สินค้าในระบบอุตสาหกรรมที่ส่งผล
ต่อมูลค่าการค้าชายแดนของประเทศไทย
Industrial Systems Product Influencing
the Value of Thailand's Border Trade

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บทคัดย่อ

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   การวิจัยครั้งนี้ มีวัตถุประสงค์ คือ เพื่อศึกษาสินค้าในระบบอุตสาหกรรมที่ส่งผลต่อมูลค่ารวม มูลค่าส่งออก และมูลค่านำเข้าของการค้าชายแดนไทย ตัวแปรที่ใช้ในการวิเคราะห์ ได้แก่ มูลค่าการส่งออกยางพารา เครื่องคอมพิวเตอร์ อุปกรณ์และส่วนประกอบ รถยนต์ อุปกรณ์และส่วนประกอบน้ำมันดีเซล และมูลค่าการนำเข้าก๊าซธรรมชาติ เทปแม่เหล็ก จานแม่เหล็กสำหรับคอมพิวเตอร์ เครื่องจักรที่ใช้ในอุตสาหกรรมและส่วนประกอบ สื่อบันทึกข้อมูล ภาพ เสียง ในช่วง พ.ศ. 2554-2561 โดยใช้การวิเคราะห์การถดถอยพหุคูณ ด้วยวิธีการทดสอบระดับนัยสำคัญที่ 0.05 ผลการวิจัยพบว่า (1) มูลค่าสินค้าที่ส่งผลต่อมูลค่าการค้าชายแดนของประเทศไทย ประกอบด้วย มูลค่าการส่งออกเครื่องคอมพิวเตอร์ อุปกรณ์และส่วนประกอบ และมูลค่าการนำเข้าเครื่องจักรที่ใช้ในอุตสาหกรรมและส่วนประกอบ (2) มูลค่าสินค้าที่ส่งผลต่อมูลค่าการส่งออกของการค้าชายแดนประเทศไทย คือ มูลค่าการส่งออกเครื่องคอมพิวเตอร์ อุปกรณ์และส่วนประกอบ และ (3) มูลค่าสินค้าที่ส่งผลต่อมูลค่าการนำเข้าของการค้าชายแดนประเทศไทย คือ มูลค่าการนำเข้าเครื่องจักรที่ใช้ในอุตสาหกรรมและส่วนประกอบ ผลการวิจัยนี้แสดงถึงอิทธิพลของสินค้าในระบบอุตสาหกรรมที่มีต่อมูลค่าการค้าชายแดนไทย เนื่องจากไทยเป็นประเทศที่มีศักยภาพในการผลิตเพื่อตอบสนองความต้องการของตลาดในประเทศเพื่อนบ้าน และไทยก็ยังต้องนำเข้าสินค้าเพื่อนำมาพัฒนาอุตสาหกรรมภายในประเทศด้วย การวิจัยนี้จะเป็นประโยชน์ต่อหน่วยงานรัฐบาลและผู้ประกอบการไทยในการนำไปประยุกต์ใช้สำหรับโครงการและกลยุทธ์สำหรับการค้าชายแดน

คำสำคัญ: การค้าชายแดน ส่งออก นำเข้า สินค้าในระบบอุตสาหกรรม ประเทศเพื่อนบ้าน

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Abstract

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   This study attempted to identify products in the industrial systems that affect total value, export value and import value of Thailand's border trade. The variables for analyzing included the export value of rubber, computer, equipment and components, automobile, automotive parts and components, diesel fuel and the import value of natural gas, magnetic tape and magnetic disk for computer, industrial machinery and components, storage media from 2011 to 2018. The multiple regression analysis was tested with the significant level of 0.05. The results revealed that (1) the export value of computer, equipment and components and the import value of industrial machinery and components had an influence on the total value of Thailand's border trade, (2) the export value of computer, equipment and components had an influence on the export value of Thailand's border trade, and (3) the import value of industrial machinery and components had an influence on the import value of Thailand's border trade. The study showed how those products in the industry had an impact upon border trade value of Thailand. As Thailand has production potential to respond to neighboring market needs, meanwhile it still relies on imported product for national industrial development. This study will be useful for the Thai government and entrepreneurs to implement the results for projects and strategies for border trade.

Keywords: Border Trade, Export, Import, Industrial Systems Product, Neighboring Country

Introduction

Thailand is a highly export-dependent emerging economy that accounts for over two-thirds of the GDP (Gross Domestic Product). Thailand is an active ASEAN (Association of Southeast Asian Nations) member and is highly open to foreign trade [1].

Strategic positioning of Thailand as a regional connectivity hub with land borders connected with 4 countries including Myanmar on the west, Cambodia and Laos on the east and Malaysia in the south (Department if Foreign Trade., n.d.) [2]. In the heart of Asia, the location of the country makes it a gateway to Southeast Asia and the area of the Greater Mekong Basin, where great economic potential in new emerging markets. Moreover, Thailand's economic partnership with its neighboring countries, including not only trade and investment, but economic support as well, is inseparably related within Thailand to regional growth [3].

According to location advantage, border trade plays an important role in economic development in this region by generating jobs and rising levels of income. Border trade is defined as the movement of goods and services within the range of a duly defined region across international land borders (Kaminski, B., & Mitra, S., n.d.) [4]. Border trade encompasses a variety of forms of trade carried out by individuals or companies living in provinces, districts or villages close to neighboring countries on the border. It also involves the trade or exchange of goods in non-sophisticated transactions but in a comfortable way between people living along the borders of the two countries [5].

Border trade with neighbors is the dominant channel for Thailand's imports and exports. Border trade in Thailand fell 4.57 per cent to THB 1.07 trillion. Exports totalled THB 612.49 billion, down 5.28 per cent, while imports totalled THB 456.76 billion, down 3.59 per cent. There was a surplus of THB 155.73 billion from this border trade. With the highest trade value of THB 514.07 billion, Malaysia became the top country for border trade with Thailand. Laos came in second at THB 197.52 billion for border trade with Thailand, THB 196.40 billion for Myanmar and THB 161.26 billion for Cambodia, respectively Parpart, E. And ThailandToday.co. [6-7].

As products of Thailand origin are considered high quality. Imported goods are perceived to be of much higher quality than domestically produced goods in neighboring countries (U.S. Depatment of Commenrce., 2019) [8]. For example, automobile and parts, internal combustion engine, and diesel [6]. At the same time, Thailand offers numerous business opportunities in a variety of industries [9]. Consequently, Thailand needs to seek imported products to fulfill great opportunities, such as electric machinery and component, aluminium and products, and copper and products [6].

Demand for Thai products has been rising fast in neighboring countries, in parallel with their burgeoning economies. In order to tap the local markets, international investors are hopping to set up operations within these nations, but Thai businesses have the advantage of a next-door neighbor. In these countries, Thai goods are already well known and considered good in quality. In general, this drives border trade and enables Thai entrepreneurs to expand their sales overseas without ever leaving Thailand. Compared to more far-flung forms of commerce, border trade facilitates quicker distribution and lower shipping costs. Furthermore, Thai products are frequently more familiar and available to neighboring countries than other foreign products.

As a result of national strategy 2018-2037, one of the national strategy of the country aims to improve competitiveness in foreign markets by increasing its efficiency and by planning for regional economic growth [10]. The main motivation for conducting this study was the lack of studies about Thailand's border trade.

In order to fulfill such a gap in border trade, this paper is organized to examine industrial systems product influencing the value of Thailand's border trade. Multiple regression models were development and tested in this study, based on the statistic data from 2011-2018. The required data, including border trade products, export products and import products among Thailand and neighboring countries, of the current study have been collected from Department of Foreign Trade, Ministry of Commerce, Thailand. The result of the study could provide a better understanding of industrial systems product affecting value of Thailand's border trade. This has led us to the study objective of whether it is reasonable for Thai government and entrepreneurs to implement a project and strategies for border trade products.

Objective

1. Investigate the influence of industrial systems product value in Thailand's total border trade value.

2. Examine the influence of export industrial systems product value to Thailand's border trade export value.

3. Inspect the influence of import industrial systems product value on Thailand's border trade import value.

Methodology

To investigate industrial systems product influencing the value of Thailand's border trade, the multiple regression analysis has been employed which significant level is 0.05. The dependent variables consist of (1) total border trade value, (2) border trade export value,

and (3) border trade import value in the period of 2011-2018. The independent variables, they relatively have the relationship with above mentioned dependent variables. Data and source can be concluded as shown in Table 1.

Table 1 Data for this study (Million THB)

Data	Abbreviation
Total border trade value	ToVal
Border trade export value	ExpVal
Border trade import value	ImpVal
Rubber export value	Rubber
Computer, equipment and components export value	Com
Automobile, automotive parts and components export value	Car
Diesel fuel export value	Diesel
Natural gas import value	NatGas
Magnetic tape and magnetic disk for computer import value	MagTape
Industrial machinery and components import value	EngInd
Storage media import value	StoMed

Source: Department of Foreign Trade, 2015; 2016; 2017; 2018; 2019. [11-15]

This study is set out to identify products affecting the value of Thailand's border trade. The study adopts a quantitative analysis of these factors. The attempt is, therefore, made to estimate the following 3 statistical models:

(1) Industrial systems product value affecting Thailand's total border trade value that was determined by a formula used. This equation is

$$Y_1 = \alpha + \beta x_1 + \beta x_2 + \beta x_3 + \beta x_4 + \beta x_5 + \beta x_6 + \beta x_7 + \beta x_8 + \varepsilon$$

Where

Y_1 = Total border trade value

βx_1 = Rubber export value

βx_2 = Computer, equipment and components export value

βx_3 = Automobile, automotive parts and components export value

βx_4 = Diesel fuel export value

βx_5 = Natural gas import value

βx_6 = Magnetic tape and magnetic disk for computer import value

βx_7 = Industrial machinery and components import value

βx_8 = Storage media import value

ϵ = error term

      (2) Export industrial systems product value affecting Thailand's border trade export value that was determined by a formula used. This equation is

$$Y_1 = \alpha + \beta x_1 + \beta x_2 + \beta x_3 + \beta x_4 + \epsilon$$

Where

Y_1 = Border trade export value

βx_1 = Rubber export value

βx_2 = Computer, equipment and components export value

βx_3 = Automobile, automotive parts and components export value

βx_4 = Diesel fuel export value

ϵ = error term

      (3) Import industrial systems product value affecting Thailand's border trade import value that was determined by a formula used. This equation is

$$Y_1 = \alpha + \beta x_1 + \beta x_2 + \beta x_3 + \beta x_4 + \epsilon$$

Where

Y_1 = Border trade import value

βx_1 = Natural gas import value

βx_2 = Magnetic tape and magnetic disk for computer import value

βx_3 = Industrial machinery and components import value

βx_4 = Storage media import value

ϵ = error term

      The confidence level was set at 95%. The allowance for error was set at 5%, so ϵ = 0.05. Even more, Durbin-Watson statistic test will be used to prove the Autocorrelation problem because the data are time series.

Results

      The results of examining the products influencing the value of Thailand's border trade using multiple regressions are shown in the following three tables;

```
Dependent Variable: TOVAL
Method: Least Squares
Date: 10/30/20   Time: 00:52
Sample: 1 8
Included observations: 8
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Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	453739.7	20763.18	21.85309	0.0000
COM	3.486084	0.904883	3.852524	0.0120
ENGIND	2.728253	0.829445	3.289251	0.0217

R-squared	0.960781	Mean dependent var	619307.6
Adjusted R-squared	0.945094	S.D. dependent var	38081.62
S.E. of regression	8923.312	Akaike info criterion	21.31072
Sum squared resid	3.98E+08	Schwarz criterion	21.34051
Log likelihood	-82.24287	Hannan-Quinn criter.	21.10979
F-statistic	61.24509	Durbin-Watson stat	2.212644
Prob(F-statistic)	0.000305		

Figure 1 Industrial systems product affecting Thailand's total border trade value

Source: Calculation from Department of Foreign Trade, 2015; 2016; 2017; 2018; 2019. [11-15]

(1) Industrial systems product value affecting Thailand's total border trade value

$$\widehat{ToVal} = 453739.7 + 3.486084Com + 2.728253EngInd$$

The study used correlations analysis to determine whether a computer, equipment and components and industrial machinery and components and Thailand's total border trade value are correlated. At a 5 per cent significance level, the results show that all products are correlated.

As it could be seen in Figure 1, the value of R-square in this test is 0.96. Thus, independent variables explain 96 per cent of the changes in the dependent variable. This means that two variables which include computer, equipment and components and industrial machinery and components can explain 96 per cent variations in Thailand's total border trade value.

The F-statistic for these data was 61.245, which was statistically significant at $p<0.05$. Therefore, the study can be concluded that there is a statistically significant effect of computer, equipment and components and industrial machinery and components on Thailand's total border trade value and thus rejected the null hypothesis and accepted the alternative hypothesis.

The serial correlation of residuals is 2.212, according to the Durbin-Watson statistic, the value is within the range of acceptable values (1.5-2.5). This means that the data does not have an autocorrelation problem. Therefore, the findings of this study show that products, including computer, equipment and components and industrial machinery and components have a significant influence on Thailand's total border trade value.

```
Dependent Variable: EXPVAL
Method: Least Squares
Date: 10/30/20   Time: 00:58
Sample: 1 8
Included observations: 8

Variable          Coefficient   Std. Error    t-Statistic    Prob.

C                 405230.4      26122.50      15.51269       0.0000
COM               5.779471      0.771205      7.494077       0.0003

R-squared           0.903477    Mean dependent var      598196.3
Adjusted R-squared  0.887390    S.D. dependent var      37092.84
S.E. of regression  12447.42    Akaike info criterion   21.90873
Sum squared resid   9.30E+08    Schwarz criterion       21.92859
Log likelihood      -85.63493   Hannan-Quinn criter.    21.77478
F-statistic         56.16119    Durbin-Watson stat      1.338896
Prob(F-statistic)   0.000292
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Figure 2 Industrial systems product affecting Thailand's border trade export value

Source: Calculation from Department of Foreign Trade, 2015; 2016; 2017; 2018; 2019. [11-15]

(2) Export industrial systems product value affecting Thailand's border trade export value

$$\widehat{ExpVal} = 405230.4 + 5.779471Com$$

Correlations analysis was used in the study to determine whether a computer, equipment and components and Thailand's border trade value are correlated. At a 5 per cent significance level, the results show that all products are correlated.

As it could be seen in Figure 2, the value of R-square in this test is 0.903. Thus, 90 per cent of the changes in the dependent variable are explained by independent variables. This means that only one variable which is computer, equipment and components explain 90 per cent variations in Thailand's border trade export value.

The Figure 2 shows that the F-statistic for these data was 56.161, which was statistically significant at $p < 0.05$. Therefore, the study can be concluded that there is a statistically significant effect of computer, equipment and components on Thailand's border trade export value and thus rejected the null hypothesis and accepted the alternative hypothesis.

The serial correlation of residuals is 1.338, according to the Durbin-Watson statistic, the value is between 0 and 2, indicating positive autocorrelation (common in time series data) [16]. Therefore, the results of this study show that computer, equipment and components have a significant influence on Thailand's border trade export value.

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Dependent Variable: IMPVAL
Method: Least Squares
Date: 10/30/20  Time: 01:00
Sample: 1 8
Included observations: 8

       Variable      Coefficient   Std. Error    t-Statistic     Prob.

          C           268154.4     22258.92     12.04705      0.0000
        ENGIND        6.953007     1.167295      5.956512      0.0010

R-squared             0.855352   Mean dependent var     393475.1
Adjusted R-squared    0.831244   S.D. dependent var      50034.05
S.E. of regression    20553.94   Akaike info criterion    22.91181
Sum squared resid     2.53E+09   Schwarz criterion       22.93167
Log likelihood       -89.64724   Hannan-Quinn criter.    22.77786
F-statistic           35.48004   Durbin-Watson stat       2.088966
Prob(F-statistic)     0.001002
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Figure 3 Industrial systems product affecting Thailand's border trade import value

Source: Calculation from Department of Foreign Trade, 2015; 2016; 2017; 2018; 2019. [11-15]

(3) Import industrial systems product value affecting Thailand's border trade import value

$$\widehat{ImpVal} = 268154.4 + 6.953007 Englnd$$

Correlations analysis was used in the study to determine whether industrial machinery and components and Thailand's border trade export value are correlated. At a 5 per cent significance level, the results show that all products are correlated.

As it could be seen in Figure 3, the value of R-square in this test is 0.855. Thus, the independent variables explain 85 per cent of the changes in the dependent variable. This means that only one variable which is industrial machinery and components explain 85 per cent variations in Thailand's border trade import value.

The Figure 3 shows that the F-statistic for these data was 35.480, which was statistically significant at $p<0.05$. Therefore, the study can be concluded that there is a statistically significant effect of industrial machinery and components on Thailand's border trade import value and thus rejected the null hypothesis and accepted the alternative hypothesis.

The serial correlation of residuals is 2.038, according to the Durbin-Watson statistic, the value is within the range of acceptable values (1.5-2.5). This means that the data does not have an autocorrelation problem. Therefore, the findings of this study show that industrial machinery and components have a significant influence on Thailand's border trade import value.

Discussions

The results of this study in Figure 1 show a significant influence of the export value of computer, equipment and components and the import value of industrial machinery and components on Thailand's total border trade value. This result is in accordance with study conducted by Chemsripong, S. [17] that reveals investment value in Mae Sot, Tak province is increasing. The growth of labor hire employment is rising and the numbers of company's registration are also increasing, the majority is export and import companies. This study supports why Thailand can be both important exporter and importer in Southeast Asia region.

The findings of this study are consistent with the findings of Nongkhoo, A. (2007). [18], which shows that border trade between Thailand and Cambodia, especially in Sa Kaeo province has increasingly expanded. When opportunities and risks have been addressed, it is found that Thai products are more competitive. Strong proof may be the continuous expansion of the value of exports to the borders. The quality of logistics in Thailand is a main driving factor for such competitiveness. Another main factor is the well-known Cambodian products from Thailand.

Suriphai, T., & Manmart, L. [19] demonstrates Lao tends to consume more luxury goods such as electronic appliances, communicators, jewelry accessories and etc. This study supports Thai export product as computer, equipment and components has high potential in border trade market.

Based on the results of the above Figure 2, it is known that the export value of computer, equipment and components has a significant influence on Thailand's border trade export value.

A central aspect of the growth of the Thai manufacturing sector is the electronics industry. Computer parts and IC (Integrated Circuits) were the key electronics exports from Thailand. Meanwhile, Thailand is one of the ASEAN region's major production bases for these products. Thailand has a well-known reputation in the IC and semiconductor industries. Electronics industry of Thailand, welcoming the boom of the modern digital era, has seen a steady increase in exports [20].

Increased demand for computers and related components came in the digital age from growing online activities. Another factor that has helped promote Thai exports is the FTA (Free Trade Agreement). The Information Technology Agreement allows tariff-free exports of IT-related goods to more than 50 member countries. Thailand has signed FTAs with 18 countries and has joined the WTO (World Trade Organization) [21]. Nearly all E&E (Electrical and Electronics) products can be imported tariff-free into FTA partner countries through these FTAs [22].

This study strengthens research from Chasuk, N., & Tavonprasith, B. (2014). [23] that shows the majority of Malaysian consumers purchase electronic appliances, computers and components, mobile phones, office equipment and entertainment media from Thailand. Also, Malaysian consumers prefer to purchase these products in Thailand and Malaysia border. Chemsripong, S. [17] in her research examines Thailand is more competitive than Myanmar on factor of production, example capital and technology. For that reason, Thailand exports computer, equipment and components more than Myanmar.

Given the results in Figure 3 of this study indicate that the import value of industrial machinery and components has a significant influence on Thailand's total border trade value.

On the import side, Thailand's border trade has also been shifting. In former times, Thailand used to import mainly primary products from neighboring countries, such as vegetables, metal and wood. Currently, Thailand primarily imports heavy machinery and parts for use in the manufacturing sector. This transition is partially due to the relocation of factories manufacturing electronic components. Thus, not only market trends, but also the development of supply chains are opening up new possibilities for adaptive Thai companies [24].

It is well known that the machinery industry plays a crucial role in supporting the manufacturing sector, which has a significant impact on Thailand's overall economy. Despite continued progress, gaps in development are still evident in the industry, as the production of highly complex and accurate technical machinery in Thailand is still in short supply. This has contributed to the country becoming primarily dependent on importing those goods [25].

Thailand's manufacturing sector has shown continued growth and is expected to sustain that path. This industry contributes greatly to the overall growth of the economy of Thailand. More significantly, machinery, mould and die equipment and materials are heavily dependent on this field. As such, further extensions may also be expected in the machinery market. Major manufacturing industries including automotive industry, food processing industry and construction industry [25]. Therefore, Thailand's industry relies on imported foreign machinery and equipment. There are many businesses that produce domestic and export industrial machinery, but most machines are still imported.

The value of this research lies in exploring a better understanding of industrial systems product influencing the value of Thailand's border trade. Most studies on border trade of Thailand and neighboring countries have focused on business environment [26], trade pattern [17], potential [27-28], policy [29-31], strategy [18], development [19, 32-35], and customer behavior Chasuk, N., & Tavonprasith, B. [23] in specific area, and few studies

have dealt with industrial systems product. The purpose of this study was to fill a gap in the literature and add to the extremely limited number of studies on industrial systems product influencing the value of Thailand's border trade with all of its neighbors, including Malaysia, Myanmar, Cambodia, and Laos. The findings reveal (1) the export value of computer, equipment and components and the import value of industrial machinery and components have an influence on the total value of Thailand's border trade, (2) the export value of computer, equipment and components have an influence on the export value of Thailand's border trade, and (3) the import value of industrial machinery and components have an influence on the import value of Thailand's border trade. Based on these results, Thai government and entrepreneurs will benefit from the findings related to implement a project and strategies for border trade products and how products may have an impact upon border trade among Thailand and neighboring countries.

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