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Impact of GVC on growth of economic: Malaysia case study

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Abstract:
Through a qualitative and quantitative analysis of data on GVC membership and Malaysia's GDP from 2000 to 2022, this paper talked about what GVC is, how important it is to be a part of it, and how it affects economic growth. The premise that underpins the study is that GVC membership contributes positively to economic development. Does GVC membership affect Malaysia's economic development throughout the study period? The industrial sector contributes significantly to both local and foreign added value in exports, and participation in GVC has a positive impact on economic growth in Malaysia during the studied period. The impact is reciprocal between GVC participation and the industrial sector. Additionally, connecting the local market to the foreign market helps to provide advanced intermediate inputs and introduce modern production methods and technology that increase the competitive and productive capabilities of local companies. GVC also gets more companies involved through forward and backward links because it lets them specialize in a part of the production process instead of finishing the whole thing. This makes it easier for new companies to get into the market and makes them more competitive.

Key words: Global value chains, Economic Growth, marketing.

Introduction:

The procedures and practices of international commerce and industrial production have changed as a result of globalization, which has also made global marketplaces more integrated. From the design phase to manufacture, distribution, and marketing, the production process has evolved into an international one. Governments have shifted their priorities away from import substitution policies in favor of policies that aim to increase global market competitiveness and increase regional and international agreements that aim to achieve the greatest degree of economic integration. This is because globalization has also changed the impact of traditional policy tools and diminished their significance as a means of influencing the volume and direction of international trade flows. Along with the facilities that have facilitated the free flow of goods and international capital, the technological and information revolution has contributed to the unprecedented growth of international trade and income as well as the interconnectedness and entwining of markets and nations. Given the significant changes in the global economy, GVC has become one of the most crucial instruments for boosting national economic growth. This is because GVC helps increase productivity and efficiency by sharing production processes across nations, giving businesses and governments a number of competitive advantages. This economic trend is becoming more and more significant.Through a qualitative and quantitative analysis of data on GVC membership and Malaysia's GDP from 2000 to 2022, this paper talked about what GVC is, how important it is to be a part of it, and how it affects economic growth. The premise that underpins the study is that GVC membership contributes positively to economic development. Does GVC membership affect Malaysia's economic development throughout the study period? The industrial sector contributes

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significantly to both local and foreign added value in exports, and participation in GVC has a positive impact on economic growth in Malaysia during the studied period. The impact is reciprocal between GVC participation and the industrial sector. Additionally, connecting the local market to the foreign market helps to provide advanced intermediate inputs and introduce modern production methods and technology that increase the competitive and productive capabilities of local companies. GVC also gets more companies involved through forward and backward links because it lets them specialize in a part of the production process instead of finishing the whole thing. This makes it easier for new companies to get into the market and makes them more competitive.

Research Problem:

The research problem is represented by the following question: Does participation in GVC have an impact on economic growth in Malaysia during the period (2000-2022).

Research Importance:

This research contributes to identifying GVC and the importance of participation in them, understanding the relationship between GVC and economic growth, and knowing the role that GVC play in economic growth in Malaysia.

Research Hypothesis:

The research is based on the hypothesis that participation in GVC has a positive impact on economic growth in Malaysia during the period (2000-2022).

First axis: The theoretical framework of GVC and economic growth

First: The concept of GVC

The World Bank defines GVC as: "A production pattern distributed among a number of companies in different countries, each company specializes in a specific task and does not produce the entire commodity." (World Bank Group, 2020, 1) The topic of GVC is part of the international trade agenda that concerns the internationalization of corporate activities, as companies invest in different industries and in different regions around the world at an unprecedented speed. The term GVC refers to the increasing fragmentation of the production of goods and services and the creation of added value in different countries in the production cycle. This process is accompanied by progress and development in many areas such as supply chain management, technologies, transportation, investment, trade liberalization, and reducing transaction costs. Many companies adopt strategies to establish international production chains. The cost reduction strategy leads to the production of large quantities of goods with inputs from different countries and in large quantities and at low cost. (Abdul Rahman, et al., 2021, 45) We can define GVC as a production process that takes place through multiple stages and in different countries. At each stage of production, added value is obtained. GVC allow countries and companies to specialize in the stage in which they have a comparative advantage instead of carrying out the production process alone. GVC are divided into four basic types: (Hisham, 2020, 209)

A- International supply markets, in which transactions take place on the basis of free competition relationships between sellers and buyers across borders, which require a minimum of coordination and cooperation, for example, (commodity markets).

B- Producer-driven networks, where leading companies (such as car assemblers or consumer electrical appliances) play an important and central role in controlling international networks of subsidiaries, affiliates and suppliers.

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C- Buyer-driven networks, where major retailers from manufacturers and branded marketers (multinational retailers) are supplied from decentralized networks of cross-border suppliers.
C- Integrated companies, where hierarchical governance systems are applied in all international networks, and all major goods and products are produced within the company, which is characterized by vertical integration and strong administrative control (for example, the American automobile industry).
Second: The benefits and significance of taking part in GVC
Over the last three decades, the globe has seen a tremendous advancement in technology, which has led to a notable growth in GVC, which, according to Globe Bank estimates, now accounts for almost 50% of global trade volume. The primary cause of the growth waves that have taken place in some developing nations and the primary driver of the decline in poverty in those that have focused on and participated in GVC more than others is the activity of GVC. Compared to 1990, when the participation rate of developing nations was 18.5% of global trade, figures show that GVC helped increase the proportion of developing countries in the volume of international commerce to around 47.3% in 2010. The economic benefits of taking part in GVC stem from the fact that rising international trade in intermediate goods is directly related to the creation of jobs and income, gives nations the opportunity to improve their production capacities, and promotes regional integration. In order to increase productivity, GVC encourages overspecialization in some production stages and activities. It also encourages long-term relationships between institutions and businesses, which brings in money for the countries that take part. (Ismail, 2019:3) Developing countries benefit from the positive development in GVC by participating in the production processes of goods and commodities, as GVC enable participating developing countries to specialize in one of the parts or stages of the production process and obtain added value without the need to carry out the entire production process, as this requires high capabilities and costs, qualifications and expertise beyond their capabilities, and specialization in a specific activity or part of the production process and supplying the global value chain with intermediate goods and commodities necessary for the final product of the value chain enables developing countries to use their available resources optimally and increase competitiveness and exports and obtain more added value and technological development and expertise brought by global companies into the country and provide better job opportunities for individuals and high incomes, which contributes to raising the standard of living for individuals and reducing the level of unemployment. (Drid Gharib, 2019, 200) In 2014, the World Commerce Organization estimated that commodities and intermediary products made up around 30% of global commerce. Even though developing nations typically participate in GVC through simple, low-skilled tasks, they can advance and strengthen their position in the value chain by moving from simple, low-skilled tasks to more complex ones that call for comparatively higher skill levels. GVC is an essential instrument for achieving economic development since it assists participating countries in fortifying their domestic manufacturing infrastructure. (Helmy, 2019, 171) The procedures and practices of international commerce and industrial production have changed as a result of globalization, which has also made global marketplaces more integrated. From the design phase to manufacture, distribution, and marketing, the production process has evolved into an international one. Governments have shifted their priorities away from import substitution policies in favor of policies that aim to increase global market competitiveness and increase regional and international agreements that aim to achieve the greatest degree of economic integration. This is

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because globalization has also changed the impact of traditional policy tools and diminished their significance as a means of influencing the volume and direction of international trade flows. Along with the facilities that have facilitated the free flow of goods and international capital, the technological and information revolution has contributed to the unprecedented growth of international trade and income as well as the interconnectedness and entwining of markets and nations. Given the significant changes in the global economy, GVC has become one of the most crucial instruments for boosting national economic growth. This is because GVC helps increase productivity and efficiency by sharing production processes across nations, giving businesses and governments a number of competitive advantages. This economic trend is becoming more and more significant.Through a qualitative and quantitative analysis of data on GVC membership and Malaysia's GDP from 2000 to 2022, this paper talked about what GVC is, how important it is to be a part of it, and how it affects economic growth. The premise that underpins the study is that GVC membership contributes positively to economic development. Does GVC membership affect Malaysia's economic development throughout the study period? The industrial sector contributes significantly to both local and foreign added value in exports, and participation in GVC has a positive impact on economic growth in Malaysia during the studied period. The impact is reciprocal between GVC participation and the industrial sector. Additionally, connecting the local market to the foreign market helps to provide advanced intermediate inputs and introduce modern production methods and technology that increase the competitive and productive capabilities of local companies. GVC also gets more companies involved through forward and backward links because it lets them specialize in a part of the production process instead of finishing the whole thing. This makes it easier for new companies to get into the market and makes them more competitive.

The gains from participating in GVC vary from one country to another, as they are not distributed equally between or within countries. Large companies that fragment their activities and tasks in developing countries obtain high profits due to the low cost of production elements, which indicates a growing percentage of cost reduction as a result of participating in GVC. Participation in GVC also allows countries to open up to global trade, and foreign investment has a positive impact on development through the acquisition of knowledge and technology and capacity building in activities carried out by the labor force. (World Bank Group, 2020, 3)

The most important gains of participating in GVC are: (Halim, 2023, 113)

1. Achieving an increase in exports and greater integration and integration with countries of the world in all stages of production.
2. Transferring knowledge and technology between countries participating in GVC through foreign direct investment and imports.
3. Access to global markets and integration into the global economy, where profit opportunities increase, which enables participating countries to increase their capabilities through good training of their workers, improving economic efficiency, and increasing the efficiency of human capital.
4. Developing trade in added value through the participation of local companies in the stages of production of global value chain goods.
5. Achieving sustainable development and reducing poverty levels by providing better employment opportunities, which contributes to improving income levels.

Third: The connection between GVC and the participating nations' degree of economic growth

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A structural shift in the economy that moves jobs from low-productivity industries (like traditional agriculture) to higher-productivity ones is what leads to economic growth. But this essential procedure is more complicated than it first seems. "Successful" structural transformation requires not only diversifying operations but also adoptjing and modifying current technologies, progressing up the technological ladder, and consistently enhancing production structures in significant industrial areas. According to traditional economic theory, industrialization is essential to capacity development because it strengthens the causal chain of events that accelerates economic growth.

There are at least three advantages to GVCs from the standpoint of development. First, because of the connection to GVCs, businesses, particularly those in developing nations, are not required to develop a product's full manufacturing capability. They may instead concentrate on a particular manufacturing process or activity by using their comparative advantage, which allows them to integrate into the global economy faster than was feasible during the industrialization era. Second, new employment may be created as a result of GVC involvement. But according to the World Bank Group, the WTO, and the OECD, "the benefits of GVCs can vary significantly depending on whether a country operates at the top or bottom of the value chain, and the gains from participation in GVCs are not automatic." Due to disparities in comparative advantage, industrialized and developing nations may have significantly different costs and risks while entering GVCs. Research and development, design, and brand creation are examples of advanced, intangible production activities that are often carried out in developed nations before manufacture and after-sales services and marketing during the post-manufacturing phase. Low-tech, low-wage nations may be concerned about the erosion of their economies due to the outsourcing of industrial employment. The "smiley face curve" in GVC shows how much value can be added at each stage of production in different industries. This may be a problem for developing countries, which usually focus on making things that people can touch and see, like cars and furniture. They may also worry that they are receiving the wrong kinds of jobs. We use the smiling face curve (Figure 1-1) to demonstrate the connection between economic progress and GVC involvement. According to the chart, manufacturing and assembly operations get the lowest value-added, while research and development, innovation, branding, and logistical services are at the top, representing the greatest value-added service activities. The nations that engage in assembly and manufacturing operations earn low value-added, while the countries that focus on research and development and activities that use sophisticated technology receive high value-added and are the biggest benefactors of involvement. This explains why nations and businesses relocate their manufacturing and assembly operations to low-wage, labor-intensive nations in order to save expenses and concentrate on higher-value-added activities. By importing medium- and high-technology intermediate goods, countries engaged in manufacturing and assembly activities gain access to knowledge and technology that boost productivity and make locally produced goods more competitive. This boosts local value-added in exports because of the backward links of participation in GVC. Countries at the bottom of the chain, or the bottom of the smiling face, may improve in GVC and target activities with the greatest value-added by being exposed to new technology. This is accompanied by the idea that as the degree of development increases, the higher the nation moves up the chain, the more developed it is. Since

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there is a positive correlation between the two, it can be concluded that the greater a nation's added value share, the higher it moves up the chain and the higher its degree of growth and development.

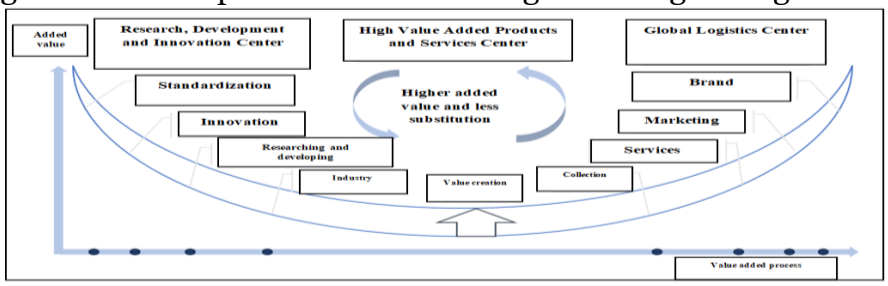

Figure (1-1): Smiling face curve

Source: Prepared by the researcher based on: GVC Implications for Developing Countries and Trade Policy, 2012, p21.

The second axis measures and analyzes how GVC membership affects Malaysia's economic development between 2000 and 2022.

First: An examination of how GVC involvement contributes to Malaysia's economic development between 2000 and 2022

The GDP index, employment rate, and gross domestic product are some of the most significant indicators of economic performance. The growth in the GVC participation rate is directly correlated with the growth in the GDP index because, in the majority of the years during the period, the growth in the GDP index and the growth in the GVC participation rate move in the same direction. This is in line with the economic theory that GVC participation raises GDP. In addition, we can see that the rise in the rate of GVC participation is strongly linked to the rise in the export index in most of the years that were studied (2000–2022). This is in line with the economic theory that suggests that GVC involvement increases exports. Additionally, we observe that the growth in the GVC participation rate is directly correlated with the growth in the employment rate in half of the period. This fits with economic theory, which says that joining GVC can lead to more jobs, but it may also cause income inequality because companies that join offer skilled workers jobs while unskilled workers have to temporarily move to meet the needs of these companies because tasks are being shared across nations, which makes the job market more competitive. There are two ways to participate in GVC, and the participating nation must choose the respective link it will represent in these chains (Ndubuisi, Owusu, 2021, 2890).

The first trend is participation through backward connections, in which a country buys goods or raw materials from its partners in other countries and uses them in its factories that make things to sell abroad.

The second trend is participation via forward connections, wherein the state supplies partners in other nations with inputs (items and raw materials) for their export-oriented manufacturing processes.

We compute the rate of participation in the forward and backward links. of GVC in order to gauge a nation's involvement in GVC. The rate of participation in the forward links of GVC measures the local added value in other nations' exports relative to the nation's total exports, and it can be computed as follows:

Third: The connection between GVC and the participating nations' degree of economic growth

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A structural shift in the economy that moves jobs from low-productivity industries (like traditional agriculture) to higher-productivity ones is what leads to economic growth. But this essential procedure is more complicated than it first seems. "Successful" structural transformation requires not only diversifying operations but also adopting and modifying current technologies, progressing up the technological ladder, and consistently enhancing production structures in significant industrial areas. According to traditional economic theory, industrialization is essential to capacity development because it strengthens the causal chain of events that accelerates economic growth.
There are at least three advantages to GVCs from the standpoint of development. First, because of the connection to GVCs, businesses, particularly those in developing nations, are not required to develop a product's full manufacturing capability. They may instead concentrate on a particular manufacturing process or activity by using their comparative advantage, which allows them to integrate into the global economy faster than was feasible during the industrialization era. Second, new employment may be created as a result of GVC involvement. But according to the World Bank Group, the WTO, and the OECD, "the benefits of GVCs can vary significantly depending on whether a country operates at the top or bottom of the value chain, and the gains from participation in GVCs are not automatic." Due to disparities in comparative advantage, industrialized and developing nations may have significantly different costs and risks while entering GVCs. Research and development, design, and brand creation are examples of advanced, intangible production activities that are often carried out in developed nations before manufacture and after-sales services and marketing during the post-manufacturing phase. Low-tech, low-wage nations may be concerned about the erosion of their economies due to the outsourcing of industrial employment. The "smiley face curve" in GVC shows how much value can be added at each stage of production in different industries. This may be a problem for developing countries, which usually focus on making things that people can touch and see, like cars and furniture. They may also worry that they are receiving the wrong kinds of jobs. We use the smiling face curve (Figure 1-1) to demonstrate the connection between economic progress and GVC involvement. According to the chart, manufacturing and assembly operations get the lowest value-added, while research and development, innovation, branding, and logistical services are at the top, representing the greatest value-added service activities. The nations that engage in assembly and manufacturing operations earn low value-added, while the countries that focus on research and development and activities that use sophisticated technology receive high value-added and are the biggest benefactors of involvement. This explains why nations and businesses relocate their manufacturing and assembly operations to low-wage, labor-intensive nations in order to save expenses and concentrate on higher-value-added activities. By importing medium- and high-technology interjmediate goods, countries engaged in manufacturing and assembly activities gain access to knowledge and technology that boost productivity and make locally produced goods more competitive. This boosts local value-added in exports because of the backward links of participation in GVC. Countries at the bottom of the chain, or the bottom of the smiling face, may improve in GVC and target activities with the greatest value-added by being exposed to new technology. This is accompanied by the idea that as the degree of development increases, the higher the nation moves up the chain, the more developed it is. Since there is a positive correlation between the two, it can be concluded that the greater a nation's added value share, the higher it moves up the chain and the higher its degree of growth and development.

$$\text{GVC f}=\frac{DVX}{GE}*100\%$$

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On the other hand, DVX stands for the domestic value added in exports from foreign nations. The foreign value added in the nation's exports to its total exports is represented by the rate of involvement in backward connections of GVC, which may be computed as follows: GE stands for the nation's total exports.

GVC b=$\frac{FVA}{GE} * 100\%$

Where FVA represents: Foreign value added in a country's exports

GE represents: Total exports of a country

The most effective method for determining a nation's total GVC participation rate is to utilize a metric that concurrently accounts for the nation's involvement in both forward and backward connections. To calculate a nation's GVC participation rate, use the following formula: (Ndubuisi, Owusu, 2021, 2890)

GVC =GVC f +GVC b

GVC =$\frac{DVX+FVA}{GE}$ *100%

Malaysia has a stable participation rate in GVC for the period (2000-2022) with an average participation rate of about 54.79%, and the participation rate in the forward links of GVC ranged between 13.2% and 19.7% during the research period, while the participation rate in the backward links of GVC ranged between 33.9% and 44.2%. Note Table No. (1)

Because the Malaysian economy primarily depends on the manufacturing sector for GVC participation, we can see from Table No. (1) That the rate of participation in the backward links of GVC in Malaysia is more than twice the rate of participation in the forward links of GVC in Malaysia in the majority of the period. Malaysia imports intermediate goods and raw materials from foreign countries, and these materials enter into many local industries and transform them into final products in their exports or re-export them as intermediate goods used in industries of foreign countries and enter into their exports after processing them as a stage of the production of the commodity and obtaining Malaysian added value. Since the index of participation in GVC is the sum of the rate of participation in the forward and backward links of GVC, we note that the rate of participation in GVC is greatly affected by changes in the rate of participation in the backward links, and we note the fluctuation of the rate of participation in GVC during the research period, as the highest rate of participation reached 58.54% in 2022 and the lowest rate of participation reached 50.67% in 2019, as Malaysia recorded positive growth in the GVC participation index in half of the years of the period and negative growth in the other half. We also note that the GVC participation rate is directly related to GDP, as the GVC participation rate and GDP move in one direction in most years of the period, which is consistent with the economic theory that states that participation in GVCs contributes to increasing GDP.

Table (1) Indicators of participation in GVCs in Malaysia for the period 2000-2022 (percentage%)

GDP (million ($US	Participation in (GVC (GVC	Participate in GVC B-Backlinks	Participate in GVC F-Forward Links	Year
93790	57.4	44.2	13.2	2000
92784	54.8	41.2	13.6	2001

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100846	52.5	38.7	13.8	2002
110202	52.7	37.8	14.9	2003
124749	55.3	39.4	15.9	2004
143534	57.8	41.4	16.4	2005
162692	56	37.2	18.8	2006
193550	58.14	40.50	17.64	2007
230812	55.55	37.80	17.75	2008
202257	55.00	37.52	17.48	2009
255018	56.13	38.21	17.91	2010
297952	56.37	37.37	19.00	2011
314443	53.42	35.88	17.55	2012
323276	54.97	35.25	19.73	2013
338066	53.33	35.18	18.15	2014
301355	52.34	34.64	17.70	2015
301256	52.00	34.09	17.91	2016
319109	54.16	35.51	18.65	2017
358789	54.00	35.05	18.95	2018
365178	50.67	33.94	16.73	2019
337456	53.53	35.94	17.59	2020
373832	55.45	38.52	16.94	2021
407027	58.54	39.61	18.93	2022

Source:
1- Data from 2000-2006: OECD, Trade in Value Added, Key Indicators (2023 version), Data | OECD, accessed on 9/1/2024.
2- Data from 2007-2022: Asian Development Bank, Key Indicators Database, Economic Globalization, GVC Database, Key Indicators Database – Asian Development Bank (adb.org), accessed on 9/1/2024.
3- Growth in the Global Value Chain Participation Index: Prepared by the researcher based on the growth equation:
(Y2-Y1)/Y1*100
Second: Assessing how GVC involvement affects Malaysia's economic development from 2000 to 2022.
A: An explanation of the standard model's variables
1. Independent factors The total of the rates of participation in the forward and backward links of GVC is the rate of participation in GVC, represented as (GVC). The domestic value added in exports from other nations is represented by the forward link participation rate, while the foreign value

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added in local exports is represented by the backward link participation rate of GVC.

The rise in the total value of goods and services generated by the economy over a specific time period, often a year, is known as economic growth, and the change in the total value of goods and services produced by the economy over a regular time period, typically a year, is known as the economic growth rate. There is a mutual dependence between these two variables. The symbol for the economic growth rate is "EG."
Considering that the economic growth rate function in the model is
EC= F (GVC) ..... (1)
B: Outlining and evaluating the standard model's findings in Malaysia
1. The unit root test for extended Dickey-Fuller (ADF)
The independent variable's time series (GVC) is not stable at the level with only a categorical trend, with a categorical and general trend, or without a categorical and general trend at a significance level of 1%. However, the dependent variable's time series (EG) is stable at the level with only a categorical trend, with a categorical and general trend, and without a categorical and general trend, as shown in Table 2 of the extended Dickey-Fuller unit root test. When the first differences of the variables' time series were calculated, it was clear that at a significance level of 1%, the dependent variable's (EG) time series is stable at the first difference with only a categorical trend, with a categorical and general trend, and without a categorical and general trend. At a significance level of 1%, the independent variable's (GVC) time series is likewise stable at the first difference with categorical alone, with a categorical and general trend, and without a categorical and general trend. As a result, we reject the null hypothesis H0 and accept the alternative hypothesis H1.

Table (2) Results of the augmented Dickey-Fuller (ADF) unit root test

UNIT ROOT TEST RESULTS TABLE (ADF)			
Null Hypothesis: the variable has a unit root			
At Level			
		EG	GVC
With Constant	t-Statistic	-4.2729	-2.1666
	Prob.	0.0035	0.2231
		***	no
With Constant & Trend	t-Statistic	-4.7676	-1.948
	Prob.	0.0055	0.5945
		***	no
Without Constant & Trend	t-Statistic	-2.8796	0.3251
	Prob.	0.0062	0.77
		***	no
At First Difference			
		d(EG)	d(GVC)
With Constant	t-Statistic	-5.5407	-4.8163
	Prob.	0.0003	0.0012

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		***	***
With Constant & Trend	t-Statistic	-5.3481	-4.7119
	Prob.	0.0021	0.0066
		***	***
Without Constant & Trend	t-Statistic	-5.7111	-4.8792
	Prob.	0	0
		***	***

2. We are applying the Autoregressive Distributed Lag (ARDL) model to estimate the association function between GVC participation and economic growth.
By testing the ARDL model, it is clear that the independent variable (GVC) explains 44.5% of the changes in the dependent variable (EG). The random variable and other variables not included in the model explain the rest. The R2 value is 0.44. Similar to the independent variable (GVC), the dependent variable (EG) has a one-degree (year) time lag, as seen in Table No. (3). Additionally, it is evident that the estimated model is significant at the 5% level, as shown by the computed (F) value of 4.55 and the corrected (R2) value of 0.34.

B: Outlining and evaluating Malaysia's standard model's findings

1. Extended unit root test for Dickey-Fuller (ADF)

The time series of the dependent variable (EG) is stable at the levels of merely categorical, with a categorical and general trend, and without a categorical and general trend, according to the findings of the extended Dickey-Fuller unit root test (Table 2). One percent is chosen as the relevance threshold. In contrast, the independent variable's (GVC) time series is unstable if it is only categorical, if it has both a general and a categorical trend, or if it lacks both. When comparing the first differences of the time series of the variables, it became clear that the dependent variable's (EG) time series is stable at the first difference with only a categorical, with a categorical and general trend, and without a categorical and general trend, at a significance level of 1%. Additionally, whether there is a categorical trend alone, a categorical and general trend, or neither a categorical nor a general trend, the independent variable's (GVC) time series is stable at the first difference. As a result, the alternative hypothesis H1 is accepted and the null hypothesis H0 is rejected.

Table (3) ARDL model test results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
EG (-1)	-0.354792	0.217601	-1.630467	0.1214
GVC	2.074041	0.962614	2.154593	0.0458
GVC (-1)	2.423878	1.243654	1.948997	0.068
C	-235.1109	67.33018	-3.491909	0.0028
R2	0.44547	Mean dependent var		7.742856
Adjusted R2	0.347611	S.D. dependent var		8.87032
S.E. of regression	7.980626	AIC		8.151553
SSRESDUI.	1082.737	SCHW.		8.460511
Log likelihood	-71.19632	H.Q		8.304733
F-statistic	4.552191	DWTEST		1.891552
Prob(F-statistic)	0.016202			

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3. Determining the optimal slowdown period

This test determines the ideal slowing duration by using the Akaike criterion's lowest value. Figure (1) shows that, according to the Akaike criteria, the ideal slowing times are (1.1).

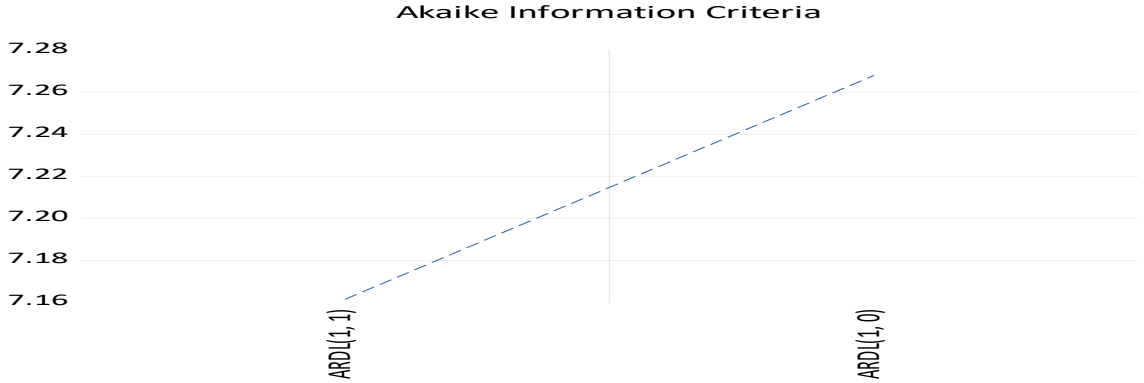

Figure (1) determining the optimal slowdown period

4. Bounds Test (Variables' long-term association) The F-Bounds Test

To determine if there was a joint integration connection between the variables, the limits test was used, as shown in Table (4). Because the computed F value (12.9) was greater than the upper limit I (1) at a significance level of 1%, the findings demonstrated a joint integration (long-term connection) between the variables. Consequently, we accepted the alternative hypothesis, H1, and rejected the null hypothesis, H0.

Table (4) Bounds Test Results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I (0)	I (1)
			Asymptotic: n=1000	
F-statistic	12.94357	10%	4.12	4.34
K	1	5%	4.55	5.23
		2.50%	5.23	5.98
		1%	5.22	6.77
Actual Sample Size	21		Finite Sample: n=35	
		10%	4.233	4.747
		5%	4.945	4.53
		1%	6.731	6.66
			Finite Sample: n=30	
		10%	4.322	4.755
		5%	5.19	5.633
		1%	6.011	7.73

5. Diagnostic tests

A: LM Test for Serial Correlation

The null hypothesis H0 says that there is no serial correlation problem between the residuals. The alternative hypothesis H1 is thrown out after the serial correlation test between the estimated model's residuals showed that the F probability value is (0.39), which is not significant at the 5%

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level, and the Chi-Square probability value is also (0.29), which is also not significant at the 5% level.

Table 5: Findings from the residuals' serial correlation test

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.97669	Prob. F (2,15)	0.4967
Obs*R2	2.419635	Prob. Chi-Square (2)	0.3956

B- Heteroskedasticity Test

Test of Serial Correlation LM

When we do the serial correlation test between the estimated model's residuals, we find that the computed F probability value is (0.39), which is not significant at the 5% level, and the Chi-Square probability value is (0.29), which is likewise not significant at the 5% level. The null hypothesis, H0, which asserts that there is no problem with serial correlation between the residuals, is therefore accepted, while the alternative hypothesis, H1, is rejected.

Table 5: Serial correlation test results between residuals

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	0.868987	Prob. F (3,17)	0.5765
Obs*R2	2.792182	Prob. Chi-Square (3)	0.5258
Scaled explained SS	2.232459	Prob. Chi-Square (3)	0.4256

T- Histogram-Normality Test

We find that the probability value of Jarque-Bera (0.32) is not significant at the 5% level when testing the normal distribution problem for the estimated model. The estimated model follows the normal distribution of random errors, so we reject H1 as an alternative hypothesis and accept H0 as the null hypothesis. This means that the normal distribution of random errors is not bad.

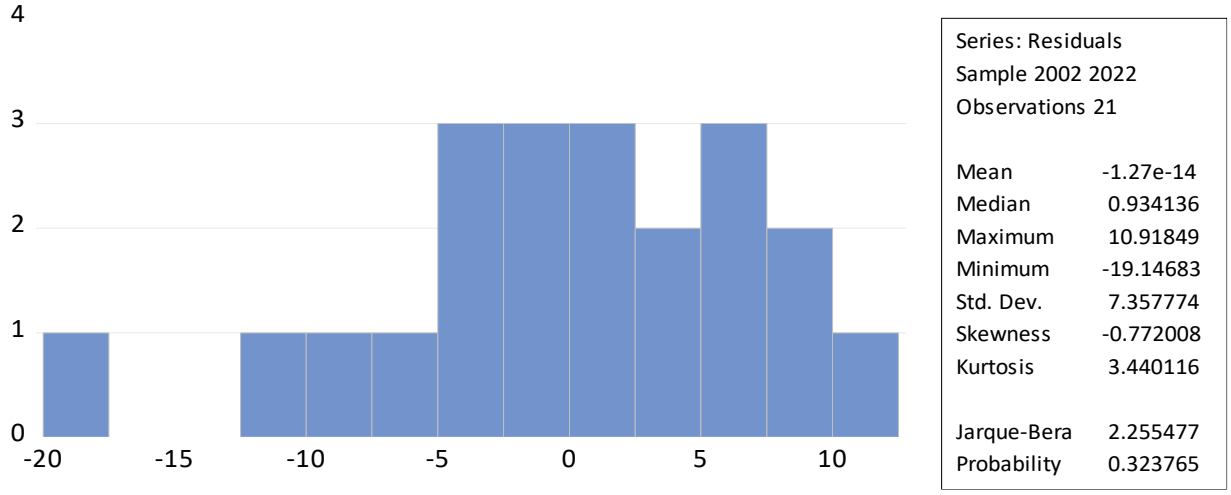

Figure (4)

Results of the Histogram-Normality Test

6. The ARDL model's structural stability test

A. Assessing the calculated parameters' significance (CUSUM)

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Figure (3) demonstrates that, while executing the test of the significance of the estimated parameters (CUSUM), the sum of the accumulation of residuals falls inside the column (limits) of the critical values. The anticipated parameters are consistent and significant at the 5% level. Thus, the alternative is accepted and the null hypothesis is rejected.

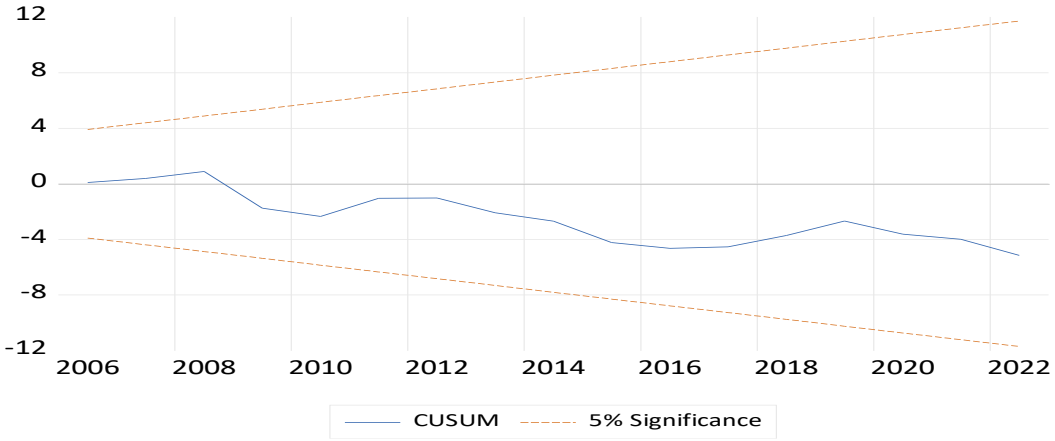

Figure (5) Results of the significance test of the estimated parameters CUSUM

B. Examining the stability of the variables in the CUSUM of Squares model

It can be seen in Figure (4) that when the stability test of the model's variables is done, the sum of the cumulative squares of the residuals falls inside the column of the critical values. This indicates that, at a significance level of 5%, the variables in the model are stable. Therefore, we reject the null hypothesis and accept the alternative.

B. Testing the stability of the variables included in the model CUSUM of Square

When conducting the stability test of the variables included in the model, we notice from Figure (4) that the sum of the cumulative squares of the residuals falls within the column (limitedly) of the critical values. This means that the variables included in the model are stable at a significance level of 5%. Thus, we accept the alternative hypothesis and reject the null hypothesis.

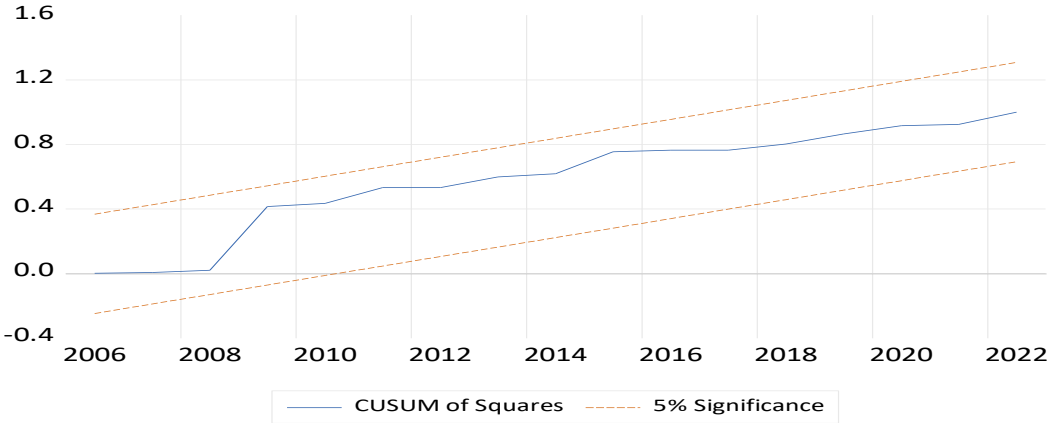

Figure (5) Testing the stability of the variables included in the model CUSUM of Square

7. Testing the predictive performance of the model

When we run the estimated model's predictive performance test, Figure (5) shows that the Theil coefficient equals (0.41), which is near zero. This indicates that future economic forecasting and

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decision-making can be done using the estimated model. Additionally, we see that the covariance ratio is 0.76, which is closer to one; the variance ratio is 0.23, which is also near zero; and the bias ratio is 0.000203, which is extremely near zero.

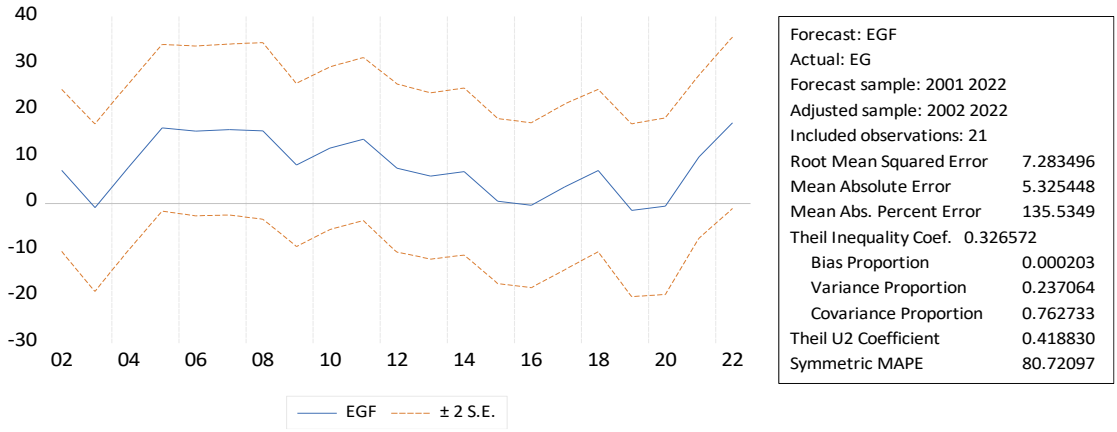

Figure (6) Results of the predictive performance test of the model

8. Estimating short-term parameters and error correction parameter

In order to ascertain the type of relationship between variables and elucidate the impact of the independent variable on the dependent variable, we estimate parameters in the short term. Table No. (7) shows that the GVC parameter (GVC) equals 2.07, which is positive and significant at the 5% level. This indicates that there is a direct correlation between GVC participation and economic growth in Malaysia; that is, if the GVC participation rate is increased by one unit in the short term, the economic growth rate will increase by 2.07. This can be explained economically because the Malaysian economy is heavily dependent on the industrial sector and international trade, which enables it to react to changes in GVC more quickly, which is directly reflected in short-term economic growth., according to economic theory, leads to positive effects on economic growth, as participation in GVC contributes to increasing exports and the volume of economic exchange between countries participating in GVC, and also leads to increasing the volume of local and foreign investment and knowledge transfer Participation in GVC provides mechanisms for rapid learning, innovation, industrial modernization, and better access to information for participating companies.

As we can see from Table (7), the error correction parameter (CointEq) is equal to (-1.35), which is negative and significant at the 1% level, and is greater than one in absolute value, indicating that the speed of adaptation and correction of imbalances in the short term in order to reach equilibrium in the long term is less than one year.

Table (7) Results of estimating short-term parameters and error correction parameter

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GVC)	2.074041	0.813045	2.550956	0.0207
CointEq (-1) *	-1.354792	0.205652	-6.587795	0
R2	0.716787	Mean dependent var		0.47381

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Adjusted R2	0.701881	S.D. dependent var	13.82579
S.E. of regression	7.548916	AIC	6.971078
SSRESDUI.	1082.737	SCHW.	7.070556
Log likelihood	-71.19632	H.Q	6.992667
DWTEST	1.791552		

9. Testing the estimated parameters in the long run

When estimating the parameters in the long run, it is important to determine the type of relationship between the variables and clarify the effect of the independent variable.

Variable on the dependent variable, we note from Table No. (8) that the parameter of GVC (GVC) is equal to (3.32) and is significant at the 1% level, which means that participation in GVC is directly related to economic growth in the long run in Malaysia, and that increasing the rate of participation in GVC by one unit leads to an increase in the economic growth rate by (3.32) in the long run, and we note that the effect in the long run is greater and more evident compared to the short run due to the fact that Malaysia relies heavily on the industrial and manufacturing sector, which is closely linked to international trade, and that increasing participation in GVC leads to improving competitiveness, enhancing innovation, and increasing productivity, which leads to enhancing the impact of participation in GVC on economic growth in the long run.

Table No. (8) Results of Estimating Long-Term Parameters

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
GVC	3.320007	0.773758	4.290758	0.0005
C	-173.5402	42.23253	-4.10916	0.0007
EC = EG - (3.3200*GVC - 173.5402)				

Conclusions:

1. Malaysia has a stable participation rate in GVC for the period (2000-2022), with an average participation rate of about 54.79%.
2. The participation rate in backward links of GVC in Malaysia is more than double the participation rate in forward links of GVC in Malaysia in most years of the period, Malaysia relies on backward links to obtain intermediate goods and raw materials and use them in industry.
3. The Malaysian economy relies heavily on the manufacturing sector in participating in GVC.
4. The research found that GVC involvement positively impacts both short- and long-term economic development in Malaysia. The industrial sector—particularly the manufacturing sector—contributes significantly to the GDP's added value and exports, which makes the Malaysian economy more sensitive to short-term fluctuations in GVC. Increased GVC involvement boosts productivity, innovation, and competitiveness, all of which increase the long-term effects of participation.

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5. The industrial sector makes a substantial contribution to the added value of both domestic and international exports, and the short-term consequences of GVC involvement are felt in the industrial sector.
6. Participation in GVC and the industrial sector has a reciprocal effect; through forward and backward links, the industrial sector helps to increase the rate of GVC participation, while GVC participation helps to develop the industrial sector, improve competitiveness, enhance innovation, and increase productivity.

Recommendations:

1. Focus on developing other economic sectors in addition to the industrial sector by providing tax facilities, supporting modern technologies, and enhancing innovation in all sectors.
2. Strengthening trade links between the local market and global markets to facilitate companies' access to advanced intermediate inputs and modern technology, which enhances their productivity and competitiveness.

1. 3 Strengthening forward and backward links between local and global sectors, allowing companies to specialize in certain stages of production and participate in GVC.

3. Encouraging innovation and technological development by establishing partnerships between the public and private sectors to support research and development, especially in the areas of design, marketing and services, and supporting emerging companies in this field to increase their contribution to local added value due to the importance of the added value achieved by these services that are closely linked to trade and GVC.
4. Preparing specialized training programs that focus on the skills required in the industrial, services and logistics sectors, which contributes to enabling workers to keep pace with global developments and increase readiness to participate in GVC.
5. Focusing on achieving a stable political and economic environment, as it is one of the essential factors for attracting foreign and local investments and enhancing participation in GVC.

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