# Linking Digital Development with the Economic Resilience in Thailand

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**Abstract: Thailand is now a middle-income developing country, with a free economic policy. In recent years, Thailand has introduced national-level strategies such as "Thailand 4.0" and the Eastern Economic Corridor to vigorously promote infrastructure construction and the development of key industries. The strategic importance of digital economy in national development has been greatly enhanced, which has contributed to the reform of economic structure and innovation of all countries in the world. This study analyzes the impact of digital development on the resilience of the Thailand's economy according to the data from World Bank from 1996 to 2021. The study shows that digital technology in Thailand sharply develop through these years, like e-commerce and online education. Digital development is conducive to the improvement of economic resilience and coordination, even significantly weakens external shocks on economic resilience. Economic policy uncertainty is not beneficial for economic growth and coupling coordination and the detrimental effects of economic policy uncertainty might counteract the beneficial effects of digital development.**

**Keywords: Thailand; Economic Resilience; Digital Development; Economic Policy Uncertainty**

## 1. Introduction

Economic resilience is the sum of the country's economic immunity and development potential. Resilience is the reflection of a country's capacity to lessen vulnerability, withstand shocks, and recovery quickly [1]. As a result of the solidification of the industrial structure, it is difficult for Thailand's per capita national income to achieve further breakthroughs. Thailand has been trapped in the middle-income stage for nearly 40 years, and it has become a typical representative of East Asian countries trapped in the "middle-income trap". Speaking at the 2016 International Symposium on the Blue Ocean Strategy, Thai Prime Minister Bharat said that Thailand has intended to take economic development to a high-value-based stage of economic development-"Thailand 4.0", over the next 20 years. "Thailand 4.0" is to increase the added value of products through innovation and the application of new technologies, thus facilitating Thailand's economic transformation and eventually achieving "Digital Thailand". Dr. Veerapong Malai, OSMEP director general, believes digital technology and business are key to overcoming challenges to forward. The application of digital technology has accelerated international economic development and injected new impetus into the development of globalization through the integration of resources to the optimization and upgrading of traditional trading methods. Since 2020, the traditional model of physical economic development has encountered an unprecedented bottleneck. The strategic importance of the digital economy in national sustainable development has been greatly enhanced, which has contributed to changes in the economic structures of the world and innovations in economic development models. China and Thailand have a good basis for digital economic cooperation, and the need and urgency of strengthening the "Digital Silk Road" has greatly increased, especially in the fields of digital economy such as e-commerce, smart cities, artificial intelligence, big data, internet payments and information and communications technology. Then whether digital development can improve the resilience of Thailand's economy, has theoretical and practical value for China's implementation of the "Belt and Road" strategy.

 

## 2. Digital Development in Thailand

The e-commerce revenue in 2020 was $9 billion, an increase of 81% compared to 2019, reaching 33.7 million e-business users in Thailand, about 10% more than in 2019[2]. According to the Digital Transformation Survey for Thailand (2021), the digital transformation of enterprises in Thailand's industries has accelerated significantly since the outbreak of the corona-virus epidemic. 56% Thai enterprises have moved from the digital technology assessment phase to the digital implementation phase, while only 12% were in the digital application phase prior to the onset, compared with 59% in the digital technology assessment phase. The use of cloud technologies, the Internet of Things and mobile applications increased by 19%, 16% and 15% respectively after the outbreak of the corona-virus epidemic. World Bank 2021 statistics show fixed broadband subscriptions at 17.35% in Table1, individuals using the Internet reaches 85.27, mobile cellular subscriptions reaches as highly as 168.78; communication facilities in remote areas, only 53% of 74,965 villages have access to the Internet, and schools, hospitals and a large number of government agencies do not have access to broadband. Although more than 50% Thailand's network passes through big data center countries with swaps such as Singapore, Malaysia and the United States, only 11 undersea cables (5 in operation) are connected to landing stations as the number of undersea cables is much lower than its neighbors, making Thailand's network bandwidth far from short. In 2021, Thailand achieved $21 billion for e-commerce, $4.5 billion for online media, $2.8 billion for online travel, and $2 billion for transportation and food. The 68% growth in e-commerce compensates for a delayed recovery in tourism and has become an important engine driving Thailand's digital economy. From the outbreak in 2020 to June 2021, Thailand has added 9 million new digital consumers, ranking the second highest consumption penetration rate in Southeast Asia, and more than 90 percent of Internet users consume digital services.

**Table 1. Digital Life in Thailand**

| year | Individuals using the Internet (% of population) | Fixed broadband subscriptions (per 100 people) | Fixed telephone subscriptions (per 100 people) | Mobile cellular subscriptions (per 100 people) |
|---|---|---|---|---|
| 2001 | 5.56 | 0.00 | 9.50 | 11.86 |
| 2002 | 7.53 | 0.01 | 10.21 | 27.17 |
| 2003 | 9.30 | 0.02 | 10.24 | 33.37 |
| 2004 | 10.68 | 0.25 | 10.43 | 41.29 |
| 2005 | 15.03 | 0.84 | 10.69 | 46.28 |
| 2006 | 17.16 | 1.35 | 10.66 | 60.50 |
| 2007 | 20.03 | 1.94 | 10.51 | 79.27 |
| 2008 | 18.20 | 3.08 | 10.98 | 91.84 |
| 2009 | 20.10 | 3.87 | 10.62 | 97.26 |
| 2010 | 22.40 | 4.76 | 10.01 | 105.06 |
| 2011 | 23.67 | 5.67 | 9.69 | 112.71 |
| 2012 | 26.46 | 6.53 | 9.22 | 122.93 |
| 2013 | 28.94 | 7.46 | 8.70 | 134.88 |
| 2014 | 34.89 | 7.78 | 8.13 | 138.79 |
| 2015 | 39.32 | 8.86 | 7.55 | 146.44 |
| 2016 | 47.50 | 10.22 | 6.67 | 169.49 |
| 2017 | 52.89 | 11.58 | 14.04 | 171.41 |
| 2018 | 56.82 | 12.92 | 8.52 | 175.88 |
| 2019 | 66.65 | 14.18 | 7.59 | 181.77 |
| 2020 | 77.84 | 16.06 | 7.00 | 162.70 |
| 2021 | 85.27 | 17.35 | 6.47 | 168.78 |

## 3. Research Design

### 3.1 Model Specification and Variable Setting

For this study, we constructed the following three models.

$$ER_t = \alpha_0 + \alpha_1 ER_{t-1} + \alpha_2 DD_t + \alpha_3 SE + \alpha_4 * SE * DD_t + \gamma X_t + \varepsilon_t \quad (1)$$

$$CD_t = \lambda_0 + \lambda_1 CD_{t-1} + \lambda_2 DD_t + \gamma X_t + \varepsilon_t \quad (2)$$

$$ER_t / CD_t = \beta_0 + \beta_1 ER_{t-1} / CD_{t-1} + \beta_2 DD_t + \beta_3 \ln epu + \beta_4 \ln epu * DD_t + \gamma X_t + \varepsilon_t \quad (3)$$

where ER refers to economic resilience in year t; DD and CD are the digital development and coupling coordination in the $t^{th}$ year, respectively; X denotes a vector consisting of a series of control variables involving creative ability, unemployment, the ratio of exports of goods and services, and the ratio of gross fixed capital formation. Taking 2008 as the time point of external impact, the binary dummy variable SE is set to 0 with the time before 2008, and 1 with the time after 2008. DE * SE is introduced to reflect the interaction of digital

 

development and SE. Each model coefficient and its significance should be considered, as this assists in investigating the relationship between Digital Development and the economic resilience in Thailand.

Explained variable: Economic resilience (ER) is the driving force of national development, and its comprehensive evaluation is mainly based on entropy method. This study, combined with data from 1996 to 2021, combines the research ideas of Han [3], mainly from the four aspects (scale, structure, innovation and openness), to construct an economic resilience evaluation indicator system. This study is based on per capita GDP growth, gross savings, gross fixed capital formation, urbanization to indicate scale resilience. Structure resistance is mostly reflected in the three major industries development, the whole industry chain structure is conducive to combating external crises, to ensure strong industrial structures support, specifically for three major industrial value added ratio. The resilience of innovation is fundamental to improving competitiveness, specifically manifested by the number of patents and R&D expenditures. Openness is the attention to international cooperation, the acquisition of international resources (finance, technology, etc.) and market opportunities is a manifestation of the development of foreign trade.

The coordination degree (CD) is used to check balances among four resilience. When $U_1, U_2, U_3, U_4$ are the computed composite values for scale, structure, innovation, and openness resilience.

$$C = 4\sqrt{\frac{U_1 \times U_2 \times U_3 \times U_4}{(U_1 + U_2 + U_3 + U_4)^4}}, T = aU_1 + bU_2 + cU_3 + dU_4, D = \sqrt{C \times T} \quad (4)$$

C and D is the coupling and coordination degree, respectively. We focus on the value of coordination degree this study [4].

Explanatory variable: This study adopts digital development (DD) as the measurement scale for national digital economy, can be expressed by individuals using the Internet (% of population).

Moderator variable: The policy is closely related to management activities. Economic policy uncertainty (epu) is expressed by the annual average of the EPU index[5].

Control variables: creative ability is determined by R&D expenditure. Unemployment refers to the share of the labor force that is without work but available for and seeking employment. The ratio of exports of goods and services, and the ratio of gross fixed capital formation are the proportion of total exports and fixed assets to total GDP.

### 3.2 Data Description

We perform the descriptive statistics and correlation analysis of the variables via STATA software (Table 2). The results show that the coefficients between the variables are all less than 0.7. We conduct multicollinearity analysis and find that the maximum variance inflation factor is 4.1, reflecting that there is no multicollinearity between the variables.

**Table 2. Descriptive Statistics**

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| ER | 26 | 0.4848 | 0.0951 | 0.3352 | 0.6153 |
| CD | 26 | 0.1642 | 0.0199 | 0.1259 | 0.1886 |
| DD | 26 | 26.6892 | 24.3835 | 0.1155 | 85.27 |
| unemployment | 26 | 1.2865 | 0.7959 | 0.25 | 3.4 |
| R&D | 26 | 0.0641 | 0.0458 | 0.0164 | 0.1636 |
| export | 26 | 0.0264 | 0.0073 | 0.0035 | 0.0345 |
| fixed-capital | 26 | 0.0311 | 0.0192 | 0.0104 | 0.1042 |
| lnepu | 26 | 4.7425 | 0.4467 | 4.0479 | 5.7591 |

## 4. Results

### 4.1 Benchmark Regression

It can be seen from the column (1) in Table 3 that the economic resilience lag has a significant positive effect on economic resilience, indicating that economic resistance has a magnetic stagnation effect, thereby giving a certain sustainability to the ability to withstand external shocks. The coefficient of digital development is 0.0184, which is significantly positive, indicating that the level of digitalization will increase by 1.84% for every 1%, because digital development can effectively reduce information asymmetry, intelligent matching, resource error quota is greatly reduced, accelerated technological progress and innovation, and thus promoted the rise of economic resilience. The negative impact of the virtual variable SE on economic resilience is significant, indicating that external shocks have led to a significant decrease in economic resistance. The significant negative

 

impact of the interaction between SE and digital development on economic resilience suggests that external shocks reduce economic resilience, while digital development significantly improves the negative effects of external impacts on economic elasticity. Digital development in Thailand is constrained by technology, talent, and the economic environment, and although the process is slow, the enormous potential of digital development is conducive to economic recovery. Column (2) indicates that digital development can significantly positively affect the coordination of economic resilience, and that for every 1 percentage point of increase in the Internet level, coordination will increase by 0.627%, as digital technologies can integrate multiple resources to further synergies. For every 1% increase in R&D investment, economic resilience increased by 0.466%, and coordination improved by 1.396%. The impact of opening-up and fixed-capital formation on economic resilience is significantly positive, indicating that the rise of open-up, the increase in fixed-capital input and the reduction in unemployment are conducive to economic development and to improved risk resistance.

**Table 3. Estimates of the Impact of Digital Development on Economic Resilience and Coupling Coordination**

| | (1) | (2) |
|---|---|---|
| L.ER | 1.072*** | |
| | (0.0099) | |
| L.CD | | 0.627*** |
| | | (0.0255) |
| DD | 0.0184*** | 0.0077*** |
| | (0.0042) | (0.0026) |
| R&D | 0.466*** | 1.396*** |
| | (0.170) | (0.131) |
| export | 0.0062* | 0.0187*** |
| | (0.0035) | (0.0027) |
| fixed-capital | 0.0086* | 0.0309*** |
| | (0.007) | (0.0051) |
| unemployment | -0.0572** | -0.0350** |
| | (0.0238) | (0.0147) |
| SE | -0.446* | |
| | (0.248) | |
| DE*SE | -0.0128*** | |
| | (0.0031) | |
| cons | -4.577*** | 1.575* |
| | (1.472) | (0.914) |
| N | 26 | 26 |
| $R^2$ | 0.9471 | 0.9405 |

### 4.2 Mediating Analysis of Economic Policy Uncertainty

Economic resilience and coupling coordination are negatively impacted by economic policy uncertainty, as demonstrated by columns (3) and (5)in Table 4, respectively. Policies that are closely related to economic activity are associated with higher uncertainty, risks and market volatility, and difficulty estimating the expected cost benefits for enterprises. These factors all contribute to higher costs for responding to surplus management policies [6]. Meanwhile, economic policy uncertainty has a short-term negative effect on growth, consumption and investment[7], which is very unfavourable for economic resilience. The multiplication coefficients of columns (4) and (6) are significantly negative, indicating that economic policy uncertainty will significantly hinder the positive impact of digital development on economic resilience and its coordination. It may be that the uncertainty of economic policy will constantly change the application scope and technical requirements of digitalization. The beneficial effects of digital development on economic resilience and coordination will be lessened in the face of unpredictable market risks due to the uncertainties surrounding economic policy.

**Table 4. Estimates of the Mediating Role of Economic Policy Uncertainty**

| | (3)-ER | (4)-ER | (5)-CD | (6)-CD |
|---|---|---|---|---|
| L.ER | 1.068*** | 1.070*** | | |
| | (0.01) | (0.01) | | |
| L.CD | | | 0.627*** | 0.628*** |
| | | | (0.0255) | (0.0260) |
| DD | 0.0096*** | 0.0104*** | 0.0077*** | 0.0078*** |
| | (0.0037) | (0.0036) | (0.0026) | (0.0026) |
| R&D | 0.220* | 0.382** | 1.396*** | 1.401*** |
| | (0.162) | (0.171) | (0.131) | (0.134) |
| export | 0.0061* | 0.0063* | 0.0187*** | 0.0187*** |
| | (0.0036) | (0.0036) | (0.0027) | (0.0027) |
| fixed-capital | 0.0123* | 0.0103 | 0.0309*** | 0.0308*** |
| | (0.0071) | (0.007) | (0.0051) | (0.0052) |
| urbanization | 0.0882*** | 0.0685*** | 0.0350** | 0.0343** |

 

| | | | | |
|---|---|---|---|---|
| | (0.0231) | (0.0239) | (0.0147) | (0.0155) |
| lnepu | -1.084*** | -1.043*** | -0.511*** | -0.510** |
| | (0.274) | (0.272) | (0.189) | (0.190) |
| Lnepu*DE | | -0.0125*** | | -0.0005* |
| | | (0.0044) | | (0.0031) |
| cons | -1.715 | -0.548 | 3.796*** | 3.833*** |
| | (1.535) | (1.577) | (1.030) | (1.062) |
| N | 26 | 26 | 26 | 26 |
| $R^2$ | 0.9913 | 0.9914 | 0.9849 | 0.9865 |

## 5. Conclusion

The effect of digital growth on economic resilience is examined in this study using time series data spanning from 1996 to 2021. It has been observed that the advancement of digital technology might enhance economic resilience and lessen the detrimental effects of external shocks on it. At the same time, the degree of coordination of economic resilience can be favorably and dramatically impacted by digital development. Besides, the detrimental effects of economic policy uncertainty on coordination and resilience in the economy might counteract the beneficial effects of digital advancement in these areas. Information infrastructure is an important foundation for the development of digital economy. Thailand should strengthen investment and cooperation in digital infrastructure, especially the construction of new-generation information infrastructure such as 5G, cloud computing and Internet of Things, and establish a digital infrastructure innovation platform to support the development of communication technology exchange and R&D.

There are also several limitations in this research, which deserves further study. Firstly, the sample quality needs to be improved with the latest statistical data. Secondly, some other macro control variables should be selected in the framework, like GDP, FDI, finance. Thirdly, we can discuss how digital development affect economic resilience to find out more breakthroughs for suggestions in the next step.

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