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Industrial Paper Price in Selected Asean Countries: The Impact of Economic and Institutional Factors

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Abstract
Purpose: The paper industry is facing increasing competition globally from economic and political aspects. The waste ban policy put forward by China has caused further fluctuation in the paper raw material supplies and production cost of papers, which causes difficulties to some major paper producers in ASEAN countries to sustain. Hence, the study aims to investigate the role of economic and institutional factors on the industrial paper price in selected ASEAN countries
Design/methodology/approach: The study employed the panel-corrected standard errors (PCSE) technique to estimate the relationship of the paper prices and its determinants: namely, price of old corrugated containers, real effective exchange rate, real GDP growth rate, China's Waste Import Policy, corruption perceptions index, population growth rate and revealed comparative advantage, using secondary data from 2000 to 2017.
Findings: The corruption perceptions index, population growth rate and revealed comparative advantage are significantly influence the industrial paper price.
Research Limitations:- The study only consider data from Malaysia, Indonesia, Thailand, and Vietnam. It may indicate that the findings may only be applicable to countries with similar economic scales. Future researches may also apply co-integration test to estimate the relationship between the paper price and its determinants.
Originality/value: Various theoretical and empirical works of literature have attempted to give an empirical justification on the factors that drives the changes in prices. However, there is a dearth of studies that have examined the determinants of the paper price; particularly, the role of institutional aspects in industries and trades. Thus, this paper filles the gap.

Keywords: Paper Price, Old Corrugated Containers, China's Waste Import Policy, Corruption, Panel-Corrected Standard Errors

1 Introduction

The paper industries play a key role in international trades and economic development of the producer countries. Globally, 679 million tons of paper and paperboard were produced and consumed in 2018, doubled the 1998 quantum (FAOSTAT, 2020). The packaging and board products are the largest paper product sector, which accounted for 53 percent of the total paper and paperboard production; whereas the share of printing and writing paper, and newsprint was 39 percent (FAOSTAT, 2020). Recently, the demand of paper[1] for paper packaging products has surged due to the COVID-19 pandemic, as self-isolating consumers rely more on online retailing and goods deliveries.

Malaysia, Thailand, Indonesia and Vietnam are top paper producers and traders of the world. The Industrial Production Index (IPI) of paper and paper products of Malaysia, Vietnam and Thailand were recorded at 119.6, 140.0 and 102.5 index points respectively (Statista, 2020). According to Trading Economics (2020), exports of paper and paperboard, articles of pulp, paper and board accounted for 2.5 percent of Indonesia's total exports, contributed 6.7 percent to its processing industry's gross domestic product (GDP), and provided approximately 1.3 million employments to its labour force. Vietnam was the biggest paper consumption country in Southeast Asia in 2018 (FAOSTAT, 2020). China by far has been the world largest paper input supplier, and dominant player in paper trading with ASEAN (Qu et al., 2019; RISI, 2020).

ASEAN paper makers have been facing instability in paper pricing and input supplies. According to the U.S. Bureau of Labor Statistics (2020), the cost of paper pulp has increased by over a quarter in the last decade. This was attributed to the rising input costs and higher-quality environmental standards (FSSI, 2018). The tightening of the China waste import policy has resulted in the shortage of recovered papers, and inevitably spikes up demand for old corrugated containers (OCC)[2] and the production cost of the paper industry (RISI, 2020).

Meanwhile, the evolution of digital media has caused a decline in paper demand in developed countries (Hetemaki, Hanninen, & Moiseyey, 2013), coupled with an intensified global effort to reduce the use of paper products and to curb the import and reprocess of wastes. As more than half of the fibrous raw materials are from recycled paper, changes in paper consumption pattern have substantially impacted the price of the industrial paper (hereafter, paper is used in reference to industrial paper) and the paper industry of ASEAN countries.

Besides, institutional factors may also burden the paper industry in ASEAN. Malaysia, Thailand, Indonesia and Vietnam, as main integrating regional economies, provide growth opportunities but are counterbalanced by a variety of institutional risks, such as the lack of government transparency in business ethics and corruption (Transparency International, 2019).

Pricing is the central to many economic theories. Examinations into the drivers of the price in economies are integral to the understanding of how effective markets function (Krugman, 2009). In the paper industry, every stage in the supply chain is crucial for a related company to gain competitive advantages and higher profit. While the industry players are compelled to pass on the cost to sustain in business, their customers on the other hand, seek to understand the reasons of

[1] Paper is made from pulp processed from trees, an intermediate product which is a soggy mass of fiber (Ackerman & Gallagher, 2002). In this study, paper refers to industrial paper, which is used as an input to produce corrugated carton boxes and paperboards.

[2] OCC is the main source of recycled paper fibre, which makes up about 40 percent of total wastepaper supply globally (Guo, Wang, Wan, & Ma, 2011).

fluctuation. Understanding the price drivers of the industry is particularly important, as they are key dimensions affecting both the sustainability of the industry, as well as the ASEAN economy. There is an urgency to highlight the economic and institutional challenges of the paper industry in in this region. Various theoretical and empirical works of literature have attempted to give an empirical justification on the factors that drives the changes in prices. However, there is a dearth of studies that have examined the determinants of the paper price; particularly, the role of institutional aspects in industries and trades (Hong, Sun, Beg & Zhou, 2020). Hence, this paper aims to investigate the determinants of the paper price, from the economic and institutional aspects of Malaysia, Indonesia, Thailand, and Vietnam.

The paper is organized as follows: Section 2 reviews the literature. Section 3 discusses the method, data and variables employed for the study. Results are discussed in Section 4. The conclusion and policy implications are presented in the last section.

2 Literature review

The price theory is primarily concerned with the allocation of resources among different users. Price fluctuates according to the demand and supply of a product and is a guidepost to where the resources are most wanted, and a key determinant of revenues. According to Friedman, the price plays three important roles: as a transmitter of information that provides the incentive to users of resources to be guided by this information, and provides an incentive to owners of resources through this information (Medema, 2008). A price set too high or too low may limit business growth, sales and cash flow. Therefore, pricing strategy is a crucial factor to maximize profit of a business.

The cost of goods or services determines the price of the final product (Mohed-Alizadeh & Handfield, 2018). The increase of the price of raw materials will lead to substantially increase in the cost of production and the selling price (Jogu, 2020; Faizah, 2019; Amanah, 2017; Ardianti, 2015). OCC is a high quality input to make papers. UNComtrade data shows that the price of OCC is highly instable due to the instability of the supply in recycled papers, and the environmental protection law imposed by OCC exporting countries (Silva, Cubbage, Gonzalez, & Abt, 2019).

Additionally, the exchange rate plays a vital role in product pricing, particularly for international traded products (Chang & Hoov, 2017). Its volatility causes the uncertainty in the pricing; consequently, to international transactions of inputs and final products. According to He and Wang (2019), the real exchange rate has a positive effect on imports and negative effect on exports in the international trade. Manuel's (2019) reveals that the appreciation and depreciation of Euro against pulp exporting nations' currencies have an impact on the export volumes to the European Union (EU), as well as the price of pulp exports. The main reason behind is the strong relationship between the trade volumes and the product price (Wang, Niu, Liu, & Zhang, 2020; Norazman, Khalid, & Ghani, 2018).

On the demand side, growth in national income (GDP) increases the consumption; hence, drives up product prices. When the demand is approaching supply constraints, the price will rise (Ackerman & Gallagher, 2002). The level of GDP per capita determines the volume of paper consumption in most countries (McCarthy & Lei, 2010; Hujala, Maija, Arminen, Hill, & Puumalainen, 2013). According to Hanna, Petri and Niko (2011), the price elasticity of paper is impacted by the growth in GDP, it exceeded unity, implies that the increases in the paper price will reduce the sales so much that the total revenues of the companies decrease. Santos, Rocha, Costa, and Soares (2019) conclude that GDP is the main economic indicator of the paper and pulp

company's net income. Besides GDP, the world consumption is also highly connected with the population growth rate. Nasrullah et al., (2020) report that there is a strong relationship between the China population growth rate and the demand for forest products.

Above and beyond, stricter environmental policies can enhance resource productivity and competitiveness of industries. However, there is a lack of analysis to determine and analyse the effectiveness of the policy in the case of paper and paperboard packaging (Cela & Kaneko, 2011). Tambe and Pandey (2019) discuss the pricing method especially in the natural resources sector through various pricing approaches. Their findings show that the elements of government policy, unclear policy environment, and market competition which lead to an inefficient determination of pricing result in revenue losses and litigations. Thomas (2009) argue that environmental regulations reduce economic growth and increase the costs and place them at a competitive disadvantage in the long run. However, recent study by Zhang, Luo, Duan, and Gao (2019) conclude that the real impact is unclear.

One cannot separate economics from political sciences in the society. Conceptually, price is influenced by many factors. Especially, it cannot be detached from institutional factors. The utilisation of materials or commodities in society, to some extent is influenced by governmental decisions and policies. This is particularly true for countries in ASEAN, where the markets are open to the international trade with much intervention from the respective governments. A few surveys report in ASEAN countries reveals a situation where corruption is widely perceived in the public, public administration, and business environment (Pring, 2017; Aziz & Sundarasen, 2015). According to the Corruption Perceptions Index (CPI) published by Transparency International in 2018, over 120 out of 180 countries around the world score an average of 43 CPI, reflecting an overall status of weak governance in controlling corruption worldwide.

Fundamentally, rampant corruption is a serious situation that can hinder the economic development of a nation. It costs up to five percent of the country's GDP ("Global Cost of Corruption", 2018), and transmits its adverse effects via an increase in the cost of production (Freckleton, 2012). Bennett and Satterfiled (2018), and Plummer et al., (2017) conclude that the main factor of many of the Southeast Asia's environmental challenges stem from the state of the involved country's weak environmental governance and position. In return, the country's credit ratings that demonstrate the investors' confidence may fall. Indirectly, the level of national competitiveness may also further decline.

The strength of competition in markets plays an important role in economic growth and improves the efficiency of resource allocation. In the competitive market, a company could increase its price through an increase in marginal cost if competitors also increase prices. However, price increases would derive the possibility of losing a share of the market to competitors. The paper industry has exhibited some market power characteristics. According to Buongiorno, Farimani, and Chuang (1983) model, the paper industry has certain large firms as price leaders and where the smaller firms act as price followers. The price elasticity of paper demand implies that the industry is competitive (Hanna, Petri, & Niko, 2011).

Daulika, Peng, and Hasani (2020) advocates there is a significant relationship in the price of Indonesia's natural rubber export vis-à-vis international rubber prices, exchange rate and domestic consumption. Its study concludes that Indonesia's natural rubber exports on the international market has a comparative advantage with an average value of RCA more than one (RCA> 1). Cariappa and Chandel (2020) reveal that with the RCA >1, that the relative lower Indian domestic pepper price show that India still has price advantage in the international market.

The literature review shows that most research focuses on the demand and supply of pulp and paper industry, wastepaper recycling, forest degradation, and environmental impact especially for the U.S market and European market. Study on ASEAN paper industry is scarce. There is a dearth of studies that specifically examine the paper price from the institutional perspectives. The emerging role of pulp and paper industries in ASEAN economies is deserving of due attention.

3 Method, data and variables

The goal of this study is to investigate the determinants of the paper price of Malaysia (MYS), Indonesia (IDN), Thailand (THA), and Vietnam (VNM). According to the law of demand, the demand of a product (*D*) is determined by its own price (*P*), subject to the budget constraint (*Y*). Inversely, *P* is determined by the level of consumption, and a set of factors that are anticipated to influence the paper price.

3.1 The Estimator

In panel regression, there are a few assumptions made in the disturbance terms which are independent of the observations that are taken over time. In this case, the price of paper. If the assumption is violated, then it is known as autocorrelation. Autocorrelation occurs when the disturbance terms exhibit serial correlation; therefore, the standard error is affected, and the predictions as shown based on ordinary least square estimated become inefficient. In order to detect the autocorrelation problem, general least square is estimator will be applied.

The function of price (as suggested from the theoretical and empirical reviews) is specified as follow:

$$P_{it} = f\{\beta_1 POCC_{it}, \beta_2 Reer_{it}, \beta_3 Gdp_{it}, \beta_4 Pop_{it}, \beta_5 CWP_{it}, \beta_6 Cpi_{it}, \beta_7 Rca_{it}\} \quad (1)$$

where *i* refers to the country while *t* refers to the time period

P_{it}	*= Industrial paper price per tons, in U.S. dollars*
POCC	*= OCC price per tons, in U.S. dollars*
Reer	*= Real Effective Exchange rate*
Gdp	*= Real GDP growth rate, in percentage*
Pop	*= Population growth rate, in percentage, a measure of the market demand*
CWP	*= China's Waste Import Policy is a dummy variable; it takes value of 1 for the year with the policy implemented, 0 otherwise*
Cpi	*= Corruption Perceptions Index*
Rca	*= Revealed Comparative Advantage Index*

Taken natural log form for *P* and *POCC*[3], the econometric model of the study is stated as follow:

$$lnP_{it} = \beta_0 + \beta_1 lnPOCC_{it} + \beta_2 Reer_{it} + \beta_3 Gdp_{it} + \beta_4 Pop_{it} + \beta_5 CWP + \beta_6 Cpi_{it} + \beta_7 Rca_{it} + \varepsilon_{it} \quad (2)$$

Equation 2 can be estimated using panel data estimators.

[3] Taking natural log for the variables, so that the coefficients can be interpreted as elasticities. Another reason is to reduce heteroskedasticity of these variables.

3.2 Variables and data

Price of the industrial paper (lnP)
Price theory is concerned with explaining the economic activity in terms of the creation and transfer of value, which includes the trade of goods and services between different economic agents. One of the greatest surprises in the ASEAN paper industry is the absence of the price data, although we anticipate that the price of paper inputs would be a determinant of the paper price. Unfortunately, the price data of the industrial paper for MYS, IDN, THA and VNM are not readily available, due to the absence of a standard parameter measurement used for the paper price index (Lin, Chen, Zheng, & Dai, 2019). Therefore, the price data are constructed based on the export price of the industrial paper obtained from The Food and Agriculture Organization (FAOSTAT) database.

Price of Old Corrugated Containers (lnPOCC)
Theoretically, an increase in the price of the input will lead to an increase in the price of a product. On the supply side, input prices such as wages, energy prices, and the price of pulpwood logs (for virgin pulp) and wastepaper (for recycled) affect the paper price. Increases in any of these input prices would be expected to cause increases in the price of paper and trade flow (Arminen, Hujala & Tuppura, 2015). Hence, the relationship between the paper price and the OCC price should be corelated and moving in the same direction. The data were constructed by dividing the annual export volumes with the annual export value of the recovered paper. The data were obtained The Food and Agriculture Organization (FAOSTAT) database for year 2000 to 2017.

Real Effective Exchange Rate (Reer)
The *Reer* is the price of foreign money in units of domestic money. The exchange rate represents a link between domestic prices and foreign prices; hence it has an important relationship to the price level. *Reer* is employed to evaluate how paper prices react to the appreciation and depreciation of the local currency against the U.S. Dollar. The data were obtained from the World Bank database.

World Real GDP growth rate (Gdp)
World Real GDP growth rate is an annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars (World Bank 2020). Fotis, Karkalakos and Asteriou (2017) conclude that there is an asymmetric response of electricity and natural gas prices with real GDP growth rate. The growth of GDP is expected to drive the demand of paper products; indirectly, influences the price.

China's Waste Import Policy (CWP)
Pro-environmental policies may give pressure to the production of forest-based products, increase the costs and place them at a competitive disadvantage in the long run (Thomas, 2009; Reijnders, 2003). The present study attempts to take a closer assessment of the link between the implementation of China's Waste Import Policy and the industrial paper price in selected ASEAN countries. China's Waste Import Policy (*CWP*) is referred to when the Chinese government introduced a new policy and regulations to ban 24 types of solid waste in 4 categories, including waste plastics, unsorted scrap papers, discarded textile materials, and vanadium slags (Xinhua,

2017). It is a dummy variable, which takes a value of 1 for the year when the policy implemented, 0 otherwise.

World Population Growth Rate (Pop)

A change in population sizes affecting a change in demand which affects the price is fundamental within economics. The impact of the population on the paper price has been confirmed by Hujala et al., (2013). The rising domestic demand for paper-based products depresses the export supply of pulp and increases its import demand. Thus, with the increase in population, the demand for the paper will also increase, which invariably increases the price of papers and *vice versa*. The world population growth rate is the increase in the number of individuals in a population expressed in percentage. The data were obtained from the World Bank database.

Corruption Perceptions Index (Cpi)

Corruption deters production and market efficiencies; thus, increases the cost. The impact of corruption and economic growth has been confirmed by Haw, Kueh, and Ling (2020) in their study in ASEAN countries covering the period from 2000 to 2017 based on the panel unit root, panel cointegration, and panel ARDL estimations, as well as panel Granger causality. The result shows that a nation reported with a lower level of corruption would promote sustainable economic growth. The nations with high corruption lowers inward FDI. Since most paper producers are foregn invested in ASEAN, corruption may influence the industrial paper price in selected ASEAN countries. Annual *Cpi* were collected from the Corruption Perceptions Index database published by Transparency International.

Revealed Comparative Advantage (Rca)

Silva, Cubbage, Gonzalez, and Abt (2019) has carried out a series of experiments and conclude that the markets are connected in many configurations; investors should consider not only proximity but also similar market structures in terms of the mix of pulp, solid wood, and pellet mill manufacturing plants. They should be aware of the market behaviour of regions with similar characteristics, regardless of the distance between them. The specific regional characteristics can lead buyers or sellers to exercise different levels of market power.

ASEAN economies are emerging and competing each other on trade and investments due to similar exporting commodities and trade partners. Hence, observing the international competitiveness in the pulp and paper industry based on the export volume of pulp or paper products may help in smoothen the impact of the price fluctuation and competition (Lin, Chen, Zheng, & Dai, 2019). Hence, market competition could be considered as one of the factors that affect industrial paper price in selected ASEAN countries. The Revealed Comparative Advantage (*Rca*) is employed as the measure of competition of the study. Naturally, the higher the RCA, the lower the price. The data were gathered from WITS for selected ASEAN countries from 2000-2017.

3.3 Descriptive statistics

Table 1 presents descriptive data of explanatory variables of the study. Data of *P* and *lnPOCC* are converted into natural logarithm for standardisation.

Table 1: Summary of descriptive statistics

Variable	Obs	Mean	Min	Max	Std. Deviation
lnPOCC	66	5.4186	4.5217	7.5760	0.6144
Reer	76	95.5131	66	124	10.9050
Gdp	76	5.1842	-2	9	1.9023
CWP	76	0.1052	0	1	0.3089
Cpi	76	87.1973	36	143	29.4419
Pop	76	1.0394	0	2	0.5276
Rca	75	0.7662	0.25	1.32	0.3080

Table 2 illustrates the correlation matrix among the variables. Other than *Cpi* and *lnPOCC* that moderately correlated, the others are mild related.

Table 2: Correlation matrix

	lnPOCC	*Reer*	*Gdp*	*CWP*	*Cpi*	*Pop*	*Rca*
lnPOCC	1.0000						
Reer	0.1059	1.0000					
Gdp	-0.2278	0.0153	1.0000				
CWP	0.1971	0.0863	0.0173	1.0000			
Cpi	-0.4879	0.0453	0.1213	0.0091	1.0000		
Pop	0.0841	-0.0751	0.1520	-0.2035	-0.4878	1.0000	
Rca	-0.0885	-0.5432	-0.1767	0.0514	0.3540	-0.3153	1.0000

4 Results and discussion

Table 3 presents the estimation results of four models. Model 1 is the Pooled OLS, the R^2 implies that at least 76.9 percent of the variation in paper prices can be explained by the explanatory variables employed. Generally, panel data possess with unequal variances. Literature suggests that fixed effect estimator may be the best estimator to take care of the individual effects suffered by the panel estimation. However, since the study uses long panel, 'pooling' has become the most prominent and promising remedy for the small-N problem. It is so widely used in comparative political economy that 'it has become difficult to defend of not using it (Kittel & Winner, 2003; Plumper, Troeger & Manow, 2005). Hence, to deal with panel heteroscedasticity, econometricians suggest panel GLS (Feasible generalized least squares) and PCSE (OLS with panel-corrected standard errors) to estimate data with T > N (Blackwell, 2005; Beck & Katz, 1995).

Model 2 is the result of GSL estimator. To deal with panel heteroscedasticity, Beck and Katz (1995) propose a robust standard error in an OLS estimate (cross-sectional time-series FGLS regression). The result is presented as Model 3 in Table 3. Modified Wald test for groupwise heteroskedasticity in cross-sectional time-series FGLS regression model is performed and the result shows that Model 3 is free from heteroskedasticity. The R^2 of Model 3 has a value of 0.8236, which is higher than Model 1, implies that FGLS is more suitable for the study. However, the coefficient of all independent variables is lower in Model 3 as compared to Model 1. Additionally, *Reer, Gdp,* and *Pop* appear to be insignificant in Model 3.

Table 3: Estimation results

Variable	Model 1		Model 2		Model 3		Model 4	
	Pooled OLS		Cross-Sectional time-series FGLS regression		Random-effects GLS regression		Prais-Winsten, correlated panels, correlated stand. errors (PCSEs)	
	Coefficient	Stand Err	Coefficient	Stand Err	Coefficient	Robust Stand Err	Coefficient	Panel-Corrected Stand Err
Constant	6.1074***	(0.4484)	6.5359***	(0.5033)	5.2245***	(0.6824)	5.5103***	(0.3762)
InPOCC	0.2349***	(0.0434)	0.2349***	(0.0395)	0.2077***	(0.0252)	0.1701***	(0.0440)
Reer	0.0110***	(0.0023)	0.0110***	(0.0021)	0.0103*	(0.0049)	0.0102***	(0.0022)
Gdp	-0.0317***	(0.0114)	-0.0317***	(0.0104)	-0.0194	(0.0209)	-0.0225**	(0.0099)
CWP	-0.0740	(0.0670)	-0.0740	(0.0611)	-0.0482	(0.0744)	-0.0617	(0.0636)
Cpi	-0.0033**	(0.0016)	-0.0033**	(0.0015)	-0.0030***	(0.0010)	-0.0034***	(0.0010)
Pop	-0.3072***	(0.0679)	-0.3072***	(0.0619)	-0.1475**	(0.0580)	-0.1591***	(0.0578)
Rca	-1.6643***	(0.3614)	-1.6643***	(0.3294)	-0.6372***	(0.1132)	-0.6461***	(0.0997)
Obs	65		65		65		65	
R^2	0.7693				0.8236		0.8980	
Wald chi2(10)			386.1400				229.0900	
Prob > chi2			0.0000				0.0000	
F (3, 54)	4.04							
Prob > F	0.0116							

Note: The asterisks ***, ** and * denote statistical significance at the 1, 5 and 10 per cent levels, respectively

As discussed earlier, in-term of goodness-of-fit by using the panel data, the model is therefore re-estimated. Based on Plumper, Troeger and Manow (2005), panel-corrected standard errors (PCSE) is recommended for panel data that have states as units of analysis. PCSE can deal with heteroskedastic errors and also with errors that are contemporaneously correlated. PCSE estimator (Model 4) yields the highest R^2 among the four models. It indicates that at least 89.8 percent of the variation in industrial paper price can be explained by the specified explanatory variables in Model 4. Hence, PCSE is the best estimator for the study.

In Model 4, all independent variables are statistically significant at one percent level, except *Gdp* (significant at 5 percent level) and *CWP* (not significant). *lnPOCC* is significant at one percent level, implies that a one percent increase in the OCC price, the paper price will increase by .17 percent, holding all other explanatories constant. This is also implying that the price elasticity of demand of OCC is inelastic. Hence, the changes in *lnPOCC* may not bring huge impact to the paper price.

Reer is significant at one percent level but the magnitude of coefficient is very small. The positive sign of *Reer* coefficient indicates that a depreciation of real effective exchange rate of the local currency against U.S. dollar will lead to the decrease in the paper price. This finding is consistent with Ho, Nguyen, and To-The (2020); Wang, Niu, Liu and Zhang (2020); and Norazman, Khalid and Ghani (2018).

In contrast, *Gdp*, *Cpi*, *Pop* and *Rca* have a negative relationship with the industrial paper price. The coefficient of *Gdp* and *Pop*, which represent the demand on the industrial paper, carry a negative sign, which is consistent with the law of demand. In addition, the existence of substitution effect from the evolution of digital media (Hetemaki, Hanninen, & Moiseyey, 2013) and the greater environmental awareness (Berglund & S€oderholm, 2003) may be an explanation for the

relationship. The negative sign of the coefficient of *Cpi* is also consistent with the expectation (Aziz & Sundarasen, 2015; Azam & Emirullah, 2014).

Rca is highly significant and inverse relationship with the industry paper price. One percent increases in *Rca* resulting in 0.64 decrease in *P, ceteris paribus*. Prabowo, Suhatmini and Dwidjono (2020) analyse Indonesia's crude palm oil comparative advantages compared to other main exporters, with the result showing international crude palm oil has a significant negative correlation with international crude palm oil prices and export volumes. Kuwornu et al., (2009) shows oil price influenced the palm oil exports' performance for Ghanaian palm oil. Holst and Weiss (2004) show the negative relation between the *Rca* and export competitiveness for ASEAN regional trade to China.

It is not surprising that *CWP* is insignificant. It may be due to the lack of the variation of the data. It takes time for a policy to be effective, hence, two years dummy variable is not sufficient to show the impact of the policy on the industrial paper price.

5 Conclusion and policy implications

The study examines the economic and institutional impacts on the industrial paper price in four selected ASEAN countries. Theoretically, the study may help the industry players to understand the causes of the instability of the industrial paper price, from the economic and institutional perspectives. The finding and recommendations are useful and of interest to both policy makers and academics as it provides a broad scope of information on the evolution of the relationship between price, institutional factors and the contribution of the paper industry to the country's economy.

The empirical results show that OCC price and real effective exchange rate have a significant positive effect on the industrial paper price in our studied countries. These findings recommend that OCC price and real effective exchange rate are most importance determinants that affect the industrial paper price and are deeply influences to pulp, paper and packaging industry's achievement. Additionally, the result reveals that the corruption perceptions index, population growth rate and revealed comparative advantage have a relative significant negative effect on the industrial paper price.

ASEAN countries are experiencing intensify export competition. The region is striving to enhance its competitiveness through openness to trade and investments. It is important to understand the fundamental comparative advantage and export competition in the countries concerned; to sharpen its global and regional competitiveness and strengthen its international trade's rivalry. Thus, these findings suggest that the regional industrial paper price is almost identical when considering the impact of all the determinants. That is, pulp, paper and packaging industry are competitive, either local or international market, should focus on pricing strategy to gain competitive advantage for long-term business sustainability.

China, the world's second-biggest economy continues its recovery growth of about 5 percent, becoming the first major economy to recover from the COVID-19 pandemic ("China's economy", 2020). According to Organization for Economic Cooperation and Development (OECD), the world GDP is expected to grow 4.2 percent in 2021, and China will lead the world economy recovery with an expected GDP growth at a stable rxound eight percent, while Europe and United States are still lagging due to the severe impact from COVID-19 ("OECD:China To Lead", 2020). Although the China's Waste Import Policy shows no impact on the paper price; however, it is recommended that policymakers should pay attention on the Chinese market, the world largest paper producer, and the wastepaper importing country ("Report on Imported", 2020). With the

strict standard and policy, the price of OCC in the Chinese market may further increase; hence driving up the price of paper and packaging products, and the paper production costs of ASEAN countries.

The study reveals the importance of ASEAN countries to maintain macroeconomic and political stability to foster their growth of industries and trades. ASEAN countries are encouraged to adopt a range of supportive policy interventions, which involve specific mix of trade, finance and investment policies including to control corruption, and to provide a better government legitimacy and political stability, to enhance international trades and stability of economic growth.

The COVID-19 crisis has seriously impacted people's lives, industrial production, and the global economy, including the paper and packaging industry due to disruption to global industry supply chains. Nonetheless, it brings about a potential to generate a positive demand of various paper products, including corrugated and packaging materials. The corrugated and packaging materials demand increase is attributed to a surge in online shopping driven by the COVID-19 pandemic. Additionally, the self-quarantine or lockdowns imposed by respective governments have accelerated the growth of online shopping. The paper packaging products are essential in the use for online shopping, and medical products and equipment. Thus, the demand of paper packaging products is expected to grow. Hence, the stability of the paper price is critically important to the ASEAN's paper industry.

The study is not free from limitations. The study only consider data from Malaysia, Indonesia, Thailand, and Vietnam. It may indicate that the findings may only be applicable to countries with similar economic scales. Future researches may apply co-integration test for study with small N. Finally, further research on the impact of the respective country's waste policy, and financial and economic crises are needed considering their impacts on the paper input, such as OCC.

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