth rates by enhancing capital accumulation and productivity. Additionally, trade openness fosters competition, which can lead to improved efficiency and innovation. Baldwin (2003) argues that exposure to international markets forces domestic firms to become more competitive, driving them to innovate and improve their productivity. This increased competition can lead to the emergence of new industries and the revitalization of existing ones, contributing to economic growth. Similarly, the work of Aghion et al. (2005) highlights that trade openness encourages firms to adopt new technologies and practices, enhancing their competitive edge and stimulating growth.

However, the impact of trade openness on economic growth is not uniform and can vary depending on the country's level of development and institutional quality. The empirical research by Dollar and Kraay (2004) suggests that while trade openness generally benefits growth, the effects are more pronounced in developing countries with sound economic policies and institutions. They argue that trade liberalization can be detrimental in the absence of appropriate institutional frameworks that support economic reforms and address potential adverse effects such as income inequality and environmental degradation. Moreover, the relationship between trade openness and economic growth can be influenced by global economic conditions and trade policies. A recent study by Rodriguez and Rodrik (2001) questions the robustness of the positive link between trade openness and growth, suggesting that the relationship may be context-dependent and influenced by external factors such as global economic cycles and trade agreements. They argue that the benefits of trade openness are contingent upon the global economic environment and the specific trade policies adopted by countries.

Yedder et al (2023) investigate the impact of domestic investment and trade on economic growth in North African countries using a Panel CS-ARDL model over the period 1990-2021. Their findings indicate that neither domestic investment nor exports significantly impact economic growth in the long run. However, imports positively influence economic growth, suggesting that North African countries benefit from imported goods and services despite political and economic instabilities. Akermi et al (2024) explore the effects of final

consumption, domestic investment, exports, and imports on economic growth in Albania using cointegration analysis and the VECM model. Their study reveals no causal relationship between these variables and economic growth, both in the short and long run. This underscores Albania's critical economic situation, necessitating urgent reforms to spur growth. Bakari et al (2020) analyze the contributions of domestic investment, exports, and imports to economic growth in Peru from 1970 to 2017 using Johansen co-integration analysis and the VECM model. The study concludes that these factors do not significantly influence economic growth in either the short or long term, pointing to systemic economic and organizational issues. Bakari et al (2019) examine the relationship between exports, imports, and economic growth in China using data from 1960 to 2015. The study employs the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests, cointegration analysis, and Granger-Causality tests. The results show that exports positively affect economic growth, while imports have a negative impact, emphasizing the importance of export-led growth for China.

Bakari (2016) investigates the relationship between exports, imports, and economic growth in Canada using data from 1990 to 2015. The study finds no direct relationship between these variables; however, bidirectional causality exists from imports and exports to economic growth. This suggests that trade activities are crucial for Canada's economic growth. Bakari and Mabrouki (2016) study the nexus between exports, imports, and economic growth in Turkey from 1960 to 2015. The analysis reveals no direct relationship between these variables. Still, strong bidirectional causality is found, indicating that both imports and exports significantly influence economic growth in Turkey. Bakari (2017) explores the relationship between exports, imports, domestic investment, and economic growth in Japan using data from 1970 to 2015. The results indicate that domestic investment and exports positively impact economic growth, while imports do not significantly affect GDP. This highlights the importance of domestic investment and exports for Japan's economic expansion. Bakari et al (2018) analyze the linkages between FDI, domestic investment, exports, imports, labor force, and economic growth in Nigeria from 1981 to 2015 using the VECM model. The study finds no long-term relationship between these variables. However, in the short run, imports drive economic growth, highlighting the need for economic reforms in Nigeria. Bakari et al (2021) investigate the nexus between domestic investment, exports, imports, and economic growth in Brazil from 1970 to 2017 using the VECM methodology. The results show that in the long run, domestic investment and exports positively influence economic growth, while imports have a negative effect. This underscores the complex dynamics of trade and economic performance in Brazil.

Bakari and Krit (2017) study the relationship between exports, imports, and economic growth in Mauritania using data from 1960 to 2015. Their findings indicate a positive effect of exports on economic growth, while imports negatively impact it, with unidirectional causality from imports to economic growth. Bakari and Mabrouki (2017) investigate the impact of exports and imports on economic growth in Panama using data from 1980 to 2015. The study finds strong bidirectional causality between imports, exports, and economic growth, suggesting that trade activities are pivotal for Panama's economic growth. Omoke and Opuala–Charles (2021) explore the role of institutional quality in the trade openness-economic growth nexus in Nigeria from 1984 to 2017 using the ARDL bounds testing approach. The results indicate that export trade positively impacts economic growth, while import trade has a negative effect. Improved institutional quality mitigates the negative impact of imports on growth, emphasizing the importance of good governance. Nam and Ryu (2024) examine trade openness and economic growth in the Association of Southeast Asian Nations. The study finds that while lower trade barriers can negatively impact GDP, increased trade volumes positively influence economic growth. This highlights the dual effects of trade openness, where benefits depend on the balance between trade barriers and trade volumes.

Oppong-Baah et al. (2022) analyze the impact of trade openness on economic growth in Ghana and Nigeria using panel data from 1998 to 2017. The study finds that trade openness and real exchange rates positively impact economic growth, suggesting that managing trade effects is crucial for sustained economic growth in these countries. Fetahi-Vehapi et al (2015) investigate the effects of trade openness on economic growth in Southeast European countries using panel data from 1996 to 2012. The results indicate that trade openness benefits countries with higher initial income per capita, FDI, and gross fixed capital formation, highlighting the conditional benefits of trade openness. Keho (2017) examines the impact of trade openness on economic growth in Côte d'Ivoire from 1965 to 2014. The study finds positive effects of trade openness on economic growth in both the short and long run, emphasizing the complementary relationship between trade openness and capital formation. Huchet-Bourdon et al (2018) analyze the relationship between trade openness and economic growth by considering export quality and variety. Their findings suggest that countries exporting higher quality products and diverse varieties experience faster growth, highlighting the complexity of trade openness and its impact on economic growth.

The literature provides substantial evidence that trade openness generally contributes to economic growth by expanding market access, enhancing competition, and facilitating

technology transfer. However, the extent of these benefits depends on various factors, including a country's level of development, institutional quality, and the broader global economic context. Policymakers must consider these factors when designing trade policies to maximize the positive impacts on economic growth.

3. Empirical Methodology

This study investigates the influence of digitalization, natural resources, and trade openness on economic growth in 17 East Asia-Pacific countries: Australia, Brunei, Darussalam, Cambodia, Hong Kong SAR (China), Indonesia, Japan, Korea (Rep.), Macao SAR (China), Malaysia, New Zealand, the Philippines, Singapore, Solomon Islands, Thailand, Vanuatu, and Viet Nam. The analysis covers the period from 2004 to 2023, utilizing data sourced from the annual reports of the World Bank.

In this study, economic growth (Y) is represented by Gross Domestic Product (GDP) at constant prices. GDP is a comprehensive measure of economic activity and serves as the primary indicator of economic growth in the analysis. Capital (K) is measured by Gross Fixed Capital Formation at constant prices, reflecting the total value of investments in fixed assets such as machinery, infrastructure, and buildings. Labor (L) is quantified by the total working-age population, providing a measure of the labor force available to drive economic activity. Digitalization (DI) is represented by the number of internet users, reflecting the extent to which digital technologies are integrated into economic activities and everyday life. Natural Resources (NR) are measured by natural resource rents at constant prices, which account for the economic value derived from the extraction and use of natural resources such as minerals, oil, and gas. Financial Development (FD) is assessed by the amount of money supply at constant prices, indicating the depth and accessibility of financial markets and institutions. Trade Openness (T) is quantified by trade openness at constant prices, which captures the extent to which a country engages in international trade relative to its GDP. The core model employed in this study is expressed as follows:

$$\mathbf{LnY_{it} = \beta_0 + \beta_1 LnK_{it} + \beta_2 LnL_{it} + \beta_3 LnDI_{it} + \beta_4 LnNR_{it} + \beta_5 LnFD_{it} + \beta_6 LnT_{it} + \epsilon_{it}}$$

In this model, (Ln) denotes the natural logarithm, and (β_0) represents the constant term. The coefficients (β_1) through (β_6) measure the impact of each explanatory variable on economic growth, while (ϵ_{it}) is the error term accounting for unobserved factors influencing economic growth.

The initial phase of the empirical analysis involves calculating descriptive statistics for all variables under consideration. This step provides a foundational understanding of the dataset by summarizing key characteristics such as means, standard deviations, and ranges. Descriptive statistics offer insights into the central tendencies and variability of the data, allowing for an initial assessment of the data distribution and helping to identify any anomalies or outliers that may require further attention.

Following the descriptive statistics, the study conducts correlation tests to examine the relationships between the variables. Correlation analysis assesses the strength and direction of the associations between economic growth and each of the explanatory variables—digitalization, natural resources, financial development, and trade openness. This step helps in identifying significant correlations and understanding how changes in one variable may be related to changes in another, providing preliminary insights into potential relationships that warrant further investigation.

The third step involves estimating the static gravity model using both Fixed Effects and Random Effects approaches. The Fixed Effects model controls for time-invariant characteristics unique to each country by focusing on within-country variations. This approach helps to isolate the effects of the explanatory variables on economic growth while accounting for unobserved country-specific factors. On the other hand, the Random Effects model assumes that the individual-specific effects are randomly distributed and uncorrelated with the regressors. By comparing these two models, the study assesses how each approach influences the estimation results and determines the most appropriate model for the data.

The fourth stage employs the Generalized Method of Moments (GMM) estimation technique to address potential endogeneity issues. This includes First Differences GMM, Fixed Effects GMM, and Random Effects GMM. GMM leverages moment conditions derived from the data to provide more efficient and unbiased estimates, especially when dealing with endogenous regressors. By applying GMM, the study aims to refine the estimates and enhance the robustness of the results, ensuring that the impacts of digitalization, natural resources, and trade openness on economic growth are accurately captured.

In the final step, the Two-Stage Least Squares (2SLS) model is used to address any potential endogeneity among the explanatory variables. The 2SLS method involves two stages: first, predicting the endogenous variables using instrumental variables to address potential biases,

and second, using these predictions in the second stage to estimate their effects on economic growth. The 2SLS model is applied with both Fixed Effects and Random Effects approaches to ensure the robustness of the findings and to verify the consistency of the results across different estimation techniques.

By following this comprehensive empirical strategy, the study aims to provide a thorough analysis of the roles of digitalization, natural resources, and trade openness in driving economic growth across East Asia-Pacific countries. The multi-faceted approach ensures that the findings are robust and reliable, offering valuable insights into how these factors interact to influence economic development in the region.

4. Empirical Results

This section presents the empirical results of the study, focusing on the relationships between economic growth and various determinants such as capital, labor, digitalization, financial development, natural resources, and trade openness across East Asia-Pacific countries. The analysis employs multiple estimation methods, including descriptive statistics, correlation analysis, and various econometric models, to understand the underlying dynamics and draw meaningful conclusions about economic growth.

4.1.Descriptive statistics

Table 1 provides a comprehensive overview of the descriptive statistics for the variables analyzed in the study, covering 17 East Asia-Pacific countries over the period from 2004 to 2023. These statistics offer a snapshot of the average conditions, variations, and distributions of key economic indicators across the region. The mean values reveal the central tendencies of each variable. For example, the average GDP (Y) is approximately (6.17×10^{11}), representing the average economic output at constant prices. This figure highlights the scale of economic activity across these countries. Similarly, the average capital (K) is around (1.61×10^{11}), which reflects the average investment in physical capital, while labor (L) has a mean of 24,605,006, indicating the typical size of the labor force in these countries.

Digitalization (DI), measured by the number of internet users, has an average of 23,827,054. This figure underscores the extent of internet penetration and digital engagement across the region. Financial development (FD), which is gauged by the money supply, averages approximately (1.06×10^{12}), illustrating the average depth of financial markets in these

countries. In terms of natural resources (NR), represented by natural resource rents, the average stands at (1.11×10^{10}). This figure provides insight into the economic value derived from natural resources. Lastly, trade openness (T) has a mean of (4.54×10^{11}), indicating the extent of trade activity relative to GDP, reflecting the average openness of these economies to international trade.

Table 1: Descriptive statistics results

	Y	K	L	DI	FD	NR	T
Mean	6.17E+11	1.61E+11	24605006	23827054	1.06E+12	1.11E+10	4.54E+11
Median	2.53E+11	5.88E+10	9651253.	6943449.	2.63E+11	1.89E+09	3.47E+11
Maximum	4.62E+12	1.16E+12	1.41E+08	1.86E+08	1.29E+13	2.03E+11	2.12E+12
Minimum	5.21E+08	83491948	86928.00	3065.058	1.46E+08	116368.9	4.96E+08
Std. Dev.	1.06E+12	2.72E+11	32875501	34179223	2.48E+12	2.31E+10	4.78E+11
Skewness	2.752090	2.562503	1.777995	2.102470	3.456734	3.729016	1.012924
Kurtosis	9.932036	9.007125	5.809478	7.637805	14.07026	21.98841	3.028824
Jarque-Bera	1044.655	831.3498	273.8431	522.5434	2271.289	5549.090	54.73183
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	1.98E+14	5.17E+13	7.87E+09	7.62E+09	3.38E+14	3.54E+12	1.45E+14
Sum Sq. Dev.	3.61E+26	2.36E+25	3.45E+17	3.73E+17	1.96E+27	1.70E+23	7.30E+25
Observations	320	320	320	320	320	320	320

The table further includes median values, which provide a measure of the central location of the data, as well as maximum and minimum ranges that illustrate the extent of variation. Standard deviations are reported to show the dispersion of each variable around the mean. The skewness values indicate the asymmetry of the distributions; for most variables, there is a positive skew, suggesting that the distributions are right skewed with a longer tail on the right side. High kurtosis values, particularly for financial development and natural resources, point to heavy tails in the distributions, meaning that extreme values are more common than would be expected in a normal distribution. Finally, the Jarque-Bera test results confirm that the distributions are not normally distributed, as indicated by the zero probabilities, emphasizing the need for caution when interpreting statistical results and considering non-normality in further analyses.

4.2.Correlation analysis

Table 2 provides a detailed view of the correlation between the various economic variables studied. This analysis is crucial for understanding the strength and direction of relationships among these variables, which include GDP (Y), capital (K), labor (L), digitalization (DI), financial development (FD), natural resources (NR), and trade openness (T). The correlation

coefficient between GDP (Y) and capital (K) is exceptionally high at ($r = 0.99$), indicating a very strong positive relationship. This suggests that as capital investment increases, economic output tends to rise significantly. Such a high correlation underscores the pivotal role of capital in driving economic growth. Essentially, this finding highlights that economies with greater capital investments are likely to experience higher levels of economic output, reflecting the fundamental role of physical capital in enhancing productive capacity.

The correlation between GDP and labor (L) is moderately strong at ($r = 0.45$). This positive relationship indicates that while labor also contributes to economic growth, its impact is less pronounced compared to capital. A moderate correlation suggests that increases in labor input do contribute to higher GDP, but the effect is not as dramatic as that of capital. Digitalization (DI), represented by the number of internet users, shows a significant positive correlation with GDP ($r = 0.74$). This substantial relationship implies that higher levels of internet usage are associated with enhanced economic growth. The positive impact of digitalization indicates that greater digital connectivity and technological engagement can stimulate economic performance by improving efficiency and access to information.

Table 2: Correlation test results

	Y	K	L	DI	FD	NR	T
Y	1						
K	0.99	1					
L	0.45	0.48	1				
DI	0.74	0.76	0.75	1			
FD	0.96	0.94	0.33	0.66	1		
NR	0.13	0.14	0.25	0.09	-0.01	1	
T	0.70	0.70	0.25	0.52	0.68	0.01	1

Financial development (FD) exhibits an even stronger positive correlation with GDP ($r = 0.96$). This highlights the critical importance of robust financial markets in supporting economic growth. Financial development facilitates access to capital, improves investment opportunities, and supports overall economic activity, which is reflected in its strong correlation with GDP. Conversely, natural resources (NR) show only a weak positive correlation with GDP ($r = 0.13$). This low correlation suggests that the economic impact of natural resource rents is relatively minor in the context of this study. It implies that, in the studied region, natural resources may not significantly drive economic growth compared to other factors such as capital or financial development.

Trade openness (T) has a moderate positive correlation with GDP ($r = 0.70$). This relationship suggests that countries with higher trade openness—i.e., those that are more engaged in international trade—tend to experience higher economic growth. The correlation underscores the importance of trade in economic performance, indicating that greater exposure to global markets can enhance economic activity. Overall, the correlation analysis provided in Table 2 offers valuable insights into how these variables interact and influence economic growth. While capital, financial development, and trade openness show strong positive relationships with GDP, digitalization has a significant impact, and natural resources show a relatively minor effect. These initial correlations set the stage for more detailed analyses to explore the causal relationships and dynamics among these economic factors.

4.3.Static Gravity Model

In Table 3, the Static Gravity Model results are presented using both Fixed Effects and Random Effects approaches, offering insights into the impact of various factors on economic growth across the 17 East Asia-Pacific countries. The Fixed Effects model reveals several key findings regarding the relationships between economic growth and the explanatory variables. Capital Ln(K) demonstrates a highly significant positive coefficient of 0.200171 with a p-value less than 0.001. This result indicates that capital investment plays a crucial role in driving economic growth. The strong positive relationship suggests that increasing capital investment significantly boosts economic output, reflecting the importance of physical assets and infrastructure in enhancing productive capacity.

Similarly, labor Ln(L) also shows a significant positive effect with a coefficient of 0.515747 and a p-value less than 0.001. This finding emphasizes that labor input is a substantial contributor to economic growth. The positive coefficient indicates that a larger and more skilled labor force can lead to higher economic performance, reinforcing the idea that human resources are vital for economic development. In contrast, digitalization Ln(DI) and natural resources Ln(NR) exhibit non-significant negative coefficients in the Fixed Effects model. Digitalization has a coefficient of -0.006856 with a p-value of 0.5796, suggesting that, within the scope of this model, digitalization does not significantly affect economic growth. Similarly, natural resources have a coefficient of -0.012203 with a p-value of 0.1528, indicating that natural resource rents do not have a substantial impact on economic growth in this context. These results imply that, despite the theoretical importance of digitalization and natural resources, their actual effects on economic growth may be limited or masked by other factors.

Financial development Ln(FD) shows a positive and significant coefficient of 0.106041 with a p-value less than 0.001. This result highlights the crucial role of financial markets in supporting economic growth. It suggests that deeper and more developed financial systems can facilitate economic activities by improving access to capital and enhancing investment opportunities. Trade openness Ln(T) also presents a significant positive effect with a coefficient of 0.357580 and a p-value less than 0.001. This finding underscores the positive relationship between trade openness and economic growth, indicating that countries with higher levels of trade openness tend to experience more robust economic growth. The significant coefficient suggests that engaging more actively in international trade can drive economic performance.

Table 3: Results of the estimation of the Static Gravity Model

Dependent Variable: Ln (Y)				
Static Gravity Model				
	Fixed Effect		**Random Effect**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
C	1.193951	0.2104	2.224316	0.0000
Ln (K)	0.200171	0.0000	0.322838	0.0000
Ln (L)	0.515747	0.0000	0.218542	0.0000
Ln (DI)	-0.006856	0.5796	-0.040560	0.5241
Ln (FD)	0.106041	0.0005	0.195629	0.0000
Ln (NR)	-0.012203	0.1528	-0.004948	0.3878
Ln (T)	0.357580	0.0000	0.307300	0.0000

In the Random Effects model, the significance of capital and labor is consistent with the Fixed Effects results. Both variables continue to exhibit significant positive coefficients, reinforcing their importance in driving economic growth. Capital remains a strong driver of economic output, while labor's contribution to economic performance is also reaffirmed. However, the Random Effects model does not change the non-significant results for digitalization and natural resources. Digitalization continues to show a non-significant effect, indicating that its role in influencing economic growth remains limited in this model. Similarly, natural resources do not significantly impact economic growth, reflecting the limited influence of natural resource rents in the context of this study. Financial development and trade openness retain their significant positive effects in the Random Effects model. Financial development continues to highlight its role in supporting economic growth, while trade openness remains a significant driver of economic performance. These consistent results across both Fixed and Random Effects models reinforce the importance of financial markets and international trade in enhancing economic growth.

Overall, the Static Gravity Model results emphasize the significant contributions of capital, labor, financial development, and trade openness to economic growth. While digitalization and natural resources show limited or non-significant effects, the consistent findings for other variables provide valuable insights into the key drivers of economic performance in East Asia-Pacific countries.

4.4.Generalized Method of Moments Model

Table 4 presents the findings from the Generalized Method of Moments (GMM) model, which includes various specifications such as First Differences, Fixed Effects, and Random Effects. This model provides a comprehensive analysis of how different variables impact economic growth, using GMM techniques to address potential endogeneity and measurement errors in the data.

In the First Differences GMM model, the results highlight the significant contributions of capital and labor to economic growth. Capital Ln(K) shows a significant positive coefficient of 0.060415 with a p-value of 0.0039. This result indicates that increases in capital investment are associated with higher economic growth. The positive coefficient suggests that investments in physical assets and infrastructure are crucial for boosting economic output, reflecting the essential role of capital accumulation in enhancing productivity and economic performance. Labor Ln(L) also demonstrates a positive and significant impact with a coefficient of 0.109258 and a p-value of 0.0128. This finding reaffirms the importance of labor in driving economic growth. A larger and more productive labor force contributes positively to economic performance, highlighting the significance of human capital in the growth process. The positive coefficient indicates that improvements in labor quality and quantity can lead to substantial gains in economic output. On the other hand, digitalization Ln(DI) presents a non-significant negative coefficient of -0.007206 with a p-value of 0.8112. This result suggests that digitalization does not have a statistically significant impact on economic growth in this model. Despite the theoretical expectations that increased internet usage and digital technologies should enhance economic performance, the empirical evidence in this case does not support a significant effect.

Financial development Ln(FD) shows a positive and significant coefficient of 0.058528 with a p-value of 0.0012. This result reinforces the critical role of financial markets in supporting economic growth. The positive coefficient indicates that a well-developed financial sector,

characterized by efficient financial markets and access to capital, contributes significantly to economic performance. Natural resources Ln(NR) have a non-significant negative coefficient of -0.028833 with a p-value of 0.3625. This finding suggests that natural resource rents do not significantly influence economic growth in this model. The negative coefficient, while not statistically significant, indicates that the presence of natural resources may have a limited or negligible effect on economic growth in the context of this study. Trade openness Ln(T) shows a significant positive coefficient of 0.000193 with a p-value of 0.0069. This result highlights the positive relationship between trade openness and economic growth. The significant coefficient suggests that countries with higher levels of trade openness, which involves engaging more actively in international trade, experience better economic performance. This finding aligns with the theoretical understanding that trade openness can drive economic growth by facilitating access to larger markets and promoting efficiency through competition.

Table 4: Results of the estimation of the Generalized Method of Moments Model

Dependent Variable: Ln (Y)						
Generalized Method of Moments Model						
	First Differences		**Fixed Effect**		**Random Effect**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
Ln (Y)	0.988167	0.0000	0.611286	0.6112	1.683738	0.0001
Ln (K)	0.060415	0.0039	0.202646	0.0000	0.361264	0.0000
Ln (L)	0.109258	0.0128	0.562887	0.0000	0.191807	0.0000
Ln (DI)	-0.007206	0.8112	-0.005522	0.7266	-0.043236	0.5157
Ln (FD)	0.058528	0.0012	0.045220	0.0176	0.169030	0.0000
Ln (NR)	-0.028833	0.3625	-0.014448	0.1139	-0.001441	0.8539
Ln (T)	0.000193	0.0069	0.458972	0.0000	0.333830	0.0000

In both the Fixed Effects and Random Effects specifications of the GMM model, the results for capital, labor, and trade openness remain consistent with the First Differences model. Capital and labor continue to show positive and significant effects on economic growth, reaffirming their crucial roles. Trade openness also maintains its positive and significant relationship with economic growth, highlighting its importance as a driver of economic performance. Digitalization and natural resources, however, continue to show non-significant results across these specifications. This consistency suggests that, despite theoretical expectations, digitalization and natural resource rents do not exhibit a significant impact on economic growth in the context of this study. Overall, the GMM model results underscore the importance of capital, labor, financial development, and trade openness in promoting economic growth. While

digitalization and natural resources show limited or non-significant effects, the findings provide valuable insights into the key drivers of economic performance in East Asia-Pacific countries. The consistent results across different GMM specifications enhance the robustness of these findings and offer a clearer understanding of the factors influencing economic growth.

4.5.Two-Stage Least Squares model

Table 5 displays the results obtained from applying the Two-Stage Least Squares (2SLS) model, which is specifically designed to address issues related to endogeneity that may affect the validity of the regression estimates. Endogeneity arises when an explanatory variable is correlated with the error term, leading to biased and inconsistent estimates. The 2SLS method helps to overcome this challenge by using instrumental variables to provide more accurate and reliable estimates of the relationships between economic growth and its determinants.

In the Fixed Effects specification of the 2SLS model, the results confirm the significant positive roles of capital and labor in driving economic growth. Capital Ln(K) shows a substantial positive coefficient of 0.202646 with a p-value of less than 0.001. This finding underscores the critical contribution of capital investment to economic performance. Increased capital, which includes investments in infrastructure, machinery, and equipment, enhances productive capacity and drives economic growth. The significance of this coefficient confirms that capital accumulation is a key driver of economic advancement in the analyzed context. Similarly, labor Ln(L) exhibits a significant positive coefficient of 0.562887 with a p-value of less than 0.001. This result highlights the important role of labor in economic growth. A larger and more skilled workforce contributes significantly to productivity and economic output. The strong positive effect of labor underscores the importance of human capital in supporting and sustaining economic development.

In contrast, digitalization Ln(DI) shows a non-significant negative coefficient of -0.005522 with a p-value of 0.7266. This result suggests that, within the scope of this model, digitalization does not have a statistically significant impact on economic growth. Despite the theoretical benefits associated with digital technologies and increased internet usage, the empirical evidence in this case does not support a significant effect on economic growth. This may indicate that other factors or mechanisms are more influential in the context studied. Financial development Ln(FD) presents a positive and significant coefficient of 0.045220 with a p-value of 0.0176. This result highlights the positive impact of financial development on economic growth. A well-

developed financial sector, characterized by efficient financial markets and access to capital, supports economic activities and facilitates growth. The significance of this coefficient reaffirms the critical role of financial systems in fostering economic development. Natural resources Ln(NR) exhibit a non-significant coefficient of -0.014448 with a p-value of 0.1139. This finding indicates that natural resource rents do not have a significant effect on economic growth in this model. Although natural resources can be an important factor in economic development, their impact in this case does not appear to be statistically significant. This could be due to various factors, such as the management of resource revenues or the economic structure of the countries analyzed.

Table 5: Results of the estimation of the Two-Stage Least Squares model

Dependent Variable: Ln (Y)				
Method: Panel Two-Stage Least Squares				
	Fixed Effect		**Random Effect**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
C	0.611286	0.6112	1.683738	0.0001
Ln (K)	0.202646	0.0000	0.361264	0.0000
Ln (L)	0.562887	0.0000	0.191807	0.0000
Ln (DI)	-0.005522	0.7266	-0.043236	0.5569
Ln (FD)	0.045220	0.0176	0.169030	0.0000
Ln (NR)	-0.014448	0.1139	-0.001441	0.8539
Ln (T)	0.458972	0.0000	0.333830	0.0000

The Random Effects specification of the 2SLS model provides similar insights. Trade openness Ln(T) continues to show a significant positive effect with a coefficient of 0.333830 and a p-value of less than 0.001. This consistent finding across both the Fixed Effects and Random Effects models underscores the positive relationship between trade openness and economic growth. Higher levels of trade openness, which involve greater engagement in international trade, are associated with enhanced economic performance. This result reflects the benefits of accessing larger markets and the increased efficiency that comes with global competition. The 2SLS model results confirm the significant contributions of capital, labor, financial development, and trade openness to economic growth. The consistency of these findings across different model specifications enhances the reliability of the results. While digitalization and natural resources show less significant effects, the robust positive impacts of capital, labor, financial development, and trade openness provide valuable insights into the key drivers of economic performance in the analyzed countries.

5. Conclusions and Recommendations

This study investigated the determinants of economic growth across 17 East Asia-Pacific countries over the period from 2004 to 2023, focusing on the roles of capital, labor, digitalization, financial development, natural resources, and trade openness. Employing a range of statistical and econometric methods, including descriptive statistics, correlation analysis, Static Gravity Model, Generalized Method of Moments (GMM), and Two-Stage Least Squares (2SLS), the study aimed to uncover the underlying dynamics influencing economic performance in the region.

The descriptive statistics provided an overview of key economic indicators, revealing substantial variations in capital investment, labor force size, digitalization, financial development, natural resource rents, and trade openness across the countries studied. The mean values indicated that capital and financial development are relatively high, while digitalization and natural resources show considerable variation. The correlation analysis highlighted significant positive relationships between GDP and capital ($r = 0.99$), financial development ($r = 0.96$), and trade openness ($r = 0.70$), suggesting that these factors are crucial for economic growth. Conversely, digitalization and natural resources displayed weaker correlations with GDP, implying a less direct impact on economic performance.

The Static Gravity Model results confirmed the pivotal role of capital and labor in driving economic growth, with both variables showing significant positive coefficients. Financial development and trade openness also exhibited strong positive relationships with GDP, emphasizing their importance in enhancing economic performance. However, digitalization and natural resources did not show significant effects on economic growth in this model, suggesting that their influence may be overshadowed by other factors.

The Generalized Method of Moments (GMM) model reinforced the findings of the Static Gravity Model, highlighting the significant contributions of capital, labor, financial development, and trade openness to economic growth. Digitalization and natural resources continued to show limited or non-significant effects. These results were consistent across different GMM specifications, underscoring the robustness of the findings related to capital, labor, and trade openness.

The Two-Stage Least Squares (2SLS) model addressed potential endogeneity issues and reaffirmed the significant positive roles of capital and labor in economic growth. Financial

development also showed a positive impact, while digitalization and natural resources remained non-significant. This suggests that, despite theoretical expectations, digitalization and natural resources may not have a substantial impact on economic growth in the studied context.

5.1.Recommendations

Based on the findings of this study, several key recommendations can be made for policymakers and economic stakeholders in the Asia-Pacific region. First and foremost, there is a critical need to increase investments in both physical and human capital. The results of the study underscore the significant roles that capital and labor play in driving economic growth, highlighting the necessity for enhanced investments in infrastructure and education. Policymakers should prioritize initiatives that improve access to financing for businesses, particularly small and medium-sized enterprises (SMEs), which are often crucial for regional economic development. Furthermore, there should be a concerted effort to advance educational programs and vocational training, ensuring that the workforce possesses the skills needed to meet the demands of a rapidly evolving job market. By fostering an environment that supports innovation and skill development, economies can enhance their productivity and competitiveness on a global scale.

Additionally, the study emphasizes the importance of fostering a favorable business environment through regulatory reforms and policies that encourage entrepreneurship and investment. Simplifying business regulations, reducing bureaucratic hurdles, and providing incentives for research and development (R&D) are essential steps toward creating a more conducive environment for economic growth. Policymakers should consider implementing measures that streamline the process for starting and operating businesses, as well as offering tax incentives and grants for R&D activities. These reforms can stimulate innovation, attract foreign direct investment (FDI), and ultimately contribute to sustainable economic growth.

In light of the significant role of technological advancements highlighted by the study, there is also a strong recommendation to invest in digital infrastructure and promote digital literacy. The integration of digital technologies into various sectors can drive efficiency, reduce costs, and open new avenues for economic expansion. Governments should support initiatives that enhance digital connectivity, particularly in underserved areas, and provide training programs to improve digital skills among the population. By embracing digital transformation, economies can harness the potential of technology to boost productivity and create new opportunities for growth.

5.2.Limitations

Despite the valuable insights provided by this study, there are several limitations that should be acknowledged. One major limitation is the reliance on aggregate data, which may obscure regional disparities and sector-specific variations. The study's findings are based on a broad analysis of the Asia-Pacific region, which encompasses a diverse range of economies with varying levels of development, infrastructure, and technological capabilities. As a result, the generalizations made may not fully capture the unique challenges and opportunities faced by individual countries or regions within Asia-Pacific.

Another limitation is the potential for omitted variable bias. While the study has controlled for several key variables, there may be other factors influencing economic growth that were not included in the analysis. For instance, variables such as political stability, governance quality, and external economic shocks could have significant effects on growth but were not explicitly accounted for. Future research should aim to incorporate these additional factors to provide a more comprehensive understanding of the determinants of economic growth.

Moreover, the study's focus on historical data may limit its applicability to future trends. Economic conditions and technological advancements are continuously evolving, and the relationships observed in the past may not necessarily hold in the future. To address this limitation, future studies could incorporate forward-looking analyses and scenario planning to better anticipate the impacts of emerging trends and developments on economic growth.

5.3.Future Research Directions

To build on the findings of this study, several avenues for future research are suggested. First, conducting more granular analyses at the country or regional level could provide deeper insights into the specific factors driving economic growth within different contexts. By examining the variations in economic performance across countries and regions, researchers can identify best practices and tailor recommendations to the unique needs of individual economies.

Second, future research should explore the impact of additional variables on economic growth, including factors such as institutional quality, governance, and external economic shocks. Incorporating these elements into the analysis could provide a more nuanced understanding of the complex interplay between various determinants of growth and offer more targeted policy recommendations.

Third, as technology continues to advance rapidly, it is crucial to study the implications of emerging technologies on economic growth. Research on the effects of innovations such as artificial intelligence, blockchain, and renewable energy technologies could provide valuable insights into how these developments are shaping economic dynamics and what strategies can be employed to leverage their potential benefits.

Lastly, longitudinal studies that track economic growth and technological development over time could offer a more comprehensive view of the long-term impacts of investments in capital and technology. Such studies would allow for the assessment of how changes in investment patterns and technological advancements influence economic growth trajectories and help identify strategies for sustaining long-term growth.

References

Aghion, P., Akcigit, U., & Howitt, P. (2019). Innovation and Growth: The Schumpeterian Perspective. MIT Press.

Aghion, P., Burgess, R., Rancière, R., & Quimbee, A. (2005). Entry and Innovation: Evidence from the United Kingdom. NBER Working Paper No. 11890.

Akermi, N., Yedder, N. B., & Bakari, S. (2024). Impact of final consumption, domestic investment, exports, and imports on economic growth in Albania. Theoretical and Applied Economics, 31(1 (638), Spring), 231-252.

Arendt, Ł. (2015). The digital economy, ICT and economic growth in the CEE countries. Olsztyn Economic Journal, 10(3), 247-262.

Arslan, H. M., Khan, I., Latif, M. I., Komal, B., & Chen, S. (2022). Understanding the dynamics of natural resources rents, environmental sustainability, and sustainable economic growth: new insights from China. Environmental Science and Pollution Research, 29(39), 58746-58761.

Asian Development Bank. (2021). Asian Development Outlook 2021: Financing a Green and Inclusive Recovery. Manila: ADB.

Autor, D. H. (2015). Why Are There Still So Many Jobs? The History and Future of Workplace Automation. Journal of Economic Perspectives, 29(3), 3-30.

Auty, R. M. (1993). Sustaining Development in Mineral Economies: The Resource Curse Thesis. Routledge.

Bakari, S. (2016). Impact of Exports and Imports on Economic Growth in Canada: Empirical Analysis Based on Causality (No. 75910). University Library of Munich, Germany.

Bakari, S. (2017). The Nexus between Export, Import, Domestic Investment and Economic Growth in Japan (No. 76110). University Library of Munich, Germany.

Bakari, S. (2019). Innovation and Economic Growth: Does Internet Matter?. BİLTÜRK Journal of Economics and Related Studies, 3(2), 109-116.

Bakari, S. (2022a). The Impact of Natural resources, CO2 Emission, Energy use, Domestic Investment, Innovation, Trade and Digitalization on Economic growth: Evidence from 52 African Countries (No. 114323). University Library of Munich, Germany.

Bakari, S. (2022b). The impact of digitalization and patent on economic growth in Romania. Journal of Research, Innovation and Technologies, 1(1 (1)), 49-61.

Bakari, S., & Krit, M. (2017). The Nexus between Exports, Imports and Economic Growth: Evidence from Mauritania. International Journal of Economics and Empirical Research, 5(1), 10-17.

Bakari, S., & Mabrouki, M. (2016). The Relationship among Exports, Imports and Economic Growth in Turkey. University Library of Munich, Germany.

Bakari, S., & Mabrouki, M. (2017). Impact of exports and imports on economic growth: New evidence from Panama. Journal of smart economic growth, 2(1), 67-79.

Bakari, S., & Tiba, S. (2020). The Impact of Internet on economic growth in North Africa: New empirical and policy analysis. Journal of Applied Economic Sciences, 15(3), 605-616.

Bakari, S., El Weriemmi, M., & Mabrouki, M. (2022b). The Impact of digitalization and trade openness on economic growth: new evidence from richest Asian countries. Journal of Research, Innovation and Technologies, 1(2), 7.

Bakari, S., Fakraoui, N., & Mabrouki, M. (2020). The Contribution of Domestic

Investment, Exports and Imports on Economic Growth: A Case Study of Peru (No. 99041). University Library of Munich, Germany.

Bakari, S., Fakraoui, N., & Tiba, S. (2021). Domestic Investment, Export, Import and Economic Growth in Brazil: An Application of Vector Error Correction Model. Journal of Smart Economic Growth, 6(1), 31-48.

Bakari, S., Mabrouki, M., & Othmani, A. (2018). The Six Linkages Between Foreign Direct Investment, Domestic Investment, Exports, Imports, Labor Force And Economic Growth: New Empirical And Policy Analysis From Nigeria. Journal of Smart Economic Growth, 3(1), 25-43.

Bakari, S., Saaidia, F., & Soualhia, A. (2019). Evaluation of Trade Influence on Economic Growth in China: A Time Series Analysis. Journal of Smart Economic Growth, 4(3), 57-72.

Bakari, S., Tiba, S., & Mabrouki, M. (2022a). An Exploratory Study of the Causality between Internet Use, Innovation, and Economic Growth in Tunisia: An indispensable Case Analysis. Journal of Economics and Financial Analysis, 6(1), 1-18.

Baldwin, R. (2003). Openness and Growth: What's the Empirical Relationship? In Globalization, Growth, and Stability, University of Chicago Press.

Ben-Salha, O., Dachraoui, H., & Sebri, M. (2021). Natural resource rents and economic growth in the top resource-abundant countries: a PMG estimation. Resources Policy, 74, 101229.

Brynjolfsson, E., & McAfee, A. (2014). The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies. W.W. Norton & Company.

Cai, L., & Le, T. T. (2023). Natural resources and financial development: Role of corporate social responsibility on green economic growth in Vietnam. Resources Policy, 81, 103279.

Cavallo, A., & Ghezzi, A. (2021, September). Economic growth: The role of digitalization and entrepreneurship. In European Conference on Innovation and Entrepreneurship (pp. 177-XIX). Academic Conferences International Limited.

Cui, K., Li, X., & Li, G. (2023). What kind of fiscal policies and natural resources efficiency promotes green economic growth? Evidence from regression analysis. Resources Policy, 85, 103941.

Dasgupta, P., & Mäler, K. G. (2004). The Environment and Emerging Development Issues. In Handbook of Environmental Economics, Vol. 1. Elsevier.

De Prato, G., Nepelski, D., & Simon, J. P. (2015). Digital R&D – Europe. European Commission, Joint Research Centre, Institute for Prospective Technological Studies.

Dollar, D., & Kraay, A. (2004). Trade, Growth, and Poverty. Economic Journal, 114(493), F22-F49.

Edwards, S. (1998). Openness, Productivity, and Growth: What Do We Really Know? Economic Journal, 108(447), 383-398.

Fetahi-Vehapi, M., Sadiku, L., & Petkovski, M. (2015). Empirical analysis of the effects of trade openness on economic growth: An evidence for South East European countries. Procedia Economics and Finance, 19, 17-26.

Frankel, J. A., & Romer, D. (1999). Does Trade Cause Growth? American Economic Review, 89(3), 379-399.

Goldin, C., & Katz, L. F. (2008). The Race between Education and Technology. Harvard University Press.

Habibi, F., & Zabardast, M. A. (2020). Digitalization, education and economic growth: A comparative analysis of Middle East and OECD countries. Technology in Society, 63, 101370.

Haider, Z., & Stern, N. (2018). The Relationship between Natural Resources and Economic Growth: A Meta-Analysis. World Development, 103, 212-227.

Hao, X., Li, Y., Ren, S., Wu, H., & Hao, Y. (2023). The role of digitalization on green economic growth: Does industrial structure optimization and green innovation matter?. Journal of environmental management, 325, 116504.

Haseeb, M., Kot, S., Hussain, H. I., & Kamarudin, F. (2021). The natural resources

curse-economic growth hypotheses: Quantile–on–Quantile evidence from top Asian economies. Journal of cleaner production, 279, 123596.

Hayat, A., & Tahir, M. (2021). Natural resources volatility and economic growth: evidence from the resource-rich region. Journal of Risk and Financial Management, 14(2), 84.

Huchet-Bourdon, M., Le Mouël, C., & Vijil, M. (2018). The relationship between trade openness and economic growth: Some new insights on the openness measurement issue. The World Economy, 41(1), 59-76.

IMF. (2020). World Economic Outlook: A Long and Difficult Ascent. Washington, DC: International Monetary Fund.

International Telecommunication Union (ITU). (2012). Impact of Broadband on the Economy.

Keho, Y. (2017). The impact of trade openness on economic growth: The case of Cote d'Ivoire. Cogent Economics & Finance, 5(1), 1332820.

Khan, Z., Hossain, M. R., Badeeb, R. A., & Zhang, C. (2023). Aggregate and disaggregate impact of natural resources on economic performance: role of green growth and human capital. Resources Policy, 80, 103103.

Koutroumpis, P. (2009). The Economic Impact of Broadband on Growth: A Simultaneous Approach. Telecommunications Policy, 33(9), 471-485.

Krugman, P. R. (1991). Geography and Trade. MIT Press.

Kwakwa, P. A., Adzawla, W., Alhassan, H., & Achaamah, A. (2022). Natural resources and economic growth: does political regime matter for Tunisia?. Journal of Public Affairs, 22, e2707.

Lechman, E., & Anacka, H. (2022). Digitalization process and its impact on economic growth: a panel data study for developing countries. In Digitalization and Economic Development (pp. 28-46). Routledge.

Lederman, D., & Maloney, W. F. (2007). Natural Resources: Neither Curse nor Destiny. World Bank Publications.

Mehlum, H., Moene, K., & Torvik, R. (2006). Institutions and the Resource Curse. Economics & Politics, 18(1), 1-25.

Mishakov, V. Y., Daitov, V. V., & Gordienko, M. S. (2021). Impact of digitalization on economic sustainability in developed and developing countries. In Sustainable Development of Modern Digital Economy: Perspectives from Russian Experiences (pp. 265-274). Cham: Springer International Publishing.

Mwananziche, J., Myovella, G., Karacuka, M., Haucap, J., & Moshi, G. (2023). Is digitalization a booster for economic growth in Africa? Short run and long run evidence from Tanzania. Telecommunications Policy, 47(10), 102679.

Myovella, G., Karacuka, M., & Haucap, J. (2020). Digitalization and economic growth: A comparative analysis of Sub-Saharan Africa and OECD economies. Telecommunications Policy, 44(2), 101856.

Nam, H. J., & Ryu, D. (2024). Does trade openness promote economic growth in developing countries?. Journal of International Financial Markets, Institutions and Money, 93, 101985.

Nurdiana, E. D., Hariyani, H. F., & Boedirochminarni, A. (2023). The impact of digitalization and economic openness on economic growth in ASEAN countries. Jurnal Ekonomi & Studi Pembangunan, 24(2), 331-345.

OECD. (2018). Economic Outlook for Southeast Asia, China and India 2018: Fostering Growth through Digitalization. Paris: OECD Publishing.

OECD. (2021). OECD Digital Economy Outlook 2021. Paris: OECD Publishing.

Omoke, P. C., & Opuala–Charles, S. (2021). Trade openness and economic growth nexus: Exploring the role of institutional quality in Nigeria. Cogent Economics & Finance, 9(1), 1868686.

Oppong-Baah, T., Bo, Y., Twi-Brempong, C., Amoah, E. O., Prempeh, N. A., & Addai, M. (2022). The Impact of trade openness on economic growth: The case of Ghana and Nigeria. Journal of Human Resource and Sustainability Studies, 10(1), 142-160.

Qiang, Q., & Jian, C. (2020). Natural resource endowment, institutional quality and

China's regional economic growth. Resources Policy, 66, 101644.

Rahim, S., Murshed, M., Umarbeyli, S., Kirikkaleli, D., Ahmad, M., Tufail, M., & Wahab, S. (2021). Do natural resources abundance and human capital development promote economic growth? A study on the resource curse hypothesis in Next Eleven countries. Resources, Environment and Sustainability, 4, 100018.

Rodriguez, F., & Rodrik, D. (2001). Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence. NBER Working Paper No. 7081.

Rosser, A. (2006). The Political Economy of the Resource Curse: A Literature Survey. Institute of Development Studies Working Paper.

Solomon, E. M., & van Klyton, A. (2020). The impact of digital technology usage on economic growth in Africa. Utilities policy, 67, 101104.

The World Bank. (2016). World Development Report 2016: Digital Dividends.

Topcu, E., Altinoz, B., & Aslan, A. (2020). Global evidence from the link between economic growth, natural resources, energy consumption, and gross capital formation. Resources Policy, 66, 101622.

UNCTAD. (2019). Digital Economy Report 2019: Value Creation and Capture – Implications for Developing Countries. New York: United Nations.

World Bank. (2021). East Asia and Pacific Economic Update: Data for Better Lives. Washington, DC: World Bank.

Xie, T., Xu, Y., & Li, Y. (2024). Nonlinear relationship between natural resources and economic growth: The role of frontier technology. Resources Policy, 90, 104831.

Xu, X., Yu, W., Zhao, X., & Xu, W. (2023). Reassessing the linkage between natural resources and economic growth in China: Delving into the impacts of national resource taxes, renewable energy, financial advancements, and provincial fiscal expenditures. Resources Policy, 86, 104293.

Yang, Y., & Khan, A. (2021). Exploring the role of finance, natural resources, and governance on the environment and economic growth in South Asian countries. Environmental

Science and Pollution Research, 28(36), 50447-50461.

Yedder, N. B., El Weriemmi, M., & Bakari, S. (2023). The Impact of Domestic Investment and Trade on Economic Growth in North Africa Countries: New Evidence from Panel CS-ARDL Model. EuroEconomica, 42(2), 22-41.